8336242

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

January 17, 2023

THIS IS TO CERTIFY THAT ANNEXED IS A TRUE COPY FROM THE RECORDS OF THIS OFFICE OF THE FILE WRAPPER AND CONTENTS OF:

APPLICATION NUMBER: ***15/958,339***
FILING DATE: ***April 20, 2018***
PATENT NUMBER: ***10561884***
ISSUE DATE: ***February 18, 2020***

Certified by

Performing the Functions and Duties of the
Under Secretary of Commerce
for Intellectual Property
and Director of the United States
Patent and Trademark Office

PTO/AIA/424 (04-14)

CERTIFICATION AND REQUEST FOR PRIORITIZED EXAMINATION UNDER 37 CFR 1.102(e) (Page 1 of 1)

First Named Inventor:	Douglas G. Bayerlein	Nonprovisional Application Number (if known):	Not yet assigned
Title of Invention:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME		

APPLICANT HEREBY CERTIFIES THE FOLLOWING AND REQUESTS PRIORITIZED EXAMINATION FOR THE ABOVE-IDENTIFIED APPLICATION.

1. The processing fee set forth in 37 CFR 1.17(i)(1) and the prioritized examination fee set forth in 37 CFR 1.17(c) have been filed with the request. The publication fee requirement is met because that fee, set forth in 37 CFR 1.18(d), is currently $0. The basic filing fee, search fee, and examination fee are filed with the request or have been already been paid. I understand that any required excess claims fees or application size fee must be paid for the application.

2. I understand that the application may not contain, or be amended to contain, more than four independent claims, more than thirty total claims, or any multiple dependent claims, and that any request for an extension of time will cause an outstanding Track I request to be dismissed.

3. The applicable box is checked below:

I. ☑ **Original Application (Track One) - Prioritized Examination under § 1.102(e)(1)**

i. (a) The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a). This certification and request is being filed with the utility application via EFS-Web.

---OR---

(b) The application is an original nonprovisional plant application filed under 35 U.S.C. 111(a). This certification and request is being filed with the plant application in paper.

ii. An executed inventor's oath or declaration under 37 CFR 1.63 or 37 CFR 1.64 for each inventor, **or** the application data sheet meeting the conditions specified in 37 CFR 1.53(f)(3)(i) is filed with the application.

II. ☐ **Request for Continued Examination - Prioritized Examination under § 1.102(e)(2)**

i. A request for continued examination has been filed with, or prior to, this form.
ii. If the application is a utility application, this certification and request is being filed via EFS-Web.
iii. The application is an original nonprovisional utility application filed under 35 U.S.C. 111(a), or is a national stage entry under 35 U.S.C. 371.
iv. This certification and request is being filed prior to the mailing of a first Office action responsive to the request for continued examination.
v. No prior request for continued examination has been granted prioritized examination status under 37 CFR 1.102(e)(2).

Signature /R.J. McKenna/	Date 04-20-2018
Name (Print/Typed) Richard J. McKenna	Practitioner Registration Number 35,610

Note: *This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4(d) for signature requirements and certifications. Submit multiple forms if more than one signature is required.**

☑ *Total of 1 forms are submitted.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Douglas	G.	Bayerlein	

Residence Information (Select One) ● US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Oconomowoc	WI	US

Mailing Address of Inventor:

Address 1	34675 Bartlett Road
Address 2	
City	Oconomowoc
State/Province	WI
Postal Code	53066
Country	US

Inventor 2 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Vance	E.	Emons	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

City	State/Province	Country of Residence
Hartland	WI	US

Mailing Address of Inventor:

Address 1	N79 W28251 Tourmaline Court
Address 2	
City	Hartland
State/Province	WI
Postal Code	53029
Country	US

Inventor 3 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Nicholas	A.	Oblamski	

Residence Information (Select One) ◉ US Residency Non US Residency Active US Military Service

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

City	Waukesha	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

Address 1	W271N525 Jills Dr.		
Address 2			
City	Waukesha	State/Province	WI
Postal Code	53188	Country	US

Inventor 4 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Scott	D.	Hoerig	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Brookfield	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

Address 1	15755 Sky Cliff Drive		
Address 2			
City	Brookfield	State/Province	WI
Postal Code	53005	Country	US

Inventor 5 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Matthew	J.	Zank	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Milwaukee	State/Province	WI	Country of Residence	US

Mailing Address of Inventor:

Address 1	4677 N. 41st Street		
Address 2			
City	Milwaukee	State/Province	WI
Postal Code	53209	Country	US

Inventor 6 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Robert	L.	Zimpel	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Menomonee Falls	State/Province	WI	Country of Residence	US

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

Mailing Address of Inventor:

Address 1	N55 W21289 Logan Dr.		
Address 2			
City	Menomonee Falls	**State/Province**	WI
Postal Code	53051	**Country**	US

Inventor 7 — Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Joel	W.	Richards	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Wauwatosa	**State/Province**	WI	**Country of Residence**	US

Mailing Address of Inventor:

Address 1	2145 N. 65th St.		
Address 2			
City	Wauwatosa	**State/Province**	WI
Postal Code	53213	**Country**	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. — Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	26371		
Email Address	IPDocketing@foley.com	Add Email	Remove Email

Application Information:

Title of the Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME		
Attorney Docket Number	097208-0226	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	20	**Suggested Figure for Publication (if any)**	1

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	● Customer Number	US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	26371		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	14/832708	2015-08-21

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

Prior Application Status	Patented	Remove

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
14/832708	Continuation of	14/076912	2013-11-11	9114276	2015-08-25

Prior Application Status	Abandoned	Remove

Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
14/076912	Continuation of	13/235065	2011-09-16

Prior Application Status	Expired	Remove

Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
13/235065	Continuation in part of	PCT/US10/27543	2010-03-16

Prior Application Status	Expired	Remove

Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
PCT/US10/27543	Claims benefit of provisional	61/161027	2009-03-17

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)[i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove

Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[j] (if applicable)

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

☐ A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

☐ B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 — Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

● Assignee	Legal Representative under 35 U.S.C. 117	Joint Inventor
Person to whom the inventor is obligated to assign.	Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here. ☒

Organization Name	Woodway USA, Inc.		
Mailing Address Information For Applicant:			
Address 1	W229 N591 Foster Court		
Address 2			
City	Waukesha	**State/Province**	WI
Country	US	Postal Code	53186
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☒

Organization Name	Woodway USA, Inc.

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1	W229 N591 Foster Court		
Address 2			
City	Waukesha	**State/Province**	WI
Country i	US	Postal Code	53186
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). **However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).**

This Application Data Sheet **must** be signed by a patent practitioner if one or more of the applicants is a **juristic entity** (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, **all** joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of **all** joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/R.J. McKenna/			Date (YYYY-MM-DD)	2018-04-20
First Name	Richard J.	Last Name	McKenna	Registration Number	35610

Additional Signature may be generated within this form by selecting the Add button. Add

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	097208-0226
	Application Number	
Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1 The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3 A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent CooperationTreaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

MANUAL TREADMILL AND METHODS OF OPERATING THE SAME

CROSS-REFERENCE TO RELATED PATENT APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application No. 14/832,708, filed August 21, 2015, which is a continuation of U.S. Patent Applicant No. 14/076,912 now U.S. Pat. No. 9,114,276, filed November 11, 2013, which is a continuation of U.S. Patent Application No. 13/235,065, filed September 16, 2011, which is a continuation-in-part of prior international Application No. PCT/US10/27543, filed March 16, 2010, which claims priority to U.S. Provisional Application Serial No. 61/161,027, filed March 17, 2009, all of which are incorporated herein by reference in their entireties.

BACKGROUND

[0002] The present invention relates generally to the field of treadmills. More specifically, the present invention relates to manual treadmills. Treadmills enable a person to walk, jog, or run for a relatively long distance in a limited space. It should be noted that throughout this document, the term "run" and variations thereof (e.g., running, etc.) in any context is intended to include all substantially linear locomotion by a person. Examples of this linear locomotion include, but are not limited to, jogging, walking, skipping, scampering, sprinting, dashing, hopping, galloping, etc.

[0003] A person running generates force to propel themselves in a desired direction. To simplify this discussion, the desired direction will be designated as the forward direction. As the person's feet contact the ground (or other surface), their muscles contract and extend to apply a force to the ground that is directed generally rearward (i.e., has a vector direction substantially opposite the direction they desire to move). Keeping with Newton's third law of motion, the ground resists this rearwardly directed force from the person, resulting in the person moving forward relative to the ground at a speed related to the force they are creating.

[0004] To counteract the force created by the treadmill user so that the user stays in a relatively static fore and aft position on the treadmill, most treadmills utilize a belt that is

driven by a motor. The motor operatively applies a rotational force to the belt, causing that portion of the belt on which the user is standing to move generally rearward. This force must be sufficient to overcome all sources of friction, such as the friction between the belt and other treadmill components in contact therewith and kinetic friction, to ultimately rotate the belt at a desired speed. The desired net effect is that, when the user is positioned on a running surface of the belt, the forwardly directed velocity achieved by the user is substantially negated or balanced by the rearwardly directed velocity of the belt. Stated differently, the belt moves at substantially the same speed as the user, but in the opposite direction. In this way, the user remains at substantially the same relative position along the treadmill while running. It should be noted that the belts of conventional, motor-driven treadmills must overcome multiple, significant sources of friction because of the presence of the motor and configurations of the treadmills themselves.

[0005] Similar to a treadmill powered by a motor, a manual treadmill must also incorporate some system or means to absorb or counteract the forward velocity generated by a user so that the user may generally maintain a substantially static position on the running surface of the treadmill. The counteracting force driving the belt of a manual treadmill is desirably sufficient to move the belt at substantially the same speed as the user so that the user stays in roughly the same static position on the running surface. Unlike motor-driven treadmills, however, this force is not generated by a motor.

SUMMARY

[0006] One embodiment of the disclosure relates to a manually operated treadmill comprising a treadmill frame having a front end and a rear end opposite the front end, a front shaft rotatably coupled to the treadmill frame at the front end, a rear shaft rotatably coupled to the treadmill frame at the rear end, and a running belt including a curved running surface upon which a user of the treadmill may run. The running belt is disposed about the front and rear shafts such that force generated by the user causes rotation of the front shaft and the rear shaft and also causes the running surface of the running belt to move from the front shaft toward the rear shaft. The treadmill is configured to control the speed of the running belt to facilitate the maintenance of the contour of the curved running surface.

[0007] Another embodiment of the disclosure relates to a manually operated treadmill comprising a treadmill frame, a front support member rotatably coupled to the treadmill frame, a rear support member rotatably coupled to the treadmill frame, a running belt including a curved running surface upon which a user of the treadmill may run, wherein the running belt is supported by the front support member and the rear support member, and a synchronizing system configured to cause the front support member and the rear support member to rotate at substantially the same speeds. The force generated by the user causes rotation of the front support member and the rear support member and also causes the running belt to rotate relative to the treadmill frame.

[0008] Another embodiment of the disclosure relates to a manually operated treadmill comprising a treadmill frame, a front shaft rotatably coupled to the treadmill frame, a rear shaft rotatably coupled to the treadmill frame, a running belt including a contoured running surface upon which a user of the treadmill may run, wherein the running belt is disposed about the front and rear shafts such that force generated by the user causes rotation of the front shaft and the rear shaft and also causes the running belt to rotate about the front shaft and the rear shaft without the rotation of the running belt being generated by a motor, and a one-way bearing assembly configured to prevent rotation of the running surface of the running belt in one direction.

[0009] Another embodiment of the disclosure relates to manually operated treadmill comprising a treadmill frame, a running belt including a running surface upon which a user of the treadmill may run, a front support member rotatably coupled to the treadmill frame, the front support member comprising the forwardmost support for the running belt, a rear support member rotatably coupled to the treadmill frame, the rear support member comprising the rearwardmost support for the running belt. The running surface comprises at least in part a complex curve located intermediate the front support member and the rear support member and incorporating a minimum of two geometric configurations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a perspective view of an exemplary embodiment of a manual treadmill having a non-planar running surface.

[0011] FIG. 2 is a left-hand partially exploded perspective view of a portion of the manual treadmill according to the exemplary embodiment shown in FIG. 1.

[0012] FIG. 3 is a right-hand partially exploded perspective view of a portion of the manual treadmill according to the exemplary embodiment shown in FIG. 1.

[0013] FIG. 4 is a perspective view of the right-hand side of the manual treadmill of FIG. 1 with a portion of the rear of the treadmill cut-away to show a portion of the arrangement of elements.

[0014] FIG. 5 is a cross-sectional view of a portion of the manual treadmill taken along line 5-5 of FIG. 1.

[0015] FIG. 6 is an exploded view of a portion of the manual treadmill of FIG. 1 having the side panels and handrail removed.

[0016] FIG. 7a is a side schematic view of the profile of the running surface of the manual treadmill according to an exemplary embodiment.

[0017] FIGS. 7b-7j are sides schematic views of alternative profiles of the running surfaces of manual treadmills according to alternative exemplary embodiments.

[0018] FIG. 8 is a partially exploded, perspective view of a bearing rail for the manual treadmill according to the exemplary embodiment shown in FIG. 1.

[0019] FIG. 9 is a side elevation view of the bearing rail of FIG. 6.

[0020] FIG. 10 is a top elevation view of a front shaft assembly for the manual treadmill according to the exemplary embodiment shown in FIG. 1.

[0021] FIG. 11 is a top elevation view of a rear shaft assembly for the manual treadmill according to the exemplary embodiment shown in FIG. 1.

[0022] FIG. 12 is a partial, cross-sectional view of the manual treadmill taken along line 12-12 of FIG. 1.

[0023] FIG. 13 is an alternative exemplary embodiment of the partial, cross-sectional view of the manual treadmill similar to FIG. 12.

[0024] FIG. 14 is a perspective view of an alternative embodiment of a synchronizing system integrated into a manual treadmill.

[0025] FIG. 15 is a partial, cross-sectional view of a manual treadmill including an exemplary embodiment of a braking system taken along line 15-15 of FIG. 4.

[0026] FIG. 16 is a partial, cross-sectional view of a manual treadmill including another exemplary embodiment of a braking system taken along line 16-16 of FIG. 4.

[0027] FIG. 17 is a perspective side view of a portion of the manual treadmill according to the exemplary embodiment shown in FIG. 1 including a plurality of rollers used in place of bearing rails.

[0028] FIG. 18 is a side perspective view of a track system for use with the exemplary embodiment of a manual treadmill shown in FIG. 1 and configured to help induce and maintain a running belt in a desired non-planar shape to define a running surface.

[0029] FIG. 19 is a detail view of the track system of FIG. 18 taken along line 19-19.

[0030] FIG. 20 is a partial cross-sectional view of the track system of FIG. 18 taken along line 20-20.

[0031] FIG. 21 is a detail view of the track system of FIG. 20 taken along line 21-21.

[0032] FIG. 22 is a side perspective view of another exemplary embodiment of a track system for use with the exemplary embodiment of a manual treadmill shown in FIG. 1 and configured

to help induce and maintain a running belt in a desired non-planar shape to define a running surface.

[0033] FIG. 23 is a detail view of the track system of FIG. 22 taken along line 23-23.

[0034] FIG. 24 is a partial cross-sectional view of the track system of FIG. 18 taken along line 24-24.

[0035] FIG. 25 is a side perspective view of another exemplary embodiment of a track system for use with the exemplary embodiment of a manual treadmill shown in FIG. 1 and configured to help induce and maintain a running belt in a desired non-planar shape to define a running surface.

[0036] FIG. 26 is a detail view of the track system of FIG. 25 taken along a line 26-26.

[0037] FIG. 27 is a partial cross-sectional view of the track system of FIG. 25 taken along line 27-27.

[0038] FIG. 28 is a detail view of the track system of FIG. 27 taken along line 28-28.

[0039] FIG. 29 is a partially exploded, right-hand perspective view of a track system for use with the exemplary embodiment of a manual treadmill shown in FIG. 1 and configured to help induce and maintain a running belt in a desired non-planar shape to define a running surface.

[0040] FIG. 30 is a detail view of the track system of FIG. 29 taken along line 30-30.

[0041] FIG. 31 is a side perspective view of another exemplary embodiment of a track system for use with the exemplary embodiment of a manual treadmill shown in FIG. 1 and configured to help induce and maintain a running belt in a desired non-planar shape to define a running surface.

[0042] FIG. 32 is a detail view of the track system of FIG. 31 taken along a line 32-32.

[0043] FIG. 33 is a partial cross-sectional view of the track system of FIG. 31 taken along a line 33-33.

[0044] FIG. 34 is a detail view of the track system of FIG. 32 taken along a line 34-34.

[0045] FIG. 35 is a perspective view of an exemplary embodiment of a manual treadmill according to another embodiment having a substantially planar running surface.

[0046] FIG. 36 is a perspective view of a one-way bearing for the manual treadmill according to the exemplary embodiment shown in FIG. 1.

[0047] FIG. 37 is a left-hand partially exploded perspective view of a portion of the manual treadmill according to the exemplary embodiment shown in FIG. 1 including an incline adjustment system.

[0048] FIG. 38 is a perspective view of a one-way bearing for the manual treadmill shown in FIG. 1, according to another embodiment.

DETAILED DESCRIPTION

[0049] Referring to FIG. 1, a manual treadmill 10 generally comprises a base 12 and a handrail 14 mounted to the base 12 as shown according to an exemplary embodiment. The base 12 includes a running belt 16 that extends substantially longitudinally along a longitudinal axis 18. The longitudinal axis 18 extends generally between a front end 20 and a rear end 22 of the treadmill 10; more specifically, the longitudinal axis 18 extends generally between the centerlines of a front shaft and a rear shaft, which will be discussed in more detail below.

[0050] A pair of side panels 24 and 26 (e.g., covers, shrouds, etc.) are preferably provided on the right and left sides of the base 12 to effectively shield the user from the components or moving parts of the treadmill 10. The base 12 is supported by multiple support feet 28, which will be described in greater detail below. A rearwardly extending handle 30 is provided on the rear end of the base 12 and a pair of wheels 32 are provided at the front of the base 12, however, the wheels 32 are mounted so that they are generally not in contact with the ground when the treadmill is in an operating position. The user can easily move and relocate the treadmill 10 by lifting the rear of the treadmill base 12 a sufficient amount so that the multiple support feet 28 are no longer in contact with the ground, instead the wheels 32 contact the

ground, thereby permitting the user to easily roll the entire treadmill 10. It should be noted that the left and right-hand sides of the treadmill and various components thereof are defined from the perspective of a forward-facing user standing on the running surface of the treadmill 10.

[0051] Referring to FIGS. 2–6, the base 12 is shown further including a frame 40, a front shaft assembly 44 positioned near a front end 48 of the frame 40, and a rear shaft assembly 46 positioned near the rear end 50 of frame 40, generally opposite the front end 48. Specifically, the front shaft assembly 44 is coupled to the frame 40 at the front end 48, and the rear shaft assembly 46 is coupled to the frame 40 at the rear end 50 so that the frame supports these two shaft assemblies.

[0052] The frame 40 comprises longitudinally-extending, opposing side members, shown as a left-hand side member 52 and a right-hand side member 54, and one or more lateral or cross-members 56 extending between and structurally connecting the side members 52 and 54 according to an exemplary embodiment. Each side member 52, 54 includes an inner surface 58 and an outer surface 60. The inner surface 58 of the left-hand side member 52 is opposite to and faces the inner surface 58 of the right-hand side member 54. According to other exemplary embodiments, the frame may have substantially any configuration suitable for providing structure and support for the manual treadmill.

[0053] Similar to most motor-driven treadmills, the front shaft assembly 44 includes a pair of front running belt pulleys 62 interconnected with, and preferably directly mounted to, a shaft 64, and the rear shaft assembly 46 includes a pair of rear running belt pulleys 66 interconnected with, and preferably directly mounted to, a shaft 68. The front and rear running belt pulleys 62, 66 are configured to facilitate movement of the running belt 16. The running belt 16 is disposed about the front and rear running belt pulleys 62, 66, which will be discussed in more detail below. As the front and rear running belt pulleys 62, 66 are preferably fixed relative to shafts 64 and 68, respectively, rotation of the front and rear running belt pulleys 62, 66 causes the shafts 64, 68 to rotate in the same direction. The front and rear running belt pulleys 62, 66 are formed of a material sufficiently rigid and durable to maintain shape under load. Preferably, the material is of a relatively light weight so as to reduce the inertia of the pulleys 62, 66. The pulleys 62, 66 may be formed of any material having one or more of these

characteristics (e.g., metal, ceramic, composite, plastic, etc.). According to the exemplary embodiment shown, the front and rear running belt pulleys 62, 66 are formed of cast aluminum. According to another embodiment, the front and rear running belt pulleys 62, 66 are formed of a glass-filled nylon, for example, Grivory® GV-5H Black 9915 Nylon Copolymer available from EMS-GRIVORY of Sumter, SC 29151, which may save cost and reduce the weight of the pulleys 62, 66 relative to metal pulleys. To prevent a static charge due to operation of the treadmill 10 from building on a pulley 62, 66 formed of electrically insulative materials (e.g., plastic, composite, etc.), an antistatic additive, for example Antistat 10124 from Nexus Resin Group of Mystic, CT 06355, maybe may be blended with the GV-5H material.

[0054] As noted above, the manual treadmill disclosed herein includes a force translation system that incorporates a variety of innovations to translate the forward force created by the user into rotation of the running belt and permit the user to maintain a substantially static fore and aft position on the running belt while running. One of the ways to translate this force is to configure the running belt 16 to be more responsive to the force generated by the user. For example, by minimizing the friction between the running belt 16 and the other relevant components of the treadmill 10, more of the force the user applies to the running belt 16 to propel themselves forward can be utilized to rotate the running belt 16.

[0055] Another way to counteract the user-generated force and convert or translate it into rotational motion of the running belt 16 is to integrate a non-planar running surface, such as non-planar running surface 70. Depending on the configuration, non-planar running surfaces can provide a number of advantages. First, the shape of the non-planar running surface may be such that, when a user is on the running surface, the force of gravity acting upon the weight of the user's body helps rotate the running belt. Second, the shapes may be such that it creates a physical barrier to restrict or prevent the user from propelling themselves off the front end 20 of the treadmill 10 (e.g., acting essentially as a stop when the user positions their foot thereagainst, etc.). Third, the shapes of some of the non-planar running surfaces can be such that it facilitates the movement of the running belt 16 there along (e.g., because of the curvature, etc). Accordingly, the force the user applies to the running belt is more readily able to be translated into rotation of the running belt 16.

[0056] As seen in FIGS 1 and 4-5, the running surface 70 is generally non-planar and shown shaped as a substantially complex curve according to an exemplary embodiment. The running surface can be generally divided up into three general regions each having a particular geometric configuration, the front portion 72, which is adjacent to the front shaft assembly 44, the rear portion 74, which is adjacent to the rear shaft assembly 46, and the central portion 76, which is intermediate the front portion 72 and the rear portion 74. In the exemplary embodiment seen in FIGS 1 and 4, the running surface 70 includes a substantially concave curve 80 and a substantially convex curve 82. At the front portion 72 of the running surface 70, the relative height or distance of the running surface 70 relative to the ground is generally increasing moving forward along the longitudinal axis 18 from the central portion 76 toward the front shaft assembly 44. This increasing height configuration provides one structure to translate the forward running force generated by the user into rotation of the running belt 16. To initiate the rotation of the running belt 16, the user places her first foot at some point along the upwardly-inclined front portion 72 of the running surface 70. As the weight of the user is transferred to this first foot, gravity exerts a downward force on the user's foot and causes the running belt 16 to move (e.g., rotate, revolve, advance, etc.) in a generally clockwise direction as seen in FIGS 1 (or counterclockwise as seen in FIG. 4). As the running belt 16 rotates, the user's first foot will eventually reach the lowest point in the non-planar running surface 70 found in the central portion 76, and, at that point, gravity is substantially no longer available as a counteracting source to the user's forward running force. Assuming a typical gait, at this point the user will place her second foot at some point along the upwardly-inclined front portion 72 of the running belt 16 and begin to transfer weight to this foot. Once again, as weight shifts to this second foot, gravity acts on the user's foot to continue the rotation of the running belt 16 in the clockwise direction as seen in FIG. 1. This process merely repeats itself each and every time the user places her weight-bearing foot on the running belt 16 at any position vertically above the lowest point of central portion 76 of the running surface 70 of the of the running belt 16. The upwardly-inclined front portion 72 of the running belt 16 also acts substantially as a physical stop, reducing the chance the user can inadvertently step off the front end 20 of the treadmill 10.

[0057] A user can generally utilize the force translation system of the treadmill 10 to control the speed of the treadmill 10 by the relative placement of her weight-bearing foot along the

running belt 16 of the base 12. Generally, the rotational speed of the running belt 16 increases as greater force is applied thereto in the rearward direction. The generally upward-inclined shape of the front portion 72 thus provides an opportunity to increase the force applied to the running belt 16, and, consequently, to increase the speed of the running belt 16. For example, by increasing her stride and/or positioning her weight-bearing foot vertically higher on the front portion 72 relative to the lowest portion of the running belt 16, gravity will exert a greater and greater amount of force on the running belt 16 to drive it rearwardly. In the configuration of the running belt 16 seen in FIG 1, this corresponds to the user positioning her foot closer to the front end 20 of the treadmill 10 along the longitudinal axis 18. This results in the user applying more force to the running belt 16 because gravity is pulling her mass downward along a greater distance when her feet are in contact with the front portion 72 of the running surface 70. As a result, the relative rotational speed of the running belt 16 and the relative running speed the user experiences is increased. Accordingly, the force translation system is adapted to convert a variable level of force generated by the user into a variable speed of rotation of the belt.

[0058] FIG. 5 illustrates a number of possible locations where a user may position her feet. A-C indicate locations along the front portion 72 of the running surface 70 where a user may place their weight bearing foot. When the user positions her weight bearing foot at location A, she will be running with greater speed than if her weight bearing foot was positioned at locations B or C based upon the fact that the force of gravity is able to have a greater effect as the user's weight bearing foot moves from location A towards the rear of the non-planar running surface 70 as the running belt 16 rotates. At location A, gravity is able to have the greatest impact on the user so that the greatest amount of force is translated into rotation of the running belt 16. A user can decrease her relative running speed by positioning her weight bearing foot at locations B or C. As location B is relatively higher along the front portion 72 than C, gravity is able to exert a greater force on the user and the running belt 16 than if the user's weight bearing foot was positioned at location C.

[0059] Another factor which will increase the speed the user experiences on the treadmill 10 is the relative cadence the user assumes. As the user increases her cadence and places her weight-bearing foot more frequently on the upwardly extending front portion 72, more gravitational force is available to counteract the user-generated force, which translates into

greater running speed for the user on the running belt 16. It is important to note that speed changes in this embodiment are substantially fluid, substantially instantaneous, and do not require a user to operate electromechanical speed controls. The speed controls in this embodiment are generally the user's cadence and relative position of her weight-bearing foot on the running surface. In addition, the user's speed is not limited by speed settings as with a driven treadmill.

[0060] In the embodiment shown in FIGS. 1-6, gravity is also utilized as a means for slowing the rotational speed of the running belt. At a rear portion 74 of the running surface 70, the distance of the running surface 70 relative to the ground generally increases moving rearward along the longitudinal axis 18 from the lowest point in the non-planar running surface 70. As each of the user's feet move rearward during her stride, the rear portion 74 acts substantially as a physical stop to discourage the user from moving too close to the rear end of the running surface. To this point, the user's foot has been gathering rearward momentum while moving from the front portion 72, into the central portion 76, and toward the rear portion 74 of the running surface 70. Accordingly, the user's foot is exerting a significant rearwardly-directed force on the running belt 16. Under Newton's first law of motion, the user's foot would like to continue in the generally rearward direction. The upwardly-inclined rear portion 74, interferes with this momentum and provides a force to counter the rearwardly-directed force of the user's foot by providing a physical barrier. As the user's non-leading foot moves up the incline (see position D in FIG. 5), the running surface 70 provides a force that counters the force of the user's foot, absorbing some of the rearwardly-directed force from the user and preventing it from being translated into increasing speed of the running belt 16. Also, gravity acts on the user's weight bearing foot as it moves upward, exerting a downwardly-directed force on the user's foot that the user must counter to lift their foot and bring it forward to continue running. In addition to acting as a stop, the rear portion 74 provides a convenient surface for the user to push off of when propelling themselves forward, the force applied by the user to the rear portion 74 being countered by the force the rear portion 74 applies to the user's foot.

[0061] One benefit of the manual treadmill according to the innovations described herein is positive environmental impact. A manual treadmill such as that disclosed herein does not utilize electrical power to operate the treadmill or generate the rotational force on the running

belt. Therefore, such a treadmill can be utilized in areas distant from an electrical power source, conserve electrical power for other uses or applications, or otherwise reduce the "carbon footprint" associated with the operation of the treadmill 10.

[0062] A manual treadmill according to the innovations disclosed herein can incorporate one of a variety of shapes and complex contours in order to translate the user's forward force into rotation of the running belt or to provide some other beneficial feature or element. FIG. 7a generally depicts the curve defined by the running surface 70 of the exemplary embodiment shown in FIG 1, specifically, substantially a portion of a curve defined by a third-order polynomial. The front portion 72 and the central portion 76 define a concave curve and the rear portion 74 of the running surface 70 defines a convex curve. As the central portion 76 of the running surface 70 transitions to the rear portion 74, the concave curve transitions to the convex curve. In the embodiment shown, the curvature of the front portion 72 and the central portion 76 is substantially the same; however, according to other exemplary embodiments, the curvature of the front portion 72 and the central portion 76 may differ. Please note, the description of the running surfaces as concave and convex provided herein is related to the relative curve which the user's foot would experience on the running surface 70.

[0063] FIGS. 7b-7h illustrate the side profiles of some exemplary non-planar, contoured running surfaces according to the innovations disclosed herein, each including a front portion, a central portion, and a rear portion. Each portion has a particular geometric configuration that is concave, convex, or linear; collectively, the portions define the non-planar running surface. For example, FIG. 7b shows an exemplary embodiment of the profile of a non-planar surface including a concave front portion 100, a concave central portion 102, and a concave rear portion 104 according to an exemplary embodiment. In this embodiment, the front portion 100, central portion 102, and rear portion 104 each have different curvatures. According to other exemplary embodiments, one or more of the front, central, and rear portions may have the same curvature.

[0064] FIG. 7c shows an exemplary embodiment of the profile of a non-planar surface including a convex front portion 110, a concave central portion 112, and a concave rear portion

114 according to an exemplary embodiment. Once again, this embodiment incorporates a smooth transition between the different curvatures of the front, central, and rear portions.

[0065] FIG. 7d shows an exemplary embodiment of the profile of a non-planar surface including a convex front portion 120, a concave central portion 122, and a convex rear portion 124 according to an exemplary embodiment. In this embodiment, the front portion 120 and the rear portion 122 have different curvatures, but these curvatures may be the same according to other exemplary embodiments.

[0066] FIG. 7e shows an exemplary embodiment of the profile of a non-planar surface including a convex front portion 130, a convex central portion 132, and a convex rear portion 134 according to an exemplary embodiment. In this embodiment, the front portion 130, the central portion 132, and the rear portion 134 each have the same convex curvature, but the curvature of one of more of the front portion 130, the central portion 132, and the rear portion 134 may differ according to other exemplary embodiments.

[0067] FIG. 7f shows an exemplary embodiment of the profile of a non-planar surface including a concave front portion 140, a convex central portion 142, and a convex rear portion 144 according to an exemplary embodiment. In this embodiment, the central portion 142 and the rear portion 144 having the same curvatures, but these curvatures may differ from each other according to other exemplary embodiments.

[0068] FIG. 7g shows an exemplary embodiment of the profile of a non-planar surface including a convex front portion 150, a convex central portion 152, and a concave rear portion 154 according to an exemplary embodiment. In this embodiment, the front portion 150 and the central portion 152 having the same curvatures, but these curvatures may differ from each other according to other exemplary embodiments.

[0069] FIG. 7h shows an exemplary embodiment of the profile of a non-planar surface including a concave front portion 160, a convex central portion 162, and a concave rear portion 164 according to an exemplary embodiment. In this embodiment, the front portion 160 and the rear portion 164 have different curvatures, but these curvatures may be the same according to other exemplary embodiments.

[0070] According to one exemplary embodiment, the non-planar running surface of the manual treadmill 10 is substantially curved, but that curve integrates one or more linear portions (e.g., that replace a "curved portion" or the curve or that are added/inserted into the curve). The linear portions may be substantially parallel to the longitudinal axis 18 or disposed at an angle relative thereto. FIG. 7i illustrates the profile of a non-planar surface wherein a substantially linear portion 170 has been integrated with a concave curve having a first concave portion 174 to one side of the linear portion 170 and a second concave portion 176 to the opposite side of the linear portion 170 according to an exemplary embodiment. In addition to the linear portion 170, the first concave portion 174 and the second concave portion 176, the profile further includes a fourth portion shown as a convex portion 178. According to an another exemplary embodiment, a linear portion may replace all or a portion of the curve. Alternatively, multiple linear portions may be included in a profile of a non-planar surface.

[0071] FIG. 7j illustrates a linear portion 180 provided at the front of the running surface which transitions into a concave curve 182 which then transitions into a convex curve 184.

[0072] According to an exemplary embodiment, the non-planar running surface of the manual treadmill 10 may include (or be so defined as to include) more or less than three portions. For example, FIG. 7g could be interpreted as defined two portions, the first portion including the front portion and the central portion, which comprise a convex curve having the same curvature throughout the front portion 150 and the central portion 152, and the second portion including the rear portion 154 which generally comprises a concave curve. According to some exemplary embodiments, some non-planar running surfaces include at least three or more portions.

[0073] According to an exemplary embodiment, the profile defined by the non-planar running surface is substantially a portion of a curve defined by any suitable second-order polynomial, but, as clearly demonstrated in FIGS. 7a-j, the profile defined by the non-planar running surface can be a portion of a curve that is a third-order polynomial or a fourth-order polynomial. According to yet another exemplary embodiment, the running surface profile can be substantially defined by a first-order polynomial, in other words, the running surface is

substantially planar. An exemplary embodiment of a manual treadmill including a planar running surface will be discussed in more detail below (see e.g., FIG. 35).

[0074] According to an exemplary embodiment, the relative length of each portion of the running surface may vary. In the exemplary embodiment shown, the central portion is the longest. In other exemplary embodiments, the rear portion may be the longest, the front portion may be shorter than the intermediate portion, or the front portion may be longer than the rear portion, etc. It should be noted that the relative length may be evaluated based on the distance the portion extends along the longitudinal axis or as measured along the surface of the running belt itself. One of the benefits of integrating one or more of the various curves or contours into the running surface is that the contour of the running surface can be used to enhance or encourage a particular running style. For example, a curve integrated into the front portion of the running surface can encourage the runner to run on the balls of her feet rather than a having the heel strike the running belt 16 first. Similarly, the contour of the running surface can be configured to improve a user's running biomechanics and to address common running induced injuries (e.g., plantar fasciitis, shin splints, knee pain, etc.). For example, integrating a curved contour on the front portion of the running surface can help to stretch the tendons and ligaments of the foot and avoid the onset of plantar fasciitis.

[0075] One of the difficulties associated with using a running surface that has a non-planar shape is inducing the running belt 16 to assume the non-planar shape and then maintaining the running belt 16 in that non-planar shape when the treadmill is being operated. In addition to discussing this difficultly in more detail below, a number of running belt retention systems providing ways to induce and maintain a belt in a desired non-planar shape to define the running surface are discussed below. Generally, these running belt retention systems are adapted to control the relative contour of the running belt so that the running belt substantially follows the contour of the running surface

[0076] One embodiment of a running belt retention system used to induce the running belt 16 to take-on the non-planar shape and then maintaining that shape, as shown in FIG. 5, is discussed in reference to FIGS. 5-6 and 8–11 in which base 12 is shown further including a pair of opposed bearing rails 200 to support the running belt 16 along with a front synchronizing

belt pulley 202, a rear synchronizing belt pulley 204, and a synchronizing belt 206 all of which are interconnected to the running belt 16. The front rear synchronizing belt pulleys 202, 204 may be formed of the same or different materials as the front and rear running belt pulleys 62, 66.

[0077] Referring to FIGS. 6 and 8-9, in particular, the bearing rails 200 are shown including a plurality of bearings 208 and an upper or top profile 210, shown shaped as a complex curve, according to an exemplary embodiment. The bearing rails 200 shown are supported by and preferably mounted to the frame 40 substantially between the front shaft assembly 44 and the rear shaft assembly 46, the support members or elements about which the running belt 16 is disposed. One bearing rail 200 is coupled to one or more of the cross-members 56 proximate to the inner surface 58 of the left-hand side member 52 and the other bearing rail 200 is coupled to one of more of the cross-members 56 proximate to the inner surface 58 of the right-hand side member 54 thereby fixing the position of the bearing rails 200 relative to the frame 40.

[0078] The bearing rails 200 are preferably configured to facilitate movement of the running belt 16. In the exemplary embodiment seen in FIGS. 8–9, the running belt 16 moves substantially along the top profile 210 of the bearing rails 200. The running belt 16 contacts and is supported in part by the bearings 208 of the bearing rails and bearing 208 are configured to rotate, thereby decreasing the friction experienced by the running belt 16 as the belt moves along the top profile 210. The bearing rails 200 are configured to help achieve the desired shape of the running surface. The shape of the top profile 210 of the bearing rails 200 at least partially corresponds to the desired shape for the running surface 70. The at least somewhat flexible running belt 16 substantially assumes the shape of top profile 210 of the bearing rails 200 by being maintained substantially thereagainst, as will be discussed in more detail later. Accordingly, the running surface 70 has a shape that substantially corresponds to the shape of the top profile 210 of the bearing rails 200. It should be noted that the front and/or rear running belt pulleys may also help define a portion of the shape of the running surface. Also, other suitable shape-providing components may be used in combination with the bearing rails.

[0079] FIG. 9 provides a side view of one of the bearing rails 200 to more clearly show the top profile 210 according to an exemplary embodiment. Similar to the running surface 70,

discussed above, the top profile 210 of the bearing rails 200 can be generally divided up into three general regions, the front portion 212 which is adjacent to the front shaft assembly 44 (see e.g., FIG. 5), the rear portion 214 which is adjacent to the rear shaft assembly 46 (see e.g., FIG. 5), and the central portion 216, intermediate the front portion 212 and the rear portions 214. The central portion 216 is shown as a concave curve 218 that has a radius of curvature R1. The front portion 212 is further shown as a continuation of the concave curve 218 of the central portion 216, and, thus, also has a radius of curvature of R1. The rear portion 214 is shown as a convex curve 220 that has a radius of curvature R2. The front portion 212 is shown disposed substantially tangential to the central portion 216, providing a smooth transition therebetween, and helping provide a smooth shape for the running surface 70. The shape of the rear portion 214 also helps provide a smooth transition for the running belt 16 from the bearing rails 200 onto the rear running belt pulleys 66, which helps ensure as much contact as possible between the running belt 16 and the rear running belt pulleys 66. As the shape of the running surface substantially corresponds to the shape of top profile the bearing rails, the shape of the top profile of the bearing rails can necessarily be any of the shapes and/or have any of the variations (e.g., in length of portions, etc.) discussed above in FIGS. 7a through 7j with reference to possible shapes of the running surface.

[0080] According to an exemplary embodiment, each portion of the top profile is disposed substantially tangential to the portions adjacent thereto. According to other exemplary embodiments, less than all of the adjacent portions are disposed substantially tangential to the portions adjacent thereto, meaning the profile does not have an entirely smooth contour.

[0081] According to an exemplary embodiment shown in FIG. 9, R1 is approximately 7.26 feet. However, it is understood that a radius anywhere from 5 feet to 100-plus feet can be used. The size of the radius which can be used is typically a function of the length of the treadmill which can be accommodated. The range of possible radiuses for a convex bearing rail depends on the shaft-to-shaft distance of the treadmill (see e.g., measurement "x" in FIG. 5, discussed in more detail below). Assuming that the radius of curvature of the curve is R_C, the radius of the front running belt pulley is R_f, and the radius of the rear running belt pulley is R_r, the range of possible radiuses is approximately: $\infty > R_C > (x - R_f - R_r)/2$. For most commercial-available treadmills, x is approximately between 14 inches and 10 feet but the treadmill can certainly be

as great as 25 feet in length. According to the exemplary embodiment shown in FIG. 5, x is approximately 57.8 inches in length. According to another exemplary embodiment, x is approximately 77.2 inches in length, with a radius R1 of approximately 8.67 feet, wherein the greater length x and radius R1 may facilitate use of the treadmill 10 by users with a longer running gait. The limiting factors in the length are the available space to accommodate the treadmill and the relative cost of constructing such a large treadmill.

[0082] When the treadmill 10 is being operated, the running belt 16 is driven rearwardly and the goal is to ensure that the running belt 16 follows the profile defined by a portion of the circumference of the front running pulleys 62, the contoured profile defined by the bearings 208 supported on the bearing rails 200 and finally by a portion of the circumference of the rear running belt pulleys 66. The particular contour which the running belt 16 assumes on the bottom of the base 12 between the rear running belt pulleys 66 and front running belt pulleys 62 is not terribly critical provided that the running belt continues to move with minimal friction and is not subject to excessive wear or obstruction.

[0083] Following the shape of the bearing rails 200 is not the natural tendency of the running belt for the particular contour seen in FIG. 5. Rather, without more, the running belt 16 tends to be pulled upward, away from the curved bearing rails and across the central portion 76 of the treadmill 10. Under the force of gravity, the weight of the running belt 16 coupled with the relative spacing between the front and rear running belt pulleys 62 and 66, respectively, would likely result in the top surface of the running belt 16 assuming a position of the shortest distance between the two pulleys, namely, a substantially straight line between the two pulleys with any excess length of the running belt 16 collecting on the bottom of the treadmill and hanging below the front and rear running belt pulleys 62 and 66, respectively. Therefore, a system of some sort needs to be integrated into a non-planar running surface treadmill to ensure that the running belt 16 follows the desired contour over the running surface.

[0084] Further referring to FIGS. 5–6 and 8–11, one way to ensure that the running belt 16 follows the contour of the bearing rails 200 and the front and rear running belt pulleys 62, 66 is to utilize the weight of the running belt 16 itself in addition to adjusting the relative size of the

front and rear running belt pulleys 62, 66; and/or providing a synchronizing system 222 according to an exemplary embodiment.

[0085] As discussed above, the running belt 16 is disposed about the front and rear running belt pulleys 62, 66 which in turn are disposed about front and rear shafts 64, 68, respectively. Measured along the longitudinal axis 18 between the centerlines of the front and rear shafts 64, 68, the front and rear shafts 64, 68 are spaced a distance x from each other, as shown in FIG. 5. Accordingly, when positioning the running belt 16 about the front and rear running belt pulleys 62, 66, the length of the running belt 16 provided therebetween must be at least x (e.g., the straight-line distance therebetween). It follows that, when the profile of the running surface 70 is non-planar, the length of the running belt provided between the front and rear shafts 64, 68 will be greater than x.

[0086] In the exemplary embodiment shown in FIG. 5, when positioning the running belt 16 about the front and rear running belt pulleys 62, 66, a length of the running belt 16 sufficient to permit the running belt 16 to correspond to (e.g., follow, be positioned against or above, etc.) the desired contours of the bearing rails 200 and the front and rear running belt pulleys 62, 66 is generally disposed between the front and rear shafts 64, 68. At each location between the front and rear shafts 64, 68, the force of gravity pulls downward on the running belt 16. Generally, this force will help pull the running belt 16 downward and against the desired components of base 12. However, gravity can also cause slippage (e.g., over the front running belt pulley 62, over the rear running belt pulley 66, down along curves of the bearing rail 200, etc.) in an amount that is undesirable and the magnitude of these slippage-problems tends to increase when the treadmill 10 is being operated. Accordingly, the solution typically relies on more than the weight of the running belt alone.

[0087] Further referring to FIGS. 5–6 and 8–11, the preferred embodiment of the running belt 16 is shown including two reinforcing belts shown as endless belts 226 and a plurality of slats 228 according to an exemplary embodiment. The endless belts 226 are configured to provide support for the running belt 16 in order to support the weight of a user. The endless belts 226 are shown disposed on opposite sides of the running belt 16, generally interior to the outer, lateral edge of the slats 228. The endless belts 226 are themselves reinforced, and thus help

stabilize the sides of the running belt and help prevent stretching of the running belt 16. For example, the endless belts may be reinforced with metal wiring, which is surrounded by a molded plastic coating. According to some exemplary embodiments, more or less than two endless belts may be used. According to other exemplary embodiments, other suitable support elements may be used to provide support for the running belt. Further details regarding the structure of the running belt and endless belt structure are seen in US Pat. No. 5,470,293, titled "Toothed-Belt, V-Belt, and Pulley Assembly, for Treadmills," which is incorporated by reference herein.

[0088] The endless belts 226 are further configured to interact with the front running belt pulleys 62 and the rear running belt pulleys 66. The location of each endless belt 226 laterally, along the width of the running belt 16, substantially corresponds to the location of a longitudinally aligned front running belt pulley 62 and rear running belt pulley 66. Each endless belt 226 includes a first or inner portion 230 and a second or outer portion 232 at an interior surface 236 according to an exemplary embodiment. The inner portion 230 is in contact with an exterior surface 234 of the corresponding running belt pulleys 62, 66. According to some exemplary embodiments, the outer portion 232 is also in contact with the exterior surface 234 of the corresponding running belt pulleys 62, 66.

[0089] FIG. 12 illustrates a running belt and running belt pulley combination wherein the exterior surfaces 234 of the front running belt pulleys 62 are substantially smooth and are in contact with the interior surface 236 of the endless belts 226, which is also substantially smooth according to an exemplary embodiment. The outer portion 232 is shown substantially not in contact with the exterior surfaces 234 of the front running belt pulleys 62. The outer portion 232 is further shown including a plurality of teeth 238 (e.g., being toothed); however, according to other exemplary embodiments, the outer portion may be smooth or have any suitable texture and/or configuration. In this embodiment, both of the running belt pulleys come in contact with the inner, substantially smooth portion of the endless belts, and a toothed portion of the endless belts is disposed to the outside of the running belt pulleys on both sides.

[0090] FIG. 13 illustrates an alternative running belt and running belt pulley combination according to an exemplary embodiment. In this exemplary embodiment, the front running belt

pulleys 62' include a first or inner portion 230' and a second or outer portion 232'. The inner portion 230' of the front running belt pulleys 62' is substantially smooth, while the outer portion 232' includes a plurality of teeth, to correspond to the inner and outer portions 230', 232', of the endless belts 226', respectively. In this embodiment, both of the running belt pulleys include an inner, smooth portion and an outer, toothed portion. These portions correspond to an inner, smooth portion of the endless belt and an outer, toothed portion of the endless belt. This endless belt/front running belt pulley configuration is discussed in more detail in U.S. Patent No. 5,470,293, titled "Toothed-Belt, V-Belt, and Pulley Assembly, for Treadmills," which is herein incorporated by reference in its entirety.

[0091] According to still another an exemplary embodiment, a combination of the endless belt/front running belt pulley configurations shown in FIGS. 12 and 13 is used. In this exemplary embodiment, the smooth belt and pulley configuration shown in FIG. 12 is used for the front running belt pulleys and the combination of smooth and toothed belt and pulley configuration shown in FIG. 13 is used for the rear running belt pulleys. In another exemplary embodiment, the configuration shown in FIG. 13 is used for the front running belt pulleys and the configuration shown in FIG. 12 is used for the rear running belt pulleys.

[0092] The slats 228 of the running belt 16 are configured to help support a user of the treadmill 10. The slats 228 may be made of substantially any suitably sturdy material (e.g., wood, plastic, metal, etc.) and extend generally laterally between the endless belts 226. Each slat 228 is coupled at its ends 252, 254 to the second portions 232 of the endless belts 226 using fasteners. According to other exemplary embodiments, the slats may be otherwise coupled to the endless belts (e.g., adhered, welded, etc.) in the manner disclosed in US Pat. No. 5,470,293, titled "Toothed-Belt, V-Belt, and Pulley Assembly, for Treadmills," which is incorporated herein by reference. Each slat is shown to include a portion 229 (e.g., stem, web, etc.) extending inwardly from an interior surface 256 of the slat 228.

[0093] According to an exemplary embodiment, the running belt may be substantially any suitable, continuous loop element, including, but not limited to, a continuous urethane (e.g., polyurethane) loop, a continuous loop made of plastics other than polyurethane, a plastic belt reinforced with reinforcing elements (e.g., metal wire, a relatively harder plastic, wood, etc.), a

continuous foam loop, a loop formed by a plurality of interconnected members (e.g., metallic members, wooden members, etc.) in a manner to provide at least some flexibility, etc.

[0094] Referring to FIGS. 6, 10 and 11, another aspect of the solution to ensuring the running belt 16 follows the desired contour involves the utilizing front running belt pulleys 62 that are slightly larger than the rear running belt pulleys 66. That is, the radius of the front running belt pulleys, R_f, is greater than the radius of the rear running belt pulleys, R_r. Assuming the front running belt pulleys 62 are rotating with the same rotational velocity (e.g., angular speed) as the rear running belt pulleys 66, the tangential velocity of the front running belt pulleys 62 is slightly greater than the tangential velocity of the rear running belt pulleys 66. Thus, as the running belt 16 is driven, the portion of the running belt 16 disposed proximate the front end 20 of the treadmill 10 will be moved over the front running belt pulleys 62 and rearward with slightly greater speed than the rear running belt pulleys 66 move the portion of the running belt 16 proximate thereto. Thus, the front running belt pulleys 62 essentially "push" the running belt 16 rearward, creating a slight amount of excess running belt 16 in the area between the front running belt pulleys 62 and the rear running belt pulleys 66, which helps to counter the force of gravity which would attempt to gather any excess length of running belt 16 on the bottom of the treadmill 10 thereby causing the top surface of the running belt 16 to assume a position of the shortest distance between the two pulleys, namely, a substantially straight line between the two pulleys. Obviously the system cannot tolerate too much excess length of running belt feeding off the front running belt pulley 62 so periodically, a portion of this excess running belt 16 will slip over the rear running belt pulley 66. By specifically balancing the excess running belt 16 coming off the front running belt pulley 62 against the slippage allowed on the rear running belt pulley 66, the running belt 16 will follow the desired concave, convex or linear (or combinations thereof) contours of the running surface.

[0095] If the difference between the radius of the front running belt pulleys 62 and the radius of the rear running belt pulleys 66 is too large, the running belt 16 will begin to bunch up atop the base 12 as too much excess is generated. Accordingly, there is a practical limit of differences between the radius of each of the front running belt pulleys 62 and the radius of each of the rear running belt pulleys 66. Generally, this range may be dependent on the length of the running surface, as measured along the running belt, and/or the shape of the running

surface. According to an exemplary embodiment, the size difference between the radii of the front and rear running belt pulleys, $R_f - R_r$, is within the range of approximately $0 < R_f - R_r, < 0.100$ inches. Preferably, the size difference between the radii of the front and rear running belt pulleys, $R_f - R_r$, is within the range of approximately $0.005 < R_f - R_r, < 0.035$ inches. In one embodiment, the radius of the front running belt pulleys is approximately 7.00" +/- 0.010" and the radius of the rear running belt pulleys is approximately 6.985" +/- 0.010. According to another exemplary embodiment, instead of using front and rear running belt pulleys having a radial size difference, the synchronizing belt pulleys may have a radial size difference. Similar to the differently sized front and rear running belt pulleys, the differently sized front and rear synchronizing pulleys would be used to essentially "push" the running belt rearward, creating a slight amount of excess running belt 16 in the area between the front running belt pulleys and the rear running belt pulleys.

[0096] Another means for ensuring that the running belt 16 follows the desired complex curve is to match the rotational velocity of the front running belt pulleys 62 to that of the rear running belt pulleys 66 utilizing a synchronizing system 222. Further referring to FIGS. 5-6 and 8-11, the synchronizing system 222 is shown generally to comprise the front synchronizing belt pulley 202, the rear synchronizing belt pulley 204, and the synchronizing belt 206 according to an exemplary embodiment.

[0097] The front synchronizing belt pulley 202 is rotatably mounted relative to the front shaft 64, similar to the front running belt pulleys 62. Preferably, the front synchronizing belt pulley 202 is securely mounted directly to the front shaft 64. Similarly, the rear synchronizing belt pulley 204 is fixed relative to the rear shaft 68 and preferably securely mounted to the rear shaft 68. Accordingly, the front synchronizing belt pulley 202 will move with substantially the same rotational speed as the front running belt pulleys 62, and the rear synchronizing belt pulley 204 will move with the same rotational speed as the rear running belt pulleys 66. When the front shaft assembly 44 and the rear shaft assembly 46 are coupled to the frame 40, the front and rear synchronizing belt pulleys 202, 204 are shown disposed exterior to the outer surface 60 of the left-hand side member 52. According to another exemplary embodiment, the front and rear synchronizing belt pulleys may be placed exterior to the outer surface of the right-hand side member of the frame. According to other exemplary embodiments, the synchronizing system

may be disposed substantially between the left-hand side member and the right-hand side member of the frame.

[0098] The synchronizing belt 206 is configured to provide a force that helps ensure that the front and rear shafts 64, 68 are rotating (e.g., moving, spinning, etc.) at the same rotational velocity. The synchronizing belt 206 is shown as an endless belt that is adapted to be supported in tension about the front synchronizing belt pulley 202 and the rear synchronizing belt pulley 204, as shown in FIGS. 4–5. As the running belt pulleys 62, 66 and the synchronizing belt pulleys 202, 204 are both substantially fixed relative to the front shaft 64 and the rear shaft 68, the rotation of the front shaft 64 and the rear shaft 68 causes the front synchronizing belt pulley 202 and the rear synchronizing belt pulley 204 to similarly rotate. In response to the motion of the front synchronizing belt pulley 202 and the rear synchronizing belt pulley 204, the synchronizing belt 206, which connects the front shaft assembly 44 and the rear shaft assembly 46, similarly rotates. Because of the tension in the synchronizing belt 206 and the fact that the synchronizing belt pulleys 202, 204 are the same size, the synchronizing belt 206 provides a counter force in response to any deviation in rotational velocity between the front shaft assembly 44 and the rear shaft assembly 46. For example, if the rear shaft assembly 46 was induced to start moving with greater rotational velocity than the front shaft assembly 44, the tension in the upper portion of the synchronizing belt (i.e., that portion of the synchronizing belt that extends generally between the tops of the synchronizing pulleys) would resist any differential rotation between the front and rear synchronizing belt pulleys 202, 204. Continuing with the example, any discrepancy between the rotational velocity of the front and rear shafts 64, 68 is similarly resisted by the engagement of the synchronizing belt 206. Thus, by constraining the relative motion of the front shaft assembly 44 and the rear shaft assembly 46, the synchronizing system 222 keeps their rotational velocity in sync, substantially preventing the front and rear running belt pulleys 62, 66 from becoming unsynchronized and moving at different rotational velocities.

[0099] So, in practice, the running belt 16 is initially installed on the front and rear running belt pulleys 62, 66 and the running belt 16 is manually positioned in the desired position so that a sufficient length of the running belt 16 is positioned along the top of the treadmill and the running belt 16 assumes the desired contour. While the running belt 16 is maintained in this

position, the synchronizing belt 206 is mounted to the synchronizing belt pulleys 202, 204 and once the synchronizing belt 206 is installed, it effectively resists differential rotation of the running belt pulleys 62, 66 which could result in loss of the desired contour of the running belt 16.

[0100] It should be noted that the tension in the synchronizing belt 206 also helps maintain the position of the synchronizing belt 206 relative to the synchronizing belt pulleys 202, 204. The tension helps enhance friction between an interior surface 244 of the synchronizing belt 206 and exterior surfaces 246 of the synchronizing belt pulleys 202, 204, making it less likely that the synchronizing belt 206 will slip relative to the synchronizing belt pulleys 202, 204.

[0101] One or more tensioning assemblies 248 may be provided to adjust the tension in the synchronizing belt 206 (see e.g., FIGS. 3 and 6 illustrating tensioning assemblies 248). Tensioning assemblies 248 are configured to move portions of the synchronizing belt 206 relative to one another, stretching the synchronizing belt 206 and maintaining this stretch so that the synchronizing belt 206 can provide the necessary resistance to differential rotation of the front and rear running belt pulleys 62, 66. Alternatively, the tensioning assemblies 248 can be adjusted to release some of the tension in the synchronizing belt 206. Releasing some of the tension may be desirable if the synchronizing belt 206 is too tight, causing excess friction between the synchronizing belt 206 that makes it too difficult to rotate the front and rear shaft assemblies 44, 46 (e.g., greater than desired by the user, too great to function, etc.). The tensioning assemblies 248 are also used when the synchronizing belt 206 is being installed and removed. According to another exemplary embodiment, a single tensioning assembly is used in conjunction with one or more stationary idlers. According to still another exemplary embodiments, any devices or elements suitable for maintaining and/or adjusting the tension in the synchronizing belt may be used.

[0102] Referring to FIG. 14, a synchronizing system 300 is shown according to another exemplary embodiment. The synchronizing system 300 would typically be used in lieu of the previously described synchronizing system 222. In this next exemplary embodiment, the synchronizing system 300 is shown comprising a synchronizing shaft 302 mechanically connected at a first end 304 to a front gear 306 and at a second end 308 to a rear gear 310. The

front gear 306 is interconnected with, and preferably directly mounted and fixed relative to, the front shaft 64, and the rear gear 310 is interconnected with, and preferably directly mounted and fixed relative to, the rear shaft 68. Accordingly, the front gear 306 will move with substantially the same rotational speed as the front running belt pulleys 62, and the rear gear 310 will move with the same rotational speed as the rear running belt pulleys 66. When the front shaft assembly 44 and the rear shaft assembly 46 are coupled to the frame 40, the front and rear gears 306, 310 are shown disposed exterior to the outer surface 60 of the right-hand side member 54. According to another exemplary embodiment, the front and rear gears 306, 310 may be placed exterior to the outer surface of the left-hand side member of the frame. According to other exemplary embodiments, the synchronizing system may be disposed substantially between the left-hand side member and the right-hand side member of the frame.

[0103] The synchronizing shaft 302 is configured to provide a force that helps ensure that the front and rear shafts 64, 68 are rotating (e.g., moving, spinning, etc.) at the same rotational velocity. The synchronizing shaft 302 is shown as an elongated, substantially cylindrical member that extends generally between the front shaft 64 and the rear shaft 68. A first threaded portion 312 including a plurality of threads 314 is shown located at the first end 304 of the synchronizing shaft 302 and is configured to mesh with a plurality of teeth 316 of the front gear 306 that is fixed relative to the front shaft 64. A second threaded portion 318 including a plurality of threads 320 is shown located at the second end 308 of the synchronizing shaft 302 and is configured to mesh with a plurality of teeth 322 of the rear gear 310 that is fixed relative to the rear shaft 68.

[0104] The synchronizing shaft 302 rotates in response to the motion of the front gear 306 and the rear gear 310. When the front shaft 64 and the rear shaft 68 rotate in response to the user driving the running belt 16, the front gear 306 and the rear gear 310, which are fixed relative to the front shaft 64 and the rear shaft 68, respectively, similarly rotate. The front gear 306 meshes with and imparts rotational motion to the first threaded portion 312, and, thereby, imparts rotational motion to the synchronizing shaft 302. The rear gear 310 meshes with and imparts rotational motion to the second threaded portion 318, and, thereby, imparts rotational motion to the synchronizing shaft 302.

[0105] Because the synchronizing shaft 302 is rigid and the front and rear gears 306, 310 are the same size, the synchronizing shaft 302 provides a counter force in response to any deviation in rotational velocity between the front shaft assembly 44 and the rear shaft assembly 46. For example, if the rear shaft assembly 46 was induced to start moving with greater rotational velocity than the front shaft assembly 44, the rear gear 310 would be prevented from moving with greater rotational velocity than the front gear 306 because of the synchronizing shaft 302. The second threaded portion 318 is meshed with the rear gear 310. The second threaded portion 318 is fixed relative to the first threaded portion 312. The first threaded portion 312 is meshed with the front gear 306, which is moving with less rotational velocity than the rear gear 310. The front gear 306, being fixed relative to the front shaft assembly 44 which is also traveling at the same rotational velocity, seeks to continue at this rotational velocity. Thus, the force transmitted to the front gear 306 from the rear gear 310 by the synchronizing shaft 302 is met with a counter force. Specifically, the teeth 322 of the front gear 306 counter the force applied thereto by the threads 314 of the first threaded portion 312 at the first end 304. This counter force substantially prevents the rotational velocity of the synchronizing shaft 302, which includes the second threaded portion 318, from increasing. Stated otherwise, the force applied is sufficient to prevent the second end 308 of the synchronizing shaft 302 from rotationally advancing ahead of the first end 304. As the second threaded portion 318 is prevented from experiencing an increase in rotational velocity, the second threaded portion 318 provides a counter force to the rear gear 310. Specifically, the threads 320 of the second threaded portion 318 counter the force applied thereto by the teeth 322 of the rear gear 310. Thus, the synchronizing shaft 302 constrains the relative motion of the front gear 306 and rear gear 310, and, thereby constrains the relative motion of the front shaft assembly 44 and the rear shaft assembly 46.

[0106] Another embodiment of a running belt retention system used to induce and maintain the running belt in a desired non-planar shape to define the running surface is seen in FIG. 15, specifically a braking system 400 configured to help induce and maintain the running belt in a desired non-planar shape to define the running surface is shown according to an exemplary embodiment. Please note, the section lines 15-15 shown in FIG. 4 do not necessarily suggest that the braking system 400 seen in FIG. 15 is integrated into the manual treadmill depicted in FIG. 4, rather, the section line 15-15 is included in FIG. 4 to show one potential location for the

integration of a braking system into a manual treadmill according to the various innovations disclosed herein. The braking system 400 is shown in cooperation with the rear shaft assembly 402 and the synchronizing system 222. The rear shaft assembly 402 differs from the above-discussed rear shaft assembly 46 in that the rear shaft assembly 402 includes a pair of rear running belt pulleys 404 that are substantially the same size as the front running belt pulleys (not shown).

[0107] The braking system 400 has substantially the same effect as the differently sized front and rear running belt pulleys discussed above. That is, the braking system 400 causes a slight amount of excess running belt 16 in the area between the front running belt pulleys and the rear running belt pulleys. More specifically, the braking system 400 causes the rotational velocity of the rear shaft assembly 402 to be slightly lower than the rotational velocity of the front shaft assembly by applying a frictional force to the rear synchronizing belt pulley 204. Thus, the braking system 400 acts on the synchronizing system 222 to force (e.g., urge, push, move, etc.) the rear shaft assembly 402 out of synch with the front shaft assembly.

[0108] The braking system 400 includes a generally elongated member 406 in cooperation with the synchronizing system 222. The elongated member 406 is coupled to the rear shaft assembly 402 by a bracket 408 having a first side 410 spaced a distance apart from an outer surface 250 of the rear synchronizing belt pulley 204. The elongated member 406 is disposed through an aperture 412 of the bracket 408 and includes a first end 414 disposed to the inside of the first side 410 and a second end 416 disposed to the outside of the first side 410. The first end 414 includes a surface 418 configured to contact the outer surface 250 of the rear synchronizing belt pulley 204. The second end 416 includes a knob 420 configured to be gripped by a person (e.g., a user, a trainer, etc.) and to have a rotational force imparted thereto. An exterior surface of the elongated member 406 is at least partially threaded to correspond to threading at an interior surface defining the aperture 412. Rotating the knob 420, and, thereby, the elongated member 406, in one direction, causes the surface 418 to be advanced toward the outer surface 250 of the rear synchronizing belt pulley 204, and rotating the knob 420 in the opposite direction causes the surface 418 to retreat or be moved away from the outer surface 250 of the rear synchronizing belt pulley 204.

[0109] During operation of the treadmill, the surface 418 of the elongated member 406 is substantially in contact with the outer surface 250 of the rear synchronizing belt pulley 204, creating friction therebetween. As the rear synchronizing belt pulley 204 of the synchronizing system 222 is fixed relative to the rear shaft assembly 402, some of the force directed to the rear shaft assembly 402 to impart rotation thereto must be used to overcome the frictional force between the surface 418 of the elongated member 406 and the outer surface of the rear synchronizing belt pulley 204. As the force needed to overcome the frictional force between the surface 418 of the elongated member 406 and the outer surface 250 of the rear synchronizing belt pulley 204 is no longer being directed into rotation of the rear shaft assembly 402, the rotational velocity of the rear shaft assembly 402 is less than the rotational velocity of the front shaft assembly. Thus, the front running belt pulleys of the front shaft assembly will "push" the running belt rearward, creating a slight amount of excess running belt 16 in the area between the front running belt pulleys and the rear running belt pulleys. This excess length of running belt 16 helps to counter the force of gravity, discussed in more detail above. It should be noted that, because the friction between the surface 418 of the elongated member 406 and the outer surface 250 of the rear synchronizing belt pulley 204 is substantially constant during operation, the rotational velocity will be substantially maintained at the lower rotational velocity.

[0110] The length of excess running belt "pushed" rearward by the front running belt pulleys can be varied by adjusting the position of the surface 418 relative to the outer surface 250 of the rear synchronizing belt pulley 204. If one moves the surface 418 laterally closer to the outer surface 250, the friction therebetween will increase, the differential between the rotational velocity of the rear shaft assembly and the front shaft assembly will increase, and the length of the excess will increase. If one moves the surface 418 away from the outer surface 250, the friction therebetween will decrease (or be removed if they are brought out of contact), the differential between the rotational velocity of the rear shaft assembly and the front shaft assembly will decrease, and the length of the excess will decrease.

[0111] According to another exemplary embodiment, the braking system 400 may be used with front and rear running belt pulleys that have a size differential. In such an embodiment,

the braking system 400 would be used to fine tune the length of excess running belt pushed rearward with each rotation of the front and rear running belt pulleys.

[0112] FIG. 16 illustrates another exemplary embodiment of a braking system, shown as braking system 500, configured to help induce and maintain the running belt in a desired non-planar shape to define the running surface. Please note, the section lines 16-16 shown in FIG. 4 do not necessarily suggest that the braking system 500 seen in FIG. 16 is integrated into the manual treadmill depicted in FIG. 4, rather, the section line 16-16 is included in FIG. 4 to show one potential location for the integration of a braking system into a manual treadmill according to the various innovations disclosed herein. The braking system 500 includes a pulley 502 mounted to a rear shaft assembly 504 generally opposite a front shaft assembly, both shaft assemblies having running belt pulleys that are substantially the same size. A belt 506 rotationally couples the pulley 502 to an idler pulley 508. The idler pulley 508 is configured to be adjustable so that it may be moved towards or away from the pulley 502 along an axis generally parallel to the longitudinal axis 18. Though, it should be noted that the idler pulley may be moved relative to the pulley 502 mounted to the rear shaft assembly along an axis other than one generally parallel to the longitudinal axis 18.

[0113] By adjusting the position of the idler pulley 508 relative to the pulley 502, one can adjust the friction between the belt 506 and the pulleys 502, 508. Moving the idler pulley 508 away from the pulley 502, increases the tension in the belt 506, and, accordingly, increases the friction between the belt 506 and the pulleys 502, 508. Moving the idler pulley 508 toward the pulley 502, decreases the tension in the belt 506, and, accordingly, decreases the friction between the belt 506 and the pulleys 502, 508.

[0114] Similar to the discussion of braking system 400, increasing the friction between the belt 506 and the pulleys 502, 508, increases the differential between the rotation of the rear shaft assembly to which the braking system 500 is coupled and the front shaft assembly. As a corollary, decreasing the friction between the belt 506 and the pulleys 502, 508, decreases the differential between the rotational velocity of the rear shaft assembly 504 and the front shaft assembly. As discussed above, the greater the differential, the greater the length of the excess that the front running belt pulleys push rearward.

[0115] FIG. 17 illustrates another exemplary embodiment of a running belt retention system of the treadmill 10 used to help induce and maintain the running belt in a desired non-planar shape to define the running surface. The treadmill 10 is shown including a plurality of rollers 600 used to support the running belt 16 in place of bearing rails 200, discussed above.

[0116] The each roller 600 is shown extending laterally generally between the left-hand side member 52 and the right-hand side member 54 of the frame 40. Along the longitudinal axis 18, the rollers 600 are disposed adjacent to one another generally between one or more front running belt pulleys 604 and one or more rear running belt pulleys 606. Typically, the running belt used with this exemplary embodiment is a continuous polymer belt without slats; the use of a continuous polymer belt having greater flexibility in the lateral direction than running belt 16 improves the ease of movement of the running belt along the rollers 600. However, other suitable continuous belts may be used according to other exemplary embodiment

[0117] In the exemplary embodiment shown, the one or more front running belt pulleys is shown as a single, front running belt pulley 604 that is substantially a large roller, disposed at the front end 48 of the frame 40. Similarly, the one or more rear running belt pulleys is shown as a single, rear running belt pulley 606 that is a substantially a large roller, disposed at the rear portion of the frame 40. According to other exemplary embodiments, any multiple of running pulleys may be used at one or both of the front end and the rear end, such as front running belt pulleys 62.

[0118] Collectively, the rollers 600 define a top profile 608 similar to the top profile 210 defined by the bearing rails 200, discussed above, and provide for a running belt to move therealong. Similar to the top profile of the bearing rails, the top profile 608 defined by the rollers may be varied (e.g., may include a convex portion and a concave portion, may be modeled by a third-order polynomial, may be modeled by a fourth-order polynomial, etc.).

[0119] The front and rear running belt pulleys 604, 606 and the rollers 600 help define the running surface. In use, the running belt is disposed over the front running belt pulley 604, along the top profile 602 defined by the rollers 600, and over the rear running belt pulley 606. The running belt is maintained in a position substantially along these elements primarily by the weight of the running belt; however, according to other exemplary embodiments, a

synchronizing system may also be used to ensure that the running belt is maintained in the desired position.

[0120] Referring to FIGS. 18-21, an embodiment of a running belt retention system including a track system 700 and configured to help induce and maintain the running belt in a desired non-planar shape to define the running surface according to an exemplary embodiment.

[0121] A treadmill according to this exemplary embodiment does not include front and rear shaft assemblies or bearing rails, but, rather, includes a pair of opposed tracks 702 configured to provide for movement of a running belt 16 therealong. The tracks 702 are spaced apart, generally define the path that the running belt 16 will travel, and substantially replicate at least a portion of the running surface. Each track 702 includes a side support wall 708 and a guide portion 710 generally centrally-disposed along the side support wall 708. The guide portion 710 extends from an inner side 712 of the side support wall 708 towards the interior of the treadmill frame, defined generally between the left-hand side member and the right-hand side member. The guide portion 710 generally defines the contour of the running surface that is defined by the running belt 16 when coupled to the tracks 702. An outer side 714 each side support wall 708 is disposed substantially adjacent to an inner surface of one of the side members of the treadmill frame.

[0122] A plurality of roller or wheel assemblies 716 are connected with, preferably mounted directly to or integral with, each of a plurality of slats 228 of the running belt 16. Each a laterally-oriented slat 228 includes a left-hand end 252 generally opposite a right-hand end 254. One of a plurality of wheel assemblies 716 is coupled at each end 252, 254 of each slat 228 at an interior surface 256. The wheel assemblies 716 are configured to be mated with the tracks 702 and provide for motion of the running belt 16 along the tracks 702.

[0123] Each wheel assembly 716 is shown including first roller or wheel 720 and a second roller or wheel 722 rotatably coupled to a support shown as an elongated connecting member 724. The connecting member 724 connects each wheel assembly 716 to a slat 228 and maintains the relative position of the first wheel 720 and the second wheel 722. When coupled to the track 702, the first wheel 720 of a wheel assembly 716 is disposed to one side the guide portion 710 and rotatably movable therealong, and the second wheel 722 of the wheel assembly

716 is disposed generally opposite the first wheel 720 to the other side of the central guide portion 710.

[0124] The wheels 720, 722 and the tracks 702 are shaped such that when they are mated, the wheels 720, 722 cannot be pulled inwardly off of or pushed outwardly off of the track 702. In the exemplary embodiment shown, the guide portion 710 is shown having a substantially-circular cross section 724 and the wheels 720, 722 are shown having circumferentially-disposed arcuate depressions 726 that receive and travel along an outer curved portion 728 and an inner curved portion 730 of the guide portion 710 of the track 702. According to other exemplary embodiments, the wheels and the track guide portion can have substantially any corresponding shapes that provide for the wheels and the track to mate and that provide for movement of the wheels therealong.

[0125] When the running belt 16 is being driven by a user, the interaction of the guide portion 710 and the first and second wheels 720, 722 helps maintain the belt in the desired non-planar shape. As mentioned above, the tracks 702 generally defines the contour of the running surface defined by the running belt 16. Being coupled to the guide portion 710 of the track 702, each wheel assembly 716 rotates about the track 702, following the contour defined thereby.

[0126] If the running belt 16 began to deviate from the desired path, the interaction between the wheels 720, 722 and the guide portion 710 would substantially prevent undesirable shifting. While being rotatably coupled to the elongated connecting member 724, the axes 732 and 734 of the first wheel 720 and second wheel 722, respectively, are a fixed distance apart. Further, the arcuate depressions 726 of the wheels 720, 722 are in contact with the outer curved portion 728 and inner curved portion 730, respectively. Thus, as a result the interactions between the arcuate depressions 726 and the curved portions 728, 730, any movement of a wheel assembly 716 relative to the track 702 other than along the path defined by the track 702 is countered by a force from the guide portion 710. It should also be noted that the interactions between the depressions 726 of adjacent wheel assemblies 716 and the curved portions 728, 730 of the track 702 may also help keep a wheel assembly 716 in place.

[0127] Referring to FIGS. 22-24, the treadmill 10 is shown including another exemplary embodiment of a track system configured to help induce and maintain the running belt in a

desired non-planar shape to define the running surface, shown as a track system 800. Similar to track system 700, a treadmill according to this exemplary embodiment does not include front and rear shaft assemblies or bearing rails, but, rather, includes a pair of tracks 802 configured to provide for movement of a running belt 16 therealong. In this exemplary embodiment, each track 802 is shown as an elongated member having a substantially C-shaped cross section that defines a channel 804 having an opening 806 that faces the interior of the frame 40. An outer wall 808 each of the tracks 802 is disposed substantially adjacent to an inner surface of a left-hand or right-hand side member 52, 54 (shown, e.g., in FIG. 2) such that the openings 806 face each other. The outer wall 808 is substantially opposite an inner wall 810

[0128] As discussed above, the running belt 16 includes a plurality of laterally-oriented slats 228 each having a left-hand end 252 generally opposite a right-hand end 254. One of a plurality of roller or wheel assemblies 812 is coupled at each end 252, 254 of each slat 228 to mate with the tracks 802 and to provide for motion of the running belt 16 along the tracks 802.

[0129] Each wheel assembly 812 is shown including a support shown as a mounting block 814 and a wheel 816 rotatably coupled to the mounting block 814. The mounting block 814 mounted to an interior surface 256 of a slat 228. The wheel 816 is supported relative to the mounting block 814 by an axis 818 that extends substantially parallel to the slats 228 to facilitate positioning the wheel 816 in the channel 804. The wheel 816 is received in the channel 804 and is rotatably movable therewithin to facilitate travel of the running belt 16 along the contour defined by the channel 804. The shape of the channel 804 generally corresponds to the shape of the wheel 816.

[0130] When the running belt 16 is being driven by a user, the walls of the track 802 defining the C-shaped channel 804 help forcibly retain the wheel 816 therein, preventing the wheel from moving in any direction other than along the contour defined by the channel 804, and, thereby, maintaining the running belt 16 in the desired non-planar shape to define the running surface. The outer wall 808 and the inner wall 810 limit the side-to-side, lateral movement of the wheel 816 when it is disposed in the channel 804. Limiting the motion of the wheel 816, similarly limits the motion of the wheel assembly 812 and the slat 228 fixed relative thereto. Further, a first wall 820 substantially opposite a second wall 822 substantially limits the up-and-down

motion of the wheel 816 relative to the channel 804. In circumstances where side-to-side and/or up-and-down motion of the wheel 816 occurs, the walls 808, 810, 820, 822 defining the channel 804, providing counter forces to maintain the wheel 816 in the desired position and help direct the wheel 816 along the desired path.

[0131] Referring to FIGS. 25-28, the treadmill 10 is shown including still another exemplary embodiment of a track system configured to help induce and maintain the running belt in a desired non-planar shape to define the running surface, shown as a track system 900. Similar to track system 800, the treadmill according to this exemplary embodiment does not include bearing rails, but, rather, includes a pair of tracks 902 configured to provide for movement of a running belt 16 therealong. In this exemplary embodiment, each track 902 is shown as an elongated member having a substantially C-shaped cross section that defines a channel 904 having an opening 906 that faces the exterior of the track 902. Stated otherwise, each channels 904 extend about an outer periphery 908 of a tracks 902.

[0132] As discussed above, the running belt 16 includes a plurality of laterally-oriented slats 228 each having a left-hand end 252 generally opposite a right-hand end 254. One of a plurality of roller or wheel assemblies 910 is coupled at each end 252, 254 of each slat 228 to mate with the tracks 902 and to provide for motion of the running belt 16 along the tracks 902.

[0133] Each wheel assembly 910 is shown including a support shown as a connecting bar 912 that is substantially T-shaped and connected to a first wheel 914 and a second wheel 916. A first portion 918 of the connecting bar 912 is fixed relative to the interior surface 256 of a slat 228. A second portion 920 extends substantially perpendicular to the first portion 918 and away from the interior surface 256 of the slat 228. The first wheel 914 and the second wheel 916 are connected to the connecting bar 912 by an axis 922 that extends generally parallel to the first portion 918 and perpendicular to the second portion 920 of the connecting bar 912. The first wheel 914 is disposed to one side of the second portion 920 of the connecting bar 912 and the second wheel 916 is disposed opposite the first wheel 914 to the other side of the second portion 920.

[0134] When the wheel assemblies 910 are mated with the tracks 902, the second portion of the connecting bar 912 extends partially into the channel 904, the first wheel 914 is received

within a first portion 924 of the channel 904 and the second wheel 916 is disposed within a second portion 926 of the channel 904. The first portion 924 of each channel 904 is disposed proximate to an outer surface 928 of the track 902 relative to the second portion 926.

[0135] When the running belt 16 is being driven by a user, the first wheel 914 and the second wheel 916 of a given wheel assembly rotate within the channel 904, facilitating moment of the running belt 16 in the path defined by the track 902. As the running belt 16 is rotated, the slats 228 are disposed generally exterior to the periphery 908 of the track 902. The walls of the track 902 defining the channel 904 help forcibly retain the wheels 914, 916. An outer wall 930 and an inner wall 932 limit the side-to side movement of the wheels 914, 916, either by coming into contact with the wheels 914, 916 themselves or by coming into contact with another part of the wheel assembly 910 (e.g., the connecting bar 912). Limiting the motion of the wheels 914, 916 and the wheel assembly 910 similarly limits the motion of the slat fixed relative thereto, helping each slat, and, thereby, the running belt 16 to follow the desired path. Further, a first wall 934 substantially opposite a second wall 936 substantially limits the up-and-down motion of the wheels 914, 916 relative to the channel 904. In circumstances where side-to-side and/or up-and-down motion of the wheel 916 occurs, the walls 930, 932, 934, 936 defining the channel 904, providing counter forces to maintain the wheels 914, 916 in the desired position and help direct the wheels 914, 916 along the desired path.

[0136] Referring to FIGS. 29-30, the treadmill 10 is shown including another exemplary embodiment of a track system configured to help induce and maintain the running belt in a desired non-planar shape to define the running surface, shown as a track system 1000.

[0137] Instead of using wheel assemblies, such as 716 and 910, discussed above, the treadmill according to this exemplary embodiment utilizes a plurality of magnets 1002 to maintain the running belt 16 in the desired position. One or more magnets 1002 are fixed relative to the interior surface 256 of the slats 228 at locations substantially corresponding to the position of a track 1004, which is typically along the left-hand end 252 and the right-hand end 254 of the slats 228. The magnets 1002 may be coupled by any variety of fasteners or fastening mechanisms. Generally, it is preferable that, when the magnets 1002 are fixed relative to the slats, the fasteners do not directly contact the periphery 1006 of the tracks 1004

to avoid scratching and damage thereto. While it is generally desirable to mount a magnet 1002 to each slat, 228, the number of magnets used will vary depending upon a variety of factors such as the relative weight of the belt and the relative magnetic strength of each magnet.

[0138] The magnets 1002 are configured to magnetically couple the running belt 16 to the track 1004, which is made of metal (e.g., steel) or includes a peripheral metal portion. The magnets 1002 have strength suitable to maintain the running belt 16 in close proximity to a periphery 1006 of the tracks 1004.

[0139] When the treadmill is driven by a user, the force imparted to the running belt 16 is sufficient to permit the magnets to move relative bearing rails, but not to lose the magnetic connection therebetween. According to one exemplary embodiment, as the running belt 16 moves relative to the track 1004, the magnets 1002 are generally spaced a small distance from the periphery 1006 of the track 1004, helping to further reduce the noise associated with operation of the treadmill. According to other exemplary embodiments, the magnets 1002 are in physical contact with the periphery 1006 of the track 1004 in addition to being magnetically coupled thereto.

[0140] According to an exemplary embodiment similar to track system 1000, a plurality of magnets may be positioned on the frame, track, or other fixed component of the treadmill base to apply a downwardly-directed force to the metal slats of the running belt as it passes over the magnets. For example, the magnets may be positioned on the cross-members 56. As the running belt rotates, the portion passing above the magnets will be drawn downward by the force of the magnets, helping maintain that portion of the running belt (i.e., defining the running surface) in the desired shape.

[0141] Referring to FIGS. 31-34, the treadmill 10 is shown including another exemplary embodiment of a track system configured to help induce and maintain the running belt in a desired non-planar shape to define the running surface, shown as a track system 1100.

[0142] The track system 1100 is substantially similar to track system 700, but configured to be operable with a running belt 1102 that is a conventional running belt rather than a slatted running belt 16. The track system 1100 includes a pair of tracks 702 and a wheel assemblies

1104 having substantially the same configuration as wheel assembly 716 with the exception that a securing device shown as a clip 1106 is used to connect the wheel assembly 1104 to the running belt 1102, rather than the elongated connecting member 724. The clip 1106 is shown extending and having a first portion 1108 and a second portion 1110 that opening towards the interior of the treadmill 10 before being secured. When the running belt 1102 shown as a continuous polymer (e.g., urethane) belt is in position, a first edge 1112 of the running belt 1102 is received between a first portion 1108 and a second portion 1110 of the clip 1106 and fixed relative thereto (e.g., by a fastener, etc.). The polymer belt is a urethane belt according to an exemplary embodiment. The urethane belt is desirable heavy enough to help assume the shape of the rollers, but not so thick or heavy that it undesirably impedes movement. The clips extend along the first edge 1112 and the second edge 1114 of the running belt 1102, substantially suspending the belt between the tracks 702. According to an exemplary embodiment, the securing device may be any securing device suitable for securing an edge portion of the running belt 1102 relative thereto (e.g., a bolt, a clamp, etc.).

[0143] According to still another exemplary embodiment, a treadmill has a track system including a pair of tracks and wheel assemblies. The wheel assemblies include hangers (e.g., magnetic hangers) that are received in channels that are interior to the track, the hangers being slidably movable within the channels. According to one exemplary embodiment, the hangers are substantially I-shaped, having one transverse portion received in the channel and the other transverse portion fixed to an interior side of a slat. According to some exemplary embodiments, the system further includes bearing rails that facilitate motion of the running belt itself and the hangers within the track. The hangers and the channel of the track may have any configuration suitable for facilitating movement of the running belt and maintaining the running belt in the desired non-planar shape.

[0144] The above-described ways of inducing and maintaining the running belt in the desired non-planar shape can also be used with or adapted to a manual treadmill having a planar running surface, such as treadmill 1200 having planar running surface 1202 shown in FIG. 35. The treadmill 1200 is shown substantially similar to treadmill 10, but the running surface is substantially planar. Accordingly, the ability to manually drive the treadmill is substantially

dependent on the incline of the running surface 1202 relative to the ground. Ways to adjust this incline for any treadmill disclosed herein will be discussed in more detail later.

[0145] In the exemplary embodiment shown, the running surface 1202 is defined by a running belt 1204 that is disposed about front and rear running belt pulleys of a front and rear shaft assembly, respectively. The running belt 1204 also travels along a pair of bearing rails having a substantially linear top profile that facilitate motion of the running belt 1204.

[0146] As discussed above, the speed controls for the manual treadmill 10 and the various embodiments thereof are generally the user's cadence and relative position of her weight-bearing foot on the running surface. More generally, the running belt 16 of the treadmill 10 is responsive to the weight of the user mounting, dismounting, or running on the treadmill 10. While it is generally desirable for the running belt 16 to be moved rearward, the running belt is capable of rotating forward. Forward rotation of the running belt can create safety concerns. For example, if a user were to mount the treadmill by placing her weight bearing foot at a location (e.g., location D shown in FIG. 5) along the rear portion 74 of the running surface 70, the running belt 16 may move forward and cause them to loose their footing, resulting in an injury or simply an unpleasant user experience.

[0147] A number of safety devices may be used with the treadmill 10 to help prevent undesirable forward rotation of the running belt 16. FIG. 36 illustrates a safety device shown as a one-way bearing assembly 1300 according to an exemplary embodiment. The one-way bearing assembly 1300 is a motion restricting element that is configured to permit rotation of at least one of the front and rear shaft assemblies 44, 46 (and hence the running belt 16) in only one direction, preferably clockwise as seen in FIGS 1 and 5.

[0148] In the exemplary embodiment shown, the one way bearing assembly 1300 is disposed about and cooperates with the rear shaft 68 as shown in FIG. 2. The one-way bearing assembly 1300 comprises a housing 1302 which supports an inner ring 1304 that cooperates with the rear shaft 68 and supports an outer ring 1306 fixed relative to the housing 1302. A plurality of sprags (not shown) are disposed between the inner ring 1304 and the outer ring 1306. The sprags are asymmetric, and, thus, provide for motion in one direction and prevent rotation in the opposite direction. The housing 1302 is fixed to a bracket 1310 that is connected to, and

preferably directly mounted to, the frame 40 to fix the location of the housing 1302 and prevent movement of the housing 1302 in response to the rotation of the rear shaft 68. It should be noted that the location at which the bracket 1310 is mounted to the frame 40 can be adjusted depending on the location of the rear shaft 68, which may change depending on the shape of the non-planar running surface or the desired tension in the running belt. According to another exemplary embodiment, the one-way bearing may be transitionally fit into the housing, rather than press fit. According to yet another exemplary embodiment, the one-way bearing may include rollers in addition to sprags.

[0149] The one-way bearing assembly 1300 further includes a key 1312 that is fixed relative to the inner ring 1304 and configured to cooperate with a keyway 1314 formed in the rear shaft 68. Viewed from the perspective shown in FIGS. 1 and 5, when the running belt 16 is moving rearward, rotating in the clockwise direction, the rear shaft 68 similarly rotates in the clockwise direction. The inner ring 1304 of the one-way bearing assembly 1300 rotates with rotational velocity corresponding to the rotational velocity of the rear shaft 68 because of the interaction between the key 1312 and the keyway 1314. If a force is applied by the user to the running belt 16 that urges the rear shaft 68 to rotate counterclockwise, the one-way bearing assembly 1300 provides a counter force, preventing the counterclockwise rotation of the rear shaft 68 and the forward rotation of the running belt 16. Specifically, as the rear shaft 68 begins to move counterclockwise, the interaction of the key 1312 and the keyway 1314 begins to drive the inner ring 1304 of the one-way bearing assembly 1300 rearward. The sprags become wedged between the inner ring 1304 and the outer ring 1306, preventing the counterclockwise rotation of the inner ring and key 1312 disposed therein. The key 1312, by virtue of its inability to rotate, provides a counterforce to the keyway 1314 as the keyway continues to attempt to rotate counterclockwise. By preventing the keyway 1314 from moving counterclockwise, the one-way bearing assembly 1300 thus prevents the rear shaft 68, the rear running belt pulleys 66, and running belt 16 from rotating counterclockwise as seen in FIGS 1 and 5.

[0150] FIG. 38 illustrates another safety device that may be used with the treadmill 10, shown as a one-way bearing assembly 1500 according to an exemplary embodiment. The one-way bearing assembly 1500 is a motion restricting element that is configured to permit rotation of at

least one of the front and rear shaft assemblies 44, 46 (and hence the running belt 16) in only one direction, preferably clockwise as seen in FIGS 1 and 5.

[0151] In the exemplary embodiment shown, the one-way bearing assembly 1500 is disposed about and cooperates with the rear shaft 68. The one-way bearing assembly 1500 comprises a housing 1502 which supports an inner ring 1504 that cooperates with the rear shaft 68 and supports an outer ring 1506 fixed relative to the housing 1502. A plurality of sprags (not shown) are disposed between the inner ring 1504 and the outer ring 1506. The sprags are asymmetric, and, thus, provide for motion in one direction and prevent rotation in the opposite direction. The one-way bearing assembly 1500 is further shown to include a first snap ring 1532 and a second snap ring 1534, which are configured to seat in a first circumferential groove 1536 and a second circumferential groove 1538 on the rear shaft 68, respectively. When installed, the first snap ring 1532 is supported inboard of and adjacent to the inner ring 1504, and the second snap ring 1534 is supported outboard of and adjacent to the inner ring 1504, thereby further restricting axial motion of the one-way bearing assembly 1500 relative to the rear shaft 68.

[0152] The housing 1502 is supported by a stud 1520 which is coupled to the frame 40. The stud 1520 may be separated or spaced apart from the housing 1502 by a spacer 1522 and a sleeve 1523 which may be restrained on the stud 1520 by a nut 1524 and a washer 1526. The sleeve 1523 of the embodiment shown is formed of rubber and is configured to reduce noise, wear, and shock load between the housing 1502 and the stud 1520 and/or the spacer 1522. The housing 1502 includes a plurality of legs, shown as a first leg 1516 and a second leg 1518, which extend on either side of the stud 1520. Accordingly, the stud 1520 resists rotational motion of the housing 1502 in response to rotation of the rear shaft 68 and may provide sufficient reactive or counter force to the housing 1502 to enable the one-way bearing assembly 1500 to prevent counterclockwise rotation of the rear shaft 68. Supporting the one-way bearing assembly 1500 in this manner negates the need for fixing the housing 1502 to the frame 40 or an intermediary bracket. Accordingly, the housing 1502 may move with the rear shaft 68 (e.g., the housing 1502 may pivot about the stud 1520) as the rear shaft 68 flexes under load, thereby reducing side loading on the inner ring 1504, which in turn reduces wear on, and extends the life of, the one-way bearing assembly 1500.

[0153] It should be noted that the location at which the stud 1520 is mounted to the frame 40 can be adjusted depending on the location of the rear shaft 68, which may change depending on the shape of the non-planar running surface or the desired tension in the running belt. Furthermore, the stud 1520 need not be positioned below or downward from the rear shaft 68, as shown, but may be located in any direction relative to the rear shaft 68. According to another exemplary embodiment, the one-way bearing may be transitionally fit into the housing, rather than press fit. According to yet another exemplary embodiment, the one-way bearing may include rollers in addition to sprags.

[0154] The one-way bearing assembly 1500 further includes a key 1512 that is fixed relative to the inner ring 1504 and configured to cooperate with a keyway 1514 formed in the rear shaft 68. Viewed from the perspective shown in FIGS. 1 and 5, when the running belt 16 is moving rearward, rotating in the clockwise direction, the rear shaft 68 similarly rotates in the clockwise direction. The inner ring 1504 of the one-way bearing assembly 1500 rotates with rotational velocity corresponding to the rotational velocity of the rear shaft 68 because of the interaction between the key 1512 and the keyway 1514. If a force is applied by the user to the running belt 16 that urges the rear shaft 68 to rotate counterclockwise as seen in FIGS. 1 and 5, the one-way bearing assembly 1500 provides a counter force, preventing the counterclockwise rotation of the rear shaft 68 and the forward rotation of the running belt 16. Specifically, as the rear shaft 68 begins to move counterclockwise, the interaction of the key 1512 and the keyway 1514 begins to drive the inner ring 1504 of the one-way bearing assembly 1500 rearward. The sprags become wedged between the inner ring 1504 and the outer ring 1506, preventing the counterclockwise rotation of the inner ring and key 1512 disposed therein. The key 1512, by virtue of its inability to rotate, provides a counterforce to the keyway 1514 as the keyway continues to attempt to rotate counterclockwise. By preventing the keyway 1514 from moving counterclockwise, the one-way bearing assembly 1500 thus prevents the rear shaft 68, the rear running belt pulleys 66, and running belt 16 from rotating counterclockwise as seen in FIGS 1 and 5.

[0155] Other safety devices to help prevent undesirable forward rotation of the running belt 16 may include cam locking systems, which may be particularly well-suited for use in

conjunction with track systems 700, 800, and 900. Also, taper locks, a user operated pin system, or a band brake system with a lever may be utilized.

[0156] Controlling the operation of the running belt 16 in ways in addition to preventing rearward rotation, can help improve the safety of the treadmill and/or help a user adjust the treadmill for a desirable level of performance. Including an incline or elevation adjustment system is one way to provide these benefits. As mentioned above, as the increasing or decreasing of the relative height or distance of the running surface relative to the ground is one way that the operation, most typically the speed, of the treadmill can be adjusted. Accordingly, adjusting the incline of the base of the treadmill results in an adjustment to the speeds a user can achieve and/or how easy or challenging it is for the user to achieve certain speeds.

[0157] Referring back to FIGS. 1-6, a plurality of nuts 270 are fixed, and more preferably welded, to the bottom of the frame 40 allow the feet 28 to be adjusted. The feet 38 include a lower or base portion 272 and a threaded shaft 274 extending vertically upward from the base portion 272 according to an exemplary embodiment. Generally, by increasing the distance between the nuts 270 and the base portions 272 of the feet 28 at the front end 48 of the frame 40 relative to the rear end 50, the incline of the base 12 will increase. Stated otherwise, the angle between the longitudinal axis 18 and the ground will increase. Similarly, the distance between the nuts 270 and the base portions 272 of the feet at the rear end 50 may be decreased relative to the feet 28 at the front end 48, thereby increasing the incline. By increasing the incline, a user is typically able to achieve greater speeds on the treadmill 10.

[0158] Treadmill 1200 shown in FIG. 35 preferably has at least some incline (i.e., the longitudinal axis of the treadmill to be other than parallel to the ground) when in operation as the shape of the running surface, substantially planar, does not provide for increases and decreases in height in and of itself. On the other hand, the longitudinal axes of the treadmills having non-planar running surfaces may be parallel to the ground or at an incline thereto during operation. It should be noted that, while it is generally desirable to have the front shaft at a height at or above the height of the rear shaft, with some running surface configurations, desirable orientations can be achieved by raising the rear shaft to a location above the front shaft relative to the ground.

[0159] In some cases, the user may want to decrease the incline of the treadmill (e.g., to decrease the speeds the treadmill can achieve, etc.). For example, the user may want to utilize a relatively long stride, but does not want to be running at such high speeds. This can be accomplished by lowering the incline of the treadmill from the higher incline position. Once in the lowered position, the same stride the user was using at the higher incline position will typically result in the user running at lower speeds in the lower incline position. This same principle can also be applied for the purposes of safety. That is, keeping the front of the treadmill at a lower incline position or lowering the treadmill to a lower incline position can help prevent a user from achieving speeds that are too great for them (e.g., that would cause them to be off-balance, lose control, be injured, etc.).

[0160] Because the treadmill is preferably manually operated, it does not have an external power source which can be utilized to operate a height adjusting motor as is found in conventional treadmills. Therefore, a manual height adjusting system is preferably integrated into the treadmill. Referring to FIG. 37, an example of a manual incline or elevation adjustment system 1400 is shown according to an exemplary embodiment. A hand crank 1402 configured to be operated by a person, such as the user, is provided allow a user to operate the incline adjustment system 1400 to adjust the incline of the base 12 of the treadmill 10 relative to the ground. The front shaft 64 may be lowered relative to the rear shaft 68 and/or the front shaft 64 may be raised relative to the rear shaft 68 using the hand crank 1402. In an alternative exemplary embodiment, the front shaft may be maintained at a position above the ground, and the rear shaft may be raised or lowered relative thereto adjust the incline.

[0161] Generally, the hand crank 1402 includes a handle portion 1404 disposed parallel to and spaced a distance from a shaft 1406 that is coupled to the frame 40 (e.g., with a bracket). When assembled, a drive belt or chain 1407 is disposed about a gear 1408 that is positioned about the shaft 1406 of the hand crank 1402. Rotational motion can be imparted to the gear 1408 by rotating the handle portion 1404. In response to rotation of the gear 1408, the drive belt 1407 causes a sprocket 1410 is fixed relative to an internal connecting shaft 1412 of the internal connecting shaft assembly 1414 to rotate. The internal connecting shaft assembly 1414 further includes a pair of drive belts or chains 1416 that are operably coupled to gears 1418 of rack and pinion blocks 1420. The rotation of the internal connecting shaft 1412 causes the

drive belts or chains 1416 to rotate gears 1418. As the gears 1418 rotate, a pinion (not shown) disposed within the rack and pinion blocks 1420 imparts linear motion to the racks 1422, thereby operably raising or lowering the base 12 of the treadmill 10 depending on the direction of rotation of the handle portion 1404 of the hand crank 1402.

[0162] According to another exemplary embodiment, an incline adjustment system that is a gas assisted un-weighting incline adjustment system may be utilized. According to other exemplary embodiments, any suitable linear actuator may serve as an incline adjustment system for the manual treadmill disclosed herein.

[0163] According to an exemplary embodiments, the incline of one or more portions of the running surface may be adjusted independent of adjusting the incline of the base. For example, one or more portions of a bearing rail may be configured to be movable relative to one or more other portion of the bearing rail. In one exemplary embodiment, a bearing rail is divided into a first portion and a second portion movable relative to each of the about a pivot point disposed therebetween. A person (e.g., a user, trainer, technician, etc.) can adjust the operational characteristics of the treadmill (similar to the discussion of using running surfaces having different curved profiles above) by merely adjusting the relative position of the bearing rail portions. If the user wants to achieve greater speeds, they may increase the incline of the front portion, while leaving the center and rear portions unchanged. If the user would like to alter the configuration of the treadmill to more strongly encourage running on the balls of their feet, they might increase the incline of the front and rear portions from a higher radius of curvature so that they collectively define a lower radius of curvature. Adjustments to the position of the bearing rails may be imparted using a crank, or other suitable device.

[0164] It is further contemplated that, because the treadmill 10 does not require an electric motor for operation, it is well suited for operation in an aquatic environment. For example, the treadmill 10 may be at least partially submerged in a pool, thereby providing added resistance due to hydrodynamic drag on a user and/or reducing footfall impact due to the buoyancy of the user. Accordingly, a submerged embodiment of the treadmill 10 may be used for training and/or rehabilitation purposes. Modifications may be made to the treadmill 10 for use in an aquatic environment. For example, the treadmill 10 may include sealed bearings and

components formed of corrosion-resistant materials (e.g., plastic, composite, stainless steel, brass, etc.) to extend its useful life. Further, the shape of the running surface 70 may also be modified to compensate for the buoyancy of the user in water and to compensate for the effects of salinity on buoyancy. For example, it is contemplated that the shape of the running surface 70 may be different for a treadmill 10 used in a freshwater environment and a highly saline environment.

[0165] A number of other devices, both mechanical and electrical, may be used in conjunction with or cooperate with a treadmill according to this disclosure. FIG. 1, for example, shows a display 280 adapted to calculate and display performance data relating to operation of the treadmill according to an exemplary embodiment. The display 280 includes an independent power source (e.g., a battery) that provides for the display 280 to be electrically-operative. The feedback and data performance analysis from the display may include, but are not limited to, speed, time, distance, calories burned, heart rate, etc. For example, a the display may include a sensor that is responsive to the position of a magnet on one of the running belt pulleys. The sensor is configured to recognize every time the magnet rotates past (e.g., moves past, crosses, etc.) a certain location. With this data, the display may calculate the speed at which the user is running and then provide this data to them via a user interface. According to other exemplary embodiments, other displays, cup holders, cargo nets, heart rate grips, arm exercisers, TV mounting devices, user worktops, and/or other devices may be incorporated into the treadmill.

[0166] As utilized herein, the terms "approximately," "about," "substantially," and similar terms are intended to have a broad meaning in harmony with the common and accepted usage by those of ordinary skill in the art to which the subject matter of this disclosure pertains. It should be understood by those of skill in the art who review this disclosure that these terms are intended to allow a description of certain features described and claimed without restricting the scope of these features to the precise numerical ranges provided. Accordingly, these terms should be interpreted as indicating that insubstantial or inconsequential modifications or alterations of the subject matter described and are considered to be within the scope of the disclosure.

[0167] It should be noted that the term "exemplary" as used herein to describe various embodiments is intended to indicate that such embodiments are possible examples, representations, and/or illustrations of possible embodiments (and such term is not intended to connote that such embodiments are necessarily extraordinary or superlative examples).

[0168] For the purpose of this disclosure, the term "coupled" means the joining of two members directly or indirectly to one another. Such joining may be stationary or moveable in nature. Such joining may be achieved with the two members or the two members and any additional intermediate members being integrally formed as a single unitary body with one another or with the two members or the two members and any additional intermediate members being attached to one another. Such joining may be permanent in nature or may be removable or releasable in nature.

[0169] It should be noted that the orientation of various elements may differ according to other exemplary embodiments, and that such variations are intended to be encompassed by the present disclosure.

[0170] It is important to note that the constructions and arrangements of the manual treadmill as shown in the various exemplary embodiments are illustrative only. Although only a few embodiments have been described in detail in this disclosure, those skilled in the art who review this disclosure will readily appreciate that many modifications are possible (e.g., variations in sizes, dimensions, structures, shapes and proportions of the various elements, values of parameters, mounting arrangements, use of materials, colors, orientations, etc.) without materially departing from the novel teachings and advantages of the subject matter recited in the claims. For example, elements shown as integrally formed may be constructed of multiple parts or elements, the position of elements may be reversed or otherwise varied, and the nature or number of discrete elements or positions may be altered or varied. The order or sequence of any process or method steps may be varied or re-sequenced according to alternative embodiments. Other substitutions, modifications, changes and omissions may also be made in the design, operating conditions and arrangement of the various exemplary embodiments without departing from the scope of the present disclosure.

What is Claimed:

1. A manually powered treadmill, comprising:

a frame having a front end and a rear end positioned opposite the front end;

a front shaft coupled to the frame proximate the front end;

a rear shaft coupled to the frame proximate the rear end;

a plurality of bearings coupled to the frame;

a running belt at least partially supported by the plurality of bearings, wherein the running belt includes a curved running surface; and

a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to restrict movement of at least one of the running belt, the front shaft, and the rear shaft in a first rotational direction while permitting movement of the at least one of the running belt, the front shaft, and the rear shaft in a second rotational direction opposite the first rotational direction.

2. The manually powered treadmill of claim 1, wherein the frame includes a left side member, a right side member, and at least one cross-member extending between the left side member and the right side member, wherein the plurality of bearings includes a first plurality of bearings coupled to a left-side of the frame and a second plurality of bearings coupled to a right-side of the frame.

3. The manually powered treadmill of claim 2, wherein the first plurality of bearings and the second plurality of bearings each at least partially define a curved top profile, wherein the curved top profile substantially corresponds to at least a portion of the curved running surface.

4. The manually powered treadmill of claim 1, wherein the safety device is a one-way bearing.

5. The manually powered treadmill of claim 1, further comprising at least one support foot coupled to the frame, wherein the at least one support foot is adjustable to enable an adjustment of the relative vertical incline of at least a portion of the manually powered treadmill in relation to a surface supporting the manually powered treadmill.

6. The manually powered treadmill of claim 1, further comprising a braking system coupled to the frame and configured to selectively resist the rotational movement of the running belt.

7. The manually powered treadmill of claim 6, wherein the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt.

8. A manually powered treadmill, comprising:

a frame;

a first plurality of bearings coupled to the frame;

a second plurality of bearings coupled to the frame a spaced distance from the first plurality of bearings;

a front shaft assembly coupled to the frame;

a rear shaft assembly coupled to the frame;

a running belt at least partially supported by the first plurality of bearings and the second plurality of bearings, at least partially disposed about the front and rear shaft assemblies, and including a running surface, at least a portion of which is curved; and

a safety device for resisting rotation of at least one of the running belt, the front shaft assembly, and the rear shaft assembly in a first rotational direction while permitting rotation of at least one of the running belt, the front shaft assembly, and the rear shaft assembly in a second rotational direction opposite the first rotational direction.

9. The manually powered treadmill of claim 8, wherein the safety device is a one-way bearing.

10. The manually powered treadmill of claim 8, wherein the front shaft assembly comprises a front shaft coupled to frame.

11. The manually powered treadmill of claim 10, wherein the front shaft assembly comprises and at least one front running belt pulley coupled to the front shaft.

12. The manually powered treadmill of claim 8, wherein the rear shaft assembly comprises a rear shaft coupled to the frame.

13. The manually powered treadmill of claim 12, wherein the rear shaft assembly comprises at least one rear running belt pulley coupled to the rear shaft.

14. The manually powered treadmill of claim 8, wherein the rear shaft assembly comprises at least one rear running belt pulley and the front shaft assembly comprises at least one front running belt pulley.

15. The manually powered treadmill of claim 14 wherein at least one of the at least one rear running belt pulley and the at least one front running belt pulley are formed from an electrically insulating material.

16. The manually powered treadmill of claim 8, further comprising at least one support foot coupled to the frame, wherein the at least one support foot is adjustable to enable an adjustment of the relative vertical incline of at least a portion of the manually powered treadmill in relation to a surface supporting the manually powered treadmill

17. The manually powered treadmill of claim 8, wherein the running belt is at least partially supported by the first plurality of bearings and the second plurality of bearings.

18. The manually powered treadmill of claim 17, wherein each of the first and second pluralities of bearings define a curved top profile and wherein the curved top profile substantially corresponds to at least a portion of the curved portion of the running surface.

19. The manually powered treadmill of claim 8, wherein the frame includes a left side member, a right side member a spaced distance from the left side member, and at least one cross-member extending between the left side member and the right side member.

20. The manually powered treadmill of claim 19 wherein the first plurality of bearings are coupled the left side member and the second plurality of bearings are coupled to the right side member.

21. A manually powered treadmill, comprising:

a frame;

at least one front running belt pulley coupled to the frame;

at least one rear running belt pulley coupled to the frame a spaced distance from the at least one front running belt pulley;

a plurality of bearings coupled to the frame;

a running belt at least partially supported by the plurality of bearings and at least partially supported by at least one of the at least one front running belt pulley and the at least one rear running belt pulley, wherein the running belt includes a running surface, at least a portion of which is curved; and

a safety device coupled to at least one of the running belt, the front running belt pulley, and the rear running belt pulley, wherein the safety device is structured to resist rotation of the at least one running belt, the front running belt pulley, and the rear running belt pulley in a first direction while permitting rotation of the at least one running belt, the front running belt pulley, and the rear running belt pulley in a second direction opposite the first direction.

22. The manually powered treadmill of claim 21 wherein at least one of the at least one rear running belt pulley and the at least one front running belt pulley are formed from an electrically insulating material.

23. The manually powered treadmill of claim 21 further comprising a front shaft coupled to frame, the front shaft being adapted to support the at least one front running belt pulley.

24. The manually powered treadmill of claim 21 further comprising a rear shaft coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley.

25. The manually powered treadmill of claim 21, wherein the safety device is a one-way bearing.

26. The manually powered treadmill of claim 21, further comprising a braking system coupled to the frame and configured to selectively resist the rotational movement of the running belt.

27. The manually powered treadmill of claim 26, wherein the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt.

28. A method, comprising:

providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and a rear end;

providing a plurality of bearings coupled to the frame, wherein the plurality of bearings define at least a portion of a curved top profile;

disposing a running belt on the plurality of bearings such that the curved top profile of plurality of bearings define at least a portion of a curved running surface of the running belt;

permitting movement of the running belt in a first direction; and

providing a safety device coupled to the frame wherein the safety device resists movement of the running belt in a second direction opposite the first direction.

29. A method according to claim 28 further comprising providing for the selective application of a braking force to resist the rotational movement of the running belt in the first direction.

30. A method according to claim 28 further comprising providing for the adjustment of the vertical incline of at least a portion of the running surface.

ABSTRACT

A manually operated treadmill is provided that includes a frame having a front end and a rear end positioned opposite the front end; a front shaft rotatably coupled to the frame proximate the front end; a rear shaft rotatably coupled to the frame proximate the rear end; a plurality of bearings coupled to the frame; a running belt supported by the plurality of bearings, wherein the running belt includes a curved running surface; and a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.

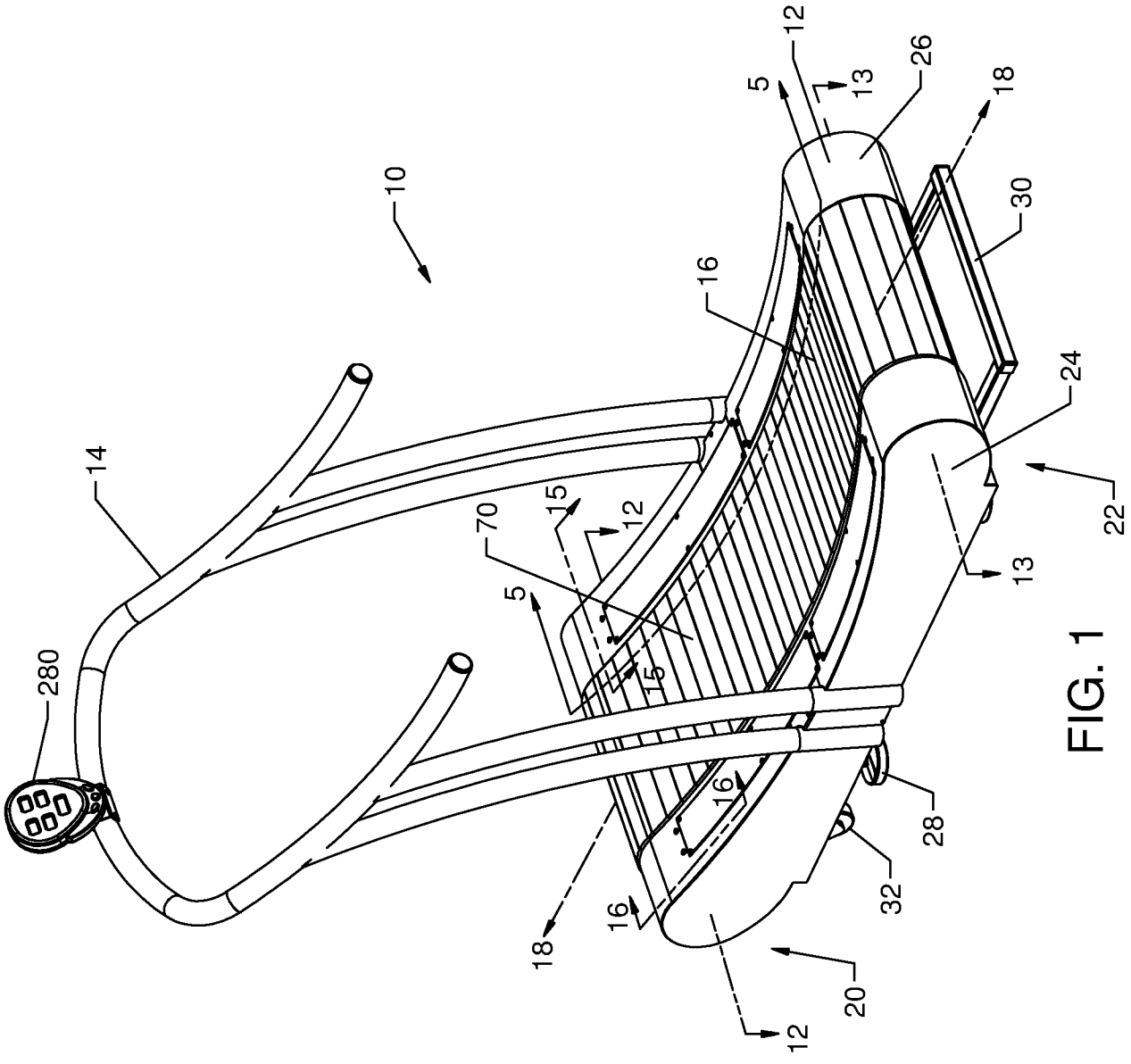

FIG. 1

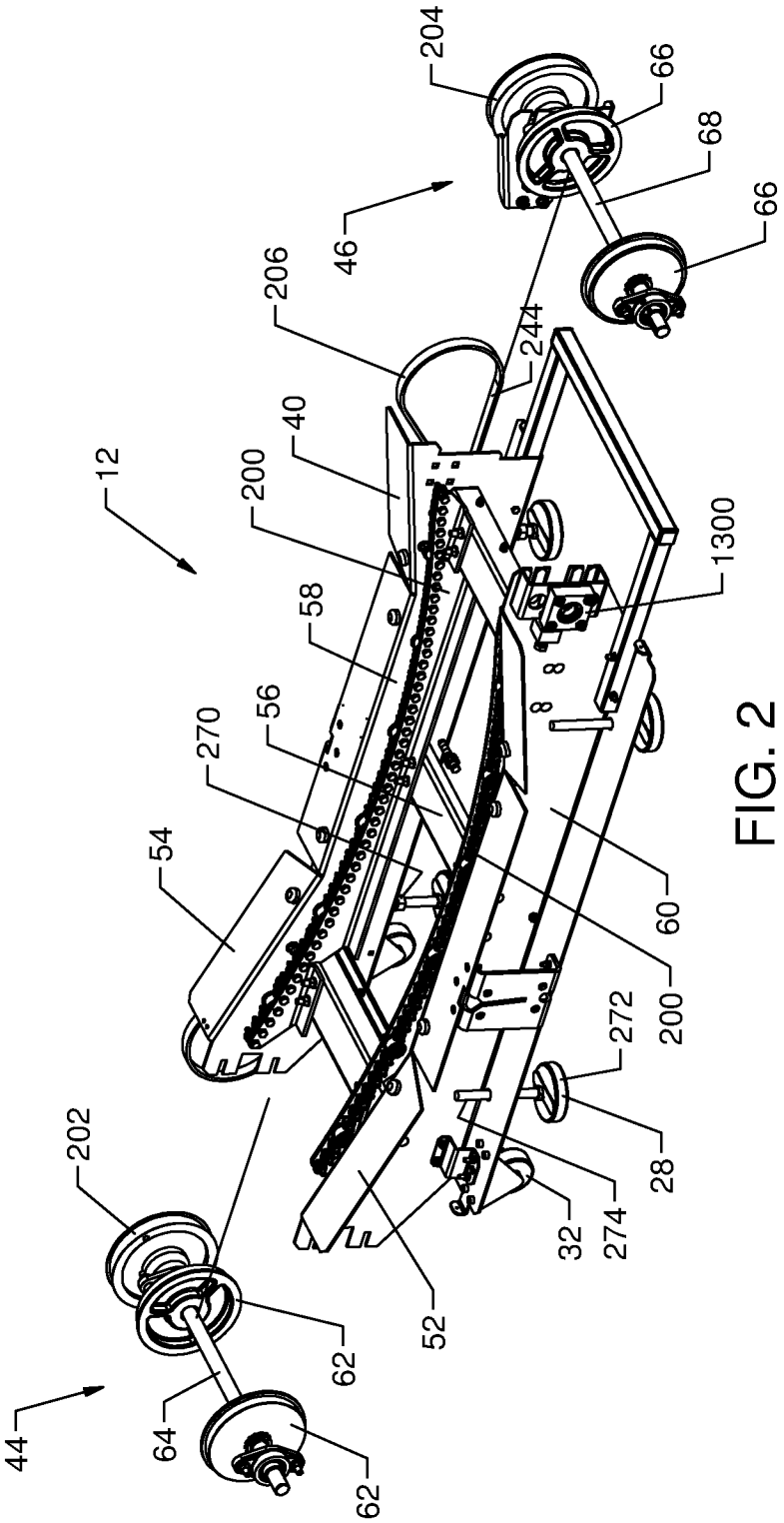
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FIG. 2

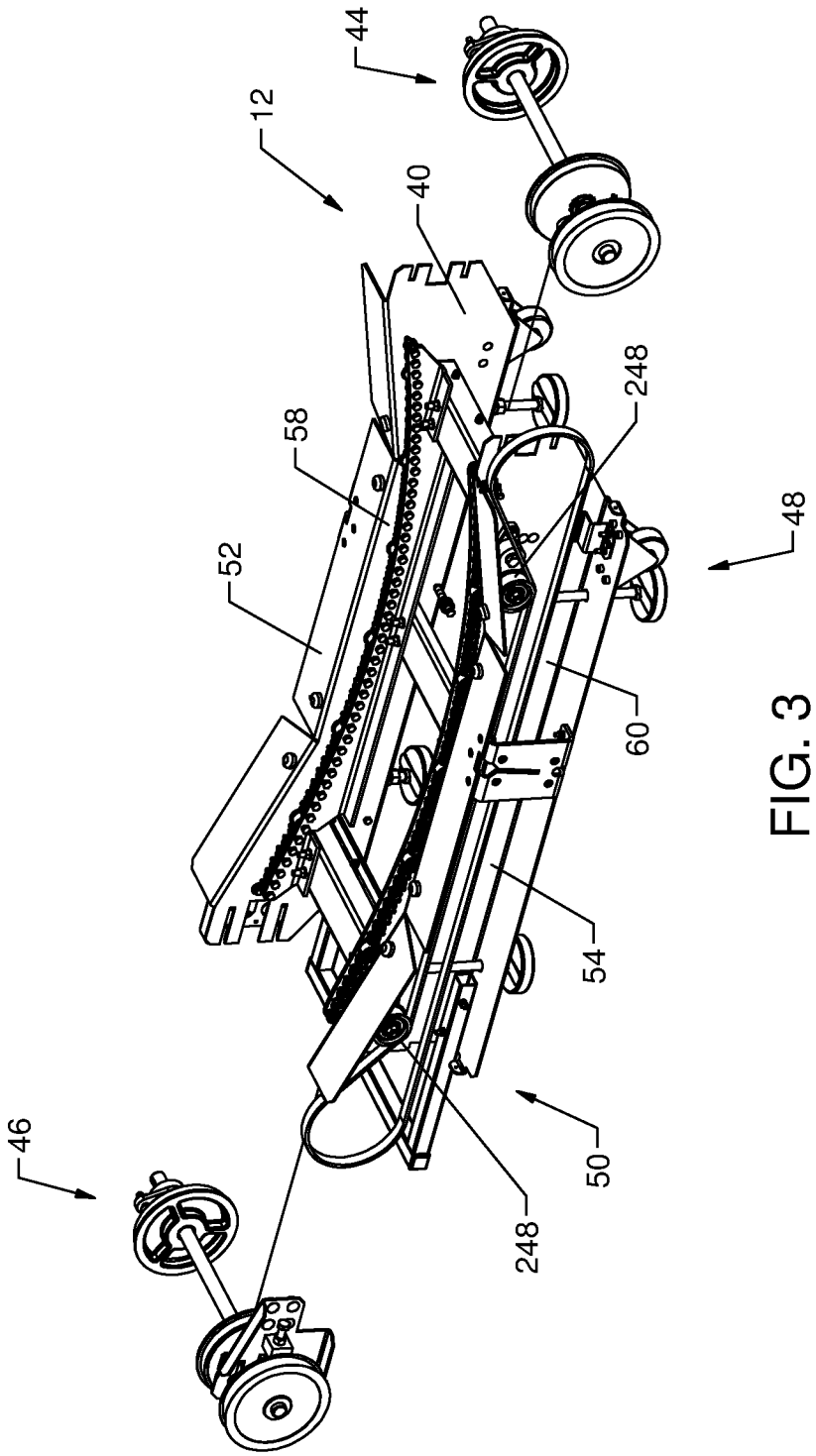

FIG. 3

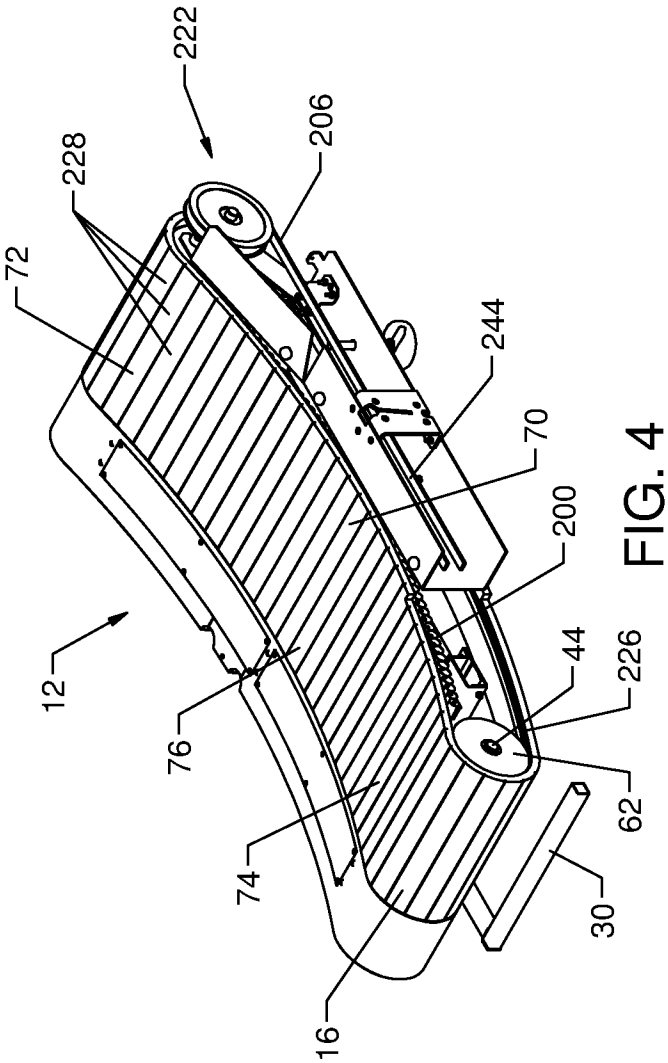
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FIG. 4

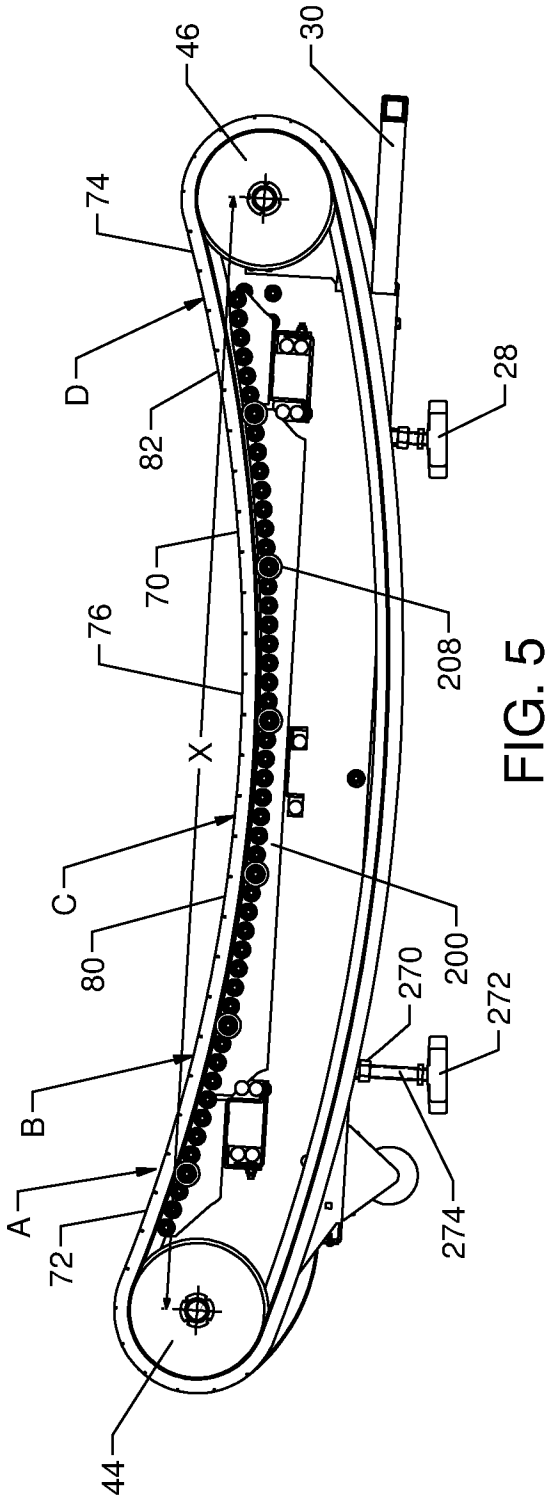
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FIG. 5

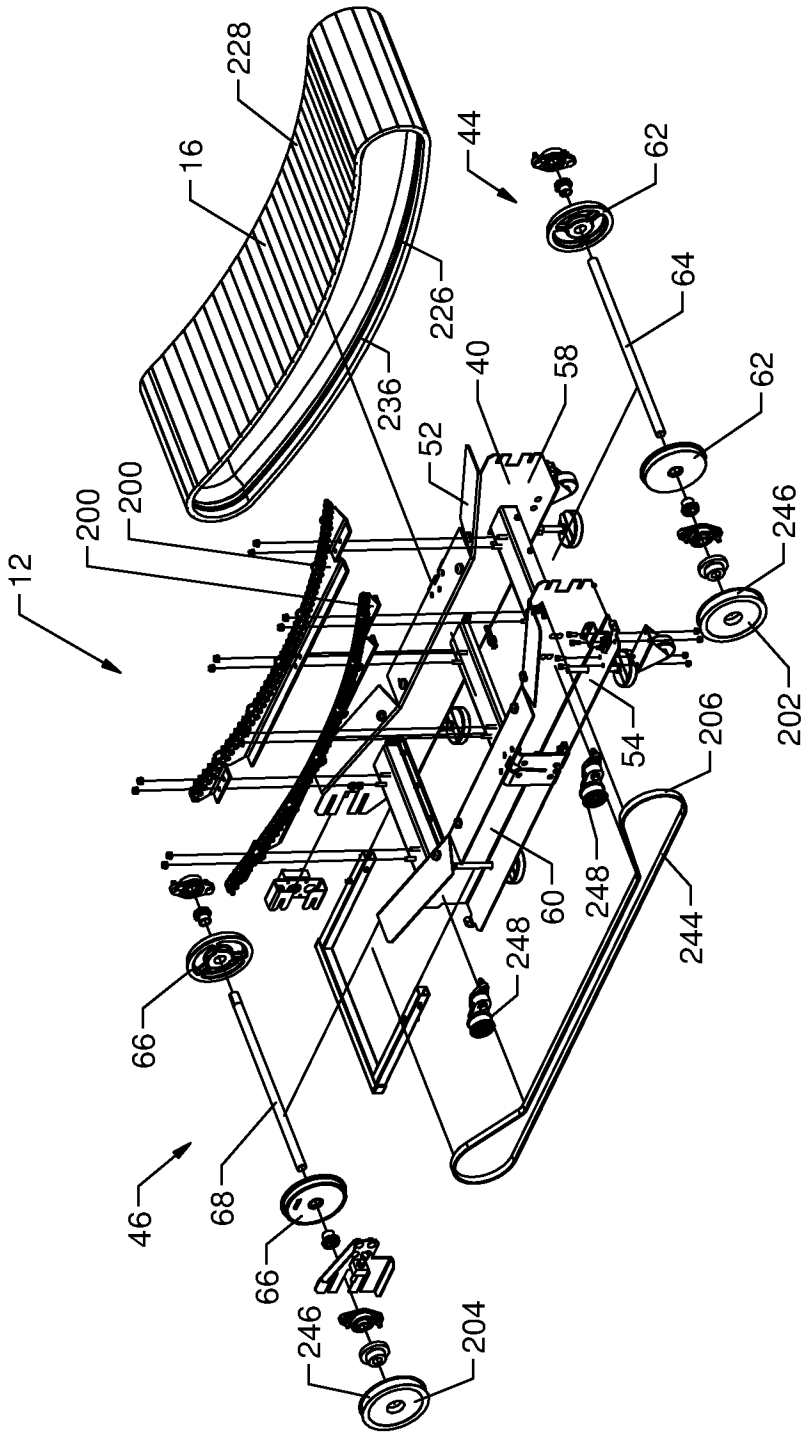
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FIG. 6

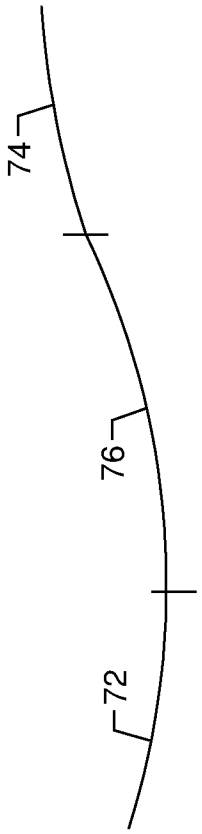

FIG. 7a

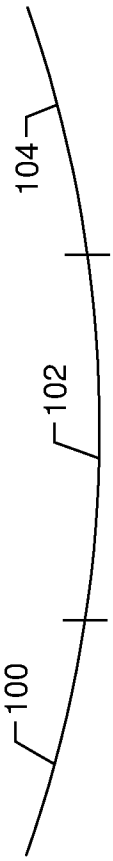

FIG. 7b

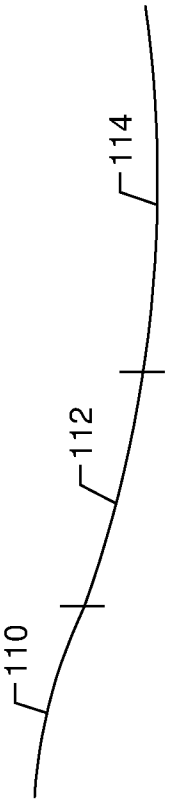

FIG. 7c

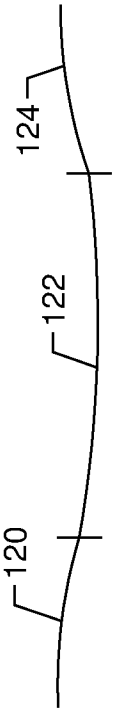

FIG. 7d

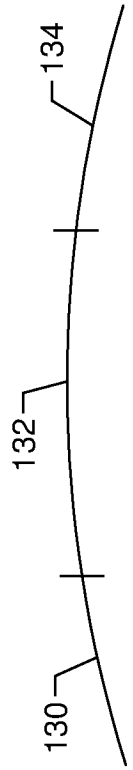

FIG. 7e

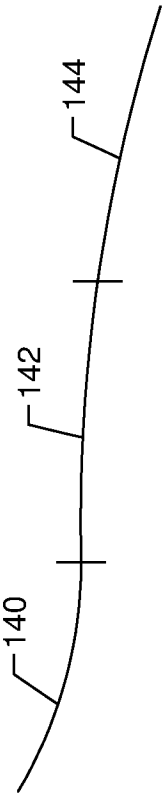

FIG. 7f

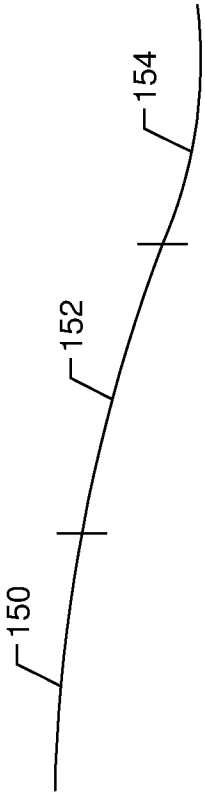

FIG. 7g

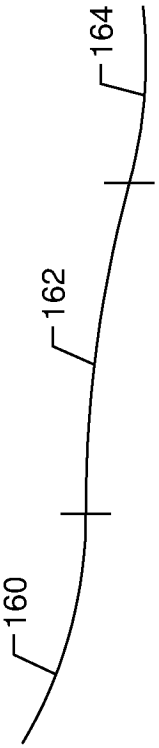

FIG. 7h

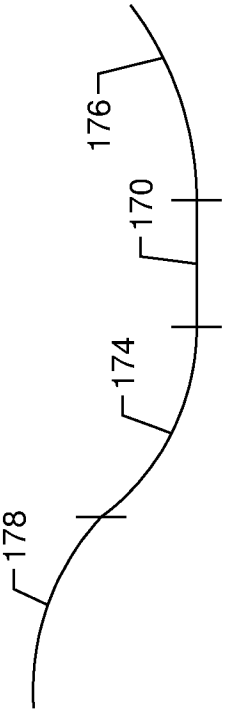

FIG. 7i

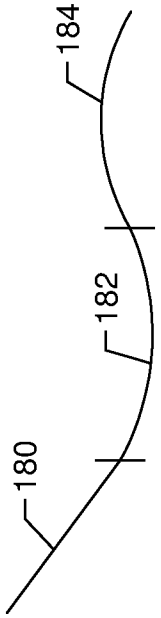

FIG. 7j

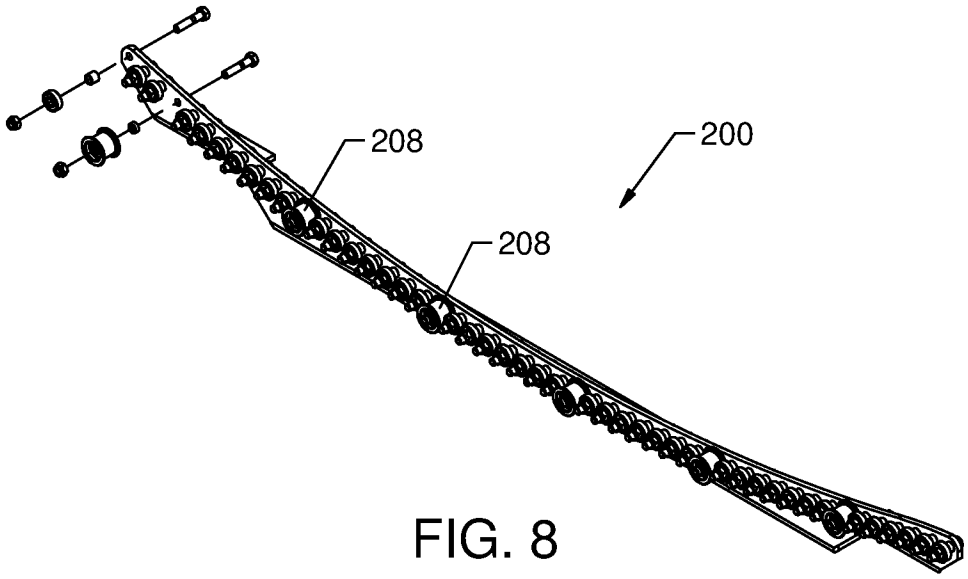

FIG. 8

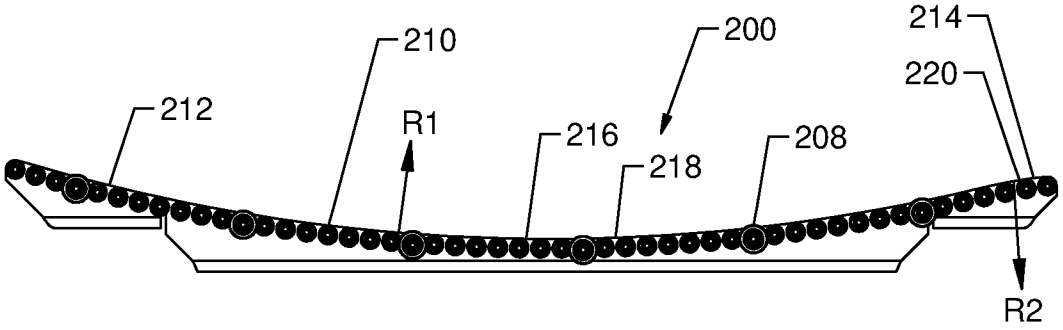

FIG. 9

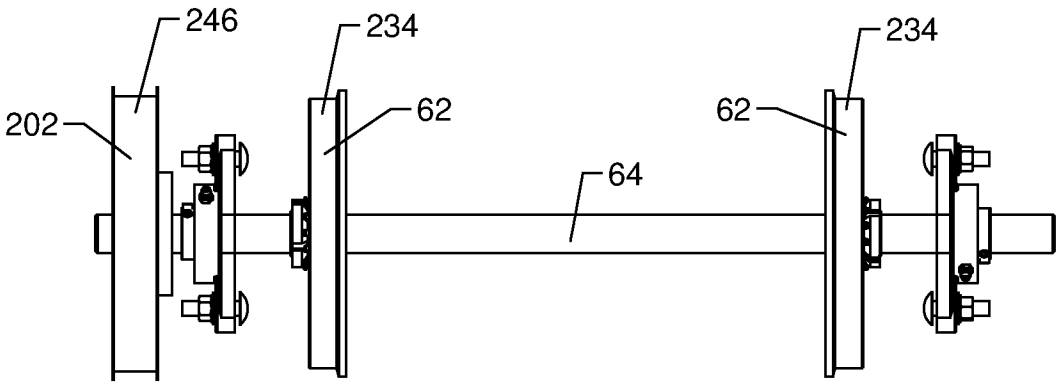

FIG. 10

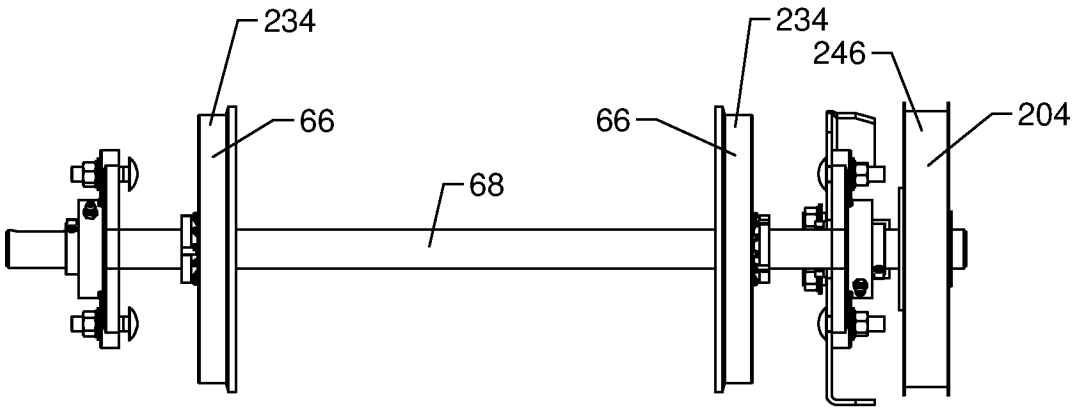

FIG. 11

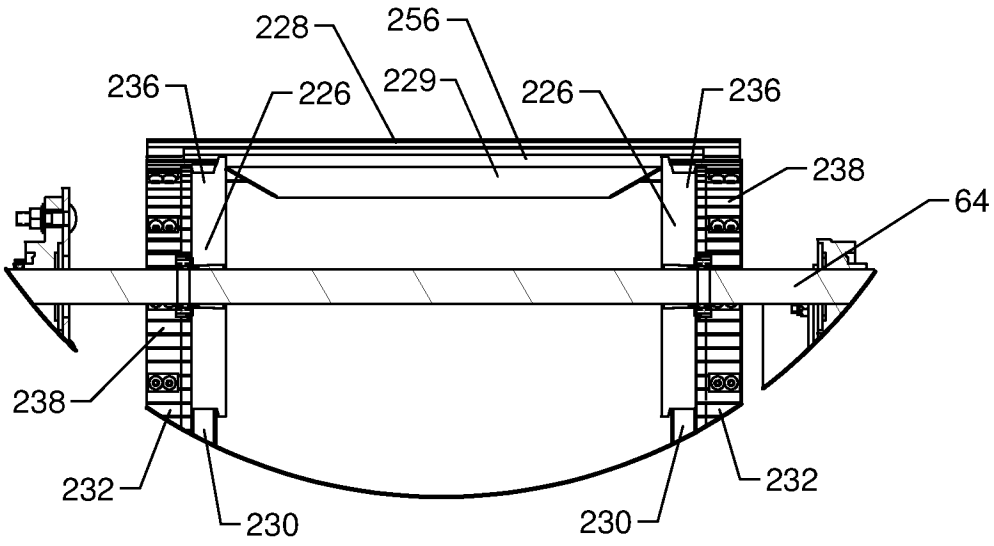
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FIG. 12

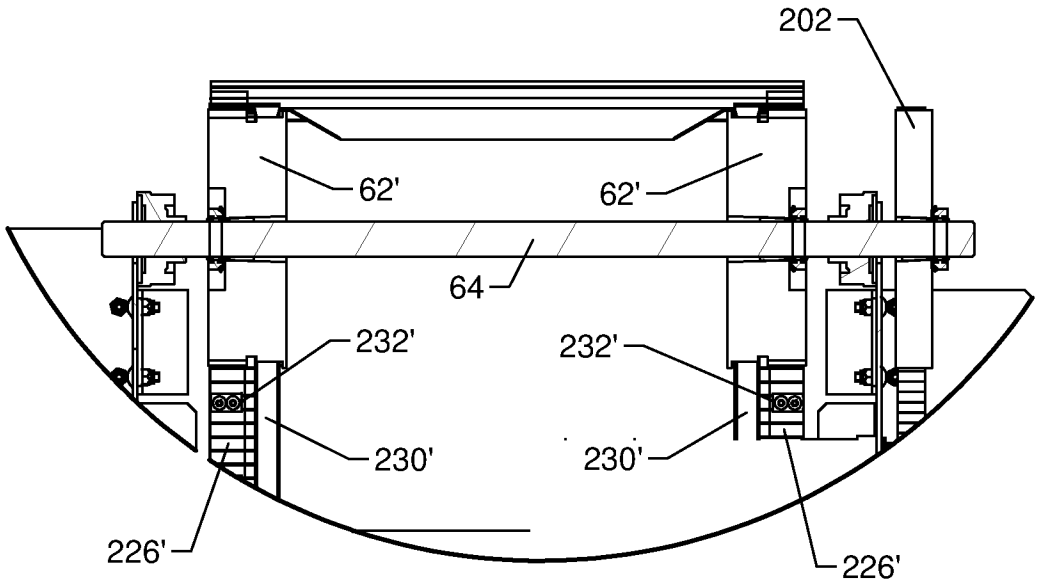
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FIG. 13

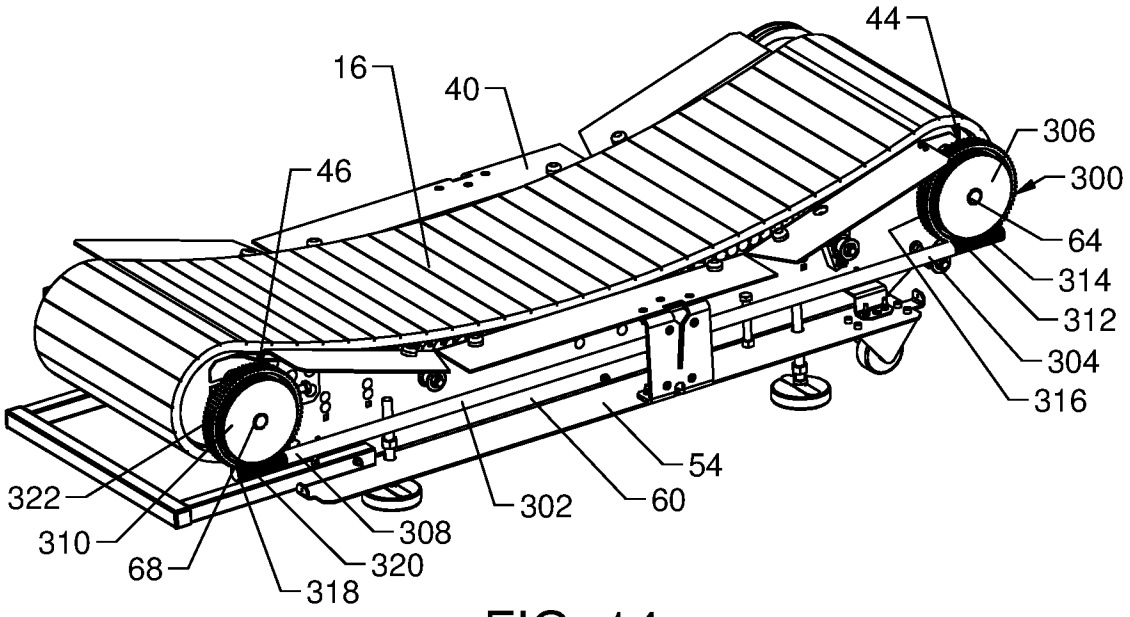
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FIG. 14

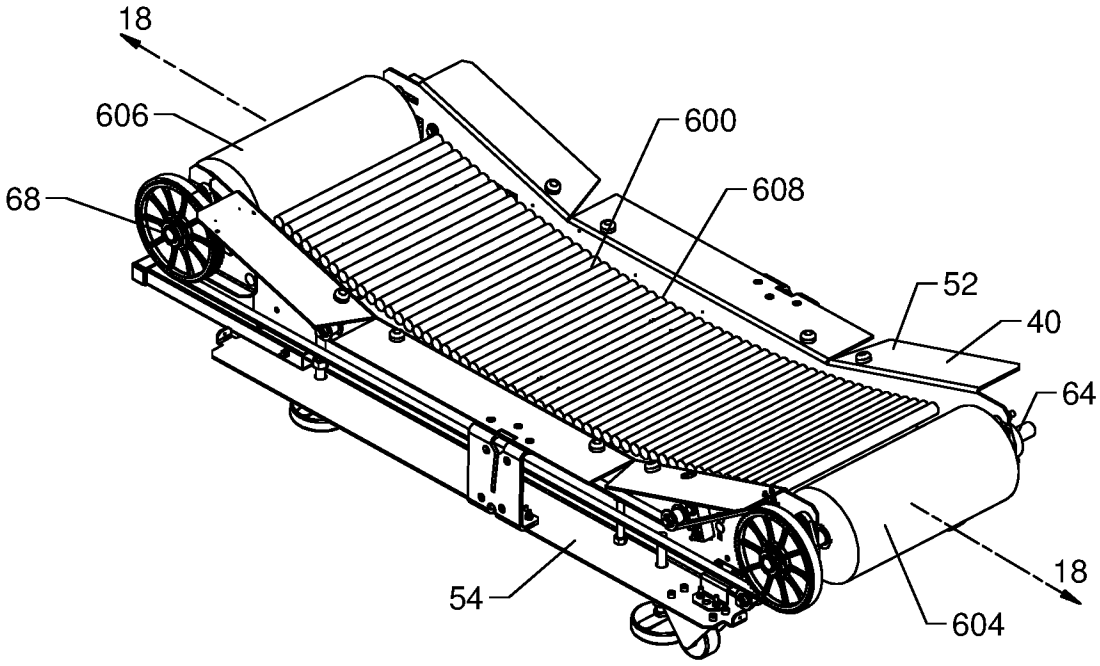
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FIG. 17

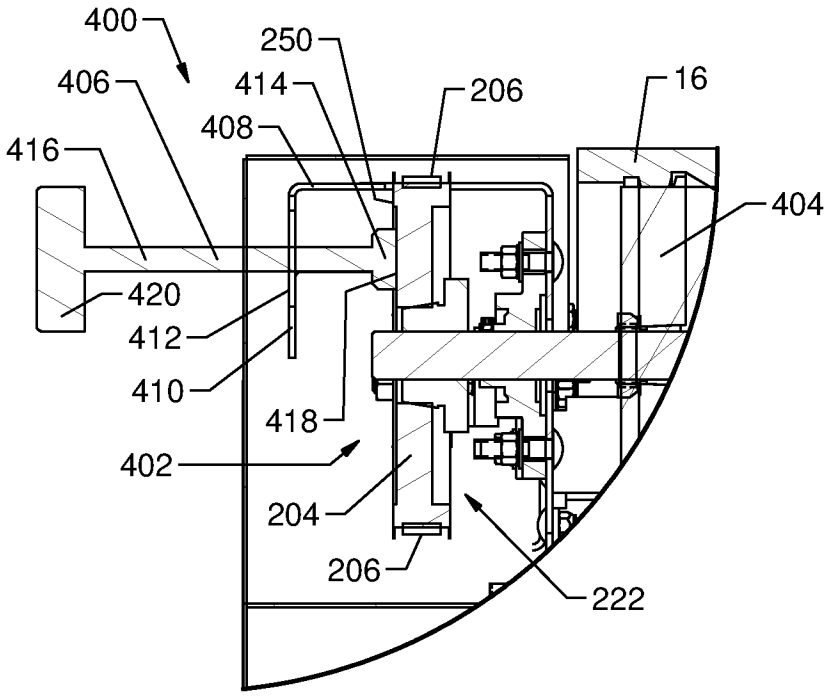
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FIG. 15

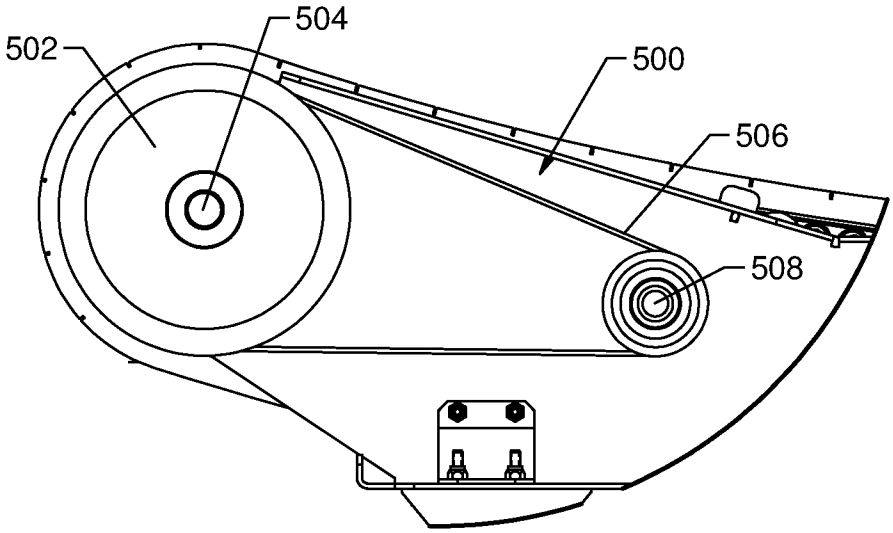
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FIG. 16

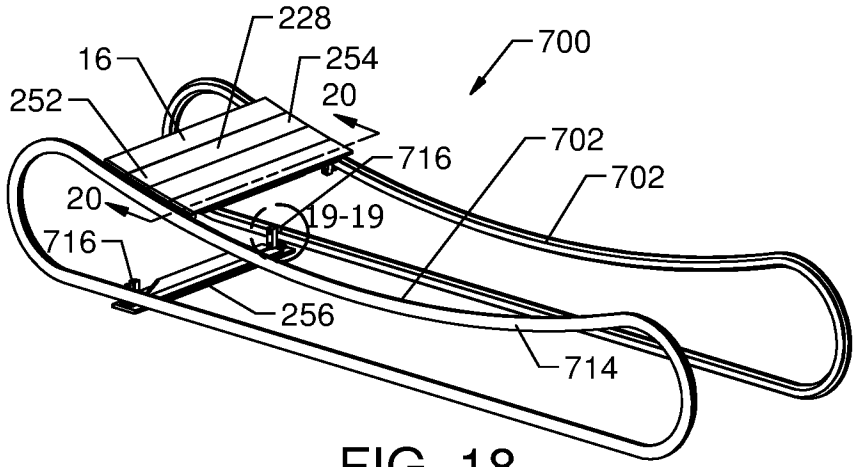


FIG. 18

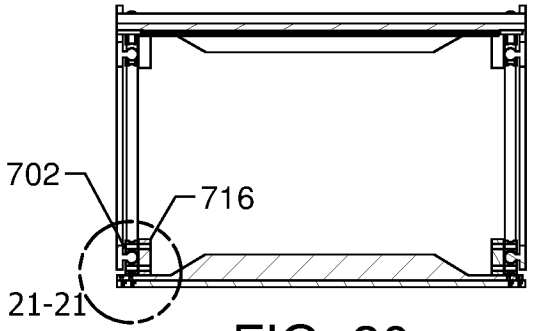


FIG. 20

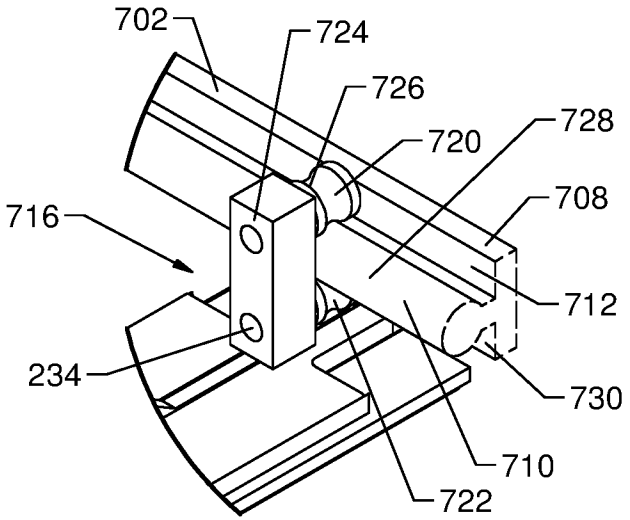


FIG. 19

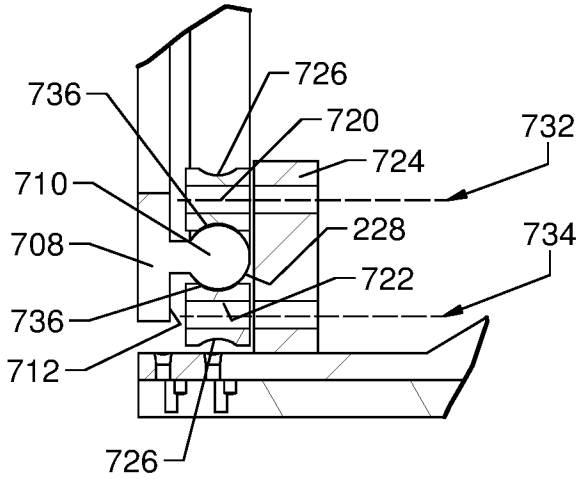


FIG. 21

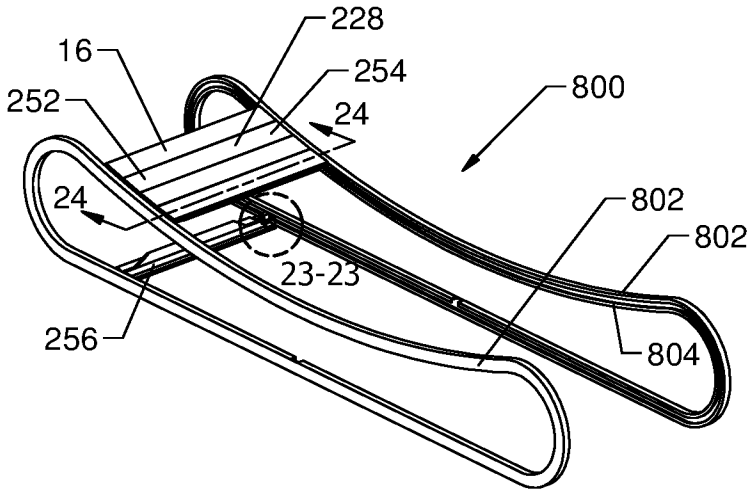


FIG. 22

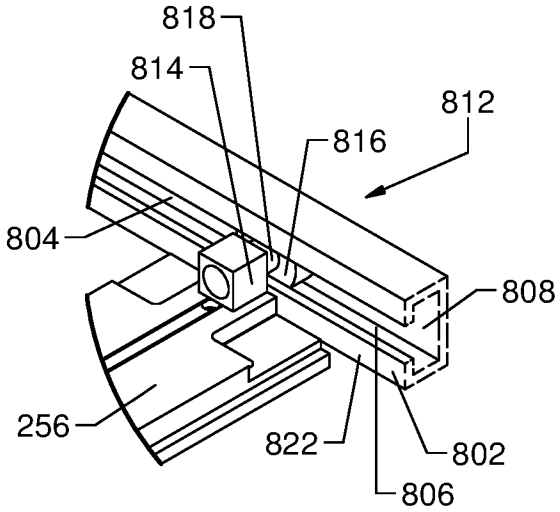


FIG. 23

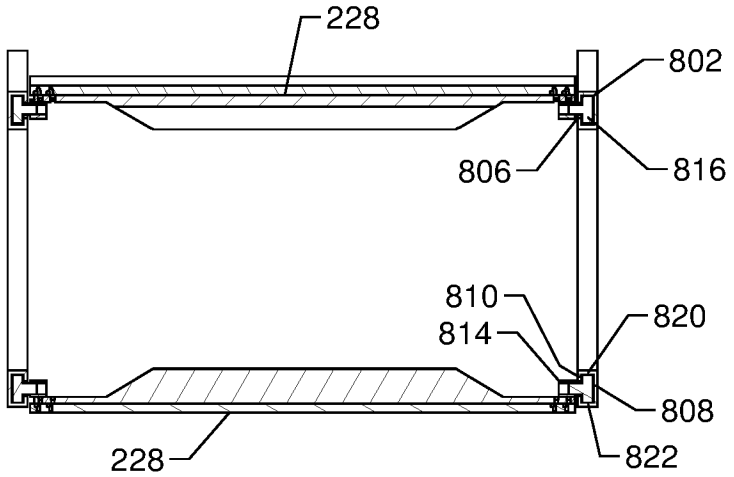


FIG. 24

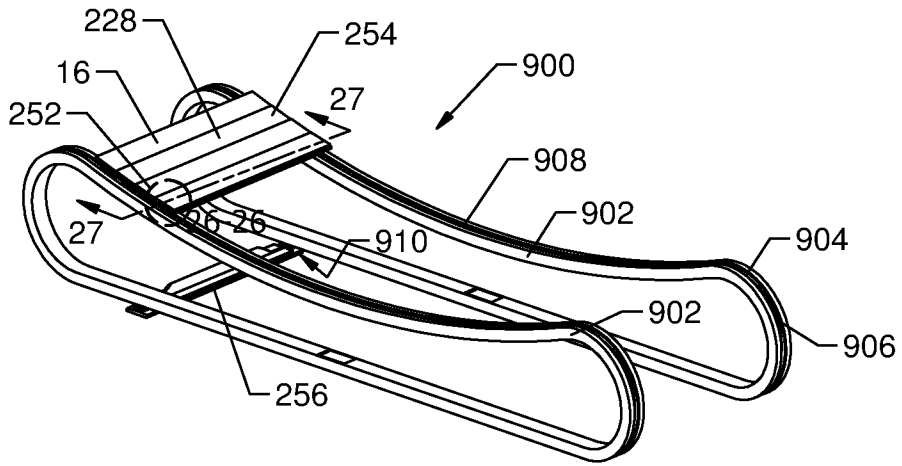


FIG. 25

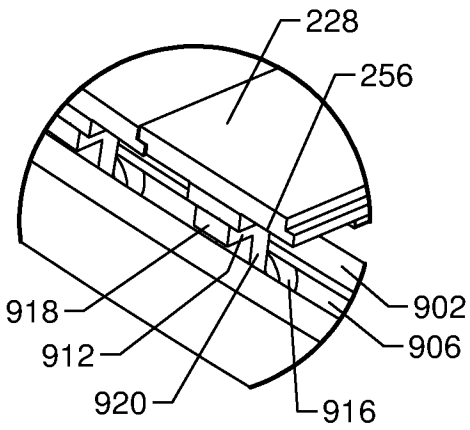


FIG. 26

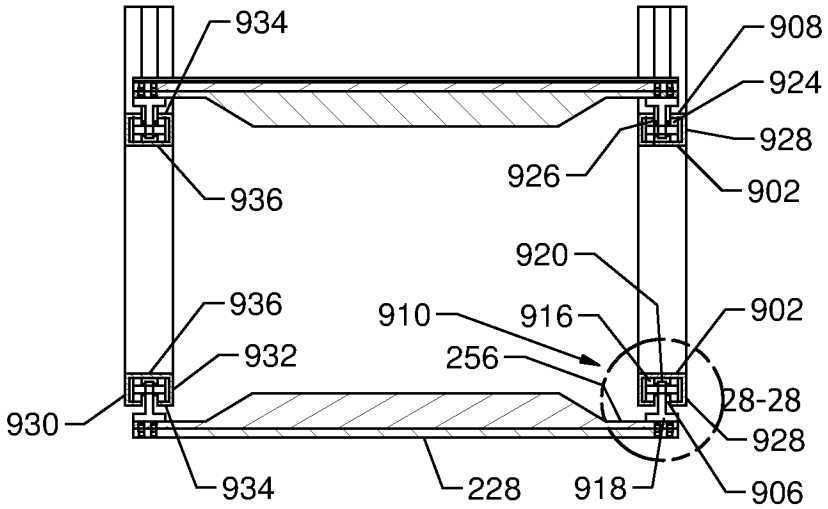


FIG. 27

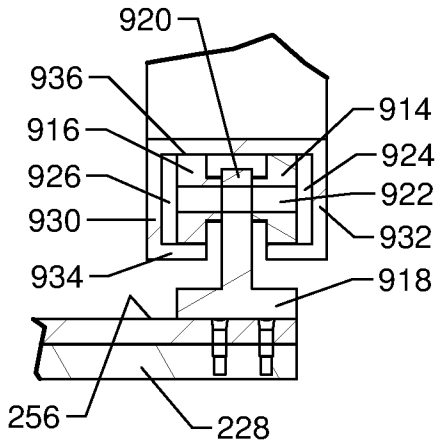
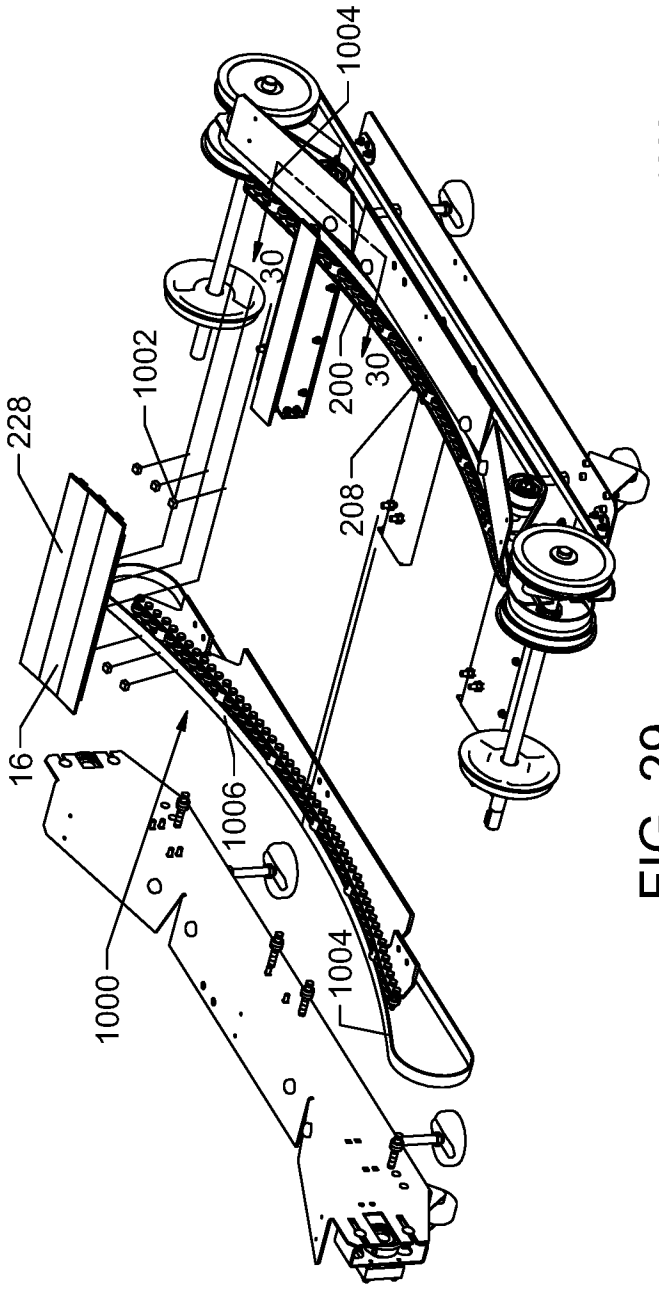


FIG. 28


228
1002
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1004
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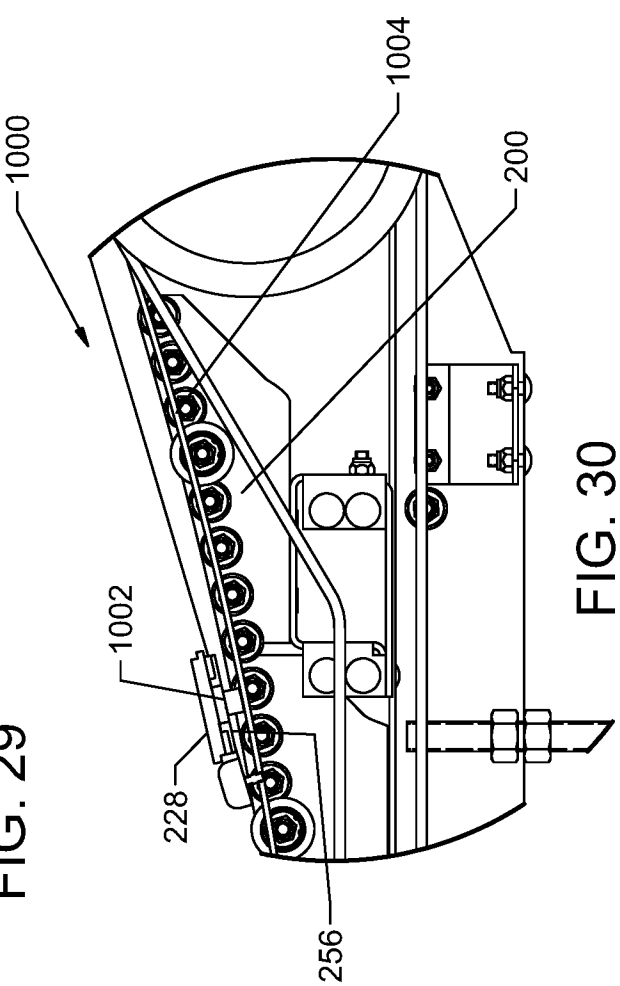
FIG. 29


1000
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256

FIG. 30

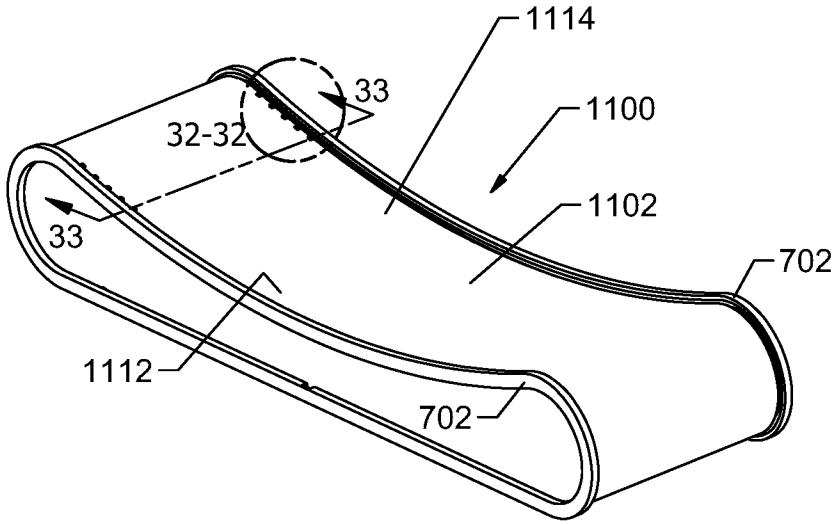


FIG. 31

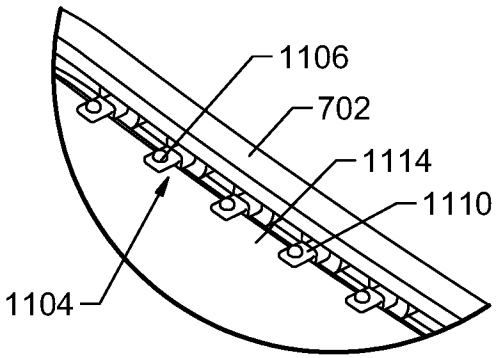


FIG. 32

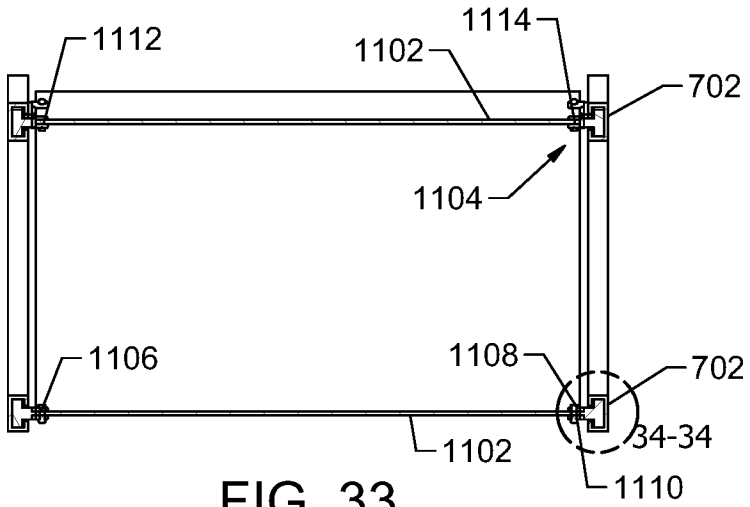


FIG. 33

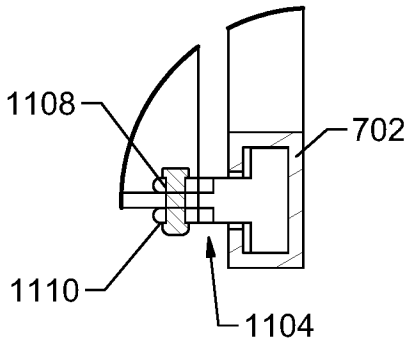


FIG. 34

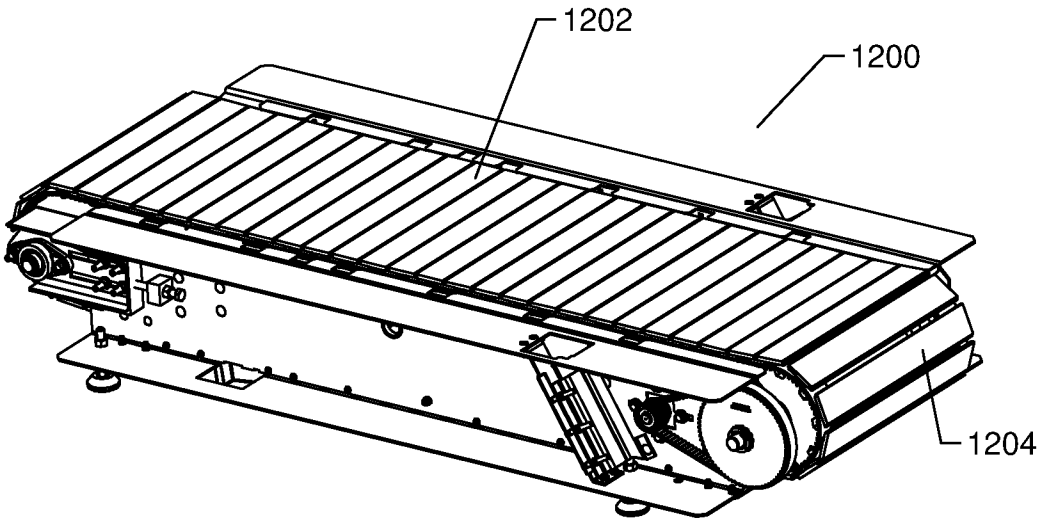
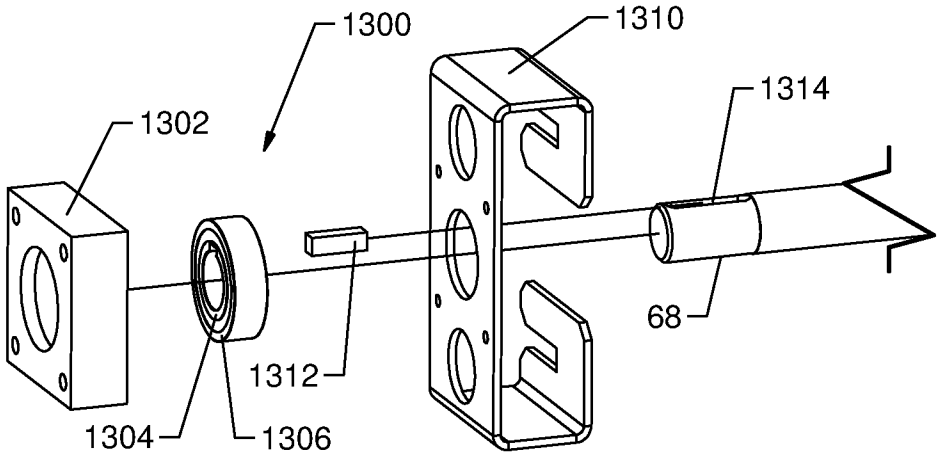


FIG. 35



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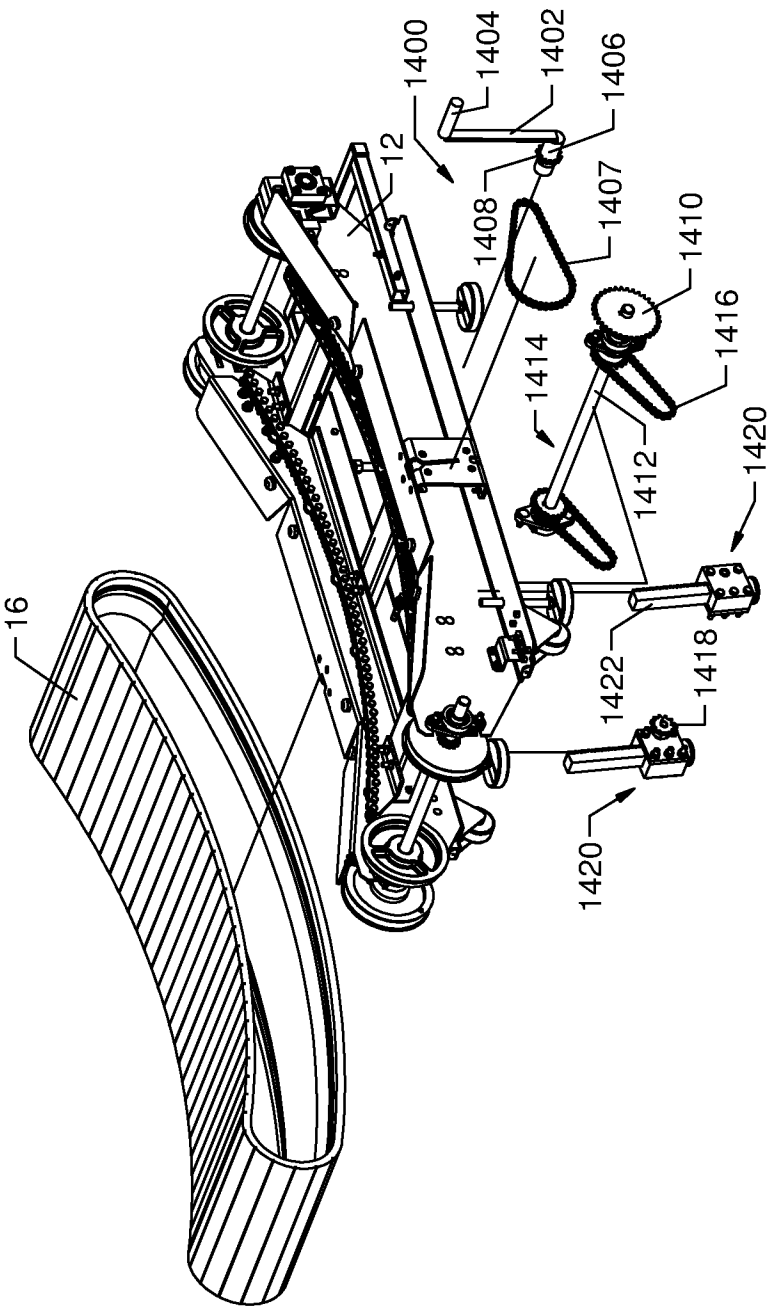
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FIG. 37

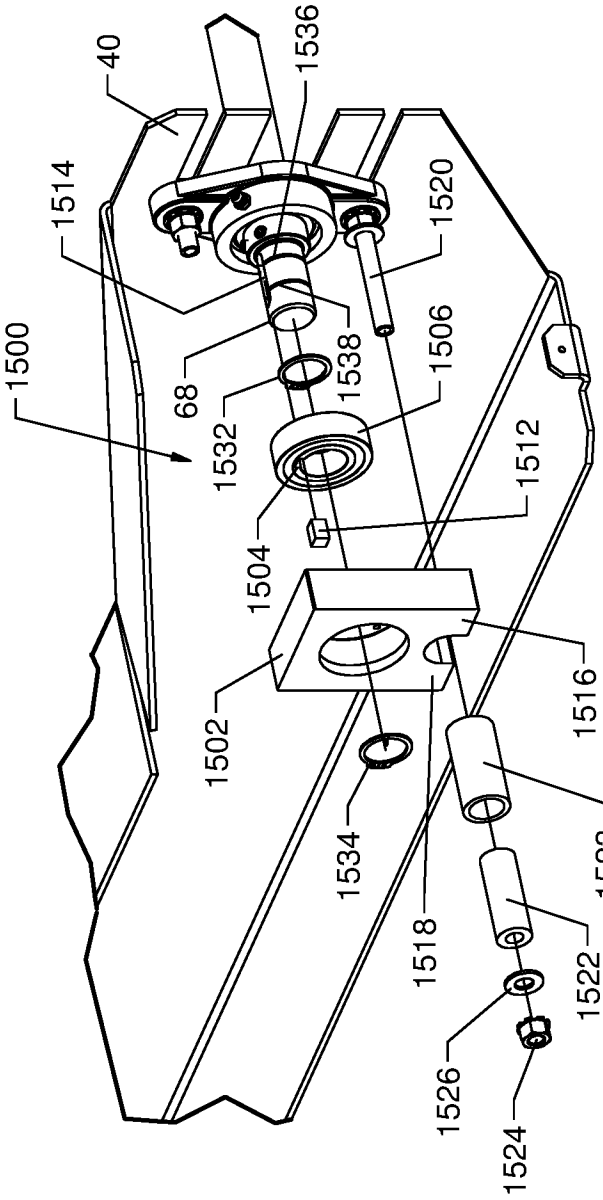
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FIG. 38

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	097208-0190

Title of Invention	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME

As the below named inventor, I hereby declare that:

This declaration is directed to:

☐ The attached application, or

☒ United States application or PCT international application number 14/076,912 filed on 11/11/2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Douglas G. Bayerlein Date (Optional): _____

Signature: Douglas G Bayerlein

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	097208-0190

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LEGAL NAME OF INVENTOR

Inventor: Vance E. Emons Date (Optional): 11/25/2013

Signature: Vance E Emons

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	097208-0190

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LEGAL NAME OF INVENTOR

Inventor: Nicholas A. Oblamski Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	097208-0190

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LEGAL NAME OF INVENTOR

Inventor: Scott D. Hoerig Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

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LEGAL NAME OF INVENTOR

Inventor: Matthew J. Zank Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	097208-0190

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I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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LEGAL NAME OF INVENTOR

Inventor: Robert L. Zimpel Date (Optional): _____

Signature: _____

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

PTO/AIA/01 (modified)

DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)	097208-0190

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This declaration is directed to:

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☒ United States application or PCT international application number 14/076,912 filed on 11/11/2013.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

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LEGAL NAME OF INVENTOR

Inventor: Joel W. Richards Date (Optional): 11/27/13

Signature: Joel Richards

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

4826-3764-5691.1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Douglas G. Bayerlein
Title:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
Application No.:	Not yet assigned
Filing Date:	Herewith
Examiner:	Not yet assigned
Art Unit:	Not yet assigned
Confirmation No.:	Not yet assigned

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

Applicant requests that, in accordance with 37 CFR §1.98(d), the Examiner review all applications relied on for an earlier effective filing date under 35 U.S.C. 120, including application no. PCT/US10/27543, filed 3/16/2010; application no. 13/235,065, filed 9/16/2011; application no. 14/076912, filed 11/11/2013; application no. 14/832,708, filed 8/21/2015, for copies of references of record therein that are not being provided here; although Applicant would be pleased to provide copies of any such documents at the Examiner's request.

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

TIMING OF THE DISCLOSURE

The listed documents are being submitted in compliance with 37 CFR §1.97(b), within three (3) months of the filing date of the application.

Although Applicant believes that no fee is required, the Commissioner is hereby authorized to charge any additional fees which may be due to Deposit Account No. 19-0741.

Respectfully submitted,

Date: April 20, 2018

By: /R.J. McKenna/

FOLEY & LARDNER LLP
Customer Number: 26371
Telephone: (414) 297-5723
Facsimile: (414) 297-4900

Richard J. McKenna
Attorney for Applicant
Registration No. 35,610

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	Not yet assigned
Date Submitted: April 20, 2018				**Filing Date**	Herewith
				First Named Inventor	Douglas G. Bayerlein
				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
Sheet	1	of	11	Attorney Docket Number	097208-0226

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	1,211,765	01-09-1917	SCHMIDT	
	A2	2002/0147079-A1	10-10-2002	KALNBACH, DOUGLAS ALLEN	
	A3	2003/0186787	10-02-2003	WU ET AL.	
	A4	2004/0018917	01-29-2004	CORBALIS ET AL.	
	A5	2004/0077465	04-22-2004	SCHMIDT, DAVID	
	A6	2005/0009668	01-13-2005	SAVETTIERE ET AL.	
	A7	2005/0209059	09-22-2005	CRAWFORD ET AL.	
	A8	2006/0003871	01-05-2006	HOUGHTON ET AL.	
	A9	2006/0003872	01-05-2006	CHILES ET AL.	
	A10	2006/0122035	06-08-2006	FELIX, RONNIE D.	
	A11	2006/0287165-A1	12-21-2006	PASQUALIN, GIORGIO GIULIANO	
	A12	2007/0123396	05-31-2007	ELLIS, JOSEPH K.	
	A13	2008/0020907-	01-24-2008	LIN, CHIN-TA	
	A14	2008/0287266-A1	11-20-2008	SMITH, ARLAN R.	
	A15	2009/0170666-A1	07-02-2009	CHIANG, YUNG-CHANG	
	A16	2009/0215589-A1	08-27-2009	SCHOENENBERGER, WILLI	
	A17	2009/0280960	11-12-2009	TIAN, PENG FENG	
	A18	2010/0216607-	08-26-2010	MUELLER, KARL	
	A19	2011/0266091	11-03-2011	TAYLOR, WILLIAM	
	A20	2012/0019973	01-26-2012	EHRMANTRAUT ET AL.	
	A21	2012/0157267-A1	06-21-2012	LO, CHIU HSIANG	
	A22	2012/0231934-A1	09-13-2012	LO, CHIU HSIANG	
	A23	2012/0270705-A1	10-25-2012	LO, CHIU HSIANG	
	A24	2014/0011642	01-09-2014	ASTILEAN, ALEX	
	A25	2014/0080679	03-20-2014	BAYERLEIN ET AL.	
	A26	2014/0087922	03-27-2014	BAYERLEIN ET AL.	
	A27	2015/0306456-	10-29-2015	PASINI ET AL.	
	A28	2015/0367175-	12-24-2015	ALESSANDRI ET AL.	
	A29	2016/0023039	01-28-2016	CEI, DANIELE	
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Sheet	9	of	11	Attorney Docket Number	097208-0226

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A210	Reply in Opposition to D126 filed November 6, 2015 and Exhibits A and B.	
	A211	Reply Memorandum of Law in Further Support of Plaintiffs' Motion for Leave to Amend the Second Amended Complaint filed July 7, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 13 pages.	
	A212	Response in Opposition re [117] First Motion to Amend Second Amended Complaint filed July 7, 2015, 2 pages.	
	A213	Response in Opposition to [110] Motion to Amend-Corret-Supplement filed June 15, 2015, 2 pages.	
	A214	Revised Answer to Counterclaims filed December 12, 2014 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 5 pages.	
	A215	ROSS ET AL., The Effects of Treadmill Sprint Training and Resistance Training on Maximal Running Velocity and Power, National Strength and Conditioning Association, March 2009, 10 pages.	
	A216	Rule 56.1 Counter-Statement by Plaintiffs Speedfit LLC, and Aurel A. Astilean filed June 6, 2017, 13 pages.	
	A217	Second Amended Complaint filed February 17, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 18 pages.	
	A218	SIROTIC ET AL., Physiological and Performance Test Correlates of Prolonged, High-Intensity, Intermittent Running Performance in Moderately Trained Women Team Sport Athletes, Journal of Strength and Conditioning Research, 2007, 7 pages.	
	A219	SIROTIC ET AL., The Reliability of Physiological and Performance Measures During Simulated Team-Sport Running on a Non-Motorised Treadmill, Journal of Science and Medicine in Sport, April 11, 2007, 10 pages.	
	A220	Soccer International, The Red Devil's in the Details, dated June 2010, 4 pages.	
	A221	Speedfit LLC's Opening Claim Construction Brief, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, March 26, 2018, 9 pages.	
	A222	SPEEDFIT, video produced to Woodway at least by November 10, 2014 in litigation, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., No. 2:13-cv-01276-KAM-AKT, 21 pages of screenshot excerpts.	
	A223	SPEEDFIT, video produced to Woodway at least by November 10, 2014 in litigation, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., No. 2:13-cv-01276-KAM-AKT, 23 pages of screenshot excerpts.	
	A224	Supplemental Complaint filed February 10, 2017 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc.	
	A225	Supplemental Declaration of Kadie M. Jelenchick filed June 6.	
	A226	The Australian Competition & Consumer Commission's Mandatory Safety Standard For Treadmills (Supplier Guide), 2009, 20 pps.	

Examiner Signature		Date Considered	

Substitute for form 1449/PTO				*Complete if Known*	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	Not yet assigned
				Filing Date	Herewith
Date Submitted: April 20, 2018				**First Named Inventor**	Douglas G. Bayerlein
				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
Sheet	10	of	11	Attorney Docket Number	097208-0226

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A227	The Woodway Force Brochure, The Best Way to Train for Speed & Athletic Power, dated May 5, 2005, 2 pages.	
	A228	Third Amended Complaint filed October 23, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc. and Exhibits A - H.	
	A229	Woodway USA, Inc.'s Answer, Affirmative Defenses, and Counterclaims to Plaintiffs' First Amended Complaint filed October 24, 2014 and Exhibits 1 and 2.	
	A230	Woodway USA, Inc.'s Answer, Affirmative Defenses, and Counterclaims to Plaintiffs' Second Amended Complaint filed March 6, 2015, 17 pages.	
	A231	Woodway USA, Inc.'s Answer, Affirmative Defenses, and Counterclaims to Plaintiffs' Supplemental Complaint filed February 24, 2017, 18 pages.	
	A232	Woodway USA, Inc.'s List of Claim Terms to be Considered and Proposed Constructions, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, Exhibit D, March 26, 2018, 4 pages.	
	A233	Woodway USA, Inc.'s Memorandum in response to Plaintiffs' Motion for Leave to Amend the Second Amended Complaint filed July 7, 2015, 16 pages.	
	A234	Woodway USA, Inc.'s Memorandum in Response to Plaintiffs' Motion Under 35 USC 256 to Correct Inventorship of USPN 8,308,619 and USPN 8,342,016 filed June 15, 2015, 20 pages.	
	A235	Woodway USA, Inc.'s Memorandum of Law in Support of Its Motions for Summary Judgment of Invalidity of US Patent Nos. 8,308,619 and 8,343,016 and Opening Claim Construction Brief filed June 6, 2017, 38 pages.	
	A236	Woodway USA, Inc.'s Opening Claim Construction Brief, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, March 26, 2018, 15 pages.	
	A237	Woodway USA, Inc.'s Patents, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, Exhibit B, March 26, 2018, 3 pages.	
	A238	Woodway USA, Inc.'s Reply Claim Construction Brief, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, March 26, 2018, 9 pages.	
	A239	Woodway USA, Inc.'s Reply Memorandum in Support of Its Motion to Dismiss filed November 25, 2017, 24 pages.	
	A240	Woodway USA, Inc.'s Responsive Claim Construction Brief filed July 28, 2017, 19 pages.	
	A241	Woodway, Curve 3.0 Specification, May 25, 2011, 1 page.	
	A242	Woodway, Curve Specification, May 24, 2011, 1 page.	
	A243	Woodway, Curve Specification, May 25, 2011, 1 page.	

Examiner Signature		Date Considered	

Substitute for form 1449/PTO **INFORMATION DISCLOSURE STATEMENT BY APPLICANT** Date Submitted: April 20, 2018 *(use as many sheets as necessary)*				***Complete if Known***	
				Application Number	Not yet assigned
				Filing Date	Herewith
				First Named Inventor	Douglas G. Bayerlein
				Art Unit	Not yet assigned
				Examiner Name	Not yet assigned
Sheet	11	of	11	Attorney Docket Number	097208-0226

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A244	Woodway, Curve XL Specification, May 18, 2011, 1 page.	
	A245	Woodway, Force Specification, April 8, 2008, 1 page.	
	A246	Woodway, Force Specification, May 2, 2011, 1 page.	
	A247	Woodway, Force Specification, May 2, 2012, 1 page.	
	A248	Woodway's USA, Inc.'s Reply in Support of its Motion for Summary Judgment of Invalidity of US Patent Nos. 8,308,619 and 8,343,016 and Reply Claim Construction Brief filed June 6, 2017, 16 pages.	
	A249	Woodway's Opposition to Defendant's Notice of Motion and Motion to Dismiss Case and Transfer Litigation to EDNY, Woodway USA, Inc. v. Aurel A. Astilean, Civ. Dkt. No. 2:13-cv-00681-WERC (E.D. WI), October 18, 2013, 22 pages.	
	A250	Woodways USA, Inc.'s Supplemental Rule 56.1 Statement of Undisputed Material Facts and Responses to Rule 56.1 Counterstatement by Plaintiffs Speedfit LLC and Aurel A. Astilean filed June 6, 2017, 20 pages.	

Examiner Signature		Date Considered	

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
First Named Inventor/Applicant Name:	Douglas G. Bayerlein
Filer:	Richard J. McKenna/Laura Buhs
Attorney Docket Number:	097208-0226

Filed as Small Entity

Filing Fees for Track I Prioritized Examination - Nonprovisional Application under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
REQUEST FOR PRIORITIZED EXAMINATION	2817	1	2000	2000
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	10	50	500
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	1	230	230

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous-Filing:				
PROCESSING FEE, EXCEPT PROV. APPLS.	2830	1	70	70
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**3585**

Electronic Acknowledgement Receipt

EFS ID:	32396459
Application Number:	15958339
International Application Number:	
Confirmation Number:	4765
Title of Invention:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
First Named Inventor/Applicant Name:	Douglas G. Bayerlein
Customer Number:	26371
Filer:	Richard J. McKenna/Laura Buhs
Filer Authorized By:	Richard J. McKenna
Attorney Docket Number:	097208-0226
Receipt Date:	20-APR-2018
Filing Date:	
Time Stamp:	14:07:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$3585
RAM confirmation Number	042318INTEFSW14082800
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	097208-0226_Transmittal.pdf	95499 7672e2ab24d5e4f0abb46a2d820053b977f26b12	no	3
Warnings:					
Information:					
2	TrackOne Request	097208-0226_Track1.pdf	119395 880a9e0c6569b6e563a08e44f6fa5a30bab205f0	no	1
Warnings:					
Information:					
3	Application Data Sheet	097208-0226_ADS.pdf	1823539 77f5b66479baf602c3fea33638ec2f0a5afa4b64	no	11
Warnings:					
Information:					
4		097208-0226_Application.pdf	223987 53409709deeda3ddfae15a11e14c2617bcce49b9	yes	54

Multipart Description/PDF files in .zip description

Document Description	Start	End
Specification	1	48
Claims	49	53
Abstract	54	54

Warnings:					
Information:					
5	Drawings-only black and white line drawings	097208-0226_Figures_Processed.pdf	1197354 4beb1dc77fb82ae2727962229d52b65140e75e2f	no	20

Warnings:					
Information:					
6	Oath or Declaration filed	097208-0226_ParentDeclarations.pdf	3443476 566e44d7171c453f95db8b53c8978379428fa5e4	no	7
Warnings:					
Information:					
7	Transmittal Letter	097208-0226_IDS.pdf	100666 a907fd7ed29da1aa309341a3b15ba1d7afa8dc5b	no	2
Warnings:					
Information:					
8	Information Disclosure Statement (IDS) Form (SB08)	097208-0226_SB08.pdf	144804 aea4da418031fa627f02d6c7c1d569879880bb7f	no	11
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
9	Fee Worksheet (SB06)	fee-info.pdf	41800 b22aadf9c36085b4049e6f81d1a742d085f2a315	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	7190520		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name: Douglas G. Bayerlein

Applicant: Woodway USA, Inc.

Title: MANUAL TREADMILL AND METHODS OF OPERATING THE SAME

Prior Appl. No.: 14/832,708

Prior Appl. Filing Date: 8/21/2015

CONTINUING PATENT APPLICATION TRANSMITTAL LETTER

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Transmitted herewith for filing under 37 C.F.R. § 1.53(b) is a:

[**X**] Continuation [ ] Division [ ] Continuation-In-Part (CIP)

of the above-identified copending prior application in which no patenting, abandonment, or termination of proceedings has occurred. Priority to the above-identified prior application is hereby claimed under 35 U.S.C. § 120 for this continuing application. The entire disclosure of the above-identified prior application is considered as being part of the disclosure of the accompanying continuing application and is hereby incorporated by reference therein.

[**X**] Applicant claims small entity status under 37 CFR 1.27.

Enclosed are:

[**X**] Description, Claims, and Abstract (54 pages).

[**X**] Formal drawings (20 sheets, Figures 1-38).

[**X**] PTO/SB/424 - Request for Prioritized Examination (1 page).

[**X**] Application Data Sheet (37 CFR 1.76) (11 pages).

[**X**] Executed Declarations (7 pages).

[**X**] Information Disclosure Statement (2 pages).

[**X**] Form PTO-SB08 (11 pages).

The adjustment to the number of sheets for EFS-Web filing follows:

Number of Sheets		**EFS-Web Adjustment**	**Number of Sheets for EFS-Web**
74	x	75%	56

The filing fee is calculated below at the small entity rate:

	Number Filed		**Included in Basic Fee**		**Extra**		Rate		Fee Totals
Basic Filing Fee							$75.00	=	$75.00
Search Fee							$330.00		$330.00
Examination Fee							$380.00		$380.00
Sequence Listing fee									$0.00
Size Fee	56	-	100	=	0	x	$200.00		$0.00
Total Claims:	30	-	20	=	10	x	$50.00	=	$500.00
Independents:	4	-	3	=	1	x	$230.00	=	$230.00
If any Multiple Dependent Claim(s) present:						+	$410.00	=	$0.00
Surcharge under 37 CFR 1.16(e) for late filing of Executed Declaration or late payment of filing fee						+	$80.00	=	$0.00
Prioritized Examination fee (Track I) under 37 C.F.R. § 1.17 (c)									$2,000.00
Processing Fee (Track I) under 37 C.F.R. § 1.17 (i)									$70.00
TOTAL FILING FEE:								=	$3,585.00
Assignment Recordation Fee:						+	$50.00	=	$0.00
Processing Fee under 37 CFR 1.17(i) for Late Filing of English Translation of Application:						+	$70.00	=	$0.00
TOTAL FEE								=	$3,585.00

The above-identified fees of $3,585.00 are being paid by credit card via EFS-Web.

The Commissioner is hereby authorized to charge any fees required to secure a filing date and maintain pendency of this application to Deposit Account No. 19-0741.

Respectfully submitted,

Date: April 20, 2018

By: /R.J. McKenna/

FOLEY & LARDNER LLP
Customer Number: 26371
Telephone: (414) 297-5723
Facsimile: (414) 297-4900

Richard J. McKenna
Attorney for Applicant
Registration No. 35,610

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
15/958,339	04/20/2018	3764	1515	097208-0226	30	4

CONFIRMATION NO. 4765

26371
FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

FILING RECEIPT

Date Mailed: 05/16/2018

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Douglas G. Bayerlein, Oconomowoc, WI;
Vance E. Emons, Hartland, WI;
Nicholas A. Oblamski, Waukesha, WI;
Scott D. Hoerig, Brookfield, WI;
Matthew J. Zank, Milwaukee, WI;
Robert L. Zimpel, Menomonee Falls, WI;
Joel W. Richards, Wauwatosa, WI;

Applicant(s)

Woodway USA, Inc., Waukesha, WI;

Assignment For Published Patent Application

Woodway USA, Inc., Waukesha, WI

Power of Attorney: The patent practitioners associated with Customer Number 26371

Domestic Priority data as claimed by applicant

This application is a CON of 14/832,708 08/21/2015
which is a CON of 14/076,912 11/11/2013 PAT 9114276
which is a CON of 13/235,065 09/16/2011 ABN
which is a CIP of PCT/US10/27543 03/16/2010
which claims benefit of 61/161,027 03/17/2009

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

Applicant may provide or rescind an authorization for access using Form PTO/SB/39 or Form PTO/SB/69 as appropriate.

If Required, Foreign Filing License Granted: 05/14/2018

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 15/958,339**

Projected Publication Date: 08/23/2018

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

MANUAL TREADMILL AND METHODS OF OPERATING THE SAME

Preliminary Class

482

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor

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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 15/958,339

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	30 minus 20 =	* 10	x 50 =	500	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	4 minus 3 =	* 1	x 230 =	230			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1515		TOTAL	

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

To: ipdocketing@foley.com,,
From: PAIR_eOfficeAction@uspto.gov
Cc: PAIR_eOfficeAction@uspto.gov
Subject: Private PAIR Correspondence Notification for Customer Number 26371

May 16, 2018 04:10:52 AM

Dear PAIR Customer:

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UNITED STATES

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Application	Document	Mailroom Date	Attorney Docket No.
15958339	APP.FILE.REC	05/16/2018	097208-0226

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PATENT APPLICATION INFORMATION RETRIEVAL SYSTEM

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/958,339	04/20/2018	Douglas G. Bayerlein	097208-0226	4765

26371 7590 05/30/2018

FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109

EXAMINER	

ART UNIT	PAPER NUMBER
3764	

NOTIFICATION DATE	DELIVERY MODE
05/30/2018	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Commissioner for Patents
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Doc Code:
TRACK1.GRANT

Decision Granting Request for Prioritized Examination (Track I or After RCE)	Application No.:15/958,339

1. THE REQUEST FILED April 20, 2018 IS **GRANTED.**

The above-identified application has met the requirements for prioritized examination
- A. ☒ for an original nonprovisional application (Track I).
- B. ☐ for an application undergoing continued examination (RCE).

2. **The above-identified application will undergo prioritized examination.** The application will be accorded special status throughout its entire course of prosecution until one of the following occurs:

- A. filing a **petition for extension of time** to extend the time period for filing a reply;
- B. filing an **amendment to amend the application to contain more than four independent claims, more than thirty total claims**, or a multiple dependent claim;
- C. filing a **request for continued examination**;
- D. filing a notice of appeal;
- E. filing a request for suspension of action;
- F. mailing of a notice of allowance;
- G. mailing of a final Office action;
- H. completion of examination as defined in 37 CFR 41.102; or
- I. abandonment of the application.

Telephone inquiries with regard to this decision should be directed to Kimberly Inabinet at 571-272-4618.

/Kimberly Inabinet/ Paralegal Specialist, Office of Petitions

U.S. Patent and Trademark Office
PTO-2298 (Rev. 02-2012)

Office of Petitions: Decision Count Sheet

Mailing Month: 5

Application No.: 15958339

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: Kimberly Inabinet

Count (1) - Palm Credit 15958339

Decision: GRANT

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: 643 - Track One request

Notes:

Count (2)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a

FINANCE WORK NEEDED
☐ Select Check Box for YES

Decision Type: NONE

Notes:

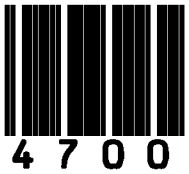
Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: 5/24/2018

Office of Petitions Internal Document - Ver. 5.0

Office of Petitions: Routing Sheet



Application No. 15958339

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

- [X] **GRANTED**
- [ ] **DISMISSED**
- [ ] **DENIED**

To: ipdocketing@foley.com,,
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May 30, 2018 05:51:35 AM

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Application	Document	Mailroom Date	Attorney Docket No.
15958339	PET.OP.DEC	05/30/2018	097208-0226
	TRACK1.GRANT	05/30/2018	097208-0226

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Atty. Dkt. No. 097208-0226

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Douglas G. Bayerlein
Title:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
Application No.:	15/958,339
Filing Date:	4/20/2018
Examiner:	Deichl, Jennifer M.
Art Unit:	3764
Confirmation No.:	4765

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicants respectfully request that each listed document be considered by the Examiner and bc made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

Applicant requests that, in accordance with 37 CFR §1.98(d), the Examiner review all applications relied on for an earlier effective filing date under 35 U.S.C. 120, including application no. PCT/US10/27543, filed 3/16/2010; application no. 13/235,065, filed 9/16/2011; application no. 14/076912, filed 11/11/2013; application no. 14/832,708, filed 8/21/2015, for copies of references of record therein that arc not being provided here; although Applicant would be pleased to provide copies of any such documents at the Examiner's request.

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

CONCISE EXPLANATION OF RELEVANCE

Regarding item A21, there appear to be two available versions of the Wreckreation Video. One version which is currently commercially available from Amazon and was previously submitted to the Patent Office in the form of multiple PDF still shots of the video and a second, slightly different version provided to the Applicant by a third party and which is being submitted in video format as part of the present SB-08. However, Applicant cannot confirm that the entirety of the video of item A21 was publicly broadcast. Applicant has reason to believe that the video from 0:00 to approximately 8:13 was publicly broadcast on February 24, 2009, but cannot confirm that the remainder of this video was ever publicly broadcast.

TIMING OF THE DISCLOSURE

The listed documents are being submitted in compliance with 37 CFR §1.97(b), within three (3) months of the filing date of the application.

Although Applicant believes that no fee is required, the Commissioner is hereby authorized to charge any additional fees which may be due to Deposit Account No. 19-0741.

Respectfully submitted,

Date /6-15-2018/

By /Alexander J. Neuworth/

FOLEY & LARDNER LLP
Customer Number: 26371
Telephone: (414) 319-7029
Facsimile: (414) 297-4900

Attorneys for Applicant

Richard J. McKenna
Registration No. 35,610

Alexander J. Neuworth
Registration No. 72,021

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	15/958,339
Date Submitted: June 15, 2018				**Filing Date**	4/20/2018
(use as many sheets as necessary)				**First Named Inventor**	Douglas G. Bayerlein
				Art Unit	3764
				Examiner Name	Deichl, Jennifer M.
Sheet	1	of	1	Attorney Docket Number	097208-0226

USPTO MAIL JUN 15 2018 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	2007/0021278	01-25-2007	PAN ET AL.	
	A2	2007/0298935	12-27-2007	BADARNEH ET AL.	
	A3	2008/0119332	05-22-2008	ROMAN, MAURIZIO	
	A4	2009/0156363	06-18-2009	GUIDI ET AL.	
	A5	2012/0264569	10-18-2012	ESCOBEDO ET AL.	
	A6	2014/0171272	06-19-2014	HAWKINS ET AL.	
	A7	2015/0119202	04-30-2015	HENDRICKSON ET AL.	
	A8	2017/0113093	04-27-2017	BELLAVISTA ET AL.	
	A9	5,031,901	07-16-1991	SAARINEN, SUVI-EVI	
	A10	5,094,447	03-10-1992	WANG, LEAO	
	A11	5,145,480	09-08-1992	WANG, KUO-LIANG	
	A12	5,310,392	05-10-1994	LO, PETER K.	
	A13	7,862,483	01-04-2011	HENDRICKSON ET AL.	
	A14	8,585,561	11-19-2013	WATT ET AL.	
	A15	8,876,668	11-04-2014	HENDRICKSON ET AL.	
	A16	9,044,635	06-02-2015	LULL, ANDREW P.	
	A17	9,233,272	01-12-2016	VILLANI ET AL.	
	A18	9,254,409	02-09-2016	DALEBOUT ET AL.	
	A19	9,314,667	04-19-2016	PUERSCHEL, BERND	
	A20	9,974,997	05-22-2018	CEI, DANIELE	

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A21	SPEEDFIT, video produced to Woodway at least by April 28, 2015 in litigation, a copy of which is submitted herewith on DVD, Speedfit LLC et al. v. Woodway USA, Inc., Docket No. 2:13-cv-01276-KAM-AKT.	
	A22	Minute Order Regarding Claim Construction, Speedfit LLC v. Woodway, Docket No. 2:17-cv-00768-KAM-AKT, June 13, 2018, 2 pages.	

Examiner Signature		Date Considered	

From: ecf_bounces@nyed.uscourts.gov
To: nobody@nyed.uscourts.gov
Subject: Activity in Case 2:17-cv-00768-KAM-AKT Speedfit LLC v. Woodway USA, Inc. Markman Hearing
Date: Wednesday, June 13, 2018 10:44:19 AM

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U.S. District Court

Eastern District of New York

Notice of Electronic Filing

The following transaction was entered on 6/13/2018 at 11:43 AM EDT and filed on 6/13/2018

Case Name: Speedfit LLC v. Woodway USA, Inc.
Case Number: 2:17-cv-00768-KAM-AKT
Filer:
Document Number: No document attached

Docket Text:
Minute Entry and Order for proceedings held before Judge Kiyo A. Matsumoto:*Markman* Hearing held on 6/13/2018. Appearances: for plaintiff, John F. Vodopia, Esq.; for defendant, Kadie M. Jelenchick, Esq. The parties presented argument as to the meaning of the term "coupled" in U.S. Patent No. 9,114,276 (the "276 Patent"). Plaintiff conceded on the record that defendant's proposed construction is proper. The court ORDERED as follows: for the reasons stated on the record at the hearing, the term "coupled," as recited in the '276 Patent, shall be construed as "the joining of two members directly or indirectly to one another." The parties are respectfully directed to proceed with discovery pursuant to the scheduling order entered by the Honorable A. Kathleen Tomlinson, United States Magistrate Judge, and under Judge Tomlinson's supervision. Following the close of discovery, the court will hold a hearing regarding inventorship of the patents-in-suit. Ordered by Judge Kiyo A. Matsumoto on 6/13/2018. (Court Reporter Anthony Mancuso.) (Flores, Diego)

2:17-cv-00768-KAM-AKT Notice has been electronically mailed to:

John F. Vodopia jvodopia@gmail.com

Kadie M. Jelenchick kjelenchick@foley.com, mpechulis@foley.com, smaass@foley.com

Jeffrey N. Costakos jcostakos@foley.com, smaass@foley.com

Matthew Peters mpeters@foley.com

2:17-cv-00768-KAM-AKT Notice will not be electronically mailed to:

ARTIFACT SHEET

Enter artifact number below. Artifact number is application number + artifact type code (see list below) + sequential letter (A, B, C …). The first artifact folder for an artifact type receives the letter A, the second B, etc.. Examples: 59123456PA, 59123456PB, 59123456ZA, 59123456ZB

15958339UA

Indicate quantity of a single type of artifact received but not scanned. Create individual artifact folder/box and artifact number for each Artifact Type.

[1] CD(s) containing:

computer program listing [ ]
Doc Code: Artifact Artifact Type Code: P

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Doc Code: Artifact Artifact Type Code: S

content unspecified or combined [1]
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voluntary electronic submission [ ]
Doc Code: Artifact Artifact Type Code: T

[ ] Stapled Set(s) Color Documents or B/W Photographs
Doc Code: Artifact Artifact Type Code: C

[ ] Microfilm(s)
Doc Code: Artifact Artifact Type Code: F

[ ] Video tape(s)
Doc Code: Artifact Artifact Type Code: V

[ ] Model(s)
Doc Code: Artifact Artifact Type Code: M

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August 31, 2016

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
15/958,339	04/20/2018	Douglas G. Bayerlein	097208-0226	4765

26371 7590 07/19/2018

FOLEY & LARDNER LLP
3000 K STREET N.W.
SUITE 600
WASHINGTON, DC 20007-5109
UNITED STATES OF AMERICA

EXAMINER	
DEICHL, JENNIFER M	

ART UNIT	PAPER NUMBER
3764	

NOTIFICATION DATE	DELIVERY MODE
07/19/2018	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 15/958,339	Applicant(s) BAYERLEIN ET AL.	
	Examiner Jennifer M. Deichl	Art Unit 3764	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04/20/2018*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

5)☒ Claim(s) *1-30* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-30* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☒ The drawing(s) filed on *04/20/2018* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some** c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4,6-14, 17-21, and 23-29 is/are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Bostic (US 5,492,517) in view of Cutter (US 3,642,279) and Schonenberger (4,334,676).

Regarding claim 1, Bostic teaches a manually powered treadmill, comprising: a frame (15) having a front end and a rear end positioned opposite the front end; a front shaft (55) coupled to the frame proximate the front end; a rear shaft (20) coupled to the frame proximate the rear end; a running belt; and a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to restrict movement of at least one of the running belt, the front shaft, and the rear shaft in a first rotational direction while permitting movement of the at least one of the running belt, the front shaft, and the rear shaft in a second rotational direction opposite the first rotational direction (one-way clutch; column 2 lines 54-56).

Bostic fails to teach the running belt having a curved running surface. Cutter teaches a manually powered treadmill comprising a running belt (30) having bearings supporting a curved running surface. It would have been obvious to one of ordinary skill in the art before the invention was made to modify the device taught by Bostic by providing the running belt in a curved orientation in order to provide for a more natural running experience (see Cutter, column 1 lines 24-70).

Bostic further fails to teach the running belt being supported by a plurality of bearings coupled to the frame. Schonenberger teaches a treadmill having a running belt supported by a plurality of bearings (12) for the purpose of supporting the belt along the length of the treadmill while providing a slightly resilient running surface (column 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device taught by Bostic by providing the bearings taught by Schonenberger in order to provide a supported, yet cushioned running surface to the user.

Regarding claim 2, Bostic teaches the frame includes a left side member, a right side member, and at least one cross-member extending between the left side member and the right side member (see Fig. 14). The combination of Bostic and Schonenberger yields a treadmill wherein the plurality of bearings includes a first plurality of bearings coupled to a left-side of the frame and a second plurality of bearings coupled to a right-side of the frame.

Regarding claim 3, the combination of Bostic, Cutter, and Schonenberger yields a treadmill wherein the first plurality of bearings and the second plurality of bearings each at least partially define a curved top profile, wherein the curved top profile substantially corresponds to at least a portion of the curved running surface.

Regarding claim 4, Bostic teaches the safety device comprises a one-way bearing (column 2 lines 54-64).

Regarding claim 6, Bostic teaches a braking system (40) coupled to the frame and configured to selectively resist the rotational movement of the running belt.

Regarding claim 7, Bostic teaches the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt (column 3 lines 27-33).

Regarding claim 8, Bostic teaches a manually powered treadmill, comprising: a frame (15); a front shaft assembly (25, 55) coupled to the frame; a rear shaft assembly (19, 20) coupled to the frame; a running belt (10) at least partially disposed about the front and rear shaft assemblies, and including a running surface; and a safety device for resisting rotation of at least one of the running belt, the front shaft assembly, and the rear shaft assembly in a first rotational direction while permitting rotation of at least one

of the running belt, the front shaft assembly, and the rear shaft assembly in a second rotational direction opposite the first rotational direction (one-way clutch; column 2 lines 54-56).

Bostic fails to teach the running belt having a curved running surface. Cutter teaches a manually powered treadmill comprising a running belt (30) having bearings supporting a curved running surface. It would have been obvious to one of ordinary skill in the art before the invention was made to modify the device taught by Bostic by providing the running belt in a curved orientation in order to provide for a more natural running experience (see Cutter, column 1 lines 24-70).

Bostic further fails to teach the running belt being supported by a plurality of bearings coupled to the frame. Schonenberger teaches a treadmill having a running belt supported by a first plurality of bearings and a second plurality of bearings (12) for the purpose of supporting the belt along the length of the treadmill while providing a slightly resilient running surface (column 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device taught by Bostic by providing the bearings taught by Schonenberger in order to provide a supported, yet cushioned running surface to the user.

Regarding claim 9, Bostic teaches the safety device comprises a one-way bearing (column 2 lines 54-64).

Regarding claim 10, Bostic teaches the front shaft assembly comprises a front shaft (55) coupled to frame.

Regarding claim 11, Bostic teaches the front shaft assembly comprises and at least one front running belt pulley (25) coupled to the front shaft.

Regarding claim 12, Bostic teaches the rear shaft assembly comprises a rear shaft (20) coupled to the frame.

Regarding claim 13, Bostic teaches the rear shaft assembly comprises at least one rear running belt pulley (19) coupled to the rear shaft.

Regarding claim 14, Bostic teaches the rear shaft assembly comprises at least one rear running belt pulley (19) and the front shaft assembly comprises at least one front running belt pulley (25).

Regarding claim 17, the combination of Bostic and Schonenberger yields a treadmill wherein the running belt is at least partially supported by the first plurality of bearings and the second plurality of bearings.

Regarding claim 18, the combination of Bostic, Cutter, and Schonenberger yields a treadmill wherein the first plurality of bearings and the second plurality of bearings each at least partially define a curved top profile, wherein the curved top profile substantially corresponds to at least a portion of the curved running surface.

Regarding claim 19, Bostic teaches the frame includes a left side member, a right side member, and at least one cross-member extending between the left side member and the right side member (see Fig. 14).

Regarding claim 20, Bostic teaches the combination of Bostic and Schonenberger yields a treadmill wherein the first plurality of bearings are coupled the left side member and the second plurality of bearings are coupled to the right side member.

Regarding claim 21, Bostic teaches a manually powered treadmill, comprising: a frame (15); at least one front running belt pulley (25) coupled to the frame; at least one rear running belt pulley (19) coupled to the frame a spaced distance from the at least one front running belt pulley; a running belt (10) at least partially supported by at least one of the at least one front running belt pulley and the at least one rear running belt pulley, wherein the running belt includes a running surface: and a safety device coupled to at least one of the running belt, the front running belt pulley, and the rear running belt pulley, wherein the safety device is structured to resist rotation of the at least one running belt, the front running belt pulley, and the rear running belt pulley in a first direction while permitting rotation of the at least one running belt, the front running belt pulley, and the rear running belt pulley in a second direction opposite the first direction (one-way clutch; column 2 lines 54-56).

Bostic fails to teach the running belt having a curved running surface. Cutter teaches a manually powered treadmill comprising a running belt (30) having bearings supporting a curved running surface. It would have been obvious to one of ordinary skill in the art before the invention was made to modify the

device taught by Bostic by providing the running belt in a curved orientation in order to provide for a more natural running experience (see Cutter, column 1 lines 24-70).

Bostic further fails to teach the running belt being supported by a plurality of bearings coupled to the frame. Schonenberger teaches a treadmill having a running belt supported by a first plurality of bearings and a second plurality of bearings (12) for the purpose of supporting the belt along the length of the treadmill while providing a slightly resilient running surface (column 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device taught by Bostic by providing the bearings taught by Schonenberger in order to provide a supported, yet cushioned running surface to the user.

Regarding claim 23, Bostic teaches a front shaft (55) coupled to frame, the front shaft being adapted to support the at least one front running belt pulley.

Regarding claim 24, Bostic teaches a rear shaft (20) coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley.

Regarding claim 25, Bostic teaches the safety device comprises a one-way bearing (column 2 lines 54-64).

Regarding claim 26, Bostic teaches a braking system (40) coupled to the frame and configured to selectively resist the rotational movement of the running belt.

Regarding claim 27, Bostic teaches the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt (column 3 lines 27-33).

Regarding claim 28, Bostic teaches a method, comprising: providing a manually powered treadmill, the manually powered treadmill having a frame (15) with a front end and a rear end; disposing a running belt (10) on frame; permitting movement of the running belt in a first direction; and providing a safety device coupled to the frame wherein the safety device resists movement of the running belt in a second direction opposite the first direction (via a one-way clutch; column 2 lines 54-56).

Regarding claim 29, Bostic teaches providing for the selective application of a braking force to resist the rotational movement of the running belt in the first direction (column 3 lines 27-33).

Claims 5, 16, and 30 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Bostic (US 5,492,517) in view of Cutter (US 3,642,279) and Schonenberger (4,334,676) as applied to claims 1, 8, and 30 above, and further in view of Gaetano (US 4,406,451).

Bostic teaches a support foot (35) coupled to the frame, but fails to teach the at least one support foot is adjustable to enable an adjustment of the relative vertical incline of at least a portion of the manually powered treadmill in relation to a surface supporting the manually powered treadmill. Gaetano (US 4,406,451) teaches a manual treadmill comprising a support foot (84) which enables an adjustment of a vertical incline of the treadmill. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device taught by Bostic by providing the incline adjustment taught by Gaetano in order to allow the user to simulate running on hills.

Claims 15 and 22 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Bostic (US 5,492,517) in view of Cutter (US 3,642,279) and Schonenberger (4,334,676) as applied to claims 14 and 21, and further in view of Skowronski (US 6,923,746).

Bostic does not specifically disclose at least one of the at least one front running belt pulley and the at least one rear running belt pulley is formed of an electrically insulating material. Skowronski teaches a treadmill comprising front and rear pulleys formed of an electrically insulating material (column 3 lines 63-67). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide Bostic's pulleys as formed from a plastic material, as taught by Skowronski, in order to provide easily produced and durable pulleys. Such a modification involves the mere selection of a known material based on its suitability for its intended use and therefore fails to distinguish the invention over the prior art.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple

assignees. A nonstatutory double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on nonstatutory double patenting provided the reference application or patent either is shown to be commonly owned with the examined application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. See MPEP § 717.02 for applications subject to examination under the first inventor to file provisions of the AIA as explained in MPEP § 2159. See MPEP §§ 706.02(l)(1) - 706.02(l)(3) for applications not subject to examination under the first inventor to file provisions of the AIA. A terminal disclaimer must be signed in compliance with 37 CFR 1.321(b).

The USPTO Internet website contains terminal disclaimer forms which may be used. Please visit www.uspto.gov/patent/patents-forms. The filing date of the application in which the form is filed determines what form (e.g., PTO/SB/25, PTO/SB/26, PTO/AIA/25, or PTO/AIA/26) should be used. A web-based eTerminal Disclaimer may be filled out completely online using web-screens. An eTerminal Disclaimer that meets all requirements is auto-processed and approved immediately upon submission. For more information about eTerminal Disclaimers, refer to www.uspto.gov/patents/process/file/efs/guidance/eTD-info-I.jsp.

Claims 1-30 provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of copending Application No. 15/957,721 (reference application). Although the claims at issue are not identical, they are not patentably distinct from each other because all of the limitations of the present application are either recited by, or obvious over the claims of the reference application.

This is a provisional nonstatutory double patenting rejection because the patentably indistinct claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Deichl whose telephone number is (571)272-5001. The examiner can normally be reached on 8:30am-5:00pm PST Monday-Friday.

Examiner interviews are available via telephone, in-person, and video conferencing using a USPTO supplied web-based collaboration tool. To schedule an interview, applicant is encouraged to use the USPTO Automated Interview Request (AIR) at http://www.uspto.gov/interviewpractice.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, LoAn Thanh can be reached on 571-272-4966. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer M Deichl/
Examiner, Art Unit 3764

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Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PTO/SB/08 (modified)

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	Not yet assigned
Date Submitted: April 20, 2018				**Filing Date**	Herewith
				First Named Inventor	Douglas G. Bayerlein
				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
Sheet	1	of	11	Attorney Docket Number	097208-0226

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PTO/SB/08 (modified)

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	Not yet assigned
Date Submitted: April 20, 2018				**Filing Date**	Herewith
				First Named Inventor	Douglas G. Bayerlein
				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
Sheet	2	of	11	Attorney Docket Number	097208-0226

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PTO/SB/08 (modified)

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	Not yet assigned
Date Submitted: April 20, 2018				**Filing Date**	Herewith
				First Named Inventor	Douglas G. Bayerlein
				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
Sheet	3	of	11	Attorney Docket Number	097208-0226

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Examiner Signature		Date Considered	

4838-1991-8947.1

 EXAMINER: INITIAL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /JLF/

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Substitute for form 1449/PTO				Complete if Known	
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Date Submitted: April 20, 2018				**Filing Date**	Herewith
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				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
Sheet	4	of	11	Attorney Docket Number	097208-0226

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	A134	ASTILEAN, ALEX, YouTube Video entitled "SpeedFit – Speedboard – First Curve Prototype" retrieved from the internet at: https://www.youtube.com/watch?v=dO9h-F-JVCU on April 6, 2015, 49 pages of screenshots.	
	A135	BRUGHELLI ET AL., Effects of Running Velocity on Running Kinetics and Kinematics, Journal of Strength and Conditioning Research, April 2011, 7 pages.	
	A136	Claim Construction Order, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:13-cv-01276-KAM-AKT, November 20, 2017, 23 pages.	
	A137	Complaint for Declaratory Judgment of Patent Invalidity and Correction of Inventorship, Woodway USA, Inc. v. Aurel A. Astilean, Civ. Dkt. No. 2:13-cv-00681-WEC (E.D. WI), June 13, 2013, 6 pages.	
	A138	Curvature, http://en.wikipedia.org/wiki/Curvature, March 3, 2010, 1 page.	
	A139	Decision and Order Denying Defendant's Motion to Dimiss or to Transfer and Staying Case Pending Decision from Eastern District New York District Court, Woodway USA, Inc. v. Aurel A. Astilean, Civ. Dkt. No. 2:13-cv-00681-WEC (E.D. WI), December 18, 2013, 7 pages.	
	A140	Declaration of Aurel A. Astilean filed June 15, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc. and Exhibit A.	
	A141	Declaration of Aurel A. Astilean, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, Exhibit 1, March 26, 2018, 5 pages.	
	A142	Declaration of Dan Bostan filed June 15, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc. and Exhibit A.	
	A143	Declaration of John F. Vodopia filed June 6, 2017.	

Examiner Signature		Date Considered	

4838-1991-8947.1

 EXAMINER: INITIAL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.F.V./

PTO/SB/08 (modified)

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	Not yet assigned
Date Submitted: April 20, 2018				**Filing Date**	Herewith
				First Named Inventor	Douglas G. Bayerlein
				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
Sheet	5	of	11	Attorney Docket Number	097208-0226

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A144	Declaration of John F. Vodopia in Further Support of Plaintiffs' Motion for Leave to Amend filed July 7, 2015 and Exhibits A - C.	
	A145	Declaration of John F. Vodopia In Support of Plaintiffs' motion for Leave to Amend filed July 7, 2017 and Exhibits A - F.	
	A146	Declaration of John F. Vodopia in Support of Plaintiffs' Motion Under 35 USC 256 to Correct Inventorship of USPN 8,308,619 and USPN 8,342,016 filed June 15, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc. and Exhibits A - H.	
	A147	Declaration of Kadie M. Jelenchick filed July 7, 2015 and Exhibits A – G.	
	A148	Declaration of Kadie M. Jelenchick filed June 15, 2015 and Exhibits A, B and E.	
	A149	Declaration of Kadie M. Jelenchick filed June 6, 2017.	
	A150	Declaration of Nicholas Oblamski filed June 15, 2015, and Exhibit A, 11 pages.	
	A151	Declaration of Nicholas Oblamski, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, Exhibit 1, March 26, 2018, 12 pages.	
	A152	Declaration of Thomas B. Decea filed November 19, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc.	
	A153	DISCOVERY CHANNEL, "Wreckreation Nation", Season 1, Episode 8, first aired February 24, 2009, 9 pages of screenshot excerpts.	
	A154	Docket Report, Speedfit LLC and Aurel A. Astilean v. Douglas G. Bayerlain, Civ. Dkt. No. 2:13-cv-01276-KAM-AKT (E.D.N.Y.), December 19, 2013, 8 pages.	
	A155	Docket Report, Woodway USA, Inc. v. Aurel A. Astilean, Civ. Dkt. No. 2:13-cv-00681-WEC (E.D. WI), December 19, 2013, 3 pages.	
	A156	EMS-Grivory Grivory GV-5H Black 9915 Nylon Copolymer, 50% Glass Fiber Filled, As Conditioned, believed to be publically available before September 16, 2011, 2 pages.	
	A157	Excerpt from U.S. Application No. 14/076,912, Exhibit F, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, March 26, 2018, 4 pages.	
	A158	First Amended Complaint (Jury Trial Demanded), Speedfit LLC and Aurel A. Astilean v. Douglas G. Bayerlein, Civ. Dkt. No. 2:13-cv-01276-KAM-AKT (E.D.N.Y.), June 17, 2013, 16 pages.	
	A159	First Amended Complaint filed June 17,2013 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 16 pages.	
	A160	HALL, The Rotary TREADWHEEL, available at least as early as November 2011, 1 page.	

Examiner Signature		Date Considered	

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 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.L.E./

PTO/SB/08 (modified)

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				First Named Inventor	Douglas G. Bayerlein
				Art Unit	Not yet assigned
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Sheet	6	of	11	Attorney Docket Number	097208-0226

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	A161	HERSHER, Perfect Landing, http://news.harvard.edu/gazette/story/2010/01/different-strokes/, January 27, 2010, 5 pages.	
	A162	HOPKER ET AL., Familiarisation and Reliability of Sprint Test Indices During Laboratory and Field Assessment, Journal of Sports Science and Medicine, December 1, 2009, 5 pages.	
	A163	http://www.gettyimages.com/detail/463782507, Animal treadmill c. 1872, Museum of Science and Industry, Chicago, 3 pps.	
	A164	http://www.gettyimages.com/license/542395667, 1930 era treadmill, 1 page.	
	A165	http://www.mpiwg-berlin.mpg.de/resrep00_01/Jahresbericht_2_2_section.html, 27 pps.	
	A166	Integrated Performance Systems, LLC, Conditioning in a Professional Athlete Case Study, 2005, 1 page.	
	A167	Integrated Performance Systems, LLC, Lower Extremity Rehabilitation & Assessment Case Study, 2005, 2 pages.	
	A168	Integrated Performance Systems, LLC, Youth Athlete-Speed Training Case Study, 2005, 2 pages.	
	A169	International Preliminary Report for Application No. PCT/US2010/026731, mail date September 29, 2011, 7 pages.	
	A170	International Preliminary Report for Application No. PCT/US2010/027543, mail date September 29, 2011, 9 pages.	
	A171	International Search Report and Written Opinion for Application No. PCT/US2010/026731, mail date May 4, 2010, 8 pages.	
	A172	International Search Report and Written Opinion for Application No. PCT/US2010/027543, mail date May 12, 2010, 10 pages.	
	A173	International Search Report and Written Opinion for International Application No. PCT/US2016/055572, dated February 17, 2017, 9 pages.	
	A174	International Search Report, PCT/US2017/040449, October 11, 2017, 6 pages.	
	A175	International Standard ISO 20957-6:2005(E), for Stationary training equipment – Part 6: Treadmills, additional specific safety requirements and test methods, First edition 2005-05-01, 18pps.	
	A176	Introducing the New Force 3 Treadmill Advanced Analysis Package, www.fittech.com.au, believed to be publically available before September 16, 2011, 3 pages.	
	A177	Joint Disputed Claim filed April 19, 2017 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 10 pages.	

Examiner Signature		Date Considered	

4838-1991-8947.1

 ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.L.E./

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	A178	LIEBERMAN ET AL., Running Barefoot, Forefoot Striking & Training Tips, http://www.barefootrunning.fas.harvard.edu/5BarefootRunning&TrainingTips.html, February 26, 2010, 5 pages.	
	A179	LIEBERMAN ET AL., Running Barefoot: Biomechanics of Foot Strike, http://www.barefootrunning.fas.harvard.edu/4BiomechanicsofFootStrike.html, February 26, 2010, 6 pages.	
	A180	LIEBERMAN ET AL., Running Barefoot: Biomechanics of Foot Strikes & Applications to Running Barefoot or in Minimal Footwear, http://www.barefootrunning.fas.harvard.edu/index.html, February 26, 2010, 2 pages.	
	A181	LIEBERMAN ET AL., Running Barefoot: FAQ, http://www.barefootrunning.fas.harvard.edu/6FAQ.html, February 26, 2010, 3 pages.	
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	A183	LIEBERMAN ET AL., Running Barefoot: Running Before the Modern Shoe, http://www.barefootrunning.fas.harvard.edu/3RunningBeforeTheModernShoe.html, February 26, 2010, 4 pages.	
	A184	LIEBERMAN ET AL., Running Barefoot: Why Consider Foot Strike, http://www.barefootrunning.fas.harvard.edu/1WhyConsiderFootStrike.html, February 26, 2010, 1 page.	
	A185	Memorandum and Order filed December 28, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 22 pages.	
	A186	Memorandum and Order filed October 10, 2014 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 39 pages.	
	A187	Memorandum and Order filed October 19, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 11 pages.	
	A188	Memorandum of Law in Support of Plaintiffs' Motion for Leave to Amend the Second Amended Complaint filed July 7, 2015, 13 pages.	
	A189	Memorandum of Law in Support of Plaintiffs' Motion Under 35 USC 256 to Correct Inventorship of SPN 8,308,619 and USPN 8,342,016 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 14 pages.	
	A190	Minute Entry for Proceedings on November 10, 2015 and Exhibit G.	
	A191	MOODY, The Effects Resisted Sprint Training on Speed, Agility and Power Production in Young Athletes, believed to be publically available before December 31, 2006, 5 pages.	
	A192	Motion to Dismiss filed October 30, 2015 and Exhibits A - H.	
	A193	Nexus Resin Group, 10124 Antistat, believed to be publically available before September 16, 2011, 2 pages.	

Examiner Signature		Date Considered	

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Sheet	8	of	11	Attorney Docket Number	097208-0226

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	A194	Notice of Motion filed July 7, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 2 pages.	
	A195	Notice of Motion Under 35 USC 256 to Correct Inventorship of USPN 8,308,619 and USPN 8,342,016 filed June 15, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 3 pages.	
	A196	Notice of Woodway USA, Inc.'s Motion for Summary Judgment of Invalidity of U.S. Patent Nos. 8,308,619 and 8,343,016 filed June 5, 2017, 9 pages.	
	A197	OSHA 1926.307, 9 pps.	
	A198	Owners Manual for NordicTrack WalkFit Classic Treadmill, received on March 2, 2017, 30 pps.	
	A199	Owners Manual, Force 1, November 29, 2007, 44 pages.	
	A200	Owners Manual, Force 3, January 28, 2009, 45 pages.	
	A201	Owners Manual, The Force, December 18, 2008, 68 pages.	
	A202	Photographs of public display of Speedfit Speedboard by Woodway presented at IHRSA Tradeshow on March 17, 2009, 8 pages	
	A203	Photographs produced to Woodway at least by November 10, 2014 in litigation, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., No. 2:13-cv-01276-KAM-AKT, 11 pages.	
	A204	Plaintiff's Reply to Defendant Woodway's Answer, Affirmative Defenses and Counterclaims to Plaintiff's Second Amended Complaint filed March 27, 2015, 6 pages.	
	A205	Plaintiff's Reply to Defendant Woodway's Answer, Affirmative Defenses and Counter-Claims to Plaintiffs' Supplemental Complaint filed March 17, 2017, 8 pages.	
	A206	Plaintiffs Memorandum of Law in Opposition to Woodway's Motion for Summary Judgement of Invalidity and Opening Claim Construction Brief, Cross-Motion for Summary Judgment Upholding Validity, Cross-Motion for Summary Judgment for Infringement and Motion to Extend the Page Limitation for this Memorandum filed June 6, 2017, 46 pages.	
	A207	Plaintiffs' Initial Claims Construction Memorandum filed July 31, 2017.	
	A208	Plaintiffs' Memorandum of Law in further Opposition to Defendant's Motion to Dismiss Certain of Plaintiffs' Claims filed November 19, 2015, 19 pages.	
	A209	Plantar Fascia, http://en.wikipedia.org/wiki/Plantar_fascia, March 3, 2010, 3 pages.	

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	A210	Reply in Opposition to D126 filed November 6, 2015 and Exhibits A and B.	
	A211	Reply Memorandum of Law in Further Support of Plaintiffs' Motion for Leave to Amend the Second Amended Complaint filed July 7, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 13 pages.	
	A212	Response in Opposition re [117] First Motion to Amend Second Amended Complaint filed July 7, 2015, 2 pages.	
	A213	Response in Opposition to [110] Motion to Amend-Corret-Supplement filed June 15, 2015, 2 pages.	
	A214	Revised Answer to Counterclaims filed December 12, 2014 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 5 pages.	
	A215	ROSS ET AL., The Effects of Treadmill Sprint Training and Resistance Training on Maximal Running Velocity and Power, National Strength and Conditioning Association, March 2009, 10 pages.	
	A216	Rule 56.1 Counter-Statement by Plaintiffs Speedfit LLC, and Aurel A. Astilean filed June 6, 2017, 13 pages.	
	A217	Second Amended Complaint filed February 17, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc., 18 pages.	
	A218	SIROTIC ET AL., Physiological and Performance Test Correlates of Prolonged, High-Intensity, Intermittent Running Performance in Moderately Trained Women Team Sport Athletes, Journal of Strength and Conditioning Research, 2007, 7 pages.	
	A219	SIROTIC ET AL., The Reliability of Physiological and Performance Measures During Simulated Team-Sport Running on a Non-Motorised Treadmill, Journal of Science and Medicine in Sport, April 11, 2007, 10 pages.	
	A220	Soccer International, The Red Devil's in the Details, dated June 2010, 4 pages.	
	A221	Speedfit LLC's Opening Claim Construction Brief, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, March 26, 2018, 9 pages.	
	A222	SPEEDFIT, video produced to Woodway at least by November 10, 2014 in litigation, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., No. 2:13-cv-01276-KAM-AKT, 21 pages of screenshot excerpts.	
	A223	SPEEDFIT, video produced to Woodway at least by November 10, 2014 in litigation, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., No. 2:13-cv-01276-KAM-AKT, 23 pages of screenshot excerpts.	
	A224	Supplemental Complaint filed February 10, 2017 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc.	
	A225	Supplemental Declaration of Kadie M. Jelenchick filed June 6.	
	A226	The Australian Competition & Consumer Commission's Mandatory Safety Standard For Treadmills (Supplier Guide), 2009, 20 pps.	

Examiner Signature		Date Considered	

4838-1991-8947.1

 EXAMINER: INITIAL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /INITIAL/

PTO/SB/08 (modified)

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	A227	The Woodway Force Brochure, The Best Way to Train for Speed & Athletic Power, dated May 5, 2005, 2 pages.	
	A228	Third Amended Complaint filed October 23, 2015 between Speedfit LLC and Aurel Astilean versus Woodway USA, Inc. and Exhibits A - H.	
	A229	Woodway USA, Inc.'s Answer, Affirmative Defenses, and Counterclaims to Plaintiffs' First Amended Complaint filed October 24, 2014 and Exhibits 1 and 2.	
	A230	Woodway USA, Inc.'s Answer, Affirmative Defenses, and Counterclaims to Plaintiffs' Second Amended Complaint filed March 6, 2015, 17 pages.	
	A231	Woodway USA, Inc.'s Answer, Affirmative Defenses, and Counterclaims to Plaintiffs' Supplemental Complaint filed February 24, 2017, 18 pages.	
	A232	Woodway USA, Inc.'s List of Claim Terms to be Considered and Proposed Constructions, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, Exhibit D, March 26, 2018, 4 pages.	
	A233	Woodway USA, Inc.'s Memorandum in response to Plaintiffs' Motion for Leave to Amend the Second Amended Complaint filed July 7, 2015, 16 pages.	
	A234	Woodway USA, Inc.'s Memorandum in Response to Plaintiffs' Motion Under 35 USC 256 to Correct Inventorship of USPN 8,308,619 and USPN 8,342,016 filed June 15, 2015, 20 pages.	
	A235	Woodway USA, Inc.'s Memorandum of Law in Support of Its Motions for Summary Judgment of Invalidity of US Patent Nos. 8,308,619 and 8,343,016 and Opening Claim Construction Brief filed June 6, 2017, 38 pages.	
	A236	Woodway USA, Inc.'s Opening Claim Construction Brief, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, March 26, 2018, 15 pages.	
	A237	Woodway USA, Inc.'s Patents, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, Exhibit B, March 26, 2018, 3 pages.	
	A238	Woodway USA, Inc.'s Reply Claim Construction Brief, Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc., Docket No. 2:17-cv-00768-KAM-AKT, March 26, 2018, 9 pages.	
	A239	Woodway USA, Inc.'s Reply Memorandum in Support of Its Motion to Dismiss filed November 25, 2017, 24 pages.	
	A240	Woodway USA, Inc.'s Responsive Claim Construction Brief filed July 28, 2017, 19 pages.	
	A241	Woodway, Curve 3.0 Specification, May 25, 2011, 1 page.	
	A242	Woodway, Curve Specification, May 24, 2011, 1 page.	
	A243	Woodway, Curve Specification, May 25, 2011, 1 page.	

Examiner Signature		Date Considered	

4838-1991-8947.1

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PTO/SB/08 (modified)

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				Art Unit	Not yet assigned
(use as many sheets as necessary)				Examiner Name	Not yet assigned
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	A244	Woodway, Curve XL Specification, May 18, 2011, 1 page.	
	A245	Woodway, Force Specification, April 8, 2008, 1 page.	
	A246	Woodway, Force Specification, May 2, 2011, 1 page.	
	A247	Woodway, Force Specification, May 2, 2012, 1 page.	
	A248	Woodway's USA, Inc.'s Reply in Support of its Motion for Summary Judgment of Invalidity of US Patent Nos. 8,308,619 and 8,343,016 and Reply Claim Construction Brief filed June 6, 2017, 16 pages.	
	A249	Woodway's Opposition to Defendant's Notice of Motion and Motion to Dismiss Case and Transfer Litigation to EDNY, Woodway USA, Inc. v. Aurel A. Astilean, Civ. Dkt. No. 2:13-cv-00681-WERC (E.D. WI), October 18, 2013, 22 pages.	
	A250	Woodways USA, Inc.'s Supplemental Rule 56.1 Statement of Undisputed Material Facts and Responses to Rule 56.1 Counterstatement by Plaintiffs Speedfit LLC and Aurel A. Astilean filed June 6, 2017, 20 pages.	

Examiner Signature	/JENNIFER M DEICHL/	Date Considered	07/11/2018

4838-1991-8947.1

EXAMINER: INITIAL IF REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /JMD/

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	15958339	BAYERLEIN ET AL.
	Examiner	Art Unit
	JENNIFER M DEICHL	3764

CPC- SEARCHED		
Symbol	Date	Examiner
A63B22/02-0228	07/11/2018	JD

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner

* See search history printout included with this form or the SEARCH NOTES box below to determine the scope of the search.

SEARCH NOTES		
Search Notes	Date	Examiner
reviewed family applicaiton history	07/11/2018	JD
EAST text search	07/11/2018	JD

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

/JENNIFER M DEICHL/ Examiner.Art Unit 3764	

CD Rom

Atty. Dkt. No. 097208-0226

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Douglas G. Bayerlein
Title:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
Application No.:	15/958,339
Filing Date:	4/20/2018
Examiner:	Deichl, Jennifer M.
Art Unit:	3764
Confirmation No.:	4765

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

Applicant requests that, in accordance with 37 CFR §1.98(d), the Examiner review all applications relied on for an earlier effective filing date under 35 U.S.C. 120, including application no. PCT/US10/27543, filed 3/16/2010; application no. 13/235,065, filed 9/16/2011; application no. 14/076912, filed 11/11/2013; application no. 14/832,708, filed 8/21/2015, for copies of references of record therein that are not being provided here; although Applicant would be pleased to provide copies of any such documents at the Examiner's request.

 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.M.D/

Atty. Dkt. No. 097208-0226

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

CONCISE EXPLANATION OF RELEVANCE

Regarding item A21, there appear to be two available versions of the Wreckreation Video. One version which is currently commercially available from Amazon and was previously submitted to the Patent Office in the form of multiple PDF still shots of the video and a second, slightly different version provided to the Applicant by a third party and which is being submitted in video format as part of the present SB-08. However, Applicant cannot confirm that the entirety of the video of item A21 was publicly broadcast. Applicant has reason to believe that the video from 0:00 to approximately 8:13 was publicly broadcast on February 24, 2009, but cannot confirm that the remainder of this video was ever publicly broadcast.

TIMING OF THE DISCLOSURE

The listed documents are being submitted in compliance with 37 CFR §1.97(b), within three (3) months of the filing date of the application.

Although Applicant believes that no fee is required, the Commissioner is hereby authorized to charge any additional fees which may be due to Deposit Account No. 19-0741.

Page 158 of 2517 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.H.E/ LIFECORE Ex. 1002

Atty. Dkt. No. 097208-0226

Respectfully submitted,

Date /6-15-2018/

By /Alexander J. Neuworth/

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Page 159 of 2517 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.L.E./ LIFECORE Ex. 1002

PTO/SB/08 (modified)

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	15/958,339
Date Submitted: June 15, 2018				**Filing Date**	4/20/2018
				First Named Inventor	Douglas G. Bayerlein
(use as many sheets as necessary)				Art Unit	3764
				Examiner Name	Deichl, Jennifer M.
Sheet	1	of	1	Attorney Docket Number	097208-0226

USPTO MAIL JUN 15 2018 PATENT & TRADEMARK OFFICE

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	A1	2007/0021278	01-25-2007	PAN ET AL.	
	A2	2007/0298935	12-27-2007	BADARNEH ET AL.	
	A3	2008/0119332	05-22-2008	ROMAN, MAURIZIO	
	A4	2009/0156363	06-18-2009	GUIDI ET AL.	
	A5	2012/0264569	10-18-2012	ESCOBEDO ET AL.	
	A6	2014/0171272	06-19-2014	HAWKINS ET AL.	
	A7	2015/0119202	04-30-2015	HENDRICKSON ET AL.	
	A8	2017/0113093	04-27-2017	BELLAVISTA ET AL.	
	A9	5,031,901	07-16-1991	SAARINEN, SULEVI	
	A10	5,094,447	03-10-1992	WANG, LEAO	
	A11	5,145,480	09-08-1992	WANG, KUO-LIANG	
	A12	5,310,392	05-10-1994	LO, PETER K.	
	A13	7,862,483	01-04-2011	HENDRICKSON ET AL.	
	A14	8,585,561	11-19-2013	WATT ET AL.	
	A15	8,876,668	11-04-2014	HENDRICKSON ET AL.	
	A16	9,044,635	06-02-2015	LULL, ANDREW P.	
	A17	9,233,272	01-12-2016	VILLANI ET AL.	
	A18	9,254,409	02-09-2016	DALEBOUT ET AL.	
	A19	9,314,667	04-19-2016	PUERSCHEL, BERND	
	A20	9,974,997	05-22-2018	CEI, DANIELE	

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.) date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	A21	SPEEDFIT, video produced to Woodway at least by April 28, 2015 in litigation, a copy of which is submitted herewith on DVD, Speedfit LLC et al. v. Woodway USA, Inc., Docket No. 2:13-cv-01276-KAM-AKT.	
	A22	Minute Order Regarding Claim Construction, Speedfit LLC v. Woodway, Docket No. 2:17-cv-00768-KAM-AKT, June 13, 2018, 2 pages.	

Examiner Signature	/JENNIFER M DEICHL/	Date Considered	07/11/2018

4835-8380-6056.1

EXAMINER: INITIAL IF REFERENCE CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP 609. DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED. INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

LIFECORE Ex. 1002

From: ecf_bounces@nyed.uscourts.gov
To: nobody@nyed.uscourts.gov
Subject: Activity in Case 2:17-cv-00768-KAM-AKT Speedfit LLC v. Woodway USA, Inc. Markman Hearing
Date: Wednesday, June 13, 2018 10:44:19 AM

This is an automatic e-mail message generated by the CM/ECF system. Please DO NOT RESPOND to this e-mail because the mail box is unattended.
*****NOTE TO PUBLIC ACCESS USERS*** Judicial Conference of the United States policy permits attorneys of record and parties in a case (including pro se litigants) to receive one free electronic copy of all documents filed electronically, if receipt is required by law or directed by the filer. PACER access fees apply to all other users. To avoid later charges, download a copy of each document during this first viewing. However, if the referenced document is a transcript, the free copy and 30 page limit do not apply.**

U.S. District Court

Eastern District of New York

Notice of Electronic Filing

The following transaction was entered on 6/13/2018 at 11:43 AM EDT and filed on 6/13/2018

Case Name: Speedfit LLC v. Woodway USA, Inc.
Case Number: 2:17-cv-00768-KAM-AKT
Filer:
Document Number: No document attached

Docket Text:
Minute Entry and Order for proceedings held before Judge Kiyo A. Matsumoto:*Markman* Hearing held on 6/13/2018. Appearances: for plaintiff, John F. Vodopia, Esq.; for defendant, Kadie M. Jelenchick, Esq. The parties presented argument as to the meaning of the term "coupled" in U.S. Patent No. 9,114,276 (the "276 Patent"). Plaintiff conceded on the record that defendant's proposed construction is proper. The court ORDERED as follows: for the reasons stated on the record at the hearing, the term "coupled," as recited in the '276 Patent, shall be construed as "the joining of two members directly or indirectly to one another." The parties are respectfully directed to proceed with discovery pursuant to the scheduling order entered by the Honorable A. Kathleen Tomlinson, United States Magistrate Judge, and under Judge Tomlinson's supervision. Following the close of discovery, the court will hold a hearing regarding inventorship of the patents-in-suit. Ordered by Judge Kiyo A. Matsumoto on 6/13/2018. (Court Reporter Anthony Mancuso.) (Flores, Diego)

2:17-cv-00768-KAM-AKT Notice has been electronically mailed to:

John F. Vodopia jvodopia@gmail.com

Kadie M. Jelenchick kjelenchick@foley.com, mpechulis@foley.com, smaass@foley.com

 REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.F.E/

Jeffrey N. Costakos jcostakos@foley.com, smaass@foley.com

Matthew Peters mpeters@foley.com

2:17-cv-00768-KAM-AKT Notice will not be electronically mailed to:

Bibliographic Data

Application No: 15/958,339

Foreign Priority claimed: ○ Yes ◉ No

35 USC 119 (a-d) conditions met: ☐ Yes ☑ No ☐ Met After Allowance

Verified and Acknowledged: /JENNIFER M DEICHL/ Examiner's Signature | Initials

Title: MANUAL TREADMILL AND METHODS OF OPERATING THE SAME

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
04/20/2018	482	3764	097208-0226
RULE			

APPLICANTS

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CONTINUING DATA

This application is a CON of 14832708 08/21/2015

14832708 is a CON of 14076912 11/11/2013 PAT 9114276

14076912 is a CON of 13235065 09/16/2011

13235065 is a CIP of PCT/US10/27543 03/16/2010

PCT/US10/27543 has PRO of 61161027 03/17/2009

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

05/14/2018

**** SMALL ENTITY ****

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FILING FEE RECEIVED

$3,585

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	54	("20040018917" | "20060287165" | "20090170666" | "3968543" | "4614337" | "7717828" | "D736866" | "20060003871" | "5897461" | "20090280960" | "20120231934" | "5887579" | "7090620" | "8308619" | "8690738" | "5411455" | "20090215589" | "5538489" | "5709632" | "6095952" | "20030045403" | "6923746" | "20120157267" | "5470293" | "6053848" | "6740009" | "8734300" | "1211765" | "20080287266" | "20140011642" | "0219439" | "4334676" | "5411279" | "6042514" | "6146315" | "6348025" | "6500097" | "3642279" | "20020147079" | "20060003872" | "20110266091" | "3637206" | "5162988" | "5577598" | "6642279" | "8343016" | "20120270705" | "4635928" | "4726581" | "5548405" | "7560822" | "9005085").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2016/10/23 17:36
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S4	8	S2 and (crank same pinion)	US-PGPUB; USPAT; USOCR	OR	OFF	2016/10/23 17:51
S5	11	treadmill and deichl.xa.	US-PGPUB; USPAT	OR	OFF	2017/05/01 20:22
S6	7	("20060052728" | "5089960" | "5913684" | "5980256" | "6152854" | "7166064" | "7980856").PN. OR ("8968161").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/05/01 20:24
S7	80	("3451526" | "3550756" | "4868682" | "5186270" | "5229756" | "5238099" | "5314391" | "5385519" | "5490784" | "5495576" | "5562572" | "D340342").PN. OR ("6152854").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/05/01 20:25
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file:///C/Users/jdeichl/Documents/e-Red%20Folder/15958339/EASTSearchHistory.15958339_AccessibleVersion.htm[7/11/2018 10:43:01 AM]

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S18	21	(("20050209059~") or ("20140087922") or ("20160263429") or ("20170182356") or ("4,886,266") or ("4,938,469") or ("5,242,339") or ("5,368,532") or ("5,643,144") or ("5,683,332") or ("6,152,854") or ("6,334,839") or ("6,824,502") or ("6,837,830") or ("7,410,449") or ("7,780,573") or ("7,806,805") or ("8,241,187") or ("8,864,627") or ("8,920,347") or ("9,429,511")).PN. or (2006/0122035).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2017/12/08 11:01
S19	2	(("8308619") or ("8343016")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/05/03 10:07
S20	35	("1211765" | "20120010048" | "20120010053" | "20120157267" | "3489408" | "3637206" | "3642279" | "3669238" | "4614337" | "5470293" | "5577598" | "5709632" | "6053848" | "6146315" | "6348025").PN. OR ("8343016").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2018/05/03 10:11
S21	5	("3489408").URPN.	USPAT	OR	ON	2018/05/03 10:32
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S23	3	(("20030186787") or ("20120019973") or ("20140080679")).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/05/03 10:36
S24	12	(("5,031,901") or ("5,094,447") or ("5,145,480") or ("5,310,392") or ("7,862,483") or ("8,585,561") or ("8,876,668") or ("9,044,635") or ("9,233,272") or ("9,254,409") or ("9,314,667") or ("9,974,997")).PN. or ((2007/0021278) or (2007/0298935) or (2008/0119332) or (2009/0156363) or (2012/0264569) or (2014/0171272) or (2015/0119202) or (2017/0113093)).CCLS.	USPAT; USOCR	OR	OFF	2018/07/06 13:17
S25	108	(US-20160150084-$ | US-0003871-$ | US-0003872-$ | US-0007886-$ | US-0009668-$ | US-0011642-$ | US-0018917-$ | US-0019973-$ | US-0020907-$ | US-0023039-$ | US-0077465-$ | US-0080679-$ | US-0087922-$ | US-0096064-$ | US-0122035-$ | US-0123396-$ | US-0147079-$ | US-0150084-$ | US-0157267-$ | US-0166877-$ | US-0170666-$ | US-0182356-$ | US-0186787-$ | US-0209059-$ | US-0215589-$ | US-0216607-$ | US-0231934-$ | US-0263429-$ | US-0266091-$ | US-0270705-$ | US-0280960-$ | US-0287165-$ | US-0287266-$ | US-0296789-$ | US-0306456-$ | US-0367175-$ | US-0367851-$ | US-1211765-$ | US-2117957-$ | US-2842365-$ | US-20020147079-$ | US-20030186787-$ | US-20040018917-$ | US-20040077465-$ | US-20050009668-$ | US-20050209059-$ | US-20060003871-$ | US-20060003872-$ | US-20060122035-$ | US-20060287165-$ | US-20070123396-$ | US-20080020907-$ | US-20080287266-$ | US-20090170666-$ | US-20090215589-$ | US-20090280960-$ | US-20100216607-$ | US-20110266091-$ | US-20120019973-$ | US-20120157267-$ | US-20120231934-$ | US-20120270705-$ | US-20140011642-$ | US-20140080679-$ | US-20140087922-$ | US-20150306456-$ | US-20150367175-$ | US-20160023039-$ | US-20160096064-$ | US-20160166877-$ | US-20160263429-$ | US-20160296789-$ | US-20160367851-$ | US-20170007886-$ | US-20170182356-$ | US-2860541-$ | US-3637206-$ | US-3642279-$ | US-3968543-$ | US-3148743-$ | US-3201120-$ | US-4334676-$ | US-4389047-$ | US-4544152-$ | US-4548405-$ | US-4576352-$ | US-4614337-$ | US-4635928-$ | US-4659074-$ | US-4726581-$ | US-4886266-$ | US-4938469-$ | US-5162988-$ | US-5242339-$ | US-5290205-$ | US-5368532-$ | US-5411279-$ | US-5411455-$ | US-5431612-$ | US-5470293-$ | US-5538489-$ | US-5575740-$ | US-5577598-$ | US-5643144-$ | US-5669856-$ | US-5683332-$ | US-5709632-$ | US-5856736-$ | US-5887579-$ | US-5897461-$ | US-6042514-$ | US-6053848-$ | US-6095952-$ | US-6146315-$	USPAT	OR	OFF	2018/07/06 13:19

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S29	0	("200600287165").PN.	USPAT; USOCR	OR	OFF	2018/07/06 13:32
S30	1	("20060287165").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 13:33
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S32	33	(US-20140011642-$ or US-20120270705-$ or US-20080287266-$ or US-20060287165-$ or US-20100216607-$ or US-20170182356-$).did. or (US-8343016-$ or US-8308619-$ or US-6053848-$ or US-5709632-$ or US-3637206-$ or US-1211765-$ or US-5833577-$ or US-4406451-$ or US-4635928-$ or US-5897461-$ or US-5538489-$ or US-5411455-$ or US-8968161-$ or US-6152854-$ or US-8714346-$ or US-9352188-$ or US-6180210-$ or US-3669238-$ or US-3642279-$ or US-7513832-$ or US-9486681-$ or US-0219439-$ or US-9005085-$ or US-8864627-$ or US-6923746-$ or US-5577598-$).did. or (US-3489408-$).did.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 13:36
S33	19	S32 and (resistance brak$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 13:36
S34	2765	A63B22/02-0292.cpc.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 13:39
S35	644	S34 and manual	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 13:39
S36	451	S35 and (resistance brak$3)	US-PGPUB; USPAT; USOCR;	OR	OFF	2018/07/06 13:39

			FPRS; EPO; JPO; DERWENT; IBM_TDB			
S37	1956	A63B22/02-0228.cpc.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 13:45
S38	324	S37 and manual and (resistance brak$3)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 13:46
S39	888	S37 not motor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 13:46
S40	383	S37 and resistance not motor	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 13:46
S41	264	S37 and "one way"	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 13:54
S42	40	S37 and slat	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 13:56
S43	43	(US-20140011642-$ or US-20120270705-$ or US-20080287266-$ or US-20060287165-$ or US-20100216607-$ or US-20170182356-$ or US-20160263429-$).did. or (US-8343016-$ or US-8308619-$ or US-6053848-$ or US-5709632-$ or US-3637206-$ or US-1211765-$ or US-5833577-$ or US-4406451-$ or US-4635928-$ or US-5897461-$ or US-5538489-$ or US-5411455-$ or US-8968161-$ or US-6152854-$ or US-8714346-$ or US-9352188-$ or US-6180210-$ or US-3669238-$ or US-3642279-$ or US-7513832-$ or US-9486681-$ or US-0219439-$ or US-9005085-$ or US-8864627-$ or US-6923746-$ or US-5577598-$).did. or (US-5104120-$ or US-3554541-$ or US-4363480-$ or US-4625962-$ or US-5110117-$ or US-	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 13:59

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S44	12	S43 and plastic	USPAT	OR	OFF	2018/07/06 14:00
S45	119	S37 and resistance with rear	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 14:02
S46	34	S37 and resistance with rear with (pulley roller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 14:02
S47	21	S37 and resistance same (flywheel friction$4) with rear with (pulley roller)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 14:03
S48	54	S37 and flywheel with rear	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2018/07/06 14:09
S49	68	("1211765" | "3554541" | "3642279" | "4389047" | "4616822" | "4938473" | "5100127" | "5125361" | "5391129" | "5431612" | "5575740").PN. OR ("5709632").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 14:17
S50	38	("1211765" | "20120010048" | "20120010053" | "20120157267" | "3489408" | "3637206" | "3642279" | "3669238" | "4614337" | "5470293" | "5577598" | "5709632" | "6053848" | "6146315" | "6348025").PN. OR ("8343016").URPN.	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 14:24
S51	11	S43 and height with adjust$4	US-PGPUB; USPAT; USOCR	OR	OFF	2018/07/06 14:29
S52	1	("4023795").PN.	USPAT; USOCR	OR	OFF	2018/07/07 15:24

7/11/2018 10:42:57 AM
C:\Users\jdeichl\Documents\EAST\Workspaces\15958339.wsp

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Application	Document	Mailroom Date	Attorney Docket No.
15958339	CTNF	07/19/2018	097208-0226
	892	07/19/2018	097208-0226
	1449	07/19/2018	097208-0226
	1449	07/19/2018	097208-0226

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
15/958,339	04/20/2018	Douglas G. Bayerlein	097208-0226

CONFIRMATION NO. 4765

26371
FOLEY & LARDNER LLP
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PUBLICATION NOTICE

OC000000101789926

Title:MANUAL TREADMILL AND METHODS OF OPERATING THE SAME

Publication No.US-2018-0236292-A1
Publication Date:08/23/2018

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	15/958,339
				Filing Date	4/20/2018
Date Submitted: September 27, 2018				**First Named Inventor**	Douglas G. Bayerlein
				Art Unit	3764
(use as many sheets as necessary)				Examiner Name	Deichl, Jennifer M.
Sheet	1	of	2	Attorney Docket Number	097208-0226

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	C1	5,318,487-A	06-07-1994	GOLEN ET AL.	
	C2	5,492,517-A	02-20-1996	BOSTIC ET AL.	
	C3	5,688,209-A	11-18-1997	TRULASKE ET AL.	
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	C6	8,075,450-B2	12-13-2011	FABBRI ET AL.	
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	C10	9,305,141-B2	04-05-2016	FABRIZIO, GIUDICI	
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	C18	2015/0157895-A1	06-11-2015	BETTINI, DENIS	
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	C21	2018/0111023-A1	04-26-2018	CEI ET AL.	
	C22	2018/0229065-A1	08-16-2018	LEONARDI ET AL.	

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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (*if known*)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Documents	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	C23	WO-2009/014330-A1	01-29-2009	KIM, JAE-CHUL		

NON PATENT LITERATURE DOCUMENTS

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Examiner Signature		Date Considered	

Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				**Application Number**	15/958,339
				Filing Date	4/20/2018
Date Submitted: September 27, 2018				**First Named Inventor**	Douglas G. Bayerlein
				Art Unit	3764
(use as many sheets as necessary)				Examiner Name	Deichl, Jennifer M.
Sheet	2	of	2	Attorney Docket Number	097208-0226

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	C28	LISZEWSKI, ANDREW, "EcoMill Treadmill Generates Its Own Power", June 1, 2009, http://www.ohgizmo.com/2009/06/04/ecomill-treadmill-generates-its-own-power/, 1 page.	
	C29	NASA, "Combined Operational Load Bearing External Resistance Treadmill (COLBERT)", August 2009, 3 pages.	
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	C35	SOUTHERN RESEARCH ET AL., "AIMTech Project Brief", October 20, 2015, 2 pages.	
	C36	SOUTHERN RESEARCH ET AL., "Resist Force-Induced Treadmill", 2 pages.	
	C37	TECMACHINE, "Sprint Club: User's Guide", believed to have published 2002, 33 pages.	
	C38	WOODWAY, "Introducing the All New EcoMill Self Powered", published to YouTube on March 25, 2010, https://www.youtube.com/watch?v=NcPH92DAArc.	

Examiner Signature		Date Considered	

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 January 2009 (29.01.2009)

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(10) International Publication Number
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(25) Filing Language: Korean

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(30) Priority Data:
10-2007-0072572 20 July 2007 (20.07.2007) KR

(71) Applicant and
(72) Inventor: **KIM, Jae-Chul** [KR/KR]; Jeonwonjutak 102ho, 141-16 (30/2), Munhyun3-dong, Nam-gu, Busan 608-822 (KR).

(74) Agent: **KIM, Deok-Tae**; Lucky International Patent & Law Office, 10th Fl., Chungwoo Bldg., 729-14, Yeonsan-dong, Yeonje-gu, Busan 611-080 (KR).

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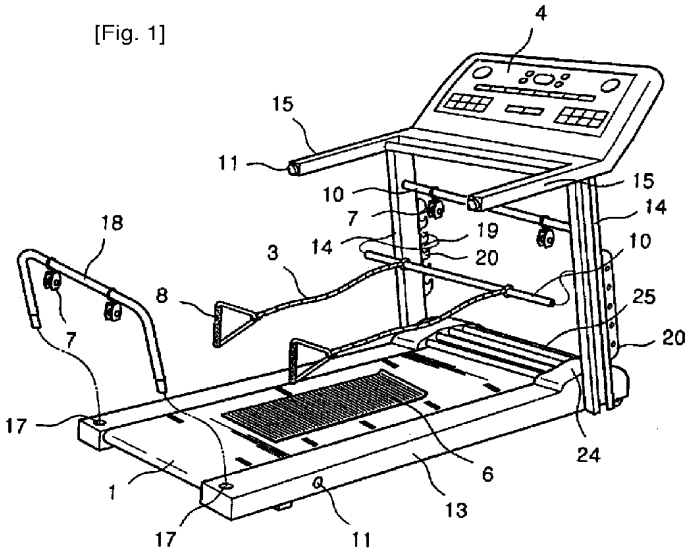
(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) **Title:** A WEIGHT TRAINING TREADMILL AND ITS CONTROLLING METHOD

[Fig. 1]



(57) **Abstract:** The present invention relates to a weight training treadmill and a method of controlling the same. The present invention more particularly relates to a weight training treadmill which includes a running belt, a motor for driving the running belt, a motor driver, sensors for controlling the running belt and the motor, and a controller, and further includes means for allowing the weight training to be carried out. And a method of controlling the treadmill is also provided, which allows the motor to act as a brake having a braking power when the running belt moves for a predetermined distance, stops and then moves backward by an external power. Therefore, according to the present invention, an operator's external power for moving the running belt backward after the running belt moves for a predetermined distance and stops leads to weight training by means of a braking power generated from the motor.

WO 2009/014330 A1

Description

A WEIGHT TRAINING TREADMILL AND ITS CONTROLLING METHOD

Technical Field

[1] The present invention relates to a weight training treadmill and a method for controlling the same. The present invention more particularly relates to a weight training treadmill which includes a running belt, a motor and a motor driver for driving the running belt, sensors for controlling the running belt and the motor, and a controller, and further includes means for allowing the weight training to be carried out. In addition, a method for controlling the treadmill is also provided, which allows the motor to act as a brake having a braking power when the running belt moves backward by an external power after the running belt had been moved for a pre-determined distance and then stopped.

[2] Therefore, according to the present invention, an operator applying his/her power to the running belt for moving the running belt backward after the running belt had moved for a predetermined distance forward and then stopped can be led to experience a weight training by means of a braking power generated from the motor.

Background Art

[3] Cited document 1: U.S. patent publication No. US 2006/0135322 A1, 2006.06.22

[4] Cited document 2: U.S. patent publication No. US 2006/0276306 A1, 2006.12.07

[5] Cited document 3: International publication No. WO/2002/083251, 2002.10.24

[6] Cited document 4: Korean patent registration No. 10-0701456, 2007.03.23

Disclosure of Invention

Technical Problem

[7] In general, a treadmill also known as a running machine in Korea has a running belt wound around two rotating axes spaced apart from each other at predetermined distance for limitless orbit rotation. Any one of the axes is connected to a motor by a belt or the like so that a rotating movement is delivered, and the running belt, the rotating axes, and the motor are disposed in a bottom frame playing role of an external casing. A support frame is disposed on the bottom frame, and a controller such as an instrument board is disposed at the support frame.

[8] Such a treadmill allows the controller to set or select a rotating speed and time of the running belt and to drive the running belt, while an operator walked or ran on the running belt. Accordingly, the conventional treadmill only allowed walking and running exercises. For physical strength training such as weight training, separated equipment should be required.

[9] According to cited document 4, it discloses a multi-functional running machine and a method for controlling the same, which allows a running belt to move reciprocally for a predetermined distance. That is, as both of the forward and backward rotations of the motor can be driven, an operator can enjoy the physical strength training such as stretching, bending, twisting, pushing, relaxation, contraction in addition to the treadmill exercise. However, it was limited to create various methods for intensively carrying out weight training.

[10] The multi-functional running machine only allows the runnung belt to move reciprocally for a predetermined distance using a driving power of the motor, so that it is limited to experience weight training exercises applying an operator's power.

[11] In addition to yoga, there is an apparatus called reformer, which relaxes or contracts muscles to strengthen the muscle power. The reformer for doing pilates exercise includes a rope supported by a frame, a rope grip, a spring, a panel moving along a rail, and a rope guide roller so that an operator usually holds the rope with his/her hands or feet to use the reformer, which is disclosed in cited document 3.

[12] The reformer for the pilates exercise is the athletic apparatus moving along the rail by the force of operator against the braking power of the spring so that the operator can exercise only using his/her muscle power on the panel without using a motor. Accordingly, an effect of the training can be significantly large, but the size of the movable panel is small to limit the training posture and method. Further, the spring and the rail are exposed due to a property of the reformer to cause a restoring power of the spring when the operator let go of the rope by accident so that the rapidly moving panel is not safe to the operator. In addition, it is burdensome to individually hang the spring in such a reformer for pushing or pulling exercise, and it is difficult for the operator to have interest in terms of the passive exercise.

Technical Solution

[13] In order to solve the foregoing and/or other problems, it is an objective of the present invention to provide a treadmill as described in the following embodiments.

[14] The present invention provides a method for allowing weight training to be carried out using a treadmill including a motor for generating a driving power and a braking power by means of a motor driver, a running belt driven by the motor and a controller for controlling the motor driver, wherein the running belt moves for a predetermined distance in a predetermined direction (forward direction) and then stops, and moves backward by means of an operator's power, and a forward driving power of the motor is removed to have only a motor load resistance so that the braking power of the motor acts on the running belt when the running belt moves backward.

[15] The weight training can be more variously carried out by using a load cell for

recognizing a weight. That is, a power applied by the operator is input to the controller through the load cell, and the input power is determined to change the driving power and the braking power of the motor according to various setting conditions, so that a power such as spring tension which has been generated in the reformer for pilates exercise can be adjusted more finely to allow various safe and interesting weight trainings to be carried out.

[16] In one aspect, the invention is directed to a weight training treadmill, which includes: a driving motor controlled by a motor driver; a running belt wound around two rotatable axes and for rotation; a bottom frame where the running belt is mounted; and a controller disposed in a vertical frame supported by the bottom frame for controlling the motor driver, wherein the running belt moves for a predetermined distance in a predetermined direction (forward direction) and then stops, and moves backward by means of an operator's power, and a forward driving power of the motor is removed to have only a load resistance that acts as a weight training load when the running belt moves backward.

Advantageous Effects

[17] According to the present invention as described above, when the running belt moves for a predetermined distance in a predetermined direction by a motor and then stops and then moves backward by an operator, a braking voltage of the motor is generated to cause the operator's power to act on the weight training. This allows a weight training function to be added to the existing treadmill function so that various trainings can be done in one apparatus.

[18] In addition, the controller that receives the operator's power as a signal by the load cell changes the braking power and the driving power of the motor according to the operator's power, so that the weight training can be properly done in a range that can draw a distinction of the training and does not apply an excessive power to the physical muscle.

Brief Description of the Drawings

[19] The foregoing and other objects, features and advantages of the invention will be apparent from the more particular description of preferred embodiments of the invention, as illustrated in the accompanying drawings. The drawings are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the invention.

[20] FIG. 1 is a whole perspective diagram of the present invention.

[21] FIG. 2 is a configuration diagram of a marking and a belt sensor.

[22] FIG. 3 is a configuration diagram of a conventional rotating axis sensor.

[23] FIG. 4 is a diagram of a base plate and an anti-rolling base plate.

[24] FIG. 5 is a configuration diagram of a configuration of a rope.

[25] FIG. 6 is a diagram of a long pull training method.

[26] FIG. 7 is a diagram of a vertical fly training method.

[27] FIG. 8 is a diagram of an arm curl training method.

[28] FIG. 9 is a diagram of a high lat pull training method.

[29] FIG. 10 is a diagram of a chest press training method.

[30] FIG. 11 is a diagram of a dipping training method.

[31] FIG. 12 is a diagram of a leg press training method.

[32] FIG. 13 is a diagram of a leg curl training method.

[33] FIG. 14 is a diagram of a total hip training method.

[34] FIG. 15 is a diagram of a chest weight training method.

[35] FIG. 16 is a diagram of an abdominal training method.

[36] FIG. 17 is a diagram of a barbell up training method.

[37] FIG. 18 is a diagram of a dumbbell and barbell training method.

[38] FIG. 19 is a diagram of a pull over training method.

[39] FIG. 20 is a diagram of a leg squat training method.

[40] FIG. 21 is a diagram of an inner thigh training method.

[41] FIG. 22 is a diagram of a whole body exercise using a rope guide roller and a rope.

[42] FIG. 23 is a diagram of a mounted load cell engagement rod.

[43] FIG. 24 is a diagram showing a running belt training.

[44] FIG. 25 is a flow chart of a general weight training mode.

[45] FIG. 26 is a flow chart of a motion copy weight training mode.

[46] FIG. 27 is a flow chart of a weight recognition weight training using a load cell.

Mode for the Invention

[47] Hereinafter, the present invention will be described with reference to the accompanying drawings.

[48] The present invention is mainly classified into two modes.

[49] The first mode is a control method mode that signals of a load cell 30 are not recognized by a controller 4 at the time of weight training, and the second mode is a control method mode that the signals of the load cell 30 are recognized by the controller 4 at the time of weight training.

[50] The first mode of the apparatus according to the present invention will be described with reference to an apparatus, as follows. The present invention is not for controlling the running belt 1 in one direction, reverse direction, or reciprocating movement for a predetermined distance in the conventional treadmill. That is, the present invention differs from the conventional treadmill due to the characteristics in that a motor 2 that moves in any one direction for a predetermined angle of the running belt 1 and stops, a

running belt 1 that moves for a predetermined distance (not greater than 1.5 meter) and stops by the motor 2 and moves backward to the original position by an operator's power, and a rope 3 and a pipe 18 that help to exert power from the operator when the running belt 1 needs to move backward are employed. And it also differs from the conventional treadmill in that a braking power is applied to the motor 2 when the operator tries to return to the original position.

[51] In particular, the present invention provides a treadmill, which derives anaerobic weight training on the running belt 1 from a braking power of the motor 2 generated when the operator tries to move the running belt 1 backward on the running belt 1 driven by the motor 2. Accordingly, the treadmill for the weight training according to the present invention includes: a motor 2 whose braking power is controllable; a controller 4 for controlling a movement speed, a movement direction, a movement distance, and so on of the running belt 1; a bench 5, a base plate 6 or an anti-rolling base plate 34 for aiding the training on the running belt 1; a rope 3, a rope guide roller 7, a rope grip 8, a rope rod 9, and an engagement rod 10 for allowing the operator to exert his/her power; and a plurality of adjustment buttons 11 for allowing the operator to readily adjust a training intensity while doing the training.

[52] Such a structure will be described with reference to FIGS. 1 to 5. The present invention, as shown in FIG. 1, provides a treadmill, which includes a motor 2 having a decelerating function controlled by a motor driver 12, a running belt 1 driven by the motor 2, a bottom frame 13 where the running belt 1 is mounted, and a vertical frame 14 vertically disposed on the bottom frame 13 and having a controller 4 for controlling the motor driver 12.

[53] The present invention is characterized in that a forward driving power of the motor 2 is removed but a backward load resistance of the motor is generated when the running belt 1 moves for a predetermined distance in a predetermined direction (forward direction) and then stops and moves backward by means of the operator's power, so that a braking power of the motor 2 acts as a weight when the operator tries to move the running belt 1 backward, thereby allowing the weight training to be carried out by the operator.

[54] The controller 4 receives signals corresponing to a movement distance, a movement speed, a movement direction, and the number of movement of the running belt 1, and a magnitude of the braking power from the operator. In addition, the running belt 1 operates in accordance with contents input to the controller 4 so that all information resulting from the movement of the running belt 1 is displayed in the controller 4 at the time of training.

[55] The braking power of the motor 2 is varied by the motor driver 12 to cause the operator's power to be changed at the time of weight training.

[56] The controller 4 already has various programs in combination of movement distance, the movement speed, the movement direction, and a movement time of the running belt 1, and the braking power of the motor 2, so that the operator selects any one of the various programs.

[57] The controller 4 operates a sound and a lamp according to the control information of the motor 2 and the operating state of the running belt 1 moving for a predetermined distance (or section). At this time, sounds generated from counting of reciprocating movement for safety according to the information of the controller are informed by a speaker so that the operator can concentrate more on the respiration and training posture.

[58] FIG. 24 illustrates the controlling examples of the running belt 1 moved within a predetermined section by the motor 2, in which the predetermined section ranges from A to Z, for example. A solid line and a dotted line are present between A and Z, wherein the solid line represents a direction of the running belt 1 driven by the motor 2 only, and the dotted line represents a direction of an operator's power movement only. When the running belt 1 moves backward by means of the operator's power, a braking power of the motor 2 is applied in the moving section and it can be also varied. Further, a driving voltage of the motor 2 can be changed also in the moving section where the running belt 1 moves forward for a predetermined distance so that the velocity of the running belt 1 may be changed. This corresponds to FIG. 24 (d) and (e). That is, thick solid lines of (d) denote changes in magnitude of the driving voltage, and thick dotted lines of (e) denote changes in braking voltage of the motor 2.

[59] The running belt 1 may be configured to have a pause period at least one time in a section where the running belt moves forward for a predetermined distance by means of the motor 2. That is, the motor 2 is forced to stop even when the operator's power acts backward so that the running belt is controlled to have the pause period at least one time within the training section. Examples of the pause period within the training section are illustrated in FIG. 24(f) and (g). In the drawing, the pause period is shown as dots.

[60] In addition, the running belt 1 may be controlled by the controller 4 to have the pause period varying from 1 to 6 seconds at an end of the predetermined distance desired by the operator's power and at an end of the predetermined distance moved by the driving voltage of the motor 2. This corresponds to of FIG. 24(b) and (c), and is shown as large dots.

[61] Referring to (a) of FIG. 24, the driving voltage of the motor 2 is uniform within the section by the already input value, and the backward braking voltage is also constantly kept within the predetermined section depending on what was input by the controller 4. Accordingly, FIG. 24(a) shows the example in which the uniform speed and braking

power of the motor 2 are presented. However, the speed and the braking power are not restricted with each other to be mutually effected.

[62] The braking power of the motor 2, the movement speed and the movement distance of the running belt 1 may be adjusted by several adjustment buttons 11 disposed in the treadmill. That is, the adjustment buttons 11 may be disposed at a proper position of the bottom frame 13 where the running belt 1 is disposed, at a proper position of the vertical frame 14 vertically disposed in the bottom frame 13 and having the controller 4, or a proper position such as an end of the knob 15 disposed above the vertical frame 14.

[63] An engagement rod 10 is disposed across the vertical frame 14, and the separated engagement rod 10 may be inserted into multi grooves 19 of an engagement unit 20 for facilitating insertion by the operator.

[64] The engagement rod 10 is disposed to allow the rope 3 to be hung on. The engagement unit 20 having the multi grooves 19 may be disposed to allow the mounted position of the engagement rod 10 to be detachably changed in the vertical frame 14.

[65] A bench 5, a base plate 6, or an anti-rolling base plate 34 may be disposed on the running belt 1.

[66] Pipe insert holes 17 are formed at both sides of the bottom frame 13, and both ends of the "∩"-shaped pipe 18 having the rope guide rollers 7 may be inserted into the pipe insert holes 17.

[67] Markings 29a and 29b as means for recognizing a movement distance are disposed at both edges of the running belt 1 at regular intervals, belt sensors 23a and 23b are disposed at positions allowing the markings 29a and 29b to be recognized, so that the movement distance and speed of the running belt 1 can be accurately measured. That is, the markings 29a are disposed at one edge of the running belt 1 with equal intervals, and the markings 29b are disposed at the other edge at equal intervals, wherein the interval of the marking 29a is different from the interval of the marking 29b. Accordingly, the controller 4 of the present invention has a built-in program for calculating a movement distance of the running belt 1 using the belt sensors 23a and 23b only without employing a rotating axis sensor 22 disposed in the rotating axis 21a, so that the information of the running belt 1 can be extracted even when errors of the rotating axis sensor 22 occur.

[68] The controller 4 calculates the voltage of the motor driver 12 and the time when the voltage was output to calculate the movement distance of the running belt 1. That is, the controller 4 may be configured to calculate the voltage of the motor driver 12 and the time when the voltage was output to calculate the movement distance of the running belt 1 without using the rotating axis sensor 22 for measuring the movement

distance of the running belt 1 that moves in a predetermined section.

[69] The running belt 1 may be configured to have a varying inclination degree by means of the controller 4 when the operator does the weight training on the running belt 1.

[70] A motor case 24 for covering the motor is disposed at one end of the bottom frame 13, and several rotating roller rods 25 are disposed above the motor case 24.

[71] The controller 4 may be configured to compare a movement distance of the running belt 1 run by the motor 2 with a movement distance of the running belt 1 run backward by the operator's power and to control the motor 2 to operate by an amount of error when the error results from the comparison so that the running belt 1 moves always by a constant distance.

[72] The present invention has set about 1:3 to 1:4 ratio of a belt pulley 26 of the motor 2 to the belt pulley 26 of the rotating axis 21a connected to the belt pulley by means of the belt 27.

[73] The present invention takes advantages of the response speed of the motor 2 that repeatedly moves after stopping and a low rpm range of the motor 2 so that a motor 2 wheel was not employed.

[74] The treadmill with an increased pulley ratio has a decreased rotating speed of the running belt 1 moving at a fast speed in a general running function, however, the decrease is cancelled off by the increased rpm of the motor 2 in control of the motor driver 12.

[75] According to the treadmill with an increased pulley 26 ratio of the rotating axis 21a, a friction power between the running belt 1 and the deck 32 pushed by the operator's weight acts to be added with the strong braking power of the motor 2 in control of the motor driver 12, thereby making the running belt 1 stop.

[76] The present invention has two fans outside the motor 2, which acts to have external cool air flow in and internal overheated air flow outside to prevent the motor 2 from being overheated due to repeat of the driving power and the braking power of the motor 2.

[77] A temperature sensor having a predetermined value is built in the motor 2 for preventing the motor from being overheated, so that the sensor controls the voltage of the motor 2 by means of the motor driver 12 at the time of overheating state.

[78] In addition, functions of the treadmill of the present invention are the same as those of a general treadmill. However, the functions of the general treadmill are not listed herein.

[79] The treadmill of the present invention meets the objectives such as walking or running of the general treadmill. Further the training method according to the present invention at the time of weight training is at least the same effect with the conventional pilates training method

[80] Change between the weight training treadmill of the present invention and the general treadmill is determined by the mode switching button of the controller 4, which is displayed by colors in up and down positions of the display of the controller 4.

[81] The present invention limits the speed of the running belt 1 to a range of pre-determined speed for safety of the weight training. The speed may change in a value not greater than 6 km/h.

[82] The rope 3, the rope grip 8, or the rope rod 9 is usually employed in the treadmill at the time of weight training.The base plate 6 may be used to enhance the feeling of cushion and contact between the body and the running belt 1 when the operator performs the weight training on the running belt 1, and several fine protrusions are formed on the bottom of the base plate 6 for preventing slipping with the running belt 1 so that the slipping can be decreased as much as possible when the operator applies a power on the running belt 1. Vertical plates 28 may be erected at both sides of the base plate for receiving the pushing power.

[83] A friction power is originally present between the deck 32 and the running belt 1 due to the operator's weight when the braking power of the motor 2 does not act on the weight training. Accordingly, the operator can do the weight training without the braking power of the motor 2, and the braking power of the motor 2 is controlled by more increasing the friction power.

[84] The motor driver 12 alternately carries out outputting voltage for the driving power of the motor 2 and outputting the DC voltage for the braking power used as a load resistance. When the braking voltage is high the motor 2 stops, and when the braking power is small the braking voltage of the motor 2 is 0 V.

[85] The braking voltage significantly varies from 0 V to high value by means of the controlled output of the motor driver 12 when the motor 2 acts for the braking power, so that the power of operator can be changed within wide range.

[86] In this case, the high value is an upper limit value that the running belt stops due to the high braking power. The upper limit value may be changed depending on the horse power of the motor.

[87] The variable braking power is combined with the number of trainings when the power increases or decreases at the time of weight training so that the weight training method becomes well-organized and phased.

[88] The motor 2 has a rotating driving power in one direction in the general treadmill, however, according to the present invention, the driving power of the motor 2 is used and the braking power of the motor 2 is also used as a load resistance.

[89] Training objects may be readily accomplished by well-known techniques for con-trollingthe running belt 1 in terms of braking power and driving power at the time of weight training without using an extremely accurate control method.

[90] To simply describe the braking power of the motor 2, the DC motor generates the braking power when to two poles are short-circuited backward, which may be divided by variable resistors or power elements and then applied to the rotating DC motor coil, thereby obtaining the varying braking power. In a case of three-phase AC motor, a constant voltage may be applied to any two phases of U, V and W phases to generate a DC voltage, which may be varied by a more or less amount and applied to the motor coil, thereby obtaining the varying control power according to the DC voltage. The DC voltage may be generated by pulse width modulation (PWM).

[91] Therefore, according to the present invention, when any one direction is selected to cause the running belt 1 to move by means of the motor 2 regardless of its direction, the braking power of the motor 2 is then required by the operator. The variable braking power may be already input in the controller 4 before doing the weight training, the operator may vary the braking power while doing his/her weight training, and separate adjustment buttons 11 for adjusting the magnitude of the braking power are disposed at a proper position. Accordingly, the degree of muscular tension and the intensity of exercise can be readily adjusted during the exercise. It is also possible for the adjustment buttons 11 to vary the braking power, the movement distance and the speed of the running belt 1.

[92] Sensors are employed to recognize the distance and calculate the length, of the running belt 1. It is required for the sensors to secure control of the movement distance of the running belt 1. Due to the characteristic that the braking power of the motor 2 varies while the operator does the weight training on the running belt 1, a slip occurs between the running belt 1 and the rotating axis 21a. Such phenomenon results from two different powers counteracting each other, i.e., the power for rotating the motor 2 and the operator's power opposite to the power for rotation.

[93] Accordingly, several markings 29a and 29b are printed at different intervals in both sides of an external surface of the running belt 1, and belt sensors 23a and 23b for recognizing the respective markings 29a and 29b are disposed close to the markings, so that the distance does not exceed the error range by means of the method of directly recognizing the length of the running belt 1 even when the slip occurs on the running belt 1.

[94] The movement distance of the running belt 1 is not accurately calculated by the rotating axis sensor 22 disposed in the rotating axis 21a of the motor 2, which occurs from the slip. Such an error results from the inner slip between the rotating axis 21a and the running belt 1.

[95] The rotating axis sensor 22 can have the accuracy of cm unit in recognizing the distance of the running belt 1, however, the accuracy is decreased due to the error occurring on the running belt 1 resulting from the slip of the running belt 1. However,

according to the present invention, an actual movement distance of the running belt 1 required for the exercise can be calculated even when the slip occurs on the running belt 1, which is accomplished by the markings 29a and 29b and the belt sensors 23a and 23b which are disposed at both edges of the running belt 1. In addition, the present invention allows the interval between the markings 29a and the interval between the markings 29b to be different from each other so that the information detected from the respective markings can be complemented for each other to perform accurate measurement.

[96] That is, the means for recognizing the movement distance of the running belt 1 was reinforced by the addition of the belt sensors 23a and 23b, and a photosensor interacts with the markings 29a and 29b printed on side surfaces of the running belt 1. Therefore, it has a structure of recognizing reflecting light in an embodiment.

[97] The belt sensors 23a and 23b may be any sensors, however, are preferably composed of photo sensors. That is, since the belt sensors receive the infrared light reflected at a predetermined distance, it is not subjected to an electrostatic phenomenon which often occurs in a cold weather.

[98] Several magnets and Hall-effect sensors may be employed at the position of the rotating axis sensor 22 of the belt pulley 26 in calculating the movement distance of the running belt.

[99] The belt sensors 23a and 23b act to complement each other in recognizing the distance of the running belt 1 controlled by the rotating axis sensor 22, and runs a program for recognizing the distance of the running belt 1 when errors occur on the rotating axis sensor 22, which thus gives the operator safety and reliability during his/her exercise.

[100] When the rotating axis sensor 22 runs the program for recognizing the distance of the running belt 1, the belt sensors 23a and 23b assist the rotating axis sensor 22. When assisting the rotating axis sensor, locations of the markings 29a and 29b of the running belt 1 are the central point notes.

[101] The controller 4 may have a program for calculating the distance of the running belt 1 only using the belt sensors 23a and 23b when the rotating axis sensor 22 fails to operate.

[102] Recognition of the length of the running belt 1 by means of the belt sensors 23a and 23b is different depending on the intervals and the number of the markings 29a and 29b. To accurately recognize the length, the number of the markings 29a and 29b needs to be increased.

[103] When the distance of the running belt 1 is recognized, the controller 4 may implement a program that compares the movement speed and the movement time of the running belt 1 without depending on the rotating axis sensor 22. The method of

calculating the movement distance of the running belt 1 calculates the voltage output to the motor and the time of the output voltage. The method of calculating the movement distance of the running belt 1 using the time corresponds to a method of recognizing the distance of the running belt when all of the rotating axis sensor 22 and the belt sensors 23a and 23b are out of order.

[104] At this time, any one of the belt sensors 23a and 23b acts as a central point of the running belt.

[105] The method of recognizing the movement distance of the running belt using the time is not as good as the method of measuring the distance of the running belt 1 using the rotating axis sensor 22. However, according to the present invention, the running belt 1 moves in a predetermined direction and then stops by means of the motor 2 and remains stopped when an external power is not applied to the running belt 1, so that the weight training treadmill of the present invention is safer than the general running machine for walking or running, and the movement distance of the running belt 1 using the time does not significantly exceed the range for accomplishing the training objective.

[106] The speed and the time of the motor 2 for rotating the running belt 1 are also delivered to the motor driver 12 in consideration of the operator's safety by the controller 4. Consequently, the driving power of the motor 2 operating in any one direction has a power-off state so long as the operator's external power is not applied to the central points of the belt sensors 23a and 23b.

[107] The weight training that the running belt 1 moves in a predetermined direction by the motor 2 and the user applies a power in a backward direction to make the running belt move is repeatedly done, and the running belt 1 stops at any time when the user does not move.

[108] A friction occurs between the deck 32 and the bottom surface of the running belt 1 when the operator does the weight training, and increases in proportion to the increased weight of the user when the operator is on the running belt 1. Accordingly, the user can do the training with his/her weight only without generating the braking power of the motor at all, so that the running belt 1 has a load resistance for the weight training. When the operator's power does not make the running belt 1 with the weight of the operator move, the inclination degree of the treadmill may be changed to derive an oblique angle of the running belt 1 and the friction of the gravity acting on the running belt 1 may be decreased to allow the weak operator to do his/her weight training.

[109] The oblique angle of the running belt 1 causes a stronger weight gravity to act on the operator on the running belt when the operator changes his/her training posture.

[110] The method of significantly increasing the gravity power instead of the braking power of the motor 2 adjusts an inclination of the treadmill, which thus allows the

weak operator to easily do his/her exercise and allows the intensity of the weight training to be varied.

[111] Such an inclination function for the treadmill is programmed in the controller 4, and an exercise effect becomes increased when the inclination of the treadmill is at high, medium, and low levels.

[112] Therefore, the weight training of the present invention can be accomplished by the inclination angle of the treadmill even without the braking power of the motor 2.

[113] In general, the general inclination angle of the treadmill is typically 25 degree or less, however, the weight training treadmill of the present invention allows the inclination angle to be increased to enhance the exercise effect as much as possible.

[114] When the weak operator does his/her exercise or the friction force of the running belt 1 with an operator's weight needs to be more decreased and the number of exercises needs to be increased, pipe insert holes 17 are formed near both side ends of the bottom frame 13 of the treadmill, and both ends of the "∩"-shaped pipe 18 are inserted into the pipe insert holes. Accordingly, the weight training can be done when the pipe 18 is inserted and an exercise for walking or running can be done when the pipe 18 is separated from the treadmill.

[115] The pipe 18 has the rope guide roller 7 for allowing legs or hands to be switched for exercise and the rope 3 to be hung on.

[116] The controller 4 of the present invention acts to control the motor driver 12 for driving the motor 2, display various information, receive information input from buttons pressed by the operator, receive sensor signals, share functions of the treadmill and process incoming or outgoing separate information required for the exercise.

[117] Several adjustment buttons 11 are separately disposed in addition to the buttons controlled by the controller 4 during the weight training, and the use of the several adjustment buttons is to avoid troublesome that the buttons connected to the controller 4 must be pressed after the operator stands up while doing his/her exercise.

[118] Therefore, the adjustment buttons 11 may be disposed anywhere, since the operator needs not to stand up to adjust the braking power of the motor 2 required for adjusting the backward exercise or the distance of the motor 2.

[119] Such an exercise allows the buttons to be controlled at the time that the running belt 1 moves by means of the motor 2 after the running belt 1 moves by means of the operator's braking power during his/her actual exercise, so that it allows the buttons to be controlled in a rest time during the weight training that causes pressure and rest to be alternately occur.

[120] Adjustment of the separate buttons 11 gives the operator continuity of the exercise to apply the power. Although not proposed by the present invention, the separate buttons 11 may be a remote control.

[121] In addition, according to the present invention, a method of allowing the speed of the running belt 1 moving for a predetermined distance to be changed in the predetermined distance is implemented in a program of the controller 4. The change in speed acts to increase the body reaction of the operator and enhance the muscle power of the operator when the running belt 1 moves in the predetermined section by means of the motor 2.

[122] In addition, according to the present invention, the change in braking power of the motor 2 also occurs in the predetermined section by means of the program of the controller 4. That is, the braking power of the motor 2 is not the same but changes when the running belt 1 moves by means of the operator's power. For example, a driver may rapidly or slowly step on the brake or does a double-brake.

[123] The treadmill of the present invention does not significantly differs from the general treadmill in terms of its structure, however, the weight training method of the present invention significantly differs from the existing general exercise method such as walking and running. The motor 2 mounted in the treadmill is designed to be the nearest to the ground, the motor case 24 covering the motor 2 is closest to the upper height of the running belt 1, and the rotating roller rod 25 is disposed above the motor case 24.

[124] The rotating roller rod 25 acts to allow the operator to smoothly slip even when the operator partially moves above the motor case 24 while the operator does his/her weight training, and acts to complement the drawback that the operator feels due to a short length of the running belt 1 when the operator does the weight training while lying or lying on his/her face. This rotating roller rod 25 gives rise to a massage effect at locations where the body contacts the rotating roller rod 25 while the rod moves by means of the motor 2.

[125] It is preferable to form the base plate 6 with its end having a curved surface upward so as to avoid overlapping of the base plate and the rotating roller rod 25 when the base plate 6 grazes upward along the rotating roller rod during the operator's weight training.

[126] To increase the exercise effect in addition to various features of the weight training, the controller 4 allows the change in speed of the motor 2 to occur within a pre-determined section, allows the braking power of the motor 2 to vary within the pre-determined section even whenthe operator applies a power in a backward direction, and allows the running belt 1 to have a pause period after it moves within the pre-determined section.

[127] A bench 5 is disposed for increasing the number of weight trainings. The bench 5 may be variously shaped. When the bench 5 is put on the running belt 1 and the operator sits on the bench to do the weight training, various body regions can be

physically strengthened by means of the roper guide roller 7 when the rope 3 is employed, which thus attributes to the exercise effect.

[128] Generation of the sound and lamp from the controller 4 is to prevent the operator from being in danger due to confusion with the existing general treadmill and to make the operator concentrate more on the respiration and exercise posture by counting the training number of weight trainings using a speaker.

[129] The rope rod 9 have concave grooves 16 that act to prevent detachment of the rope 3 and recognize the width of the rope rod 9 when the operator grasps the rope rod.

[130] When the operator does his/her weight training, a motion copy function program is implemented for facilitating adjustment of the buttons from the controller 4. A processing flow of the motion copy is illustrated in FIG. 26.

[131] The motion copy function refers to an action that receives, from the rotating axis sensor 22 and the belt sensors 23a and 23b, information of the distance of the running belt 1 that moved backward by the operator's power and makes the running belt 1 move forward again by the movement distance of the operator using the driving power of the motor 2.

[132] This motion copy function acts to allow the controller 4 to recognize the movement direction and movement speed information of the running belt 1 through the rotating axis sensor 22 and the belt sensors 23a and 23b after the operator first moves the running belt 1 in a predetermined direction, and acts to copy the information of the movement distance of the operator to the motor 2 to make the running belt 1 move to its original position when the motor 2 moves in a backward direction.

[133] The motion copy function is an easy method for simple weight training and for allowing the operator to use some buttons without use of complicated buttons.

[134] The motion copy mode is first input in the controller 4 and then the operator does his/her exercise to move on the running belt 1 according to his/her proper exercise posture involving hands, foots, elbows, a waist, etc. The running belt 1 does not move when the operator does not repeat any action, so that the safety is also secured.

[135] In the mode copy exercise mode, the driving power of the motor 2 may involve the backward movement speed of the running belt 1 moved by the operator's power, and a movement speed of 6 km/h or less that divides into three levels, i.e., high, medium, low. This corresponds to a case that the movement distance of the running belt 1 is copied to control the movement distance resulting from the driving power of the motor 2 without copying the movement speed of the running belt 1.

[136] When there is no button input from the controller 4 during the exercise, a default value among the classified speeds mentioned above is selected to cause a constant value to be output, thereby avoiding confusion for the operator. According to the weight training in the motion copy mode, the operator first changes the movement

distance of the running belt 1 to cause the next action to be generated by the motor 2, which thus facilitates using the weight training method of the beginner and enhances exercise safety. This is because various information of the complicated running belt 1 does not need to be individually input to the controller 4 and the running belt 1 does not move at all when the operator does not apply his/her power, so that the motion copy mode is safe and interesting.

[137] The foregoing has been described regarding the control method mode that does not allow the controller 4 to recognize signals of the load cell 30 when the weight training is done.

[138] A control method mode that allows the controller 4 to recognize the signals of the load cell 30 during the weight training will be now described.

[139] The apparatus is the same as the first mode, however, differs from the first mode in that the engagement rod 10 is replaced by load cell engagement rods 33a and 33b.

[140] This control method mode allows the controller 4 to receive the sensor signal of the load cell 30 and applies the signal to the driving power and the braking power of the motor 2. The processing flow is illustrated in FIG. 27.

[141] The first and the second modes mentioned above are common in that the driving power of the motor 2 is applied to any one direction without conditions and the braking power of the motor is applied to a direction opposite to the any one direction. However, the second mode differs from the first mode in that the controller 4 receives the power pushed or pulled by the operator in the first mode from the load cell 30 and varies the driving voltage and the braking voltage depending on the weight value of the load cell 30.

[142] The weight recognition weight training mode has a weight condition in addition to the first mode control method.

[143] The controller 4 in charge of adding the load cell 30 and the program receives the change in apparatus, changes it to the weight as a unit, and outputs the output voltage and the braking voltage of the motor 2 to the motor driver 12 depending on the weight condition.

[144] Load cell engagement rods 33a and 33b are disposed as additional devices which receive sensor signals of the load cell 30. The load cell engagement rod 33a has the load cell 30 engaged at a central position of the rod and allows an external rope to be hung on. The load cell engagement rod 33a acts only to extend the rope 3 after the rope is hung on the rod.

[145] The load cell engagement rod 33b has two load cells 30 disposed at both ends of the rod. Both ends of the load cell engagement rod 33b are inserted into the load cell housings 31 disposed in the vertical frame 14. At this time, the load cell 30 measures the pushing power and the pulling power according to the insertion direction. The load

cell engagement rod 33b is detachably disposed in the load cell housing 31.

[146] Accordingly, the controller 4 may receive the power pushed or pulled by the load cell engagement rods 33a and 33b, and the load cell 30 may be disposed at any place where the power of the rope 3 can act.

[147] As such, powers pushed or pulled by the load cell engagement rods 33a and 33b are changed to signals, which are then delivered to the controller 4. And the voltage of the delivered weight value is changed to the value in weight in the controller 4. The changed weight is associated with the program in the controller 4 to be used for controlling the driving power and the braking power of the motor 2.

[148] When the pulling power in weight is set to 30 kg while the operator does his/her weight training, the running belt 1 does not move due to the strong braking power of the motor 2 when the operator's pulling power is 30 kg or less. However, when the pulling power exceeds 30 kg, the braking power of the motor 2 is decreased to cause the running belt to move due to the operator's power. That is, the exercising power done by the operator is adjusted to 30 kg by the load cell 30.

[149] Such an action is implemented by reading the unit in weight using the load cell 30 in the controller 4. Comparison is made on whether the read data exceeds a set weight value selected by the operator to determine the driving power and the braking power of the motor 2. That is, the controller 4 receives an initial value as a weight training amount desired by the operator, receives an actual power applied to the running belt 1 using the load cell 30 by the user, and compares the initial value with the actual power to adjust the magnitude of the braking power of the motor 2 and the magnitude of the driving power of the motor 2, so that the actual power is adjusted to the initial value. And the controller 4 stops the operation of the treadmill to secure safety when the operator's power received from the load cell 30 and applied to the running belt 1 varies several times for a predetermined time. The controller 4 moves the running belt 1 by means of the driving power and the braking power of the motor 2 input from the load cell 30, and controls the running belt 1 depending on the braking voltage of the set button value without receiving an input from the load cell 30 in the case of backward direction. The controller 4 controls the running belt 1 so as to vary the braking power and the driving power only in a specific section within a predetermined section.

[150] The load cell 30 is connected to the load cell engagement rod 33a to measure the pulling power, however, the kind of the load cell 30 and the position where the load cell 30 is to be disposed may be changed to measure the operator's power in the manner of pushing power, and one embodiment thereof corresponds to the load cell engagement rod 33b.

[151] Accordingly, the weight training treadmill uses the power and the signal by means of the load cell 30, allows the controller 4 to process them, and allows the operator to adj

ust the power in weight unit applied to the motor 2, so that the exercise methods are creative based on the adjustment.

[152] The weight recognition weight training using the load cell 30 adds the method of controlling the weight recognition to the method of controlling the motor 2 using the driving power that moves for the predetermined distance in the predetermined direction and using the braking power for the motor that moves backward, so that resultant changes are as follows.

[153] The operator uses selection buttons to set the pulling or pushing weight by means of his/her body in the controller 4. And then the operator presses the start button, the controller 4 provides a braking power corresponding to the initially input weight value to the motor 2 to maintain the running belt 1 stopped. At this time, the running belt 1 can move only when the operator does his/her exercise with a power greater than the braking power of the motor 2.

[154] Whenever the power of the operator increases, the weight increase signal of the load cell 30 is transmitted to the controller 4 so that the controller 4 decreases the magnitude of the braking power in inverse proportion to the weight increase.

[155] This corresponds to the general weight training. When a barbell is lift up, a gravity acts on the barbell, and the barbell lift up has the same gravity. This may correspond to the case that the vertical gravity is changed to a horizontal weight.

[156] When doing an exercise, the motor 2 already has the selected weight (braking power) value, and the driving power of the motor 2 is not generated if the operator does not take any action. The running belt 1 moves when the operator's power is greater than the set weight value. At this time, the start point of the running belt 1 that starts to move is stored by the belt sensors 23a and 23b and the markings 29a and 29b. The running belt 1 returns to the stored first start point of the running belt 1 when the running belt moves for a predetermined distance and then the operator's power is smaller than the set weight value.

[157] The returning speed is the movement speed of the running belt 1, which is the driving power of the motor 2. Accordingly, when the driving power of the motor 2 occurs in any one direction in the weight recognition weight training using the load cell 30, the braking power necessarily occurs in a direction opposite to the any one direction.

[158] The power for returning to the first start point of the running belt 1 that has moved by the operator's power is responsible for the driving power of the motor 2, and the driving power that has exceeded the set value due to the operator's great power becomes the braking power to generate a voltage from the motor driver 12. Such every control is based on the set weight value and the operator's power.

[159] An embodiment thereof is as follows.

[160] 1. The operator selects a weight recognition mode button in the controller 4 mode.

[161] 2. The operator selects a sensor weight from buttons connected to the controller 4.

[162] 3. The operator sets a movement speed and a movement direction and presses an OK button.

[163] 4. The operator sits on the running belt 1 in a direction toward the controller 4 and pulls the rope 3.

[164] 5. At this time, when the operator's pulling power is not greater than the set value, the braking power of the motor 2 strongly acts to keep the running belt 1 stopped.

[165] 6. When the operator's power is greater than the set value, the braking power of the stopped motor 2 is decreased and the running belt 1 moves in a direction where the operator's power acts. At this time, a sensor signal by the amount of movement is transmitted to the controller 4. The transmitted sensor signal acts to recognize the position of the running belt that has first started and to allow the running belt 1 to return to the position backward by the distance that the running belt moved by the driving power of the motor 2.

[166] 7. When the operator's power is greater than the set weight value in item 6, the braking power of the motor 2 is decreased in inverse proportion to the operator's increased power, which leads to the increased speed of the running belt 1 due to the operator's power.

[167] 8. When the pulling power is smaller than the set weight value in item 6, the driving power of the motor 2 is added to move the running belt 1 toward the first start point during the exercise. At this time, the magnitude in movement speed of the running belt 1 is inverse proportion to the magnitude in operator's power of pulling the rope.

[168] According to the above described embodiment, the running belt 1 that acts like a spring can be controlled when the weight is sensed using the load cell 30.

[169] The running belt 1 that has moved by the operator pulling the rope 3 has a restoring property like an elastic band or spring. This is based on the fact that the controller 4 controls the motor driver 12 in terms of the operator's pulling power that is great or small. Accordingly, the weight training using the load cell 30 of the present invention uses a control method employing proportional control in the controller 4, which changes the driving voltage and the braking voltage of the motor 2 depending on the magnitude in operator's pulling or pushing power, which thus leads to changes in movement power, movement distance and braking power of the running belt 1 so that an effect of the weight training for the operator is increased.

[170] The elasticity depending on the weight when the running belt 1 moves may be associated not with the vertical gravity but with the horizontal gravity, so that the weight training methods may be various.

[171] The patterns of the horizontal reciprocating exercise of the running belt 1 may be varied as shown in (h), (i), (j), (k) and (l) of FIG. 24.

[172] The solid line arrows of FIG. 24 denote the movement of the running belt 1 by means of the driving power of the motor 2, and the dotted line arrows denote the movement of the running belt 1 by means of the operator's power exceeding the braking power of the motor 2.

[173] Examples of doing various weight trainings according to the present invention will now be described.

[174] First, the operator is in a start standby mode before doing his/her exercise. The operator inputs a control program for the running belt 1 that is suitable for the exercise by means of buttons. When the start button of the controller 4 is pressed, the program starts to run, the operator takes an exercise posture on the running belt 1 and waits for the movement of the running belt 1 in the standby time.

[175] The operator is informed of a start counter by means of a bell sound before 5 seconds the running belt 1 starts to move, the lamp operates to cause the running belt 1 to move in a predetermined distance. The movement speed is also selected by the program.

[176] The embodiment described below proposes common notes and predetermined direction for better understanding the present invention. A direction where the running belt 1 moves away from the controller 4 is the forward direction, and a direction where the running belt 1 moves toward the controller 4 is the backward direction. All exercise methods allow the motor 2 to move the running belt 1 in any one direction and allow the operator to act his/her power to move the running belt 1 in the opposite direction. Names of the exercise methods are arbitraily defined in terms of weight training equipment for better description of the present invention.

[177] Examples below correspond to ones that implement the first mode exercise method. The load cell 30 recognition weight mode is the same as the exercise methods below except that a condition regarding the weight is added, so that a description of the first mode exercise method will be sufficient. The rope rod 9 is illustrated in the examples below, however, the load cell engagement rods 33a and 33b instead of the rope rod 9 are used in other mode using the load cell 30.

[178] 1. LONG PULL

[179] The long pull exercise is illustrated in FIG. 6. The movement direction of the running belt 1 by means of the motor 2 is a forward direction. The operator grasps the rope rod 9 connected to the rope 3 with his/her both hands and keeps legs together on the running belt 1. When the running belt 1 moves, the body then moves, the length of the rope 3 is limited, so that the waist is bent. The running belt 1 stops after it moves for a predetermined distance due to the controller 4. The operator pulls the rope 3 at the point of the stop. The magnitude in pulling power changes depending on the adjusted braking power of the running belt 1.

[180] When the magnitude in weight needs to be adjusted during the exercise, adjustment

buttons separate from the key input device disposed in the controller 4 may be used for the same, and the operator may control the braking power of the running belt 1 without standing up from the running belt 1. That is, the speed, the braking power, and the direction of the running belt 1 may be changed according to the number of continuous pressing of the adjustment button 11. For example, one pressing may control the speed, two braking power, and so forth, and the right and left adjustment buttons 11 may be responsible for functions of decreasing or increasing the weight. Functions and operations of the adjustment buttons 11 are also the same in the following descriptions, so that they are omitted for simplicity.

[181] Therefore, after the thick solid line is changed to the double-dotted chain line, the running belt 1 moves in the thick solid line again by means of the operator's power, so that trapezius muscle, deltoid muscle, rhomboid muscle, and latissimus dorsi muscle can be strengthened.

[182] 2. VERTICAL FLY

[183] The vertical fly training is illustrated in FIG. 7. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator leans his/her back against the controller 4, grasps the rope 3 like grasping a steering wheel of a vehicle in front of the operator. At this time, when the running belt 1 moves for a predetermined distance in the forward direction, both arms of the operator are pulled back like spread wings.

[184] At the position where the running belt 1 has stopped, the operator strongly moves his/her arms that were pulled back like a circle and moves in a forward direction. The running belt 1 is rotated by the operator's arm power and then stop. At this time, the running belt 1 repeatedly moves again due to the motor 2. The braking power of the motor 2 is also properly controlled.

[185] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 7, the running belt 1 moves in the thick solid line again by means of the operator's power, so that deltoid muscle, pectoralis major muscle, and pectoralis minor muscle concentrated on the chest can be strengthened.

[186] 3. ARM CURL

[187] The arm curl exercise is illustrated in FIG. 8. A movement direction of the running belt 1 by means of the motor 2 is a forward direction. The operator sits on a bench 5 disposed on the running belt 1, and grasps the rope rod 9 with both hands with palms facing upward. The operator softly puts his/her elbows on knees and bends his/her both arms. At the position where the running belt 1 moves for a predetermined distance by means of the controller 4 and then stops, the operator uses bending powers of both arms to pull the rope rod toward his/her neck. The operator repeatedly does this exercise.

[188] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 8, the running belt moves in the thick solid line again by means of the operator's power, so that biceps muscle and brachial muscle can be strengthened.

[189] 4. HIGH LAT PULL

[190] The high lat pull exercise is illustrated in FIG. 9. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator lies on the running belt 1 and grasps the rope rod 9 connected to the rope 3. When the running belt 1 moves in a predetermined direction and then stops, arms are spread toward the head of the operator. At this time, the operator pulls his/her spread arms to do the weight training. The operator may do this weight training even if the operator lies on his/her stomach. In this case, the base plate 6 may be disposed between the operator and the running belt 1 to prevent slipping.

[191] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 9, the running belt moves in the thick solid line again by means of the operator's power, so that pectoralis major muscle, pectoralis minor muscle, biceps muscle, brachial muscle, rhomboid muscle, teres major muscle, and latissimus dorsi muscle can be strengthened.

[192] 5. CHEST PRESS

[193] The chest press exercise is illustrated in FIG. 10. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator sits on the bench 5 disposed on the running belt 1 with his back against the controller 4. The operator grasps the rope rod 9 connected to the rope 3 by a shoulder width and spreads his/her both arms straight at the chest height. Afterwards, when the running belt 1 moves forward, spread arms of the operator are bent and the rope rod 9 closely contacts the chest. At this time, the operator strongly pushes the rope rod 9 toward the controller direction so that the exercise can be repeatedly done in the direction where the running belt 1 moves.

[194] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 10, the running belt moves in the thick solid line again by means of the operator's power, so that pectoralis major muscle, deltoid muscle, and triceps brachii muscle can be strengthened.

[195] 6. DIPPING

[196] The dipping exercise is illustrated in FIG. 11. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator grasps the rope 3 by both hands and stands at attention on the running belt 1. When the running belt 1 moves forward, the operator's arms are bent, and the bent arms are pushed downward by means of the operator's power. This exercise is also repeatedly done. The braking power of the motor 2 is increased when the weight needs to be increased.

[197] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 11, the running belt moves in the thick solid line again by means of the operator's power, so that pectoralis muscle and biceps muscle can be strengthened.

[198] 7. LEG PRESS

[199] The leg press exercise is illustrated in FIG. 12. A movement direction of the running belt 1 by means of the motor 2 is the backward direction. The operator has his/her both legs supported by the engagement rod 10 toward the controller 4 and is in standby mode with his/her knees spread. At this time, the base plate 6 or the anti-rolling base plate 34 may be disposed for preventing slipping between the running belt 1 and the operator's back. Protrusions for increasing the fraction with the running belt 1 are formed on a bottom surface of the base plate 6, and vertical plates 28 for supporting both shoulders of the operator are formed at both sides of one end of the anti-rolling base plate 34. Accordingly, the whole body is supported through the operator's shoulders.

[200] The engagement rod 10 is disposed over the vertical frame 14 where the controller 4 is mounted. When the running belt 1 moves backward, legs are bent to cause the operator's hips to move toward the controller 4.

[201] The running belt 1 that has moved backward and then stopped makes the operator's legs bent, and the operator's power pushes the running belt 1 forward when the operator spreads out his/her legs toward the engagement rod 10. At this time, the running belt 1 is pushed away due to the squat power and the braking power may be added to repeatedly do a desired exercise.

[202] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 12, the running belt moves in the thick solid line again by means of the operator's power, so that adductor muscle, peroneus longus muscle, and peroneus longus muscle can be strengthened.

[203] 8. LEG CURL

[204] The leg curl exercise is illustrated in FIG. 13. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator lies on his/her stomach on the running belt 1, hangs two legs on the rope 3 with ankles closely pulled toward the hips, and waits for the operation of the motor 2.

[205] When the motor 2 operates to make the running belt 1 move forward, the two legs hung on the rope 3 are spread. When the operator strongly bends the running belt 1 with his/her two legs that have been spread, the two legs hung on the rope 3 are bent again like the first state. This is repeatedly done.

[206] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 13, the running belt moves in the thick solid line again by means of the operator's power, so that biceps femon's muscle, semimembranosus muscle, semitendinosus

muscle, and gastrocnemius muscle can be strengthened.

[207] 9. TOTAL HIP

[208] The total hip exercise is illustrated in FIG. 14. A movement direction of the running belt 1 by means of the motor 2 is the backward direction. The operator puts any one leg on the bottom surface next to any one side of the treadmill toward the controller 4 and puts the other leg straight behind the operator.

[209] When the running belt 1 moves for a predetermined distance and then stops due to the controller 4, the leg on the running belt 1 is bent, and the operator applies a power to the bent leg to move the running belt 1. This is repeatedly done.

[210] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 14, the running belt moves in the thick solid line again by means of the operator's power, so that gluteus muscle and iliotibial band can be strengthened.

[211] 10. CHEST WEIGHT

[212] The chest weight exercise is illustrated in FIG. 15. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator fixes the rope 3 to the upper end of the vertical frame 14, bends his/her knees, grasps the rope 3 with two arms and is in a standby mode with pulling the rope down the crotch.

[213] When the running belt 1 moves for a predetermined distance and then stops by means of the motor 2, arms are spread straight toward the controller 4. At this time, the operator pulls the rope 3 down the crotch. The running belt 1 moves backward due to the operator's pulling power and then stops, and the motor 2 causes the operator's posture to be changed forward. This is repeatedly done.

[214] Accordingly, after the thicksolid line becomes the double-dotted chain line in FIG. 15, the running belt moves in the thick solid line again by means of the operator's power, so that triceps muscle, biceps muscle, and deltoid muscle can be strengthened.

[215] 11. ABDOMINAL

[216] The abdominal exercise is illustrated in FIG. 16. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator pulls the rope 3 above the back and the head, grasps the rope 3 with two hands at the forehead position, and waits for the forward movement of the running belt 1 due to the motor 2.

[217] When the running belt 1 moves for a predetermined distance and then stops due to the motor 2, the rope 3 causes the operator's waist to be bent backward. At this time, when the operator exerts himself to the utmost to try bending by means of the waist power, the running belt 1 moves backward.

[218] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 16, the running belt moves in the thick solid line again by means of the operator's power, so that rectus abdominal muscle and obliquus externus abdominal muscle can be strengthened.

[219] 12. BARBELL UP

[220] The barbell up exercise is illustrated in FIG. 17. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator lying on the running belt 1 grasps the rope rod 9 connected to the rope 3, spreads his/her arms above the head, and puts legs on the motor case 24. Afterwards, when the running belt 1 moves for a predetermined distance and then stops due to the motor 2, the rope rod 9 is moved toward and above the head and the arms are bent. At this time, when the operator strongly pushes the bent arms above the head, the running belt 1 moves backward due to the operator's power. This is repeatedly done. In addition, although this exercise is not illustrated in the drawing, the effect of the barbell up exercise increases when the operator lies on his/her stomach on the running belt 1.

[221] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 17, the running belt moves in the thick solid line again by means of the operator's power, so that deltoid muscle and triceps brachii muscle can be strengthened.

[222] 13. DUMBELL/BARBELL

[223] The dumbell/barbell exercise is illustrated in FIG. 18. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator lies on the running belt 1, grasps the rope rod 9 connected to the rope 3 with two hands, and bends the arms. Afterwards, when the running belt 1 moves for a predetermined distance and then stops due to the motor 2, the rope rod 9 is moved down the lower body of the operator.

[224] At this time, when the operator pull his/her two arms, the running belt moves backward. This is repeatedly done.

[225] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 18, the running belt moves in the thick solid line again by means of the operator's power, so that biceps muscle can be strengthened.

[226] 14. PULL OVER

[227] The pullover exercise is illustrated in FIG. 19. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator stands his/her back against the controller 4, grasps the rope rod 9 connected to the rope 3 with two hands, and obliquely spreads both arms straight above the head. Afterwards, when the running belt 1 moves for a predetermined distance and then stops due to the motor 2, the operator bends only two elbows and fixes the upper body. The operator moves the running belt 1 only with his/her arm power at the position where the running belt 1 is stopped.

[228] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 19, the running belt moves in the thick solid line again by means of the operator's power, so that posterior-deltoid muscle, triceps, teres major muscle, and rectus

abdominal muscle can be strengthened.

[229] 15. LEG SQUAT

[230] The leg squat exercise is illustrated in FIG. 20. A movement direction of the running belt 1 by means of the motor 2is the backward direction. The operator lies on the running belt 1, and spreads straight ends of the foots against the engagement rod 10 mounted in the vertical frame 14. Afterwards, the operator bends the ankles as much as possible when the running belt 1 moves backward for a predetermined distance, and moves the running belt 1 only with the ankle power when the running belt 1 is stopped.

[231] Accordingly, after the thick solid line becomes the double-dotted chain line in FIG. 20, the running belt moves in the thick solid line again by means of the operator's power, so that tibialis anterior, peroneus longus muscle, and gastrocnemius muscle can be strengthened.

[232] 16. INNER THIGH

[233] The inner thigh exercise is illustrated in FIG. 21. A movement direction of the running belt 1 by means of the motor 2 is the forward direction. The operator sits on the bench 5 on the running belt 1 against the controller 4, hangs both legs on the rope 3 and keeps legs together forward. Afterwards, when the running belt 1 moves for a predetermined distance and then stops due to the motor 2, the operator moves the running belt 1 only with the power of keeping both legs together. This exercise is effective for women in terms of prevention of urinary incontinence, and adductor muscle, great adductor muscle, and brevi adductor muscle can be strengthened.

[234] 17. WHOLE BODY EXERCISE

[235] The whole-body exercise can be simply done using the rope guide roller 7 and the rope 3, which is illustrated in FIG. 22. Accordingly, the operator may push or pull legs and hands using the rope knob 8 disposed at both ends of the rope 3 so that the whole-body exercise is done, and the rope 3 is reciprocated along the rope guide roller 7 of the engagement rod 10 disposed in the vertical frame 14.

[236] Preferred embodiments of the present invention have been disclosed herein and, although specific terms are employed, they are used and are to be interpreted in a generic and descriptive sense only and not for purpose of limitation. Accordingly, it will be understood by those of ordinary skill in the art that various changes in form and details may be made without departing from the spirit and scope of the present invention as set forth in the following claims.

Claims

[1] A weight training treadmill comprising:
a driving motor 2 controlled by a motor driver 12;
a running belt 1 wound around two rotatable axes 21a and 21b for rotation;
a bottom frame 13 where the running belt 1 is mounted; and
a controller 4 disposed in a vertical frame 14 supported by the bottom frame 13 for controlling the motor driver 12,
wherein the running belt 1 moves for a predetermined distance in a pre-determined direction (forward direction) and then stops, and moves backward by means of an operator's power, and a forward driving power of the motor 2 is removed to have only a load resistance that acts as a weight training load when the running belt 1 moves backward.

[2] The treadmill according to claim 1, wherein the controller 4 receives, from the operator, a movement distance, a movement speed, amovement direction, the number of movements, of the running belt 1, and a magnitude of braking power, and the running belt 1 operates by means of contents input to the controller 4, so that all information according to the movement of the running belt 1 is displayed in the controller 4 when the operator does weight training.

[3] The treadmill according to claim 1, wherein the controller 4 already has various programs in combination of movement distance, the movement speed, the movement direction, a movement time, of the running belt 1, and the braking power of the motor 2, so that the operator selects any one of the various programs.

[4] The treadmill according to claim 1, wherein a braking power of the motor 2 varies to cause the operator to have a change in power when the operator does the weight training.

[5] The treadmill according to claim 1, wherein markings 29a and 29b as means for recognizing the movement distance are disposed at equal intervals at both edges of the running belt 1, and belt sensors 23a and 23b for accurately measuring the movement distance and the speed of the running belt 1 are disposed in positions that allow the markings 29a and 29b to be recognized.

[6] The treadmill according to claim 1, wherein the running belt 1 is forced to stop at both ends of a predetermined section of the running belt for 1 to 6 seconds by the braking power of the motor 2.

[7] The treadmill according to claim 1, wherein the controller 4 operates a sound and a lamp according to the control information of the motor 2 and the operating state of the running belt 1.

[8] The treadmill according to claim 1, wherein the braking voltage of the motor 2 varies in magnitude in a specific portion of a predetermined section of the running belt when the running belt 1 moves by means of the operator's power.

[9] The treadmill according to claim 1, wherein the driving voltage of the motor 2 varies in magnitude in a specific portion of a predetermined section of the running belt when the running belt 1 moves.

[10] The treadmill according to claim 1, wherein the running belt 1 has a pause period while a strong braking power of the motor 2 is applied to the running belt 1 one to ten times in a section where the running belt moves forward or backward.

[11] The treadmill according to claim 1, wherein the braking power of the motor 2, the movement distance and the movement speed of the running belt 1 are adjusted by several control buttons 11 disposed in the treadmill.

[12] The treadmill according to claim 1, wherein an engagement rod 10 or load cell e ngagement rods 33a and 33b are disposed across the vertical frame 14, and a rope 3 is engaged with the engagement rod 10 or the load cell engagement rods 33a and 33b.

[13] The treadmill according to claim 12, wherein the rope 3 has a rope grip 8 or a rope rod 9.

[14] The treadmill according to claim 1, wherein pipe insert holes 17 are disposed at both sides of the bottom frame 13, and both ends of a pipe 18 are inserted into the pipe insert holes 17.

[15] The treadmill according to claim 1, wherein an engagement unit 20 that has several grooves 19 for detachably changing the position of the mounted engagement rod 10 is disposed in the vertical frame 14.

[16] The treadmill according to claim 12, wherein the rope rod 9 have several concave grooves 16 for preventing the rope 3 from being detached when the rope 3 is hung on the groove.

[17] The treadmill according to claim 1, wherein the controller 4 stores information including the movement distance, the movement speed and the movement direction, of the running belt 1 by means of a rotating axis sensor 22 when the running belt 1 was moved by the operator's power, and causes a motion of the running belt 1 to be copied in a backward direction by driving the motor 2 again so as to make the running belt 1 move backward based on the stored movement information of the running belt 1.

[18] The treadmill according to claim 1, wherein the controller 4 stores information including the movement distance, the movement speed and the movement direction, of therunning belt 1 by means of a rotating axis sensor 22 when the running belt 1 was moved by the operator's power, and causes a motion of the

running belt 1 to be copied in a backward direction based on the stored movement information of the running belt 1 while maintaining the movement speed of the running belt 1 at a speed input from a button of the controller 4.

[19] The treadmill according to claim 1, wherein the controller 4 has a program for calculating a distance of the running belt 1 by means of a rotating axis sensor 22 and belt sensors 23a and 23b.

[20] The treadmill according to claim 1, wherein the controller 4 calculates a voltage of the motor driver 12 and a time when the voltage was output to calculate the movement distance of the running belt 1.

[21] The treadmill according to claim 1, wherein an inclination degree of the running belt 1 varies by means of the controller 4 when the operator does weight training on the running belt 1.

[22] The treadmill according to claim 1, wherein a motor case 24 for covering the motor 2 is disposed at one end of the bottom frame 13, and several rotation roller rods 25 are disposed above the motor case 24.

[23] The treadmill according to claim 1, wherein the controller 4 compares a movement distance of the running belt 1 run by the motor 2 with a movement distance of the running belt 1 run backward by the operator's power, and controls the motor 2 to operate by an amount of error when the error results from the comparison so that the running belt 1 moves always by a constant distance.

[24] The treadmill according to claim 12, wherein a load cell 30 for detecting a weight acting on the rope 3 from the operator is disposed between the load cell engagement rod 33a and the rope 3, and the controller 4 uses the information detected by the load cell 30 to variably control a braking power of the motor 2.

[25] The treadmill according to claim 12, wherein load cells 30 for detecting a weight acting on the rope 3 from the operator are disposed at both ends of the load cell engagement rod 33b, and the controller 4 uses the information detected by the load cells 30 to variably control a braking power of the motor 2.

[26] The treadmill according to claim 12, wherein a load cell housing 31 is disposed in the vertical frame 14, a load cell 30 disposed at an end of the load cell engagement rod 33b is inserted into the load cell housing 31, and information regarding the magnitude of a power when the power is applied to the engagement rod 10 is transmitted to the controller 4 so that a braking power and a driving power of the motor 2 are variably controlled by the controller.

[27] The treadmill according to claim 1, wherein a bench 5, a base plate 6 or an anti-rolling base plate 34 is disposed on the running belt 1.

[28] The treadmill according to claim 27, wherein vertical plates 28 are disposed at both sides of one end of the anti-rolling base plate 34 to facilitate tight contact

and power action, of the operator.

[29] A method of allowing weight training to be carried out using a treadmill including a driving motor 2 controlled by a motor driver 12, a running belt 1 driven by the motor 2 and a controller 4 for controlling the motor driver 12, the method comprising:

moving the running belt 1 at a predetermined speed and a predetermined direction (forward direction) for a predetermined distance and stopping the running belt;

removing a driving power of the motor 2 to cause the running belt 1 to move backward by means of an operator's power;

generating a braking power of the motor 2 to make the braking power of the motor 2 act as a weight training load when the running belt 1 moves backward; and

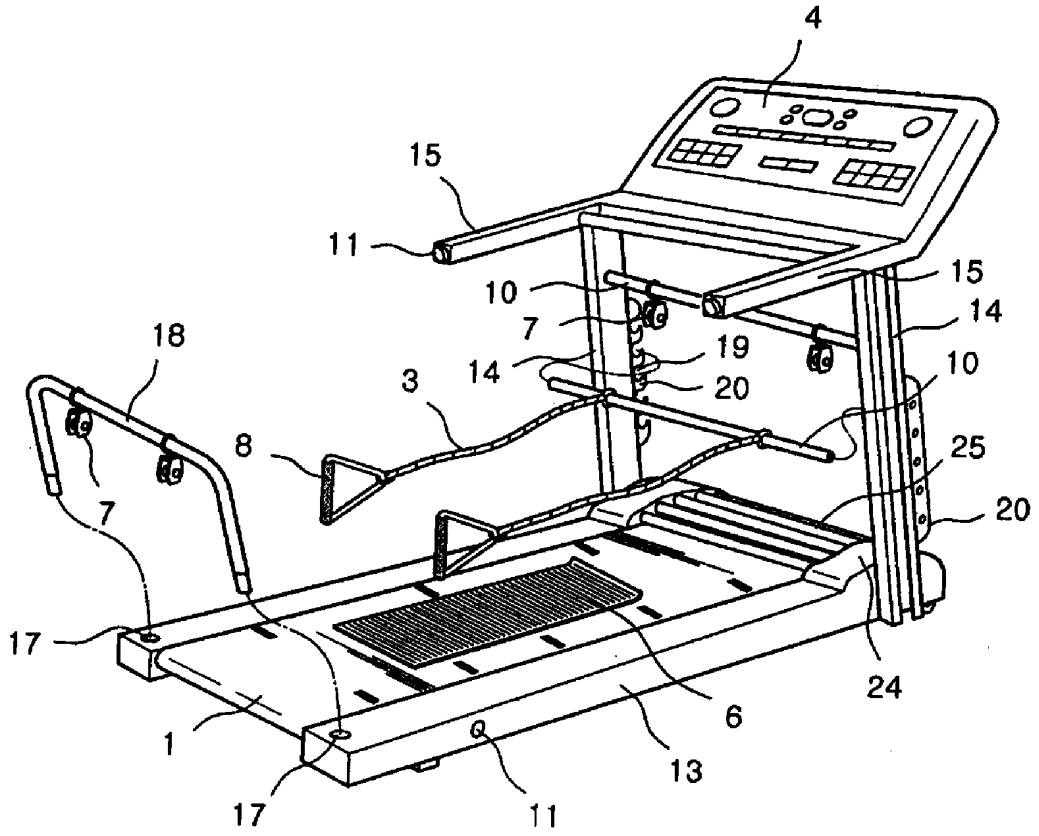
repeating the above described steps when the running belt 1 moves to the original position.

[30] The method according to claim 29, wherein when therunning belt 1 moves backward, the controller 4 varies the braking power of the motor 2 to allow several weight apparatuses to be used for training for one movement of the running belt.

[31] The method according to claim 29, wherein the controller 4 moves the running belt 1 by means of a driving voltage of the motor 2 generating from a button set value, and receives the operator's power to control the braking power of the motor 2 when the power acts backward.

[32] The treadmill according to claim 12, wherein a rope guide roller 7 for allowing the rope 3 to be hung and reciprocated is disposed in the engagement rod 10.

[Fig. 1]


4
15
11
10
7
19
14
20
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14
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18
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25
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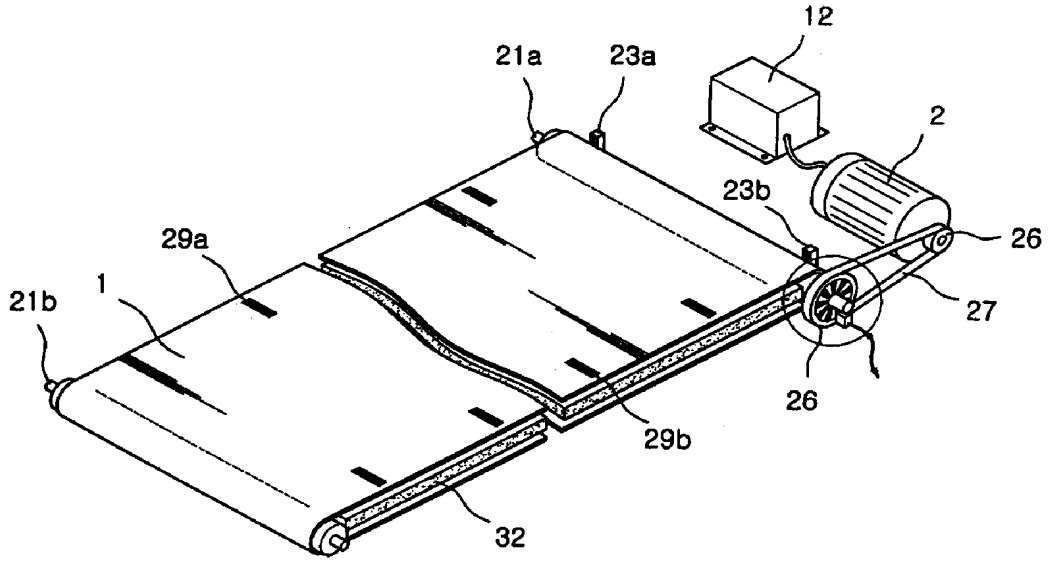
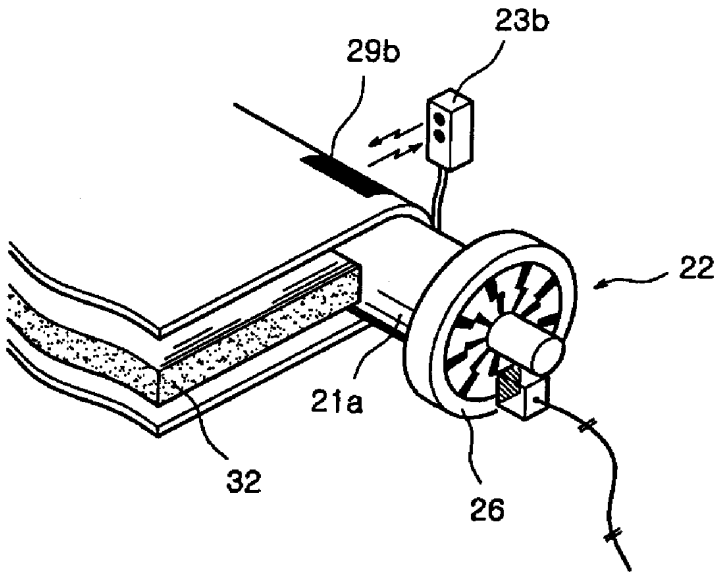
6
1
13
17
11

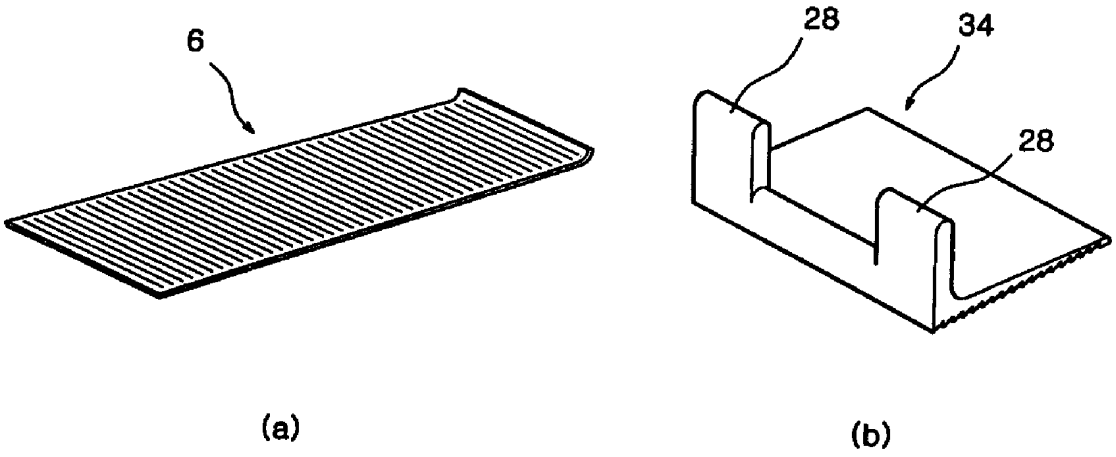
[Fig. 2]


12
21a
23a
2
23b
26
29a
1
21b
27
26
29b
32

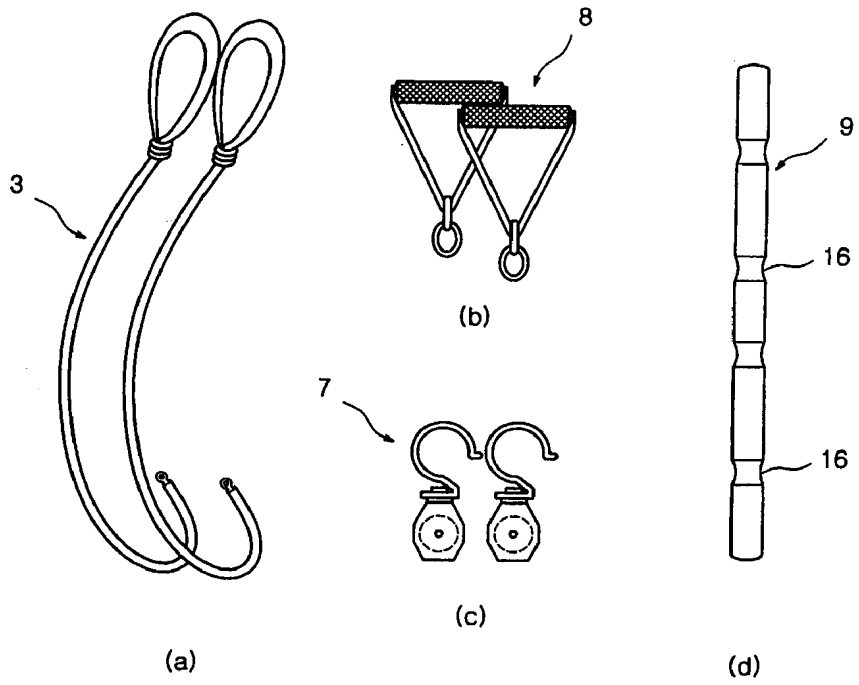
[Fig. 3]



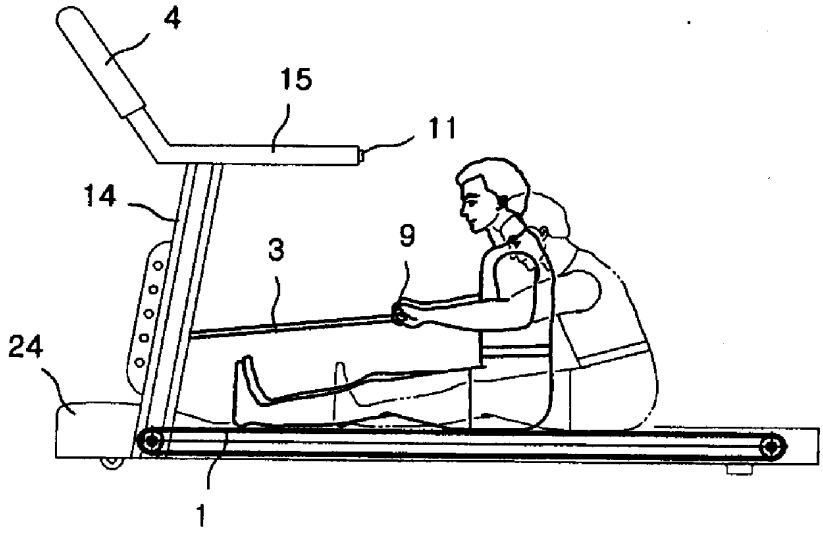
[Fig. 4]



[Fig. 5]



[Fig. 6]



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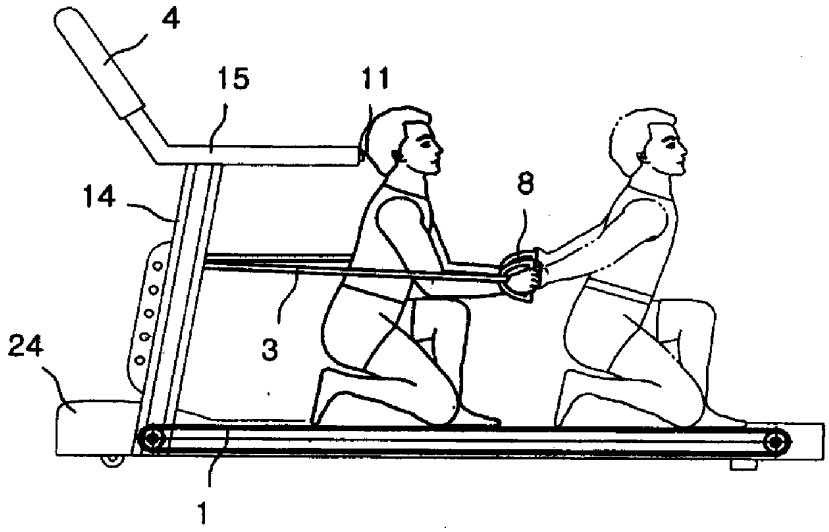
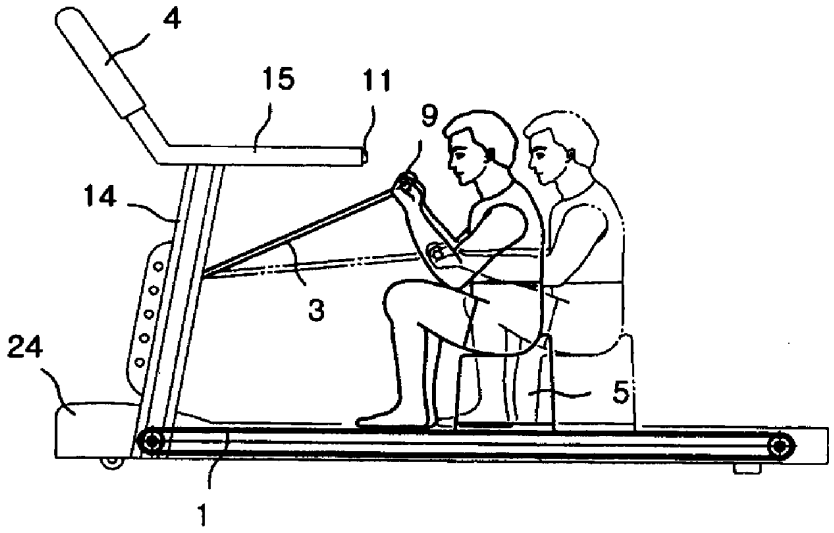
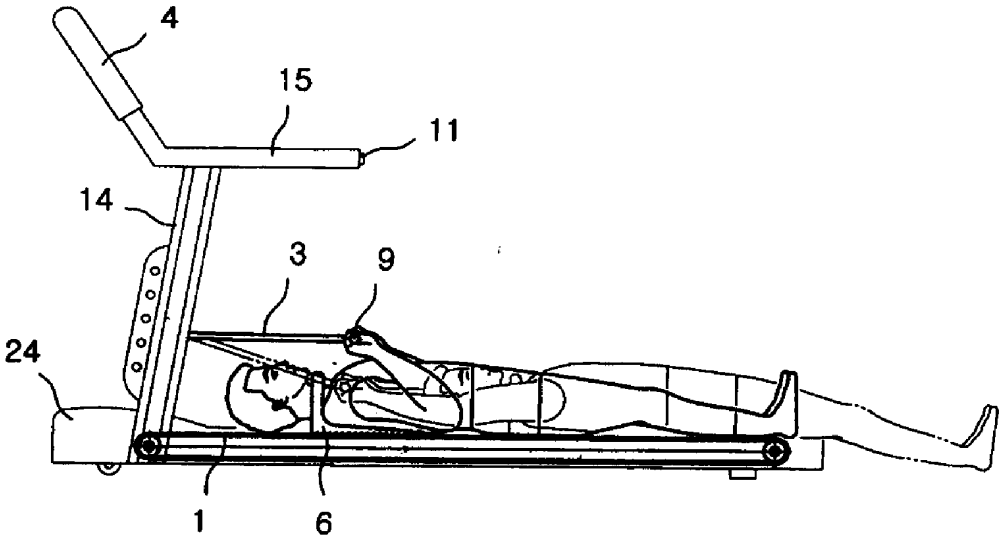


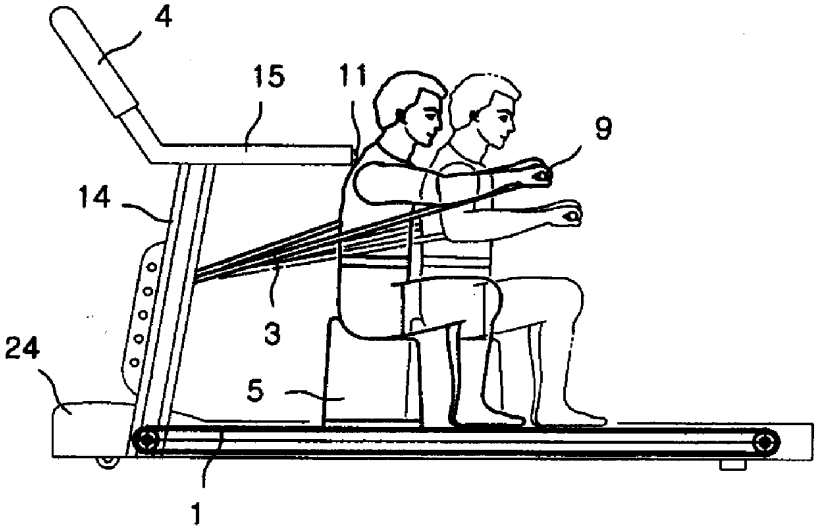
[Fig. 8]



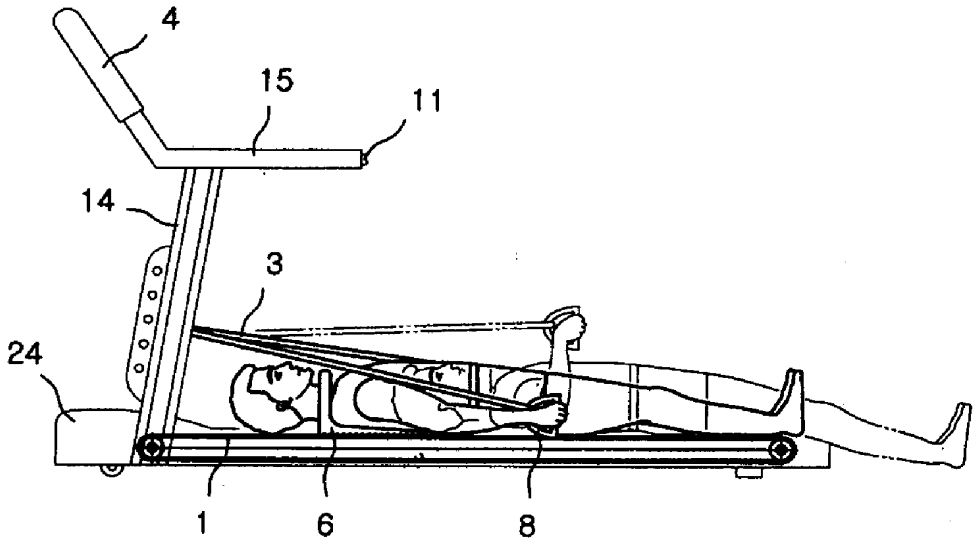
[Fig. 9]



[Fig. 10]



[Fig. 11]



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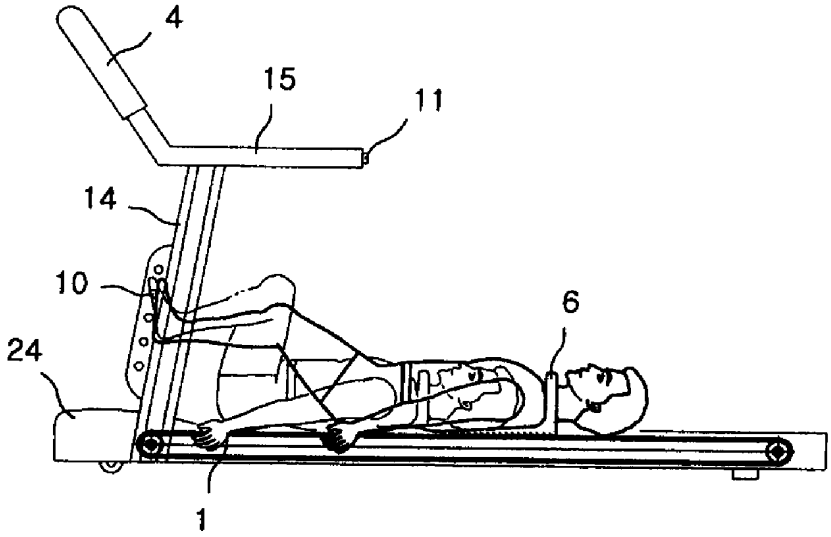

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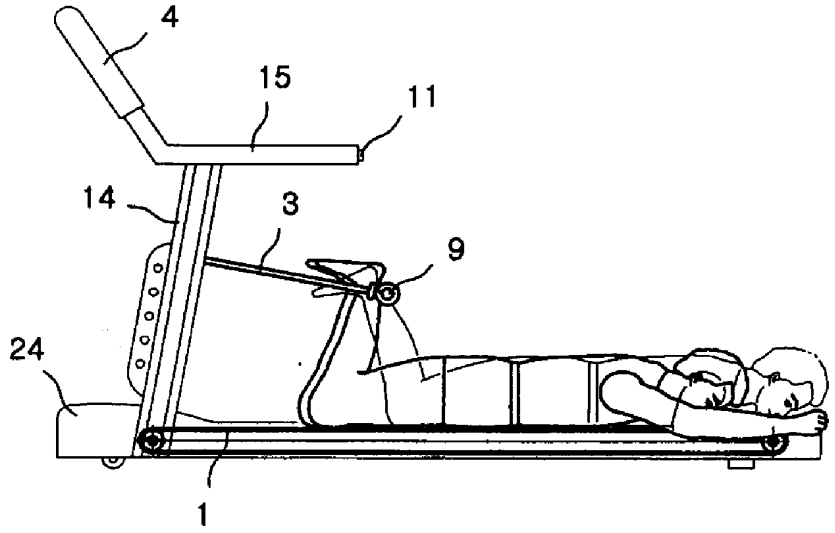

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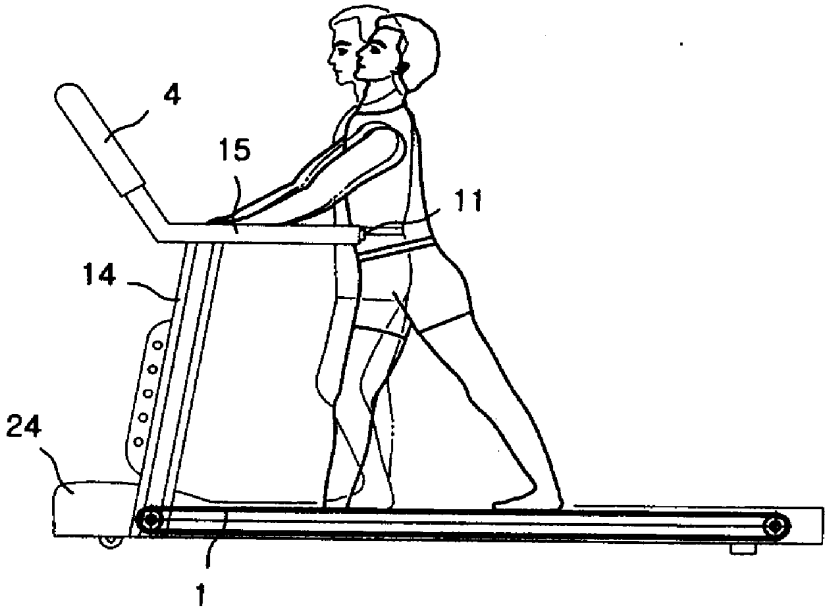

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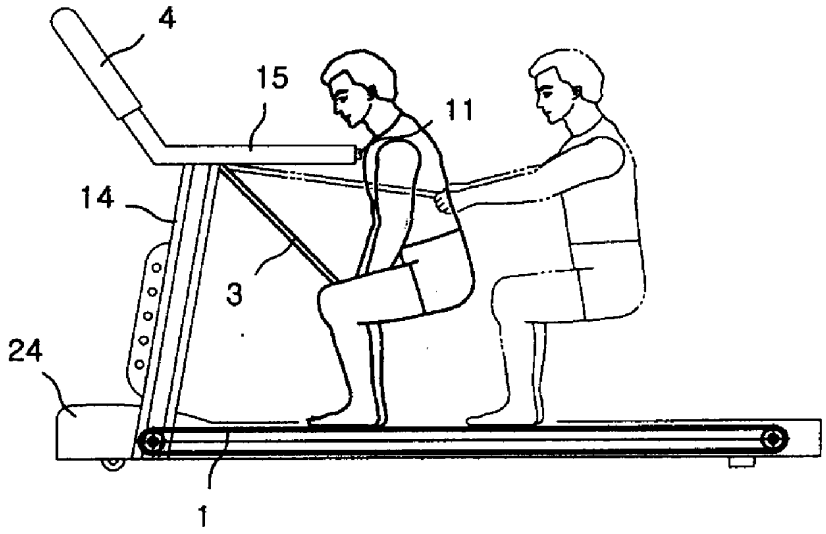

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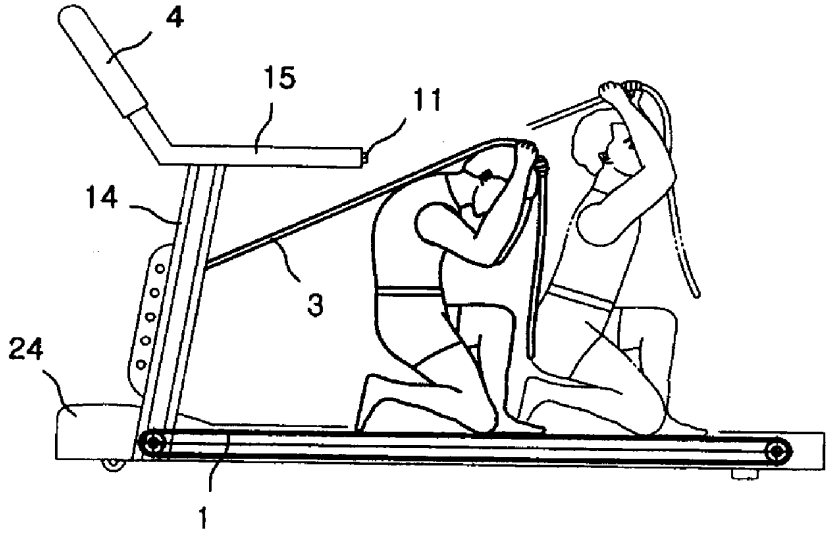
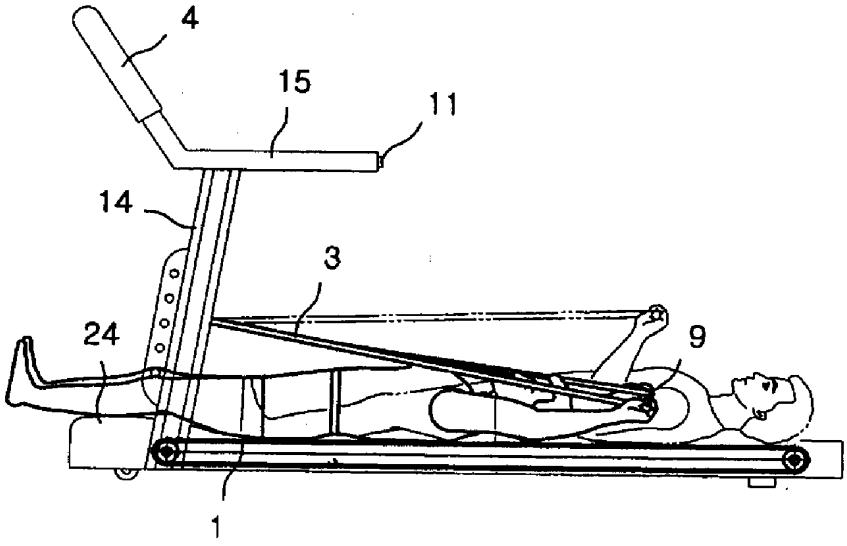
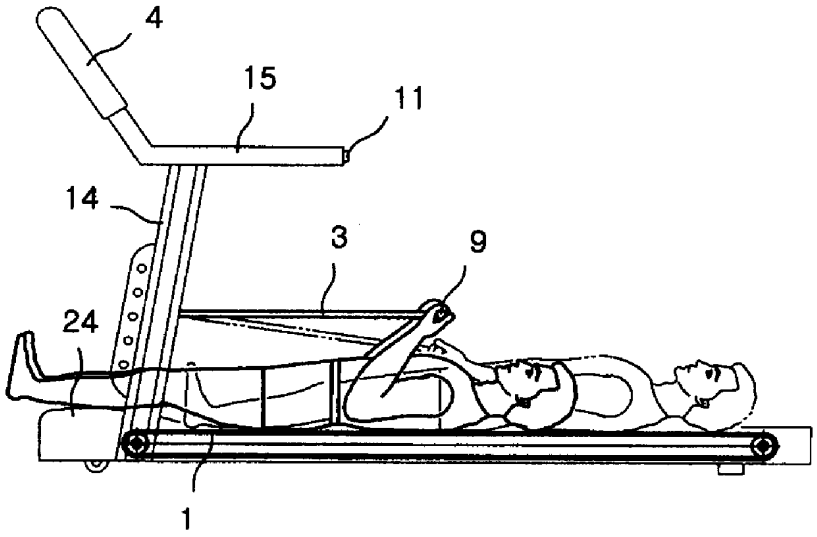


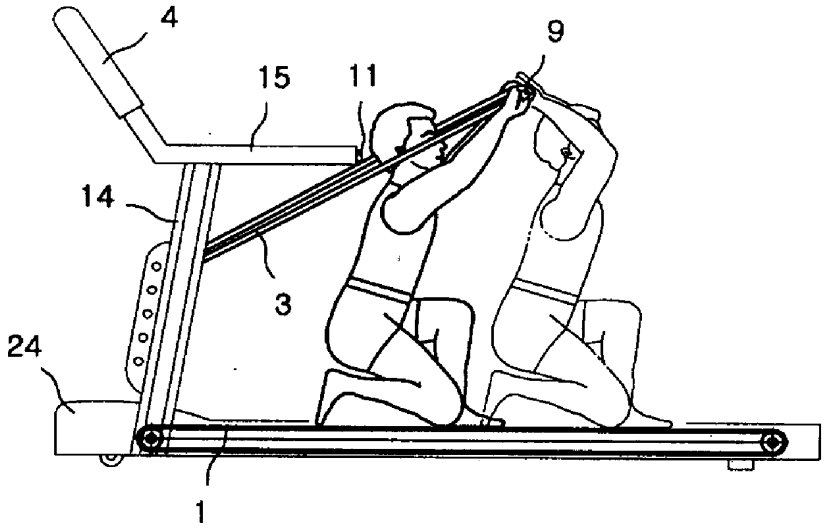
[Fig. 17]



[Fig. 18]



[Fig. 19]



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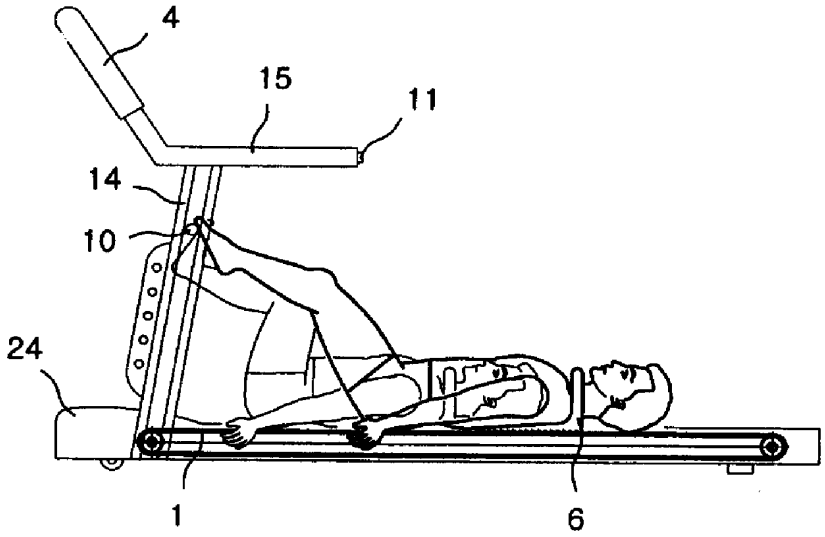

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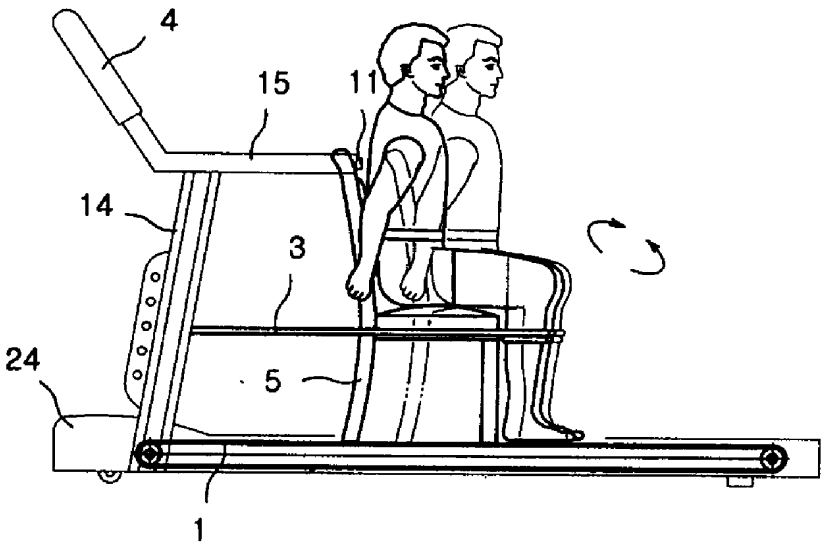
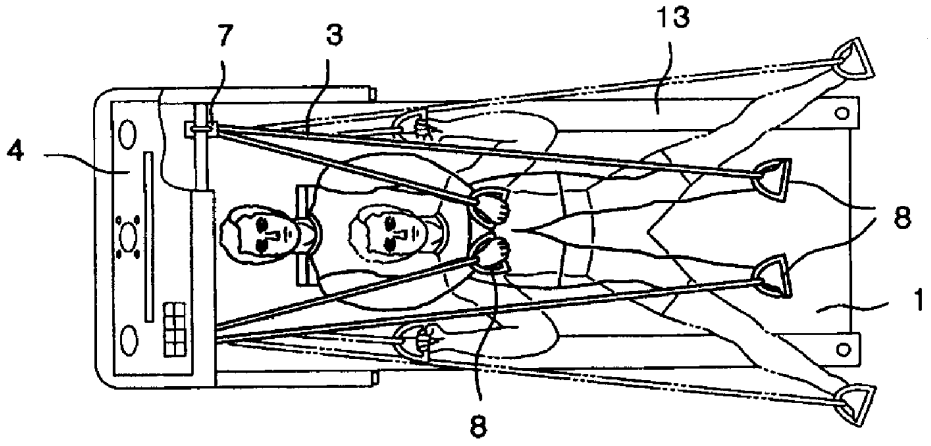
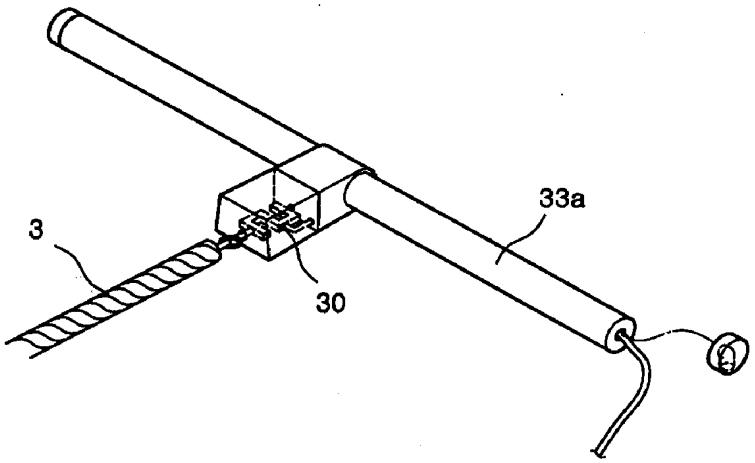


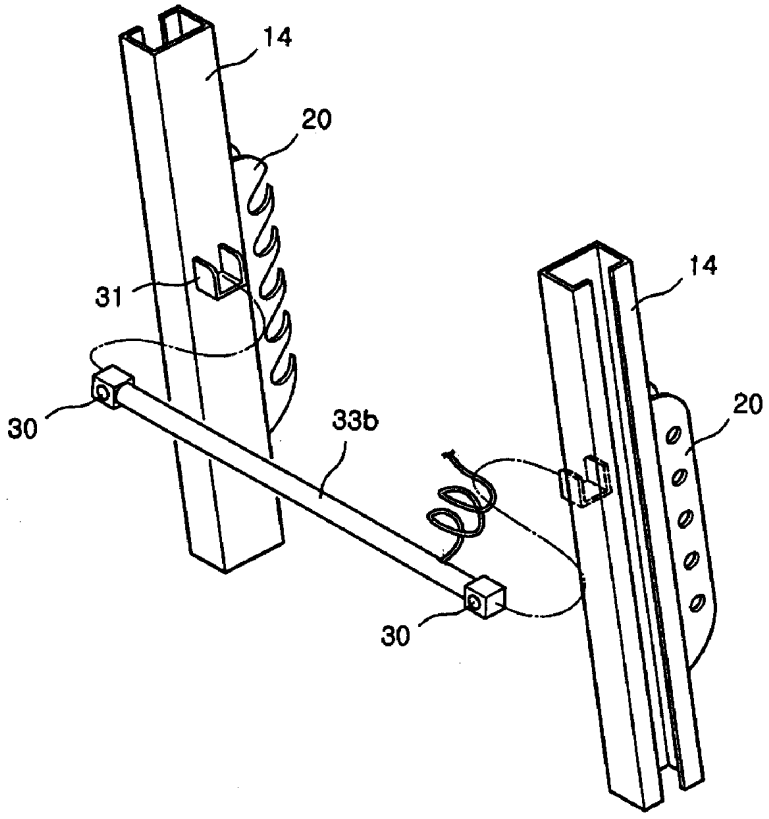
[Fig. 22]



[Fig. 23]

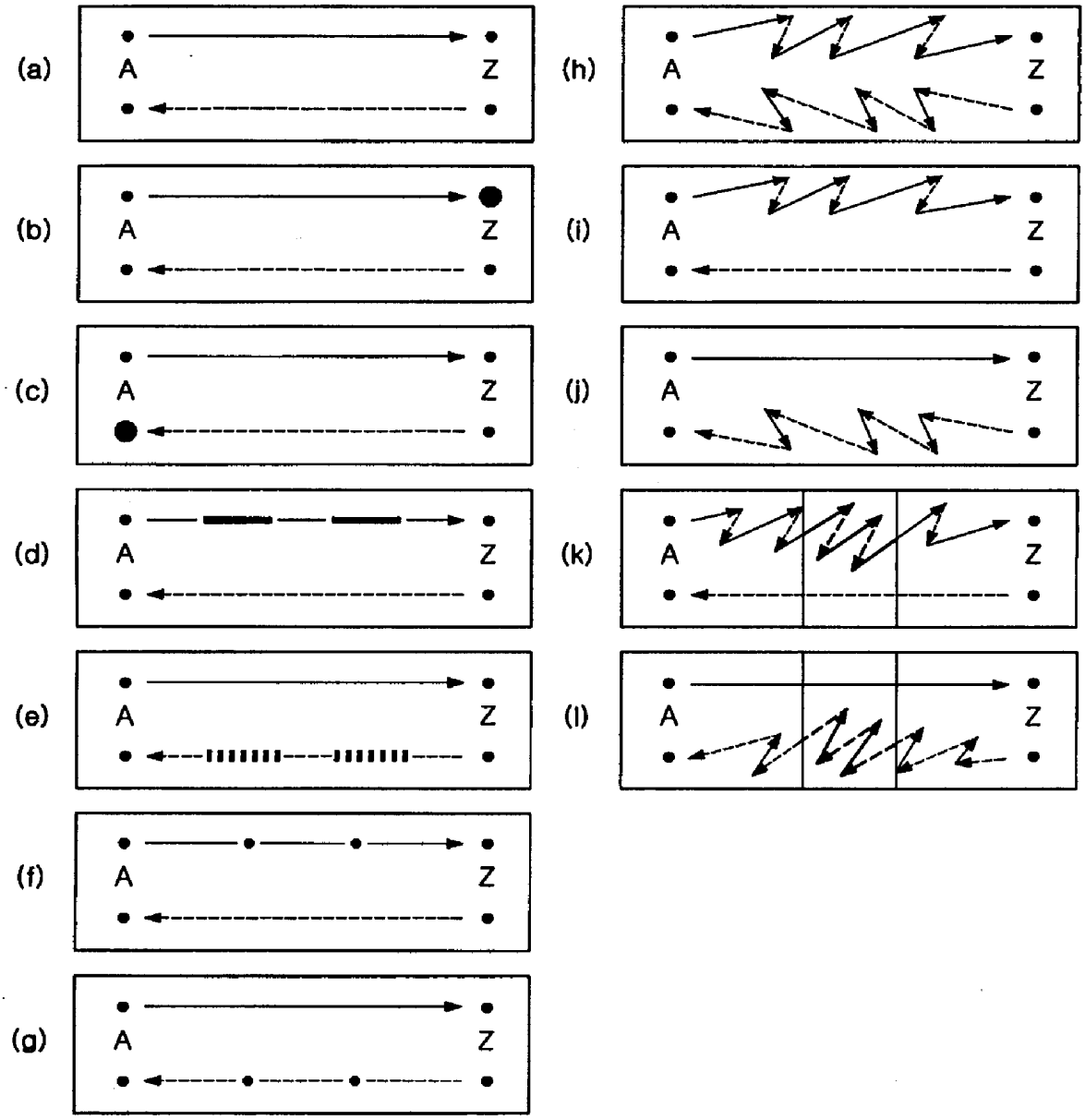


(a)



(b)

[Fig. 24]



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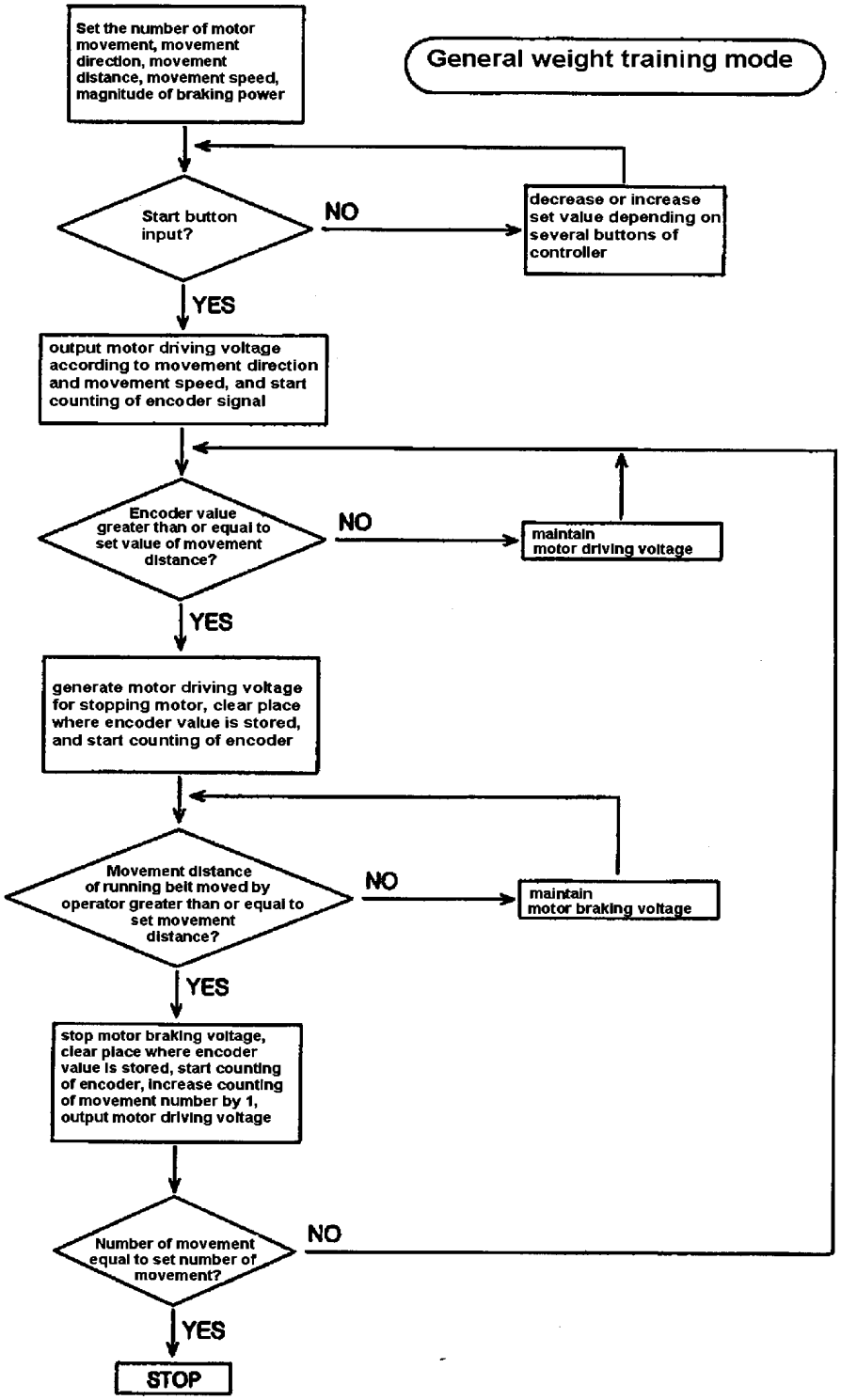
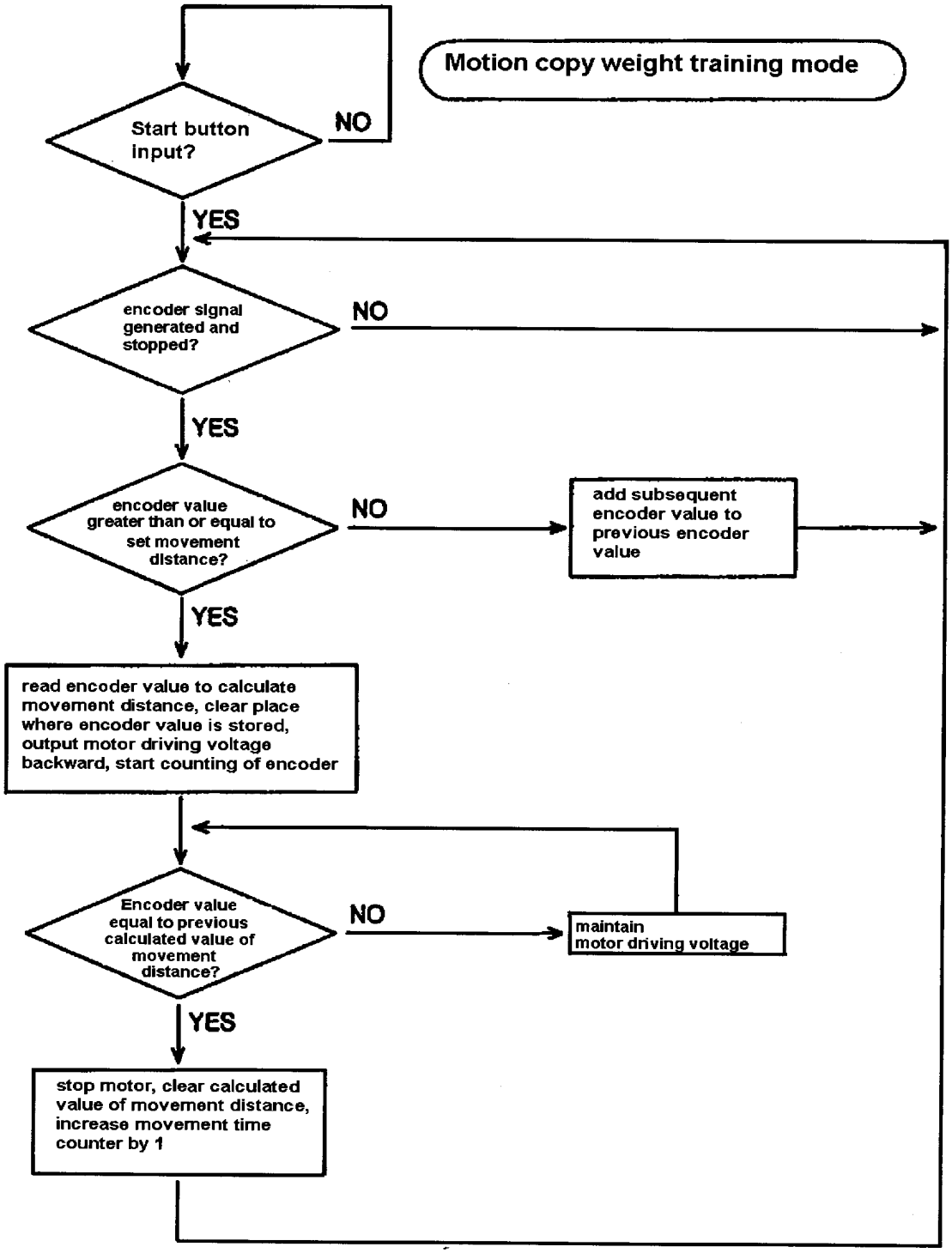
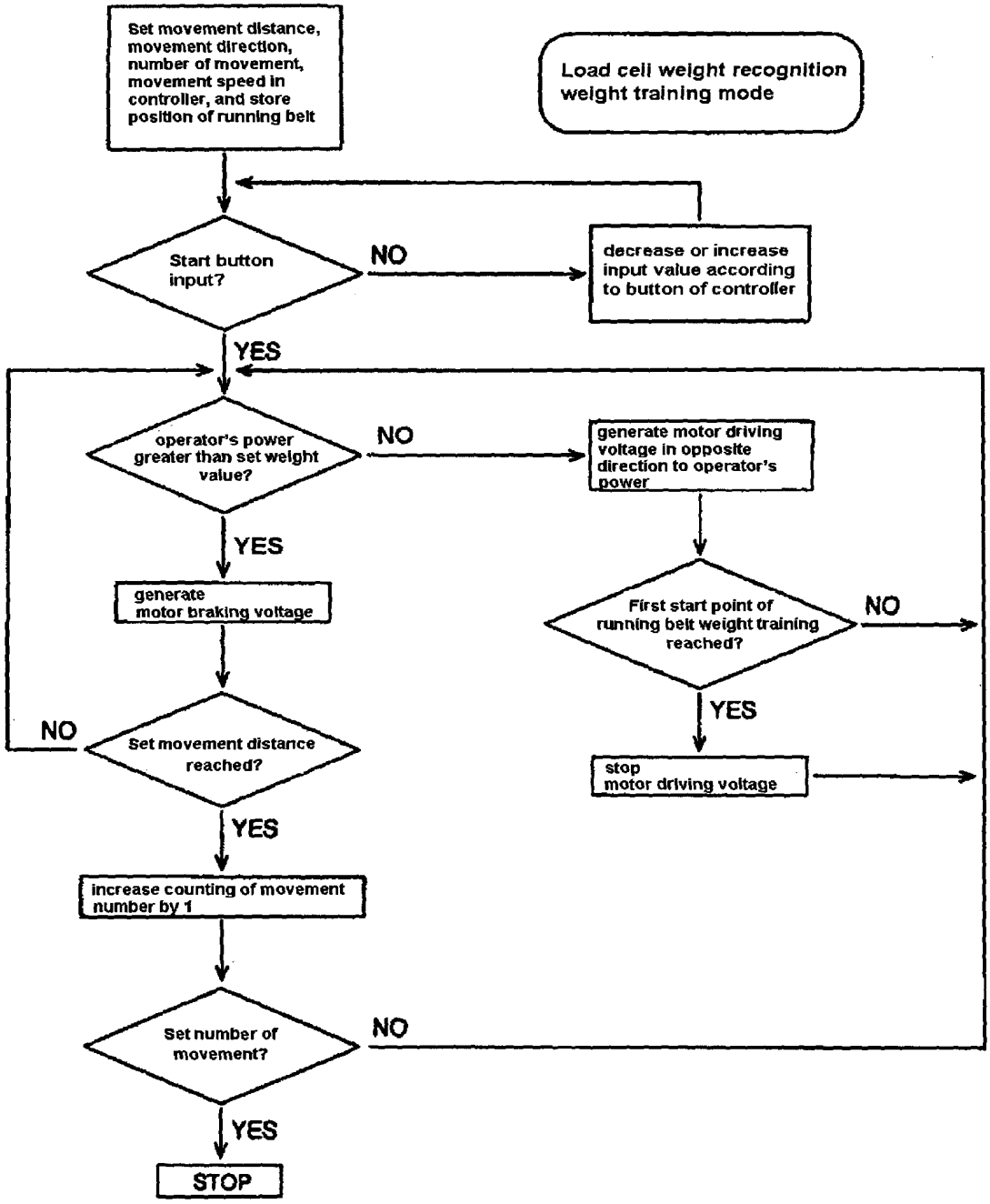

General weight training mode
Set the number of motor movement, movement direction, movement distance, movement speed, magnitude of braking power
Start button input?
NO
decrease or increase set value depending on several buttons of controller
YES
output motor driving voltage according to movement direction and movement speed, and start counting of encoder signal
Encoder value greater than or equal to set value of movement distance?
NO
maintain motor driving voltage
YES
generate motor driving voltage for stopping motor, clear place where encoder value is stored, and start counting of encoder
Movement distance of running belt moved by operator greater than or equal to set movement distance?
NO
maintain motor braking voltage
YES
stop motor braking voltage, clear place where encoder value is stored, start counting of encoder, increase counting of movement number by 1, output motor driving voltage
Number of movement equal to set number of movement?
NO
YES
STOP

[Fig. 26]


Motion copy weight training mode
Start button input?
NO
YES
encoder signal generated and stopped?
NO
YES
encoder value greater than or equal to set movement distance?
NO
add subsequent encoder value to previous encoder value
YES
read encoder value to calculate movement distance, clear place where encoder value is stored, output motor driving voltage backward, start counting of encoder
Encoder value equal to previous calculated value of movement distance?
NO
maintain motor driving voltage
YES
stop motor, clear calculated value of movement distance, increase movement time counter by 1

[Fig. 27]


Set movement distance, movement direction, number of movement, movement speed in controller, and store position of running belt
Load cell weight recognition weight training mode
Start button input?
NO
decrease or increase input value according to button of controller
YES
operator's power greater than set weight value?
NO
generate motor driving voltage in opposite direction to operator's power
YES
generate motor braking voltage
First start point of running belt weight training reached?
NO
YES
stop motor driving voltage
NO
Set movement distance reached?
YES
increase counting of movement number by 1
Set number of movement?
NO
YES
STOP

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2008/004064

A. CLASSIFICATION OF SUBJECT MATTER

A63B 22/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 8 : A63B 22/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKIPASS(KIPO internal) & keywords: treadmill, weight training, backward

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2006/062319 A1 (KIM, J. C.) 15 June 2006 See abstract; Claims 1, 5; Figures 1, 4-9	1-32
A	US 6,334,839 B1 (LIM, J. S.; Lee, B. D.) 01 January 2002 See abstract; Claim 1; Figures 1, 2	1-32
A	US 7,048,676 B1 (WU, S. Y.) 23 May 2006 See abstract; Claim 1; Figure 2	1-32
A	JP 17-000326 A (SHIMANE UNIV.; ZENKIN METAL) 06 January 2005 See abstract; Claims 1-4; Figure 1	1-32
A	JP 51-059662 U (HITACHI LTD.) 11 May 1976 See the whole document; Figures 1, 3	1-32

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
29 OCTOBER 2008 (29.10.2008)	**30 OCTOBER 2008 (30.10.2008)**

Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2008/004064

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		EP 1718375 A1	08.11.2006
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		KR 10-2005-0118143 A	15.12.2005
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US 7,048,676 B1	23.05.2006	NONE	
JP 17-000326 A	06.01.2005	NONE	
JP 51-059662 U	11.05.1976	NONE	

THE BIODEX RTM REHABILITATION TREADMILL OPERATION MANUAL

For RTM Model 400 with Numeric Display (#945-275)

and RTM Model 500 with Graphic Display (#945-285)

NOTE: The following symbol on your Biodex RTM Treadmill corresponds to the RTM Operation Manual:

Symbol Signification: Attention, se référer à la notice

Symbol Meaning: Attention, consult accompanying documents

CAUTION: Federal law restricts this device to sale by or on the order of a medical practitioner. When prescribed for therapeutic purpose, a physician should clearly define the parameters of use (i.e., total work, maximum heart rate, etc.) to reduce the risk of patient injury.

CE 0413

BIODEX

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Tel: 800-224-6339 *(In NY Call 631-924-9000)*, Fax: 631-924-9338
Email: sales@biodex.com, www.biodex.com

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INTRODUCTION

Designed specifically for rehabilitation purposes, the Biodex Rehabilitation Treadmill (RTM) provides unparalleled speed control and durability, incline and decline in both forward and reverse directions, digital feedback, a neat, trim, low profile, a choice of handrail configurations, plus optional heart rate monitoring. A choice of Numeric display (RTM Model 400) or Graphic display (RTM Model 500) allows the user to choose between a simple, no-nonsense approach that gets the patient up and moving in a matter of seconds, or full programming capability that allows for use of user-defined or factory installed exercise protocols at any of five selected intensity levels. With this choice of control panel displays, the Biodex RTM Treadmill offers the flexibility needed to suit any facility

Both the RTM Model 400 and 500 allow patients to walk, jog and run, with or without grade (0 to 15% incline/decline,) as they exercise every muscle targeted in their personalized rehabilitation program. Multiple handrail configurations allow clinicians to set up for various applications including physical therapy/sports medicine, cardiac/pulmonary rehabilitation, geriatric and pediatric conditioning, and use with neurological patients.

Additionally, 4Q Pulse Width Modulation motor control, the same motor control that helped make the Biodex Dynamometer the worldwide choice for extremity testing and rehabilitation, provides more consistent speed control than either AC or DC treadmill models can ever hope to attain. With track speeds of 0-8 mph (12.0 Km/h) in forward and 0-3 mph (4.8 Km/h) in reverse, a zero starting speed, the ability to change speeds in .1-mph (.2-Km/h) increments, easy to read displays and touch-key operation, PWM motor control and a choice of handrail configurations, the RTM treadmill is among the safest and most versatile available today.

The Biodex RTM Model 400 and 500 treadmills come fully assembled. There is only one mechanical adjustment to be made and that is simply tilting the display panel to the most comfortable viewing angle for the patient. Once this is done, all operation is electronically controlled.

In addition to all the standard features noted above, RTM Model 500 with Graphic Display options include -3 to 12% incline/decline (ideal for work with back and posture patients) and Resistive Gait training capability that allows patients to simulate pushing or pulling a specified load while walking, jogging or even running.

NOTE: This operations manual is designed for use with both the RTM Model 400 and 500. Chapter 3 covers specific use of the RTM Model 400 with Numeric Display. Chapter 4 covers specific use of the RTM Model 500 with Graphic Display. All other chapters, except where noted, apply to both models.

CLINICAL CONSIDERATIONS

1 All patients should consult a physician before beginning any rehabilitation program.

Tous les patients doivent voir leur médecin responsable avant d'entreprendre la séance de rééducation.

2 Instruct patient on proper use and all treadmill safety features before beginning exercise.

Expliquer au patient la bonne utilisation des systémes de sécurité du tapis avant de démarrer la séance.

3 ⚠ *Always attach the Safety Lanyard to the patient's clothing before allowing treadmill exercise to begin.*

⚠ *Connector toujours la sangle de sécurité aux vêtements du patient avant que le patient ne commence à travailler.*

4 Ensure patient has stretched and warmed-up prior to starting treadmill exercise.

Vérifier que la patient s'est échauffé et a fait des étirements avant de commencer l'entraînement sur le tapis.

5 Do not allow any patient to exercise unattended on the treadmill. Never leave the treadmill running while unattended.

Ne pas laisser le patient seul sur le tapis pendant la séance. Ne jamais laisser le tapis tourner sans patient et sans surveillance.

6 Periodically monitor the heart rate of any patient that is exercising on the treadmill.

Surveiller de temps à autre la fréquence cardiaque du patient pendant la séance.

7 Begin all treadmill exercise at slow pace, increasing speed gradually to patient tolerance or exercise goal. Always inform the patient immediately prior to increasing or decreasing treadmill speed or elevation.

Démarrer les protocloes à une vitesse lente et augmenter progressivement la vitesse en fonction de la tolérance du patient et des objectifs de la séance. Signaler avant de l'appliquer tonte augmentation ou diminution de vitesse ou d'inclinaison.

8 If reversing treadmill direction, bring the treadmill to a complete stop and inform patient that the treadmill will begin moving in the opposite direction.

Avant de changer la direction de déplacement du tapis, arrêter le tapis complétement et expliquer au patient que le tapis va démarrer dans le sens opposé.

9 Immediately discontinue exercise if patient feels faint, dizzy or short of breath.

Arrêter la séance immédiatement en cas de dyspnée, d'étourdissements ou d'autres signes de malaise.

10 Never allow anyone to step onto the treadmill while the treadbelt is in motion. Always stop the treadmill prior to allowing the patient to step up onto the treadbelt.

Ne jamais faire monter personne sur le tapis pendant que le tapis est en marche. Arrêter toujours le tapis avant que le patient ne s'y positionne.

11 Instruct patients to use the handrails when first learning to walk on the treadmill.

Donner la consigne au patient d'utiliser les barres horizontales lors de sa premiére séance sur le tapis.

400 NUMERIC DISPLAY/CONTROL PANEL

The Biodex RTM 400 with Numeric Display provides a simple-to-use, easy-to-read, no-nonsense approach to treadmill exercise. Real time readings are displayed for Time, Distance, Calories and MET values. At the touch of a key, users can select speed, elevation and belt direction, or set an end time for exercise duration.

POWER-UP

To provide power to the treadmill, ensure the power plug is connected to an appropriate socket. Press the ON/OFF switch, located on the base of the treadmill in the left corner at the front end, to the "I" (ON) position. All display windows should illuminate to indicate that power to the treadmill is ON and the display is active.

RTM MODEL 400 NUMERIC DISPLAY PANEL CONTROL KEYS AND FUNCTIONS (See Figure 1.)

<Start>: Pressing the <Start> key with the treadmill ON activates the treadbelt and clock, and commands the system to begin gathering data with commencement of the exercise session. Initial starting speed for treadbelt movement in either forward or reverse direction is 0 mph. Speed can be increased or decreased in .1 mph increments.

<Stop>: Press <Stop> at any time to ramp the treadmill to a complete stop. All data on the screen will be retained. At this point, you can press <Clear Display> to end the session and immediately clear all data, or press <Stop> to end the session but retain all data for 90 seconds before it is cleared.

<Speed>: Use the <Speed> <+> and <-> control keys on the left side of the display to adjust the speed to the desired level. The speed will immediately respond to your input so be sure to inform the patient that the treadbelt will begin to accelerate or decelerate. Gathering of data begins immediately at the point from which the treadmill begins to move in either forward or reverse direction.

<Elevation>: If incline or decline is desired, use the <Elevation> <+> and <-> control keys in the middle of the display panel to set the appropriate grade. Incline and decline can range from 0 to 15% grade. Note that there is a slight delay between movement of the Elevation display bar and the actual movement of the treadmill.

<Belt Direction>: Treadmill belt direction is selected via the <Forward> or <Reverse> keys. Belt direction can be changed only when speed is set to 0 speed. If you try to change direction while the treadbelt is moving, the system will automatically ramp down to 0 speed and wait for further input. For reverse direction, a minus (-) sign precedes the speed value. An orange LED denotes the selected belt direction.

<Select Display>: The <Select Display> key, located at the center of the control panel's top section, is used to determine which parameter will be displayed as data is acquired. All parameters are listed to the left of the <Select Display> key. An LED denotes the currently active parameter. Once you press the <Start> key, the display will scroll through the parameters, showing each for a 15-second interval before moving onto the next. An LED, to the left of the currently displayed parameter, denotes the active selection. To constantly display a single parameter, use the <Select Display> to rotate through the parameter list and make your selection *after* the treadbelt has begun to move. For all parameters, immediate biofeedback is provided in numeric format for the selected parameter, as described below:

• Time: Cumulative time in minutes/seconds from the point at which the treadbelt begins to move in either direction.

• Distance (Miles/Kilometers): The distance covered in miles or kilometers from the beginning to the end of the current exercise session.

• Calories: Total calories burned by the user during the current exercise session. This value is cumulative.

• METs: The METs value reflects the resting rate of Oxygen consumption with one MET equal to the Oxygen consumption of a seated individual at rest. Thus, a seated individual in a resting state is consuming 1 MET. A seated individual exercising at a rate of 2 METs is consuming twice the Oxygen of a seated, resting individual. A person exercising at 10 METs is consuming ten times the Oxygen of a seated, resting individual. To compute the METs of a person actively exercising on the RTM Model 400 Treadmill, the system uses standard calculations based on American College of Sports Medicine Guidelines for Testing and Exercise. On the RTM Model 400 Treadmill, the MET's value is always displayed in real-time for current speed.

<Clear Display>: Pressing this key immediately clears the system of all acquired data and resets all display parameters to their default settings.

<Set Weight>: Press the <Set Weight> key to display the default weight setting of 150 pounds. To alter the default setting, use the <+> or <-> keys on the right side of the display. The set weight parameter is used to calculate Calories.

<Set Time>: Press the <Set Time> key to display the default time setting of 15:00. To alter the default setting, use the <+> or <-> keys on the right side of the display. Use the Set Time function to provide an end time for exercise duration. Once a time has been entered, the clock will begin counting down from the point the treadbelt begins to move.

Safety Lanyard and Safety Stop: Disconnecting the Safety Lanyard (to the left side of Display/Control Panel) or pressing the red Safety Stop (to the right side of Display/Control Panel on the upper frame) at any time will cause the treadbelt to immediately ramp down to a full stop and reset to 0.0 mph. The Display will read <Safe> and the treadbelt will not restart until the lanyard is once again in position or <Start> is pressed following use of the Safety Stop. Display data is not lost in either case. Data accumulation will resume once the lanyard is reconnected or <Start> has been pressed. To fully abort an exercise session after pressing the Safety Stop, press <Clear Display>.

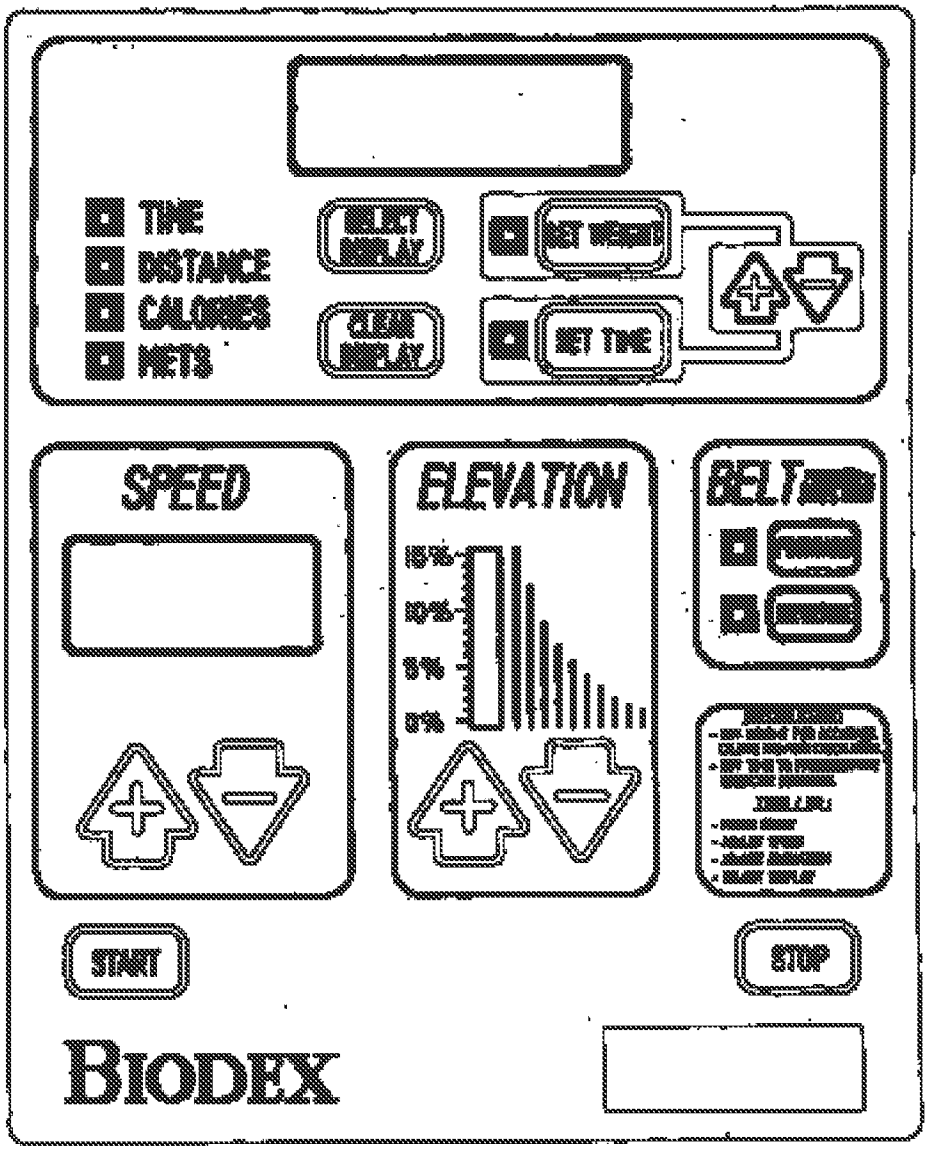

Figure 1. The RTM Model 400 Numeric Display/Control Panel.

BASIC OPERATION OF THE RTM MODEL 400 WITH NUMERIC DISPLAY

At this point, the RTM Model 400 should be ready for operation. To get the treadmill up and running simply follow the procedure below.

1. Ensure that the <ON/OFF< switch, located on the left side of the front base, is set to the "I" (ON) position. The Numeric Display should be illuminated, indicating that power to the treadmill is ON.

2. If desired, use the <Set Weight> keys to enter a weight to be used for calorie calculation. Default value is 150 pounds (68 kgs.).

3. If desired, use the <Set Time> keys to predetermine exercise duration.

4. Position the patient on the treadmill and explain the exercise routine.

5. Tilt the display panel for patient viewing comfort.

6. Attach the Safety Lanyard at the left corner of the top cross bar which supports the Display panel. The round end of the lanyard attaches to the unit via a Velcro® brand hook and loop fastener. The clip end of the lanyard should be attached to the patient's clothing in a way that does not interfere with the patient's exercise.

⚠ *NOTA: La déconnexion de la sangle de sécurité (côté gauche du panneau d'affichage et de contrôle) ou l'actionnement du bouton rouge d'arrêt d'urgence (côté droit du panneau d'affichage et de contrôle) entraîneront à tout. moment l'arrêt progressif du tapis et le réglage de la vitesse à 0.0 kn/heure. L'afficage indiquera qu'il y a eu un probléme de sécurité et le tapis ne redémarrera pas tant que la sangle ne sera pas bien positionnée. De la même façon, aprés l'arrêt par le bouton d'urgence, le tapis ne démanera pas tant que le bouton de démarrage ne sera pas actionné. Les données affichées ne seront perdues ni dans l'un ni dans l'autre cas. L'enregistrement des données reprendra une fois la sangle sera reconnectée et que le bouton de démarrage aura été actionné. Pour arrêter complétement une séance aprés un arrêt de sécurité, appuyer sur la touche commande d'effaçage.*

⚠ *NOTE: Disconnecting the Safety Lanyard (to the left side of Display/Control Panel) or pressing the red safety Stop (to the right side of Display/Control Panel on the upper frame) at any time will cause the treadbelt to immediately ramp down to a full stop and reset to 0.0 mph. The Display will read <Safe> and the treadbelt will not restart until the lanyard is once again in position or <Start> is pressed following use of the Safety Stop. Display data is not lost in either case. Data accumulation will resume once the lanyard is reconnected or <Start> has been pressed. To fully abort an exercise session after pressing the Safety Stop, press <Clear Display>.*

7. Select treadbelt direction using the Treadbelt Direction <Forward> or <Reverse> keys.

8. Press <Start> to enable treadbelt movement.

9. Use the Speed <+> and <-> keys to adjust the speed to the desired level. The speed will immediately respond to your input so be sure to inform the patient that the treadbelt will begin to accelerate or decelerate. Gathering of data begins immediately at the point from which the treadmill begins to move in either forward or reverse direction.

10. If incline or decline is desired, use the Elevation <+> or <-> keys to set the grade at which you wish the exercise to begin.

11. Press <Stop> to stop the treadmill at any time while still retaining all current data on the display screen.

⚠ *AVERTISSEMENT: Appuyer toujours sur la touche ARRET pour interrompre un exercise en cours. Ne pas appuy er sur la touche ATTENTE anant l'arrét complet du tapis. La touche ARRET antraíne une décélération progressive et toutes les données sont sauvegaardées. Si on était à appuyer sur la touche ATTENTE, non seulement on perdrait les données mais ela entraínerait aussi un arrét brutal du tapis.*

⚠ *CAUTION: Always press <Stop> to stop the treadmill when patient exercise is in progress. Do not press <On/Standby> to clear the system of data until the treadmill belt has completely stopped moving. The <Stop> key will cause the treadmill to ramp smoothly to a stop, all display data will be retained. Pressing <On/Standby> will clear all data from the display and stop the treadbelt more abruptly.*

12. Press <Clear Display> to clear display data and reset settings to their default values.

13. At the end of the day, turn OFF power to the treadmill using the ON/OFF switch located on the left side of the front base.

NOTE: BELT MOVEMENT WHILE AT ZERO SPEED
Inherent "belt creep" is common with Pulse Width Modulation Motor Control. Allow the treadmill sufficient time to "warm up" prior to making any adjustments for belt creep. See "Zero Balance Adjustment" later in this chapter for instructions on this adjustment.

CHANGING MEASUREMENT UNITS

The Biodex RTM Model 400 Treadmill can be configured to display either standard English or Euro (metric) measurements. To change measurement units:

1. Turn the treadmill OFF and then ON.
2. While the LED's on the front panel are lit, press <Stop> and the <Elevation +> key simultaneously.
3. Depress the <Set Time +> key and units will toggle from Euro (Metric) to English.
4. Once the desired units have been selected, press <Start> to save the new value.

ZERO BALANCE ADJUSTMENT

This option is used to correct treadbelt "creeping" which may occur at the zero speed setting due to changes in temperature, heavy use, etc.

1. Turn the treadmill OFF and then ON.
2. While the LED's on the front panel are lit, press <Stop> and <Forward> simultaneously. The display window should now show a "Creep Adjustment Setting" of between 1 and 8. The factory preset default value is 4.
3. Use the <F1> or <F2> key to increase or decrease the Creep Adjustment Value. Lower the value for reverse direction, raise the value for forward direction.
4. Once the treadbelt has stopped creeping, press <Start> to save the new value.

USING THE RS-232 COMPUTER INTERFACE PORT

The RTM Model 400's Remote RS-232 Serial Port can be configured through hardware jumpers on the display circuit board as follows:

1. RS-232 for single treadmill with single host PC COM: Port
2. RS-422 for multiple treadmills attached to a single PC COM port.

• Treadmills are connected with a single "daisy chained" cable. A multidrop protocol is used.

• 9 PIN D Connector: PIN 2 is XMIT, PIN 3 is RCV, PIN 5 is GND
9600 BAUD, no parity, 8 data bits, full duplex

Protocol

The host PC will be the master and initiate all commands. The RTM Model 400 should process and acknowledge each command immediately.

Command (from host):	Description	Response (to remote host)
FOH to FFH	Reserved for multi-drop device addresses if selected	
9FH	Who are You	96H, ASCII 4 Single RTM3plus (RS-232) 96H, ASCII 5 Multiple RTM3plus (RS-422) 96H, ASCII 6, RTM3
9EH	Firmware Version	9EH, ASCII II "VER_X.XX..." terminate with NUll = OOH.
80H	Start Treadmill	80H to acknowledge
81H	Stop Treadmill	81H to acknowledge
82H,ASCII 3 digits	Set Treadmill Speed	82H to acknowledge
83H,ASCII 2 digits	Set Treadmill Elevation	83H to acknowledge
84H,ASCII F or R	Set Belt Direction	84H to acknowledge
85H,ASCII 3 digits	Set Weight	85H to acknowledge
86H,ASCII 4 digits	Set Time	86H to acknowledge

Request RTM Status:	Description	Response (to remote host)
AOH	Read Present Speed	AOH, ASCII 3 digits
AIH	Read Present Elevation	AIH, ASCII 2 digits
A2H	Read Present Belt Direction	A2H, ASCII F or R
A3H	Read Time	A3H, ASCII 4 digits
A4H	Read Distance	A4H, ASCII 4 digits
A5H	Read Calories	A5H, ASCII 4 digits
A6H	Read METs	A6H, ASCII 4 digits
A7H	Read System Status	A7H, 3 hex bytes Comm. Status Byte System Status Byte I System Status Byte 2

Request RTM Status:	Description	Response (to remote host)
B0H	Send one complete packet of status	Send "A1H - AFH"
B1H	Send status continuously	
B2H	Read Set Time	B5H,ASCII 3 digits
B3H	Read Weight	B7H,ASCII 3 digits

If an invalid command is received from the HOST, the peripheral should respond with AFH for NACK. Invalid commands are defined as:

- illegal command code
- unexpected data byte (not proceeded by appropriate command)
- new command received before previous data transmission completed
- data transmission not completed within specified time limit
- H/W ACIA error, ie overflow, frame error, etc.

Each peripheral should have a Communications Status Byte as follows:

Communication Status Byte:

BO	1 - ILLG	illegal command code
	O - OK	
B1	1 - UNEXP	unexpected data byte (not proceeded by appropriate command)
	O - OK	
B2	1 - NEW	new command received before previous data transmission completed
	O - OK	
B3	1 - TIME	data transmission not completed within specified time limit
	O - OK	
B4	1 - COMERR H/W ACIA	error, ie overflow, frame error, etc.
	O - OK	
B5	1 - HWFLT	system hardware fault is disabling function or system is in diagnostic mode
B6	1 - RANGE	data out of range
	O - OK	
B7	O	data transmission, B7 MUST BE ZERO!

System Status Byte 1:

500 GRAPHIC DISPLAY/CONTROL PANEL

The RTM Model 500's innovative Graphics Display provides all the features afforded by the RTM Model 400 with Numeric Display, including real-time readings for METS, Calories, Distance and Time, plus graphic representation of real-time values for Heart Rate or METS over time. The graphics display also offers pre-defined and user-defined programmability and optional Push/Pull Resistive Gait capability.

Using the Biodex RTM Model 500 is easy. The software is both logical and intuitive. Simply follow the on-screen prompts and they'll lead you step-by-step through the various training protocols, options and system utilities.

For each screen the RTM Model 500 displays, active option keys are highlighted in boldface type. Your option choices progress based on the selections you make. The boldface type or arrows clearly note the active options.

At this point, it would be helpful to examine the display panel. Once you are familiar with the display panel and it's associated keys, you can move onto an examination of the individual menus and screens.

POWER-UP

To provide power to the treadmill, ensure the power plug is connected to an appropriate socket. Press the ON/OFF switch, located on the base of the treadmill in the left corner at the front end, to the "I" (ON) position. The orange LED on the <On/Standby> key, located at the bottom left of the display panel, should illuminate to indicate that power to the treadmill is ON. You can now press the <ON/Standby> key to activate the display panel.

THE GRAPHIC DISPLAY/CONTROL PANEL KEYS (See Figure 2.)

With the treadmill power turned ON, all display functions are controlled using the Display Panel Keys. These keys are functional for most screens and perform the standard operations described below.

On/Standby

Located at the bottom left corner of the display panel, the <ON/Standby> key is used to activate the treadmill or to turn the treadmill to Standby mode.

• For ON, the Performance/Control screen will appear on the display. From this screen it is possible to activate the treadmill belt speed, set incline or decline grade, and access additional screens and menus.

• For <Standby>, the display is turned OFF and the treadbelt is not powered (zero mph). If <On/Standby> is pressed while the system is operating, all data displayed on the screen will be lost and power to the treadbelt will immediately cease. If the treadbelt is moving, it will immediately coast to a stop.

The <S1>, <S2>, <S3>, and <S4> Control Keys
Immediately to the right of the display screen are four blue keys. From top to bottom these keys are the <S1>, <S2>, <S3> and <S4> Control Keys. Each of these keys serve different purposes on different screens (i.e., increase, decrease, yes, no). When active, the use of each key is noted by highlighted text or arrows positioned on the screen immediately to the left of the key. In general, these keys are used to increase or decrease speed and elevation values, move up and down the displayed menu, or toggle features ON and OFF.

Function Keys
From left to right directly under the display screen, the following function keys are generally active:

<Previous Screen>: Press this key to return to the screen immediately prior to the current screen. This key is functional at all times except when the Performance/Control screen (opening screen) is displayed for the first time in an exercise session.

<Next Screen>: Press this key to advance to the next logical screen. The <Next Screen> key is functional with most screens but may not be available if necessary numeric data or parameters have not been entered.

<Start>: Pressing the <Start> key with the Performance/Control screen displayed activates the treadbelt and clock, and commands the system to begin gathering data with commencement of the exercise session.

<Stop>: Press <Stop> at any time to ramp the treadmill to a stop (pause). All data on the screen will be retained. At this point, you can then press <Start> to continue with the exercise session and continue gathering data, or press <Stop> again to end the session and clear all data.

NOTE: Use the <Stop> key to stop (pause) the treadmill when an exercise session is in progress. Do not use the <On/Standby> key to end exercise in progress.

<Enter>: This key is used to confirm entry of data on the display and is also often used in the same manner as <Next Screen>.

Safety Lanyard and Safety Stop: Disconnecting the Safety Lanyard (to the left side of Display/Control Panel) or pressing the red Safety Stop (to the right side of Display/Control Panel on the upper frame) at any time will cause the treadbelt to immediately ramp down to a full stop and reset to 0.0 mph. The Display will read <Safety Lanyard Removed> and the treadbelt will not restart until the lanyard is once again in position or <Start> is pressed following use of the Safety Stop. Display data is not lost in either case. Data accumulation will resume once

the lanyard is reconnected or <Start> has been pressed. To fully abort an exercise session after pressing the Safety Stop, press <Next Screen> three times.

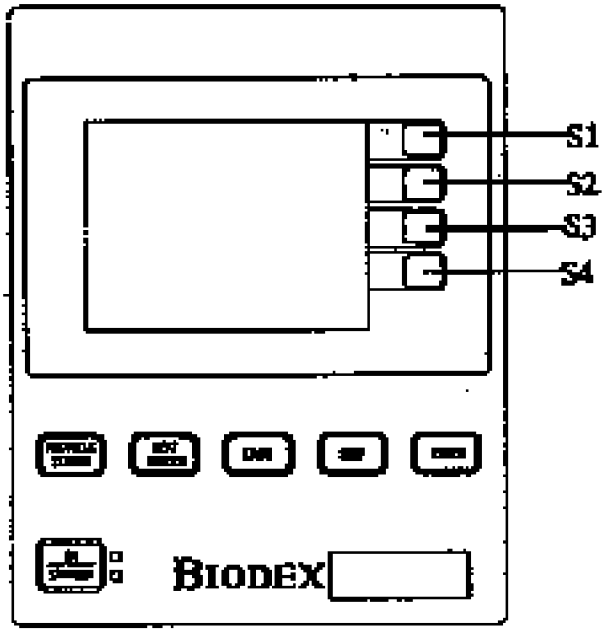

Figure 2. The RTM Model 500 Graphic Display/Control Panel.

STANDARD OPERATION FOR RTM MODEL 500 WITH GRAPHIC DISPLAY

At this point, you should be ready to run the RTM Model 500 in its standard operating mode. To get the system up and running simply follow the procedure below.

1. Ensure that the ON/OFF switch, located at the front end on the base of the treadmill, is set to the + (ON) position. The orange LED on the <On/Standby> key should be illuminated, indicating that power to the treadmill is ON.
2. Press <On/Standby> The green <On/Standby> LED will illuminate and the Performance/Control screen will be displayed.
3. If incline or decline is desired, use the Incline <S3> and <S4> control keys on the right side of the display panel to set the grade at which you wish the exercise to begin.
4. Position the patient on the treadmill and explain the exercise routine.
5. Tilt the display panel for patient viewing comfort.
6. Attach the Safety Lanyard at the left corner of the top cross bar which supports the Display panel. The round end of the Lanyard attaches to the unit via a Velcro® brand hook and loop fastener. The clip end of the lanyard should be attached to the patient's clothing in a way that does not interfere with the patient's exercise.

⚠ *NOTA: La déconnexion de la sangle de sécurité (côté gauche du panneau d'affichage et de contrôle) ou l'actionnement du bouton rouge d'arrêt d'urgence (côté droit du panneau d'affichage et de contrôle) entraîneront à tout. moment l'arrêt progressif du tapis et le réglage de la vitesse à 0.0 kn/heure. L'afficage indiquera qu'il y a eu un problème de sécurité et le tapis ne redémarrera pas tant que la sangle ne sera pas bien positionnée. De la même façon, aprés l'arrêt par le bouton d'urgence, le tapis ne démanera pas tant que le bouton de démarrage ne sera pas actionné. Les données affichées ne seront perdues ni dans l'un ni dans l'autre cas. L'enregistrement des données reprendra une fois la sangle sera reconnectée et que le bouton de démarrage aura été actionné. Pour arrêter complétement une séance aprés un arrêt de sécurité, appuyer sur la touche commande d'effaçage.*

⚠ *NOTE: Disconnecting the Safety Lanyard (left side of Display/Control Panel) or pressing the Red Comfort Stop (atop the right side of Display/Control Panel) at any time will cause the treadbelt to immediately ramp down to a full stop and reset to 0.0 mph. The Display will read <Safety Lanyard Removed> and the treadbelt will not restart until the lanyard is once again in position or <Start> is pressed following use of the Safety Stop. Display data is not lost in either case. Data accumulation will resume once the lanyard is reconnected or <Start> has been pressed. To fully abort an exercise session after pressing the Safety Stop, press <Next Screen> three times.*

7. Use the Speed <S1> and <S2> control keys on the right side of the display to adjust the speed to the desired level. The speed will immediately respond to your input so be sure to inform the patient that the treadmill will begin to operate. Gathering of data begins immediately at the point from which the treadmill begins to move in either forward or reverse direction. A detailed description of the data that can be gathered is provided later in this manual.
8. Press <Stop> to stop (pause) the treadmill at any time while still retaining all current data on the display screen.
9. Press <Stop> again to clear display data and reset settings to their default values.

⚠ *AVERTISSEMENT: Appuyer toujours sur la touche ARRET pour interrompre un exercise en cours. Ne pas appuy er sur la touche ATTENTE anant l'arrét complet du tapis. La touche ARRET antraíne une décélération progressive et toutes les données sont sauvegaardées. Si on était à appuyer sur la touche ATTENTE, non seulement on perdrait les données mais ela entraínerait aussi un arrét brutal du tapis.*

⚠ *CAUTION: Always press <Stop> to stop the treadmill when patient exercise is in progress. Do not press <On/Standby> to clear the system of data until the treadmill belt has completely stopped moving. The <Stop> key will cause the treadmill to ramp smoothly to a stop, all display data will be retained. Pressing the <On/Standby> will clear all data from the display and stop the treadbelt more abruptly.*

NOTE: BELT MOVEMENT WHILE AT ZERO SPEED
Inherent "belt creep" is common with Pulse Width Modulation Motor Control. Allow the treadmill sufficient time to "warm up" prior to making any adjustments for belt creep. See "Zero Balance" in the "System Utilities" section of this manual for instructions on treadbelt adjustments.

THE PERFORMANCE/CONTROL SCREEN (See Figure 3.)
Now that your system is up and running, it's time to take a closer look at the Performance/Control screen. This screen is displayed any time the Biodex RTM Model 500 Treadmill is ready to operate. It is the first screen that appears upon power-up and the screen from which both initial speed and incline/decline parameters are set.

The Performance/Control screen provides the user with immediate biofeedback in both numeric and graphic displays. All data displayed is current for the exercise session in progress. The Performance (left) side of the screen can display the following data when the system is in standard operating mode. Note that some display categories must be activated through the Configure Menu to appear on the display, i.e., Calories Per Hour instead of METs.

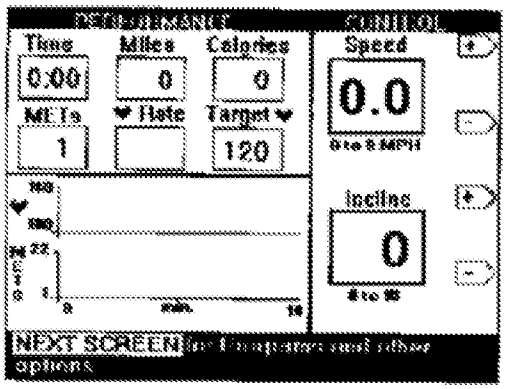

Figure 3. The Performance/Control screen provides the user with both graphic and numeric displays. Patient Performance data is displayed on the left side of the screen while system control information is displayed on the right side of the screen.

Time: Cumulative time in minutes/seconds from the point at which the treadbelt begins to move in either direction.

Miles/Kilometers: The distance covered in miles or kilometers from the beginning to the end of the current exercise session.

Calories: Total calories burned by the user during the current exercise session. This value is displayed in real-time.

Calories Per Hour: Total calories that will be burned in one hour if exercise continues at the current rate.

METs: The METs value reflects the resting rate of Oxygen consumption with one MET equal to the Oxygen consumption of a seated individual at rest. Thus, a seated individual in a resting state is consuming 1 MET. A seated individual exercising at a rate of 2 METs is consuming twice the Oxygen of a seated, resting individual. A person exercising at 10 METs is consuming ten times the Oxygen of a seated, resting individual. To compute the METs of a person actively exercising on the RTM Model 500 Treadmill, the system uses standard calculations based on American College of Sports Medicine Guidelines for Testing and Exercise. On the RTM 500 Treadmill, the MET's value is always displayed in real-time for current speed.

Heart Rate: This is the real-time heart rate of the patient during the exercise session.

Target Heart Rate: This is an exact heart rate value, entered by the clinician, (i.e., 105 beats per minute). It serves as a biofeedback component for the patient who can be instructed to match, exceed or not to exceed this value.

The Control side of the Performance/Control screen displays the following parameters when the system is in standard operating mode:

Speed: The speed range of the Biodex Rehabilitation Treadmill is 0 mph to +8.0 mph and 0 to 3 mph in reverse. For both forward and reverse directions, pressing the <S1> button makes the treadbelt go faster while pressing the <S2> button causes the treadbelt to slow down. Press the <S1> button to increase treadbelt speed in 0.1 mph increments.

Incline or Decline: The <S3> and <S4> Incline Control keys are used to increase or decrease treadmill grade. Press the <S3> key to increase the grade and the <S4> key to decrease the grade. Note that there is a slight delay between movement of the Elevation display bar and the actual movement of the treadmill.

NOTE: To change the default settings for any of the above parameters, see "System Utilities" later in this chapter.

THE EXERCISE SETUP SCREEN (See Figure 4.)

The Exercise Setup screen allows the user to set default values for daily parameters including Weight units, Target Heart Rate, Exercise Duration, and treadbelt direction.

To Access the Exercise Setup Screen:

1. At the Performance/Control screen press <Next Screen>.
2. At the Main Menu, use the <S1> or <S2> key to highlight "Exercise Setup." Press <Next Screen> to bring up the Exercise Setup screen.

Setting and Changing Exercise Default Values

The Exercise Setup screen displays the default settings for certain patient protocols. These default settings can be changed at any time as described below.

When you are finished selecting the new default values for any or all settings on this screen, press <Next Screen> to advance to the Performance/Control screen and begin the exercise session.

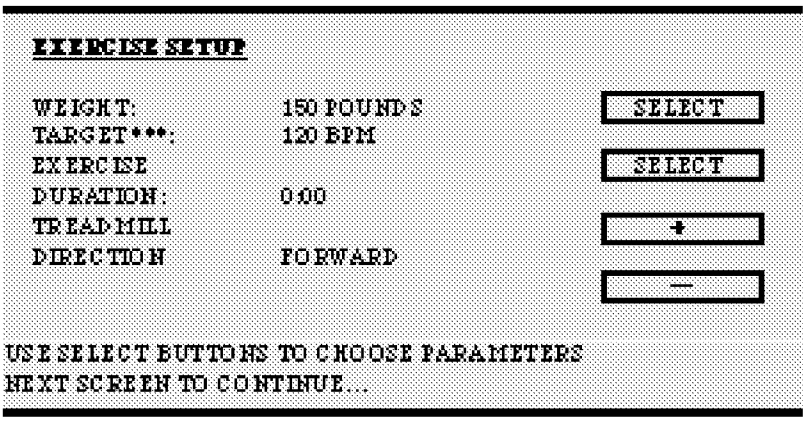

Figure 4. The Exercise Setup screen.

Weight: Press <S1> or <S2> to highlight the "Weight" value. Use the <S3> or <S4> key to increase or decrease the weight displayed. The weight value is used to calculate calories and calories per hour stats.

Target Heart Rate: Press <S1> or <S2> to highlight "Target Heart Rate." Use the <S3> or <S4> key to increase or decrease the Target Heart Rate value. (Target Heart Rate is functional only if it has been activated through the Configure screen.)

Exercise Duration: Press <S1> or <S2> to highlight "Exercise Duration." Use the <S3> or <S4> key to increase or decrease the time value for this parameter. If nothing is entered for this parameter, the "Time" value will automatically default to cumulative time (count up from 0:00).

Treadmill Direction: Press <S1> or <S2> to highlight "Treadmill Direction." Use the <S3> or <S4> key to select forward or reverse treadbelt direction.

SYSTEM UTILITIES (See Figure 5.)

The System Utility Menu allows users to choose between various display options and to set specific parameters for a variety of treadmill functions. It is from this menu that all system utility options are accessed, selected and/or programmed.

To access the Configure Menu:

1. Press <ON/STANDBY> to turn the treadmill ON. The Performance/Control screen should appear on the display.
2. Press <Next Screen>. The Main Menu screen should be displayed.

3. Use the <S1> or <S2> key to highlight "System Utilities" and then press <Next Screen>. The System Utilities menu should now be displayed.
4. Use the <S1> or <S2> key to highlight "Configure" and then press <Next Screen>. The Configure menu should now be displayed.

Configure Options

All System Utility functions are accessed from the Configure Menu. From this menu the user can choose items, toggle "Yes" or "NO" for specific features, and increase or decrease numeric parameters.

Following is a line by line description of the Configure screen options and parameters. As a general rule, use the <S1> and <S2> keys to highlight (choose) or activate options. Use the <S3> and <S4> keys to adjust numeric values. Once all parameters are set as desired, press <Next Screen> or <Previous Screen> to exit to return to the Main Menu.

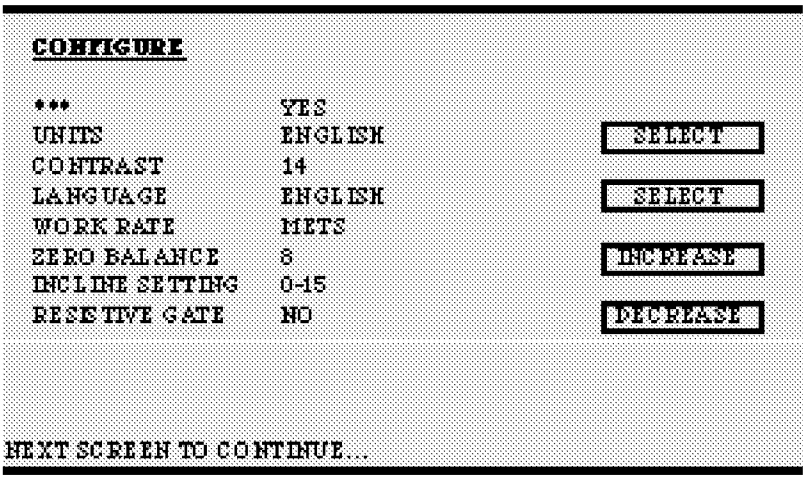

Figure 5. The Configure Screen.

Heart Rate: If active, this function causes the patient's Heart Rate to be displayed on the screen in both numeric and graphic formats. Use <S1> or <S2> to highlight this option, then use the <S3> or <S4> keys to activate or void this function.

NOTE: The Heart Rate function will not operate unless the Heart Rate Monitor is attached to both the patient and the display panel.

Measurement Units: The Biodex RTM 500 Treadmill can be configured to display either standard English or Euro (metric) measurements. To change units use the <S1> or <S2> keys to highlight this option, then use the <S3> or <S4> key to toggle from one format to the other.

Contrast: Screen contrast is easily adjusted. Use the <S1> or <S2> key to highlight this option, then use the <S2> or <S3> key to select the desired level. Selecting low numbers will result in a darker screen while selecting high numbers makes the screen appear brighter. Contrast levels range from 0 to 15.

Language: This option is for future use when the treadmill will be able to display in German, French, Japanese and English.

Work Rate: This can be displayed on screen in either MET's or Calories/Hour. Use the <S1> or <S2> keys to select this option, then use the <S3> or <S4> keys to toggle from one format to the other.

Zero Balance: This option is used to correct treadbelt "creeping" which may occur at the zero speed setting due to changes in temperature, heavy use, etc. Use the <S1> or <S2> key to select this option, then use the <S3> or <S4> key to raise or lower the Zero Balance setting anywhere between 0 and 15. Values 0 to 7 set treadmill motion in reverse, 8 through 15 set treadmill motion in the forward direction (8 is the default value.)

Incline: The RTM Model 500 can be configured with Incline/Decline of either -3 to 12 degrees or 0 to 15 degrees. This setting is preset at the factory, prior to shipping, based on the configuration selected. If, for some reason, this setting is not correct, use the <S1> or <S2> key to select this option, then use the <S3> or <S4> key to select the appropriate format.

Resistive Gait: (Optional): This option allows the patient to simulate pushing or pulling a specified load while walking, jogging or running. A specially designed microprocessor circuit measures the horizontal force applied to an optional, instrumented handlebar and varies the treadmill speed to maintain that force at a preselected level. For more detailed information on this option, see Chapter 5.

Software Version / Hours of Use: Listed at the bottom left side of the Configure Menu screen are the version identification number of your RTM Model 500 software and, at bottom right, the cumulative hours of use for this system. Both are displayed at all times while the Configure Menu is displayed.

USING THE HEART MONITORING FEATURE (OPTIONAL)

Activating Heart Rate Monitoring

If the Heart Rate Monitoring function is currently active, the Performance/Control screen will show the Target Heart Rate value. If the Target Heart Rate value box is blank, you must activate the Heart Rate Function as follows.

1. At the Performance/Control screen, press <Next Screen>. The Main Menu screen should be displayed.
2. Use the <S1> or <S2> key to highlight "System Utilities" and then press <Next Screen>. The System Utilities Menu should now be displayed.
3. Use the <S1> or <S2> key to highlight "Configure" and then press <Next Screen>. The Configure Screen should now be displayed.
4. Use the <S1> or <S2> key to highlight "Heart."
5. Use the <S3> or <S4> key to toggle the "Heart" setting to "Yes" or "No".
6. Press <Next Screen> to return to the System Utilities Menu, then use the <S1> or <S2> key to highlight "Return To Main Menu."
7. Press <Next Screen> to return to the Main Menu.

Setting Target Heart Rate

Once the Heart Rate function has been activated, the next step is to enter the Target Heart Rate value. The following chart depicts standard Target Heart Rate ranges for optimum cardiovascular benefit. While this chart may be used as a guide for cardiac-healthy users, clinicians must be sure to set the Target Heart Rate based on individual patient protocol.

⚠ *ADVERTISSEMENT: Quand l'appareil est untilisé en thérapue, le médecin responsable doit définir les paramétres spécifiques en patient pour limiter tout risque et nnotamment le travail total et la fréquence cardiaque.*

⚠ *CAUTION: When prescribed for the Therapeutic purposes, a physician should clearly define the parameters of use (i.e., total work, maximum heart rate, etc.) to reduce the risk of patient injury.*

Target Heart Rate Chart

Age	Estimated Maximal Attainable Heart Rate	85% Level	70% Level
20	200	170	140
25	195	166	136
30	190	162	133
35	185	157	129
40	180	153	126
45	175	149	122
50	170	145	119
55	165	140	115
60	160	136	112
65	155	132	108

To Set Target Heart Rate

1. At the Main Menu, use the <S1> or <S2> key to highlight "Exercise Setup." Press <Next Screen> to bring up the Exercise Setup screen.
2. Use the <S1> or <S2> keys to highlight "Target Heart Rate."
3. Use the <S3> or <S4> key to increase or decrease the Target Heart Rate value as desired.
4. Press <Previous Screen> to return to the Performance/Control screen. The Target Heart Rate value should now be displayed in the Target Heart Rate value box.

Connecting the Heart Rate Monitor

With the Heart Rate Monitoring feature activated, the Heart Rate Monitor provides a real-time reading of the patient's heart rate. The numeric values displayed in the Heart Rate Box on the Performance/Control screen mirror the actual heart rate. The graph at the bottom of the screen provides a window showing between + or 20 beats per minute from the Target Heart Rate setting.

To Connect the Heart Rate Monitor to the Patient:

1. Instruct the patient to secure the Heart Rate Monitor Strap around the chest so that it is in direct contact with the skin just below the breast. (The strap should be dampened with a sponge or wet cloth to ensure maximum conductivity or you can use the Spectra 360 Electrode Jell provided with the optional Heart Rate Kit.)
2. Insert the female adapter of the Heart Rate Cord onto the male adapter on the strap. Run the cord out from under the shirt on the same side as the display's Heart Rate plug.
3. Press <On/Standby> to turn the treadmill OFF. Instruct the patient to stand on the treadmill so that he or she is facing the display panel.
4. Install the male end of the Heart Rate Cord into the display's Heart Rate plug, located on the right edge of the display.
5. Press <On/Standby> to turn the unit ON.
6. At this point, your real-time heart rate should be shown on the display. Ensure the heart rate is displayed before proceeding. If the heart rate is not displayed, or appears to be incorrect, adjust the Heart Rate Monitor Strap for improved conductivity. (You may want to take the user's pulse rate manually and compare it against the displayed heart rate to confirm accuracy.)
7. Begin the exercise session.

PROGRAMMABLE OPTIONS

The Biodex RTM Model 500 Treadmill provides storage for eight programs. Four programs are pre-loaded and can be modified by the user. These programs allow the clinician to select predetermined exercise format routines. Each protocol can be set to provide up to five levels of exercise ranging from light (level 1) to heavy (level 5). Users can select any of the pre-defined exercise protocols, review or edit any protocol, or delete an existing protocol.

Choosing A Pre-Defined Exercise Program (See Figure 6.)
The Biodex RTM Model 500 Treadmill comes with four pre-defined exercise programs already installed. These programs offer a variety of options for standardizing patient exercise. Each program has been designed to provide a mix of program lengths, speeds, inclines and declines during the session. Each program is divided into ten segments.

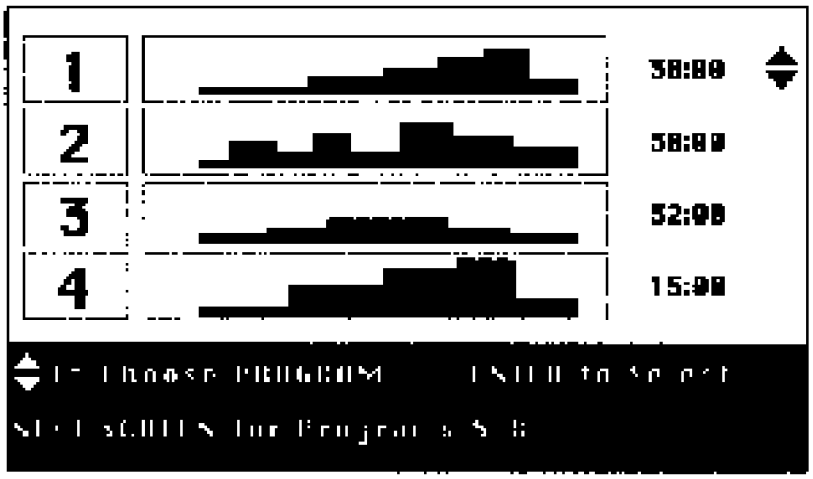

Figure 6. Pre-defined and user customized programs are available to fit a wide array of patient needs.

To access the Biodex Pre-defined Exercise Programs:
1. At the Performance/Control screen press <Next Screen>.
2. At the Main Menu, use the <S1> or <S2> key to highlight "Programmable Options." Press <Next Screen>.
3. At the Programmable Options screen, use the <S1> or <S2> key to highlight "Choose Program." Press <Next Screen>.
4. From the Programmable Options screen use the <S1> or <S2> key to highlight the desired program, (press <Next Screen> to view programs 5-8).
5. Press <Enter> to select the highlighted protocol and return to the Performance/Control screen. The selected exercise program number will be displayed in the bottom right corner on the "Control" side of the screen.
6. Use the <S2> or <S3> key to select the desired exercise level for the selected protocol.

NOTE: Each level of exercise is equal to 20% of maximum patient effort. Thus, level #5 requires 100% effort while level 1 requires only 20% effort from the patient.

7. Press <Start> to begin the exercise session. A graph depicting the selected exercise program will be displayed at the bottom of the Performance/Control screen.
8. Use the <S2> or <S3> key to further increase or decrease the exercise level as required by patient protocol.

Reviewing and Editing Programs

The RTM Model 500 treadmill exercise programs are easy to review and edit. Reviewing allows the clinician to examine all segments of any program without changing the program values or parameters. Editing allows the clinician to make and save changes to any of the eight programs.

To Review Any Exercise Program:

1. At the Performance/Control screen press <Next Screen>.
2. At the Main Menu, use the <S1> or <S2> key to highlight "Programmable Options." Press <Next Screen>.
3. At the Programmable Options screen, use the <S1> or <S2> key to highlight "Review or Edit Program." Press <Next Screen>.
4. From the Programmable Options screen, use the <S3> or <S4> key to scroll to the desired program as indicated in the Program Box at the right of the screen. For any program displayed in the Program Box, all parameters are displayed on the left side of the screen. Press <Enter> to select the desired protocol.
6. Press <Next Screen> to return to the Performance/Control screen after you have finished reviewing the program. The last program reviewed is now the currently selected program and will be shown as such in the bottom right corner of the Performance/Control screen.

To Edit Any Exercise Program:

1. At the Performance/Control screen press <Next Screen>.
2. At the Main Menu, use the <S1> or <S2> key to highlight "Programmable Options." Press <Next Screen>.
3. At the Programmable Options screen, use the <S1> or <S2> key to highlight "Review or Edit Program." Press <Next Screen> to reveal the Program Box.
4. Use the <S3> or <S4> key to scroll to the desired program number as shown in the Program Box on the right side of the screen.

NOTE: If a program is currently selected, it will automatically be displayed in the program box.

5. Press <Enter> to select and display the program to edit as listed in the Program Box.
6. Use the <S3> and <S4> keys to select the stage (1 - 10) of the protocol to edit.
7. Press <Enter> to move across the program table columns as desired from Stage to Speed to Index to Time and, eventually, back to Stage.
8. Use the <S1> and <S2> keys as plus or minus buttons to raise or lower the numeric value of the selected program stage or parameter.
9. After making all edits to the selected program, use the <Enter> key to advance across the parameters until the "Stage" column is once again highlighted.
10. Press <Next Screen> to save all changes and return to the Performance/Control screen with the edited program now selected and

displayed at the bottom of the screen, or press <Previous Screen> to abort the edit option without saving the changes and return to the Programmable Options screen.

11. You can now begin an exercise session using the selected program or choose a new exercise program, if desired, as described previously.

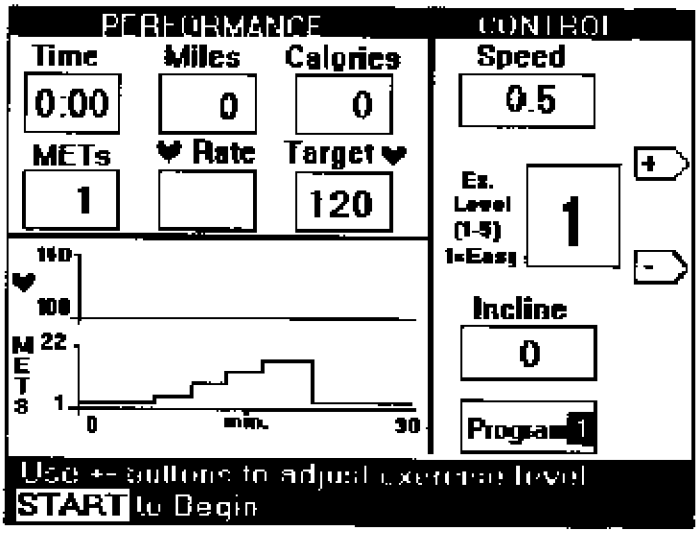

Figure 7. The Performance/Control screen displays a graph in the lower left corner depicting any selected pre-defined or customized programs.

Deleting Programs

If desired, an entire Exercise Program can be quickly deleted from the RTM 500 Treadmill memory.

To Delete Any Exercise Program From Memory:

1. At the Performance/Control screen press <Next Screen>.
2. At the Main Menu, use the <S1> or <S2> key to highlight "Programmable Options." Press <Next Screen>.
3. At the Programmable Options screen, use the <S1> or <S2> key to highlight "Delete Program." Press <Next Screen> to reveal the Program Box.
4. Use the <S3> or <S4> key to scroll to the desired program number as shown in the Program Box on the right side of the screen.

NOTE: If a program is currently selected, it will automatically be displayed in the program box.

5. Press <Enter> to select and display the program to delete as shown in the Program Box.
6. Press <Enter> to confirm deletion of program displayed in Program Box.
7. Press <Previous Screen> to return to the Programmable Options screen after deleting the selected program or press <Enter> to continue deleting programs.

RESISTIVE GAIT TRAINING

(Optional for RTM Model 500 With Graphic Display)
Resistive Gait Training is a common practice in most physical therapy clinics. In the usual scenario the patient is simply asked to walk forward or backward while pushing or pulling a specific load. This can be accomplished with the use of a chair or sled, the load being varied by the addition or subtraction of weights on the seat. In some clinics, various weight machines or elastic tubing are used to serve the same purpose with the patient walking backward or forward, to the extent allowed by the cable travel, while pulling or pushing the handle. The load is varied by selecting different weights or elasticity on the machine.

Obviously, the room needed for the chair and sled methods of supplying resistive gate exercise is a drawback. Similarly, the short travel of the cable on a weight machine makes it difficult to get the most out of each exercise session. That's where the new Biodex RTM Model 500 Treadmill comes to the rescue. With no mechanical limits to time or distance whatsoever, the Biodex RTM Model 500 allows patients to push or pull a specified load while walking. A specially fitted, optional, instrumented handlebar installed just below the display panel allows users to push forward or pull backward while using their hands on the bar. If desired, a special waist harness can also be fitted to the patient allowing the handle to be pulled forward or pushed in reverse without use of the hands.

Simply providing resistive gait training capability is a noteworthy advancement in treadmill design, but the Biodex RTM Model 500 goes a step further. It also provides a means of maintaining preselected force levels throughout the exercise session. By utilizing a specially designed microprocessor circuit, the RTM Model 500 can measure the horizontal force applied to the handlebar at all times and then vary the speed of the treadmill to maintain that force at a constant level. Lighten up and the treadmill belt slows down, exceed the preselected force level and the RTM Model 500 quickens its pace.

NOTE: For resistive gait training, mechanical work and power are measured and reported on the Performance/Control screen.

Activating the Resistive Gait Training Function
To activate the Resistive Gait Training Function:

1. At the Performance/Control screen, press <Next Screen>. The Main Menu screen should be displayed.
2. Use the <S1> or <S2> key to highlight "Resistive Gait Setup." Press <Next Screen>. The Resistive Gait Setup Screen should now be displayed.
3. Use the <S1> or <S2> key to highlight "Weight" and then use the <F3> or <F4> key to enter the patient weight.
4. Use the <S1> or <S2> key to highlight "Target" and then use the <F3> or <F4> key to enter the patient's Target Heart Rate.

5. Use the <S1> or <S2> key to highlight "Exercise Duration" and then use the <F3> or <F4> key to enter the desired exercise duration value.
6. Use the <S1> or <S2> key to highlight "Resistive Gait" and then use the <F3> or <F4> key to select "Push" or "Pull."
7. Press <Next Screen> to return to the Performance/Control Screen. The Resistive Gait function should now be active.
8. Use the <F1> and <F2> keys to set the desired resistance level (Force).
9. Use the <F3> and <F4> keys to set incline/decline.
10. Press <Start> to begin the resistive gait exercise session. The treadbelt will begin to move once the patient provides sufficient force in the required direction (push or pull).

The Resistive Gait Performance/Control Screen

With the Resistive Gait Training function selected, the Performance/Control Screen is modified slightly to provide information specific to this task. The "Calories" display is replaced by Work in Kilojoules and the MET's display is replaced by Power in Watts. Following are definitions for these additional measurements.

Kj = The amount of work being done on the resistive gait bar. For this measurement, the actual force applied to the bar (push or pull) is multiplied by the distance traveled by the treadmill belt.

Watts = The power (joules/sec) being applied to the resistive gait bar.

NOTE: To return to normal operating mode after you have selected the Resistive Gait option, press <Next Screen> to return to the Main Menu. Now select Exercise Programs and then press <Next Screen> twice. The Performance Control Screen should now be displayed with its normal settings.

MAINTENANCE

Your Biodex RTM Model 400 or Model 500 Treadmill should provide trouble-free operation as long as the following maintenance procedures are performed. If you are using the RTM Model 400 with Numeric Display, automatic prompts will appear when specific hours of usage are reached (see chart below).

If you are using the RTM Model 500 with Graphic Display, no prompts are provided so you must adhere to the hours of usage guidelines in the chart below.

NOTE: Without proper maintenance, excessive wear to drive components will occur. To assure trouble-free operation, scheduled maintenance must be performed. Failure to adhere to the scheduled maintenance chart below will void your warranty.

INSTRUCTION	HOURS OF USAGE	LED DISPLAY CODE
Lubricate Deck	75	P1
Reverse Deck	1,000	P2
Belt Replacement	1,000	P3
Clean Motor and Amp	750	P4
Front Roller Cleaning	375	P5

NOTE: Once the required maintenance has been performed, the RTM Model 400 maintenance prompt can be cleared by pressing <Select Display> twice, followed by <Clear Display> twice. The Maintenance Hour Log for the specific prompt displayed will reset to zero.

Daily Maintenence
As required, clean all exterior surfaces, upholstery and restraining straps. Specialized vinyl cleaners or protectants are recommended for upholstery and cushions. Otherwise, use a solution of warm water and mild detergent.

NOTE: DO NOT use solutions containing ammonia.

Hardware computer components should be wiped clean as needed using a soft rag dampened with alcohol.

Quarterly: Lubricate Treadbelt and Slider Deck
The Biodex Lubricant Kit is designed to reduce friction between the treadbelt and the slider deck. It is required for all institutional treadmills. Proper and timely application of the lubricate will prevent premature failures due to excessive wear and load. Items affected by inadequate lubrication are the treadbelt, slider deck, motor, and motor controller.

Annually or Every 1,000 Hours: Reverse Exact-Track Bed
Reverse the Exact-Track bed. The treadmill bed is double-sided, allowing it to be reversed and used over. Once both sides have been used, the bed must be replaced.

Annually or Every 1,000 Hours: Replace Treadbelt
Inspect Treadmill for cracks or tears. If none are found, continue to use. If any cracks or tears are apparent, replace treadbelt.

MAINTENANCE PROCEDURES

Treadmill Lubrication (See Figure 8.)

1. Using the large syringe provided, squirt one-half tube of the lubricant underneath the center of the treadbelt.
2. Walk 10 steps on the treadmill at a speed of 1.0 mph. This will moisten an 8" track underneath the center of the entire treadbelt.
3. Allow the treadmill to dry for approximately 10 minutes.

NOTE: Use only the Biodex lubricant kit with your RTM Model 400 or Model 500 Treadmill. Most standard greases, waxes and silicon sprays will build up on the rollers, causing belt slippage and affecting tracking.

To re-order lubricant kit, use Biodex part # 945-276. Each container provides 12 applications.

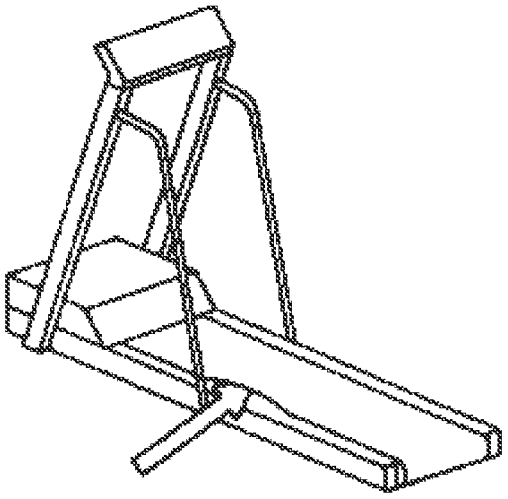

Figure 8. Squirt one-half tube of lubricant between the belt and deck.

Reverse or Replace Treadbelt and Deck

Tools Required: Phillips Screwdriver, 9/16 Socket, 3/16 and 5/32 Allen Wrench

1. Elevate treadmill to 10 degrees, allowing access to the underside of the treadmill.
2. Remove power cord from wall outlet.
3. Remove motor cover secured by the six Phillips head screws. Once screws are removed, lift and remove cover.
4. Remove motor tension lock nut, located on the underside of accessory pan. The nut is attached to the motor bracket tensioning bolt. Once the tensioning bolt has been removed, lift the motor up and remove motor drive belt.
5. Remove the two aluminum traction strips, located one on each side of running deck. These are secured by 4 Allen screws located on top of traction strips.

6. Remove rear treadbelt roller. The roller is secured by two treadbelt tensioning bolts. Once bolts have been removed, lift out the roller assembly.
7. Remove the 2 Allen screws which secure the front treadbelt roller. The screws are located on the side of the treadmill.

⚠ *ATTENTION:* Si les boutons de sécurité du rouleau sont retirés, le rouleau chutera. Ne oas oublier que les rouleaux sont lourds.

⚠ *CAUTION: When the bolts securing the roller are removed the roller will drop. Be aware that the rollers are heavy.*

8. Remove the running deck. This is done by lifting from the side of the deck and raising the deck two inches before sliding it out. The running deck is two-sided and can be flipped over and reused once.
9. To remove the treadbelt seven support brackets must be removed. These are comprised of 3 angle iron brackets attached by securing nuts, and 4 running deck support bars secured by Allen screws. Once all support brackets are removed the treadbelt can be removed.
10. Tension treadbelt and adjust tracking after you reassemble the treadmill. (See Treadbelt Adjustment procedure.)

Treadbelt Adjustment

Although the RTM Treadmill incorporates the "Exact Track System," occasional belt adjustments are still necessary for correct tensioning and tracking.

Tension Adjustment

⚠ *ATTENTION: Avant de tester la tension du tapis selon la procédure décrite ci-dessons, méttre le tapis à l'arrêt et déconnecter le câble secteur. Certaines piéces du tapis peuvent entrainer des blessures graves. Ne jamais essayer de déterminer la tension sur le tapis pendant que ce dernier est en mouvement.*

⚠ *CAUTION: Before testing treadbelt tension as described below, turn the treadmill OFF and unplug the system. Moving parts on the treadmill can cause serious injury. Do not attempt to determine treadbelt tension while the belt is moving.*

The need for tension adjustment is indicated by uneven belt speed or the belt stopping suddenly upon foot impact. Properly tensioned, the tread belt will allow the user to slip a hand snugly under the center of the belt.
Tread belt tension is adjusted by tightening or loosening the two hex-head, 9/16, bolts at the end of the treadmill frame. The bolts should be adjusted in 1/4-turn increments, exactly the same amount, in the same direction. Turn both bolts

clockwise to tighten the belt. Turn both bolts counterclockwise to loosen the belt. Failure to turn both bolts equally may affect tracking. One quick test is to apply hand heel strikes and observe if belt momentarily stops. If belt speed remains constant, this indicates belt is tight. If belt hesitates during heel strikes, additional tightening is required. To check over tightening, set treadmill .5 mph and, while holding rail, resist until belt stops. If drive roller continues to rotate with the belt stopped, further adjustment is not necessary. If drive roller stops when belt is stopped, belt is too tight. Loosen belt and recheck.

Tracking
Tracking adjustment is necessary when a pronounced bump appears toward the left side of the belt, approximately 2 inches from the left edge. This occurs when the belt works its way out of the Exact-Track grooves.

To Adjust Treadbelt Tracking:
Tighten the hex tensioning bolt on the side to which the treadbelt has migrated, turn bolt in 1/8 increments clockwise. The tread belt should slowly move away from the tightened bolt. Once belt migrates back into roller slot the bump will disappear. At this point, fine tracking adjustment is necessary.

Fine Tracking
Fine tracking adjustment prevents premature wear of the tacking belt rib which rides in the Exact-Track groove. The belt rib should be centered in the tracking groove. If the rib rides against the groove wall, a friction point forms causing excessive wear. This adjustment should be made during preventative maintenance or during belt replacements.

To Adjust Fine Tracking:
Determine which side of the exact track groove the belt rib is riding on. Mark treadbelt tracking position on deck.

Tighten the hex tensioning bolt on the side the belt is tracking against, belt should migrate to the opposite side of the groove. Mark the tread belt tracking position on the deck. You now have two (2) marks on the deck 1/4" apart. Mark the center position of the marks. This is where the belt should track. Adjust 9/16 tensioning bolt so that the belt is centered on the mark. Remember the belt will migrate away from the tension bolt that is adjusted last. Tracking adjustments are done in forward direction only, at 8 mph.

Check tensioning after adjustment to insure proper belt performance and wear.

NOTE: Motor drive belt should never slip. Check this when you check for tread belt overtightening. If tread belt drive roller is stopped, motor should also stall. If motor turns, but drive roller is stopped, tighten motor tension bracket located under the mill. Adjust until the motor belt stops slipping.

SYMPTOM
Treadmill is turned ON and speed control is inoperable (belt not moving).

1. Check for faults on display unit before moving onto step #2:

For RTM Model 400 with Numeric Display the following diagnostic error codes apply:

CODE	DESCRIPTION	
A1	Motor Amplifier Fault	
A2	Upper Board	NV Ram Failure
A3	Upper Board	PROM
A4	Upper Board	RAM
A5	Upper Board	Communication Failure RS-232
A6	Upper Board	Communication Failure RS-422
A7	Lower Board	PROM
A8	Lower Board	RAM
A9	Not Used	
b1	Lower Board Watchdog Failure	
b2	Lower Board Watchdog Disabled	
b3	Lower Board Controller Fault	
b4	Hall No Speed	
b5	Hall Over Speed	
b6	Lower Board Loopback Comm Failure	
b7	Upper Board Failure	
b8	Not Used	
b9	Not Used	
E1	Grade Failure	
P1	Deck Lubrication Maintenance	
P2	Reverse Deck Maintenance	
P3	Belt Replacement Maintenance	
P4	Motor & Amp Cleaning	
S1	Tach Overspeed	
S2	Tach No Speed	

For RTM Model 500 with Graphic Display the following diagnostic error codes apply:

CODE	DESCRIPTION	
128	Communication between upper/lower board inop	128
64	No Safety Lanyard	64
32	Control fault (no amplifier)	32
16	Grade Error	16
8	Motor Tach Output Exceeds Selected Speed	8
4	Motor Tach Output is Below Selected Speed	4
1	Hall Sensor Output is Below Selected Speed	1

2. If no faults are displayed check the following:

Large blue capacitor should measure 170 VOL across terminals. If OK, proceed to step 3.

3. Speed control signal on motor amplifier should measure .250 VDC per mill per hour E.G.

NOTE: Measurement taken at J1 Pin 1 PIN 2

1mph = .250 VDC
2mph = .500 VDC
4mph = 1.00 VDC
8mph = 2.00 VDC

If speed control signals are OK, proceed to step 4.

4. Check Amplifier Output. The Output Terminals are located on top of amplifier and are designated "m+" and "m-". The Output voltage should be: 1mph = 32 VAC, 2mph = 52 VAC

NOTE: Remember to use the volts A.C. selection on your meter. The Amplifier is pulse width modulating, therefore A.C. scale is required.

If amplifier output is OK, proceed to step 5.

5. Check Motor Resistance. The motor has a winding resistance of 1.3 to 3 Ohms. The value is dependent on commutation position. If resistance reading is significantly higher the windings or brush contacts are defective.

To measure resistance turn treadmill power OFF. Place meter lead across terminals marked "m+" and "m-". Set meter scale to the lowest resistance selection. Check resistance in several commutator positions by rotating motor shaft 9.0 degrees for every one revolution.

RTM MODEL 400 WITH NUMERIC DISPLAY

In the unlikely event of a system malfunction, the following tests may be helpful in pinpointing the problem source.

BUTTON TEST

This will test the functionality of the 14 buttons on the display panel. Listed below is the button designation and the display window codes displayed during key activation.

To activate the button test turn unit OFF then ON. While all LED's are lit press <Stop> and the <Elevation -> buttons simultaneously. All LED's should go OFF. If an error code is displayed note error and call Biodex Technical Support for assistance. To test individual buttons use chart below.

Depress each button to ensure proper operation. As each button is depressed there should be a corresponding beep.

BUTTON DESIGNATION	DISPLAY WINDOW
Select display	1
Clear display	2
Set weight	3
Set time	4
Scroll up	5
Scroll down	6
Speed up	7
Speed down	8
Grade up	9
Grade down	10
Forward	11
Reverse	12
Stop	13
Start	14

MOTOR CURRENT TEST

The test verifies that the system is operating under normal motor current levels. A contributing factor is excess motor current is proper maintenance. As the friction between the running deck and belt increases so does motor current. Listed below are typical current levels at specific speeds.

To activate motor current test turn system OFF and then ON. While all LED'S are lit depress <Stop> and <Speed -> buttons simultaneously. Using the <Speed> buttons select speed as listed below to verify motor current values. If motor current value varies by more than 20% refer to the maintenance section of the manual. If after maintenance is performed motor current value continues at 20% above listed value contact Biodex Technical Support for assistance.

SPEED	MOTOR CURRENT (AMPS)
8.0	2.0
5.0	1.4
0.0	0.4
-3.0	1.2

RTM MODEL 500 WITH GRAPHIC DISPLAY

Diagnostic Modes

In the unlikely event of a system malfunction, two diagnostic modes are available to help pinpoint the problem source. Use the Front Panel and Lower Unit Diagnostic Modes in conjunction with the following troubleshooting procedures. If further assistance is required, please call Biodex Customer Service at (800) 224-6339.

To Access the Diagnostic Mode:

1. Turn power ON and press the ON button to activate the display. Upon power-up the Performance/Control screen is displayed.
2. Press <<Next Screen>> and the Main Menu will be displayed. Using the <S1> and <S2> keys on right side of display, highlight system utilities and press enter.
3. The system utilities menu has two selections; configure and return to main menu displayed. There are, however, three hidden selection that are displayed after pressing <S3> then <S4> and <S3> again. They are calibration, diagnostics and reset programs.
4. Using the <S1> and <S2> key highlight "Diagnostics" and press <Next Screen>. The Diagnostics menu has three selections, each activated by highlighting the selection with the <S1> or <S2> key and pressing the Start button. The Diagnostic menu selections are Button Test, Display Test and Hardware Test, as described below.

Button Test

This will test the functionality of the 8 keys on the display panel. Listed below is the key designation and the display window codes displayed during key activation.

KEY DESIGNATION	DISPLAY WINDOW
<S1>	1
<S2>	2
<S3>	3
<S4>	4
<Previous Screen>	5
<Next Screen>	6
<Start>	7
<Enter>	8

Stop and Standby/On button can not be tested. If you press Stop you will return to Diagnostic menu. Pressing Standby turns the system OFF.

Display Test
This is selected by highlighting "Display Test" and pressing Start. Once activated you should observe the display screen changing contrast from light to dark at 5-second intervals. The screen should be solid while at both contrast levels, no lines or symbols should be observed. Press stop to return to the Diagnostic Menu.

Hardware Test
This is selected by highlighting "Hardware Test" and pressing start. The "Hardware Diagnostics" screen is divided into three sections:

Upper Left Screen
Monitors actual outputs of the following items:

- Motor Current: Used to monitor motor current at various speeds. As friction increases due to belt , bed or motor bearing wear, the motor current will increase accordingly.
- Strain Gauge: When push/pull option is activated the value displayed represents applied torque. The scaling is based on 256 bits. Zero applied torque is displayed as 128.
- Tach Velocity: Monitors the treadbelt speed via hall effect sensor on drive pulley. During calibration, this is used to compare set command speed to actual. If there is a variance an adjustment to motor amp gain is required necessary.
- Actual Grade: Monitors grade position sensor output. During grade calibration or verification this display is compared with set command grade. If a variance is found an adjustment to the grade sensor is necessary.

Lower Left Screen
Error flags indicate specific hardware faults. Faults are indicated by an "x" next to error. When faults occur during normal operation the system will shut down and display fault along with reset procedure.

Right Side of Screen
Speed and incline command selection are displayed. When selecting speed command both motor current and tach velocity should be monitored in upper left of display. When selecting incline actual grade should be monitored in upper left of display. Press stop to return to the Diagnostic Menu.

CALIBRATION VERIFICATION

RTM MODEL 400 WITH NUMERIC DISPLAY

This option allows you to verify and calibrate both speed and incline. To activate calibration verification turn unit OFF and then ON. While all LED's are lit press <Stop> and <Speed +> simultaneously.

To verify speed press <Speed> buttons and select a range of speeds from 1 mph to 8 mph. The speed display window and selectable display should correspond. If there is a difference call Biodex technical Support for assistance.

To verify elevation press <Elevation +> button until incline stops. The selectable display window should read between 120-128. Press <Elevation -> button until decline stops. The selectable display window should read between 11-15. If the values displayed are not within the ranges specified call Biodex Technical Support.

To exit calibration verification depress <Start> for normal operation.

RTM MODEL 500 WITH GRAPHIC DISPLAY

Calibration is under the System Utilities menu. Once in the Utilities menu press <S3> then <S4> and <S3> again. Three new hidden selections are displayed. Now press <S1> or <S2> to highlight calibration and press <Next Screen>. Once in the treadmill calibration screen, calibration verification for both speed and incline may be performed. This screen allows you to verify accuracy of those two parameters. The calibration screen is separated into two sections. On the right side of the screen two windows which display command/set speed and incline. They represent the values that the operator has set. On the left side of screen there are again two windows displaying reported/actual speed and incline. To verify calibration set commands as specified in calibration tables.

CALIBRATION SCREEN

REPORTED (ACTUAL)	COMMAND (SET)
REPORTED SPEED 1000	SPEED 1 0 TO 8 MPH
REPORTED GRADE 13	INCLINE 0 0-15°

SPEED CALIBRATION TABLE

REPORTED		COMMAND
1000	± 50	1
4000	± 100	4
8000	± 100	8

INCLINE CALIBRATION TABLE

REPORTED	COMMAND
12 - 15	0
42 - 45	5
88 - 92	10
120 - 125	15

If, after verifying calibration, it is determined the treadmill is not within specification, contact BIODEX Technical Support.

To exit the calibration screen press <Next Screen> twice.

INSTALLATION OF OPTIONAL ARM RESTS & ELEVATION ROCKERS

INSTALLING THE ARM REST PADS (See to Figure 9.)

1. Using the supplied 3/16" allen wrench, secure one Arm Rest Receiving Tubes to each guard rail so that the tube is flush mounted against the front of the guardrail. Ensure that the pull pin for each receiving tube faces out (away) from the treadbelt and tighten snugly but not completely.
2. Pull out on the pull pin and slide the arm support pad into the receiving tube (the arm pads are interchangeable.) Insert the arm pad to the half-way point and release the pull pin, ensuring that the pin locks in one of the arm pad support bar detentes.
3. Ensure the arm pad is positioned perpendicular to the floor. Once satisfied with the arm pad positioning, fully tighten the four allen screws. The arm pads are now ready for use and should be adjusted as per patient protocol.

INSTALLING THE ELEVATION ROCKERS (See Figure 10.)

The RTM Model 500 treadmill is available with Incline/Decline of either standard 0 to 15 degrees or optional -3 to 12 degrees (Part# 945-275-M315). This setting is preset at the factory prior to shipping.

⚠ *AVERTISSMENT: Cette installation nécessite au moins deux personnes en bonne santé.*

⚠ *CAUTION: This procedure requires the efforts of at least two strong individuals.*

1. Press <STANDBY> to turn the treadmill to the Standby mode. Turn the Power Switch, located at the base of the treadmill in the left corner at the display end, to the "0" (OFF) position. Unplug the treadmill.
2. With the aid of a second person, gently tip the treadmill over on one side.
3. Using a 7/16" wrench, remove the two bolts that secure each rocker to the treadmill frame.
4. Replace the existing rockers with the new rockers, replace the bolts and tighten until fully secure.
5. With the aid of a second person, rotate the treadmill back to the upright position.
6. Press <ON/STANDBY> to turn the treadmill ON. The Performance/Control screen should appear on the display.
7. Press <Next Screen>. The Main Menu screen should be displayed.
8. Use the <S1> or <S2> key to highlight "System Utilities" and then press <Next Screen>. The System Utilities Menu should now be displayed.
9. Use the <S1> or <S2> key to highlight "Configure" and then press <Next Screen>. The Configure Menu should now be displayed.
10. From the Configure Menu, use the <S1> or <S2> key to highlight "Incline Setting". Now use the <S3> or <S4> key to select the appropriate elevation format.

11. Press <Next Screen> to return to the System Utilities Menu.
12. Highlight "Return to Main Menu" and press <Next Screen> to return to the Main Menu.
13. Highlight "Exercise" and press <Next Screen> to return to the Exercise Menu.
14. Press <Next Screen> to return to the Performance/Control screen. The system should now be ready for use.

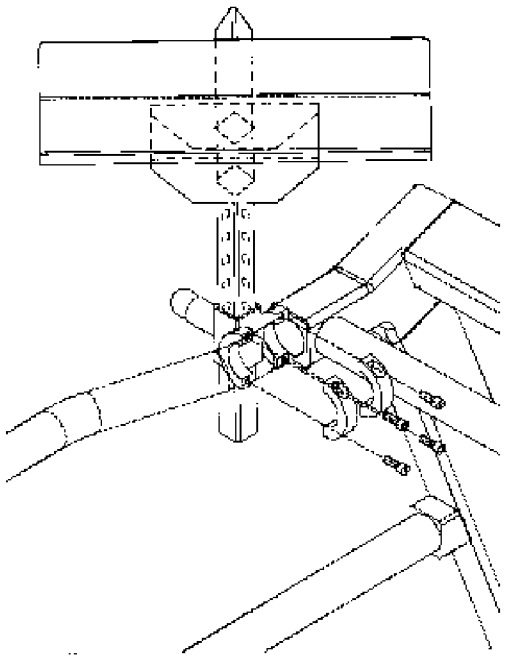

Figure 9. Installing the Arm Rest Pads.

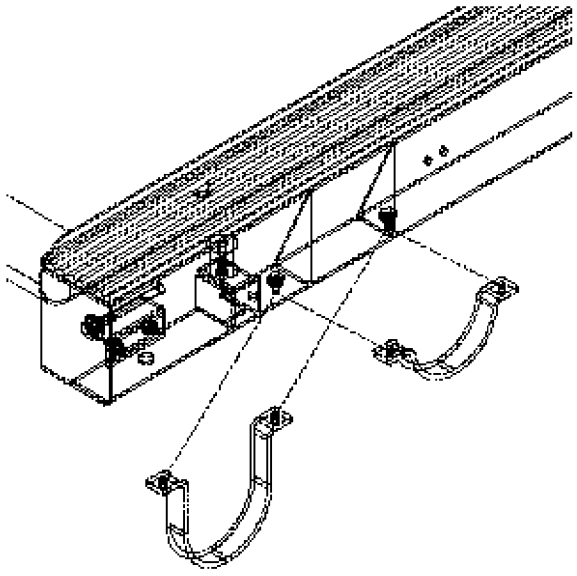

Figure 10. Installing the optional Elevation Rockers.

REPLACEMENT PARTS LIST

Item Number	Description
ELECTRICAL	
945-200-E350	Pwm Motor Controller (RTM)
945-250-E700	Treadmill Chassis Harness
945-275-E700	Display Cable Assembly
945-250-E702	115 Volt Actuator Assembly
945-250-E733	Power Cord, Euro
945-250-E703	Power Cord Assembly
945-250-E704	Hall Effects Cable Assembly
945-250-E708	Pulse Width Mod. Cable
945-250-E709	Lanyard Reed Switch Cable
945-250-E711	Position Potentiometer Assy
945-250-E712	Drive Motor with Tach (w/o flywheel)
945-275-E825	Hall Effects PC Board Assy
945-275-E101	Membrane Switch Overlay (LED)
945-300-E702	Membrane Switch Overlay (LCD)
MECHANICAL	
C08304	Isolation Transformer
C09456	Relay, Solid State (IEC)
C09102	Circuit Breaker Assy
C09001	Magnetic Sensor
C08986	Poly-V Belt "Type J"
C08992	1 x 2" Dia. Wheels
C08983	Vibration Mounts
945-250-M041	Treadmill Belt
945-250-M036	Bed "Double Groove"
945-275-M314	Rear Foot Brackets
945-275-P058	Enclosure Housing RTM Model 400
ASSEMBLIES	
945-275-A010	Front Roller Assembly
945-275-A020	Rear Roller Assembly
945-250-A090	Safety Lanyard Assembly
945-275-A320	Drive Motor/Flywheel Assembly
945-275-A700	Display, Assy, RTM 400
945-250-A700	Display, Assy, RTM 500
945-250-A720	Control PC Board Assembly

SPECIFICATIONS

Motor:	Fan-cooled, permanent magnet DC motor, 2.0 HP with 4Q Pulse Width Modulation
Speed Range:	Forward 0-8 mph (0-12.9 Km/h) in 0.1 mph (.16 Km/h) increments; Reverse 0-3 mph (0-4.8 Km/h) in 0.1 mph (.16 Km/h) increments
Elevation:	0-15% grade (optional -3 to 12% grade for RTM Model 500, part #945-257)
Deck Surface:	19″ x 60″ (49 x 153 cm)
Treadbelt:	2-ply
Electrical:	Standard 115 VAC, 20 AMP, 50/60 Hz, dedicated line (International voltages available)
Size:	28″ x 80″ (71 x 203 cm)
Treadmill Weight:	250 lbs (114 kgs)
Deck:	Reversible Teflon impregnated
Max. Patient Weight:	350 lbs (160 kgs)
Mfg:	Biodex Medical Systems P.O. Box 702 Shirley, NY 11967
Classification:	Class I measuring, type B, ordinary equipment, continuous operation

NOTE: The Authorized Representative in the European Community is:

Attn: Brian Spear, President
Prothia
26, rue serpollet
75020 Paris
France

Phone: (011)33.1.40.41.60.20
Fax: (011)33.1.40.31.62.81
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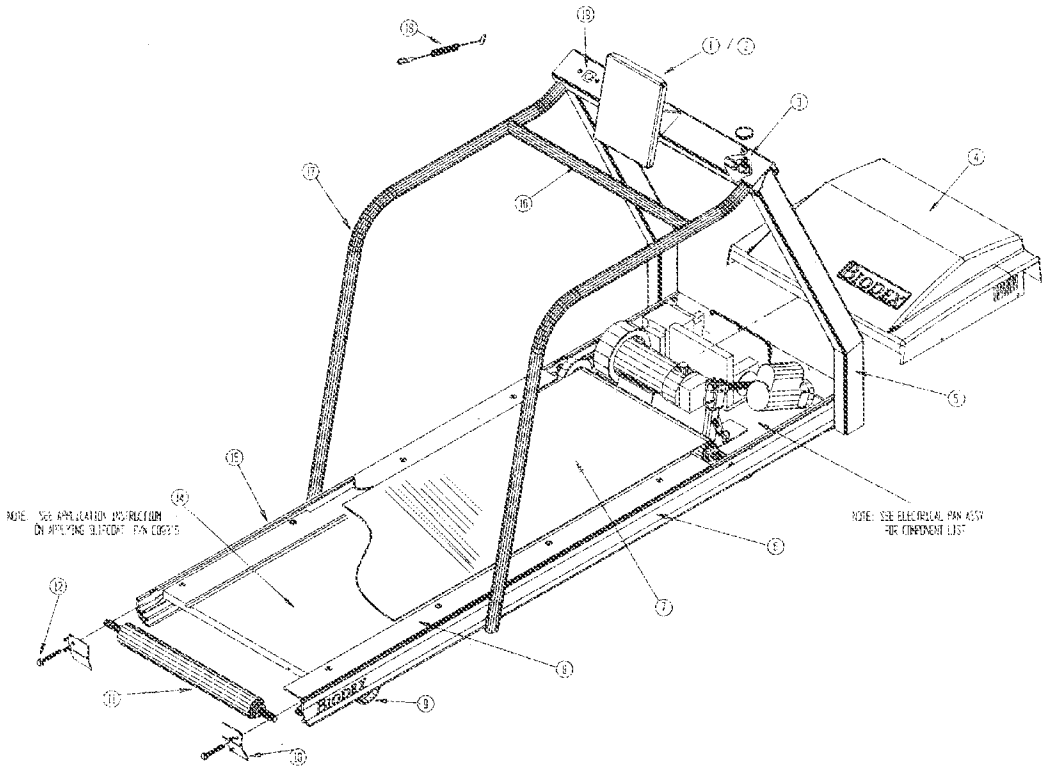

Figure 11. RTM Model 400 and Model 500 Assembly.

1.	945-275-A700	Display Assembly RTM 400 (LED)
2.	945-250-A700	Display Assy RTM 500 (LCD)
3.	945-275-E703	Modified Stop Switch Assy
4.	945-275-P058	Enclosure Housing
5.	945-275-A210	Upper Frame Assembly
6.	945-275-M302	Right Side Extrusion
7.	945-250-M041	Treadmill Belt
8.	945-275-M319	Top Bed Rails
9.	945-275-M314	Rear Foot Bracket
10.	945-275-M309	Right Side Rail Cap
11.	945-275-A020	Rear Roller Assembly
12.	C08976	Rear Roller Adjustment Bolt
13.	945-275-M308	Left Side Rail Cap
14.	945-250-M036	Bed Double Groove
15.	945-275-M301	Left Side Extrusion
16.	945-275-W140	Front Rail Weldment
17.	945-275-W150	Hand Rail Weldment
18.	945-250-A090	Safety Lanyard
19.	C09001	Magnetic Sensor
***	945-275-E701	E-Stop Extension Cable
	945-275-E700	Display Control Cable
	945-250-E709	Safety Lanyard Cable
	945-275-W160	Ger/Ped Handrail
	945-276	Lubrication Kit, RTM

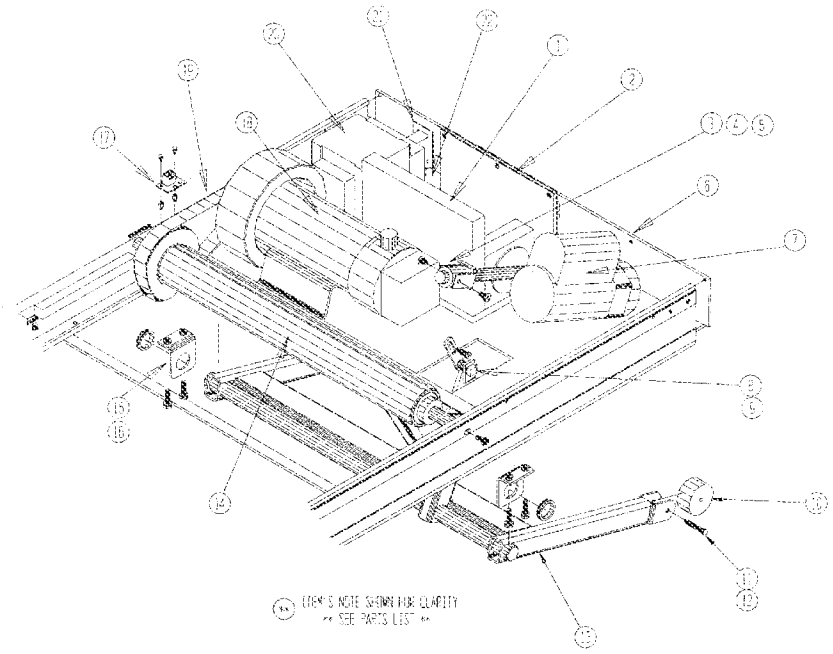

Figure 12. RTM Model 400 and Model 500 Electronic Pan Assembly.

1.	945-275-E350	PWM Motor Controller (RTM)
2.	945-250-A720	Control PC Board Assy, RTM III
3.	945-250-M091	Actuator Strap
4.	945-250-M254	Lift Pivot Bolt
5.	C09449	Nylon Actuator Nut
6.	C08905	Modular Cable Coupler, RJ45
7.	945-2850-E702	115V A/C Actuator Assy
8.	945-250-E711	Position Potentiometer Cable
9.	945-250-W180	Potentiometer Lever Weldment
	C08912	Screw, Cup Pt. Set, 8-32 x .12
10.	C08992	2.0 Diameter Wheel
11.	C08993	Clevis Pin
12.	C08424	Cotter Pin
13.	945-275-W130	Pivot Frame Weldment
14.	945-275-A010	Front Roller Assy
15.	945-275-M307	Lift Pivot Bracket
16.	C08991	Nyliner Bearing
17.	945-275-E825	Hall Effect Senor PC Bd.
18.	945-385-A320	Drive Motor/Flywheel Assy
19.	C08986	Polt V Belt
20.	C08304	Isolation Transformer 1KVA
21.	C09102	Circuit Breaker, Snap-In, 15 amp
22.	C09456	Relay, Solid State (IEC)
**	945-250-E700	Treadmill Chassis Harness
**	945-250-E704	Hall Effect Cable
**	945-250-E708	Pulse Width Modulator Cable
**	945-275-E702	Communication Ext. Cable

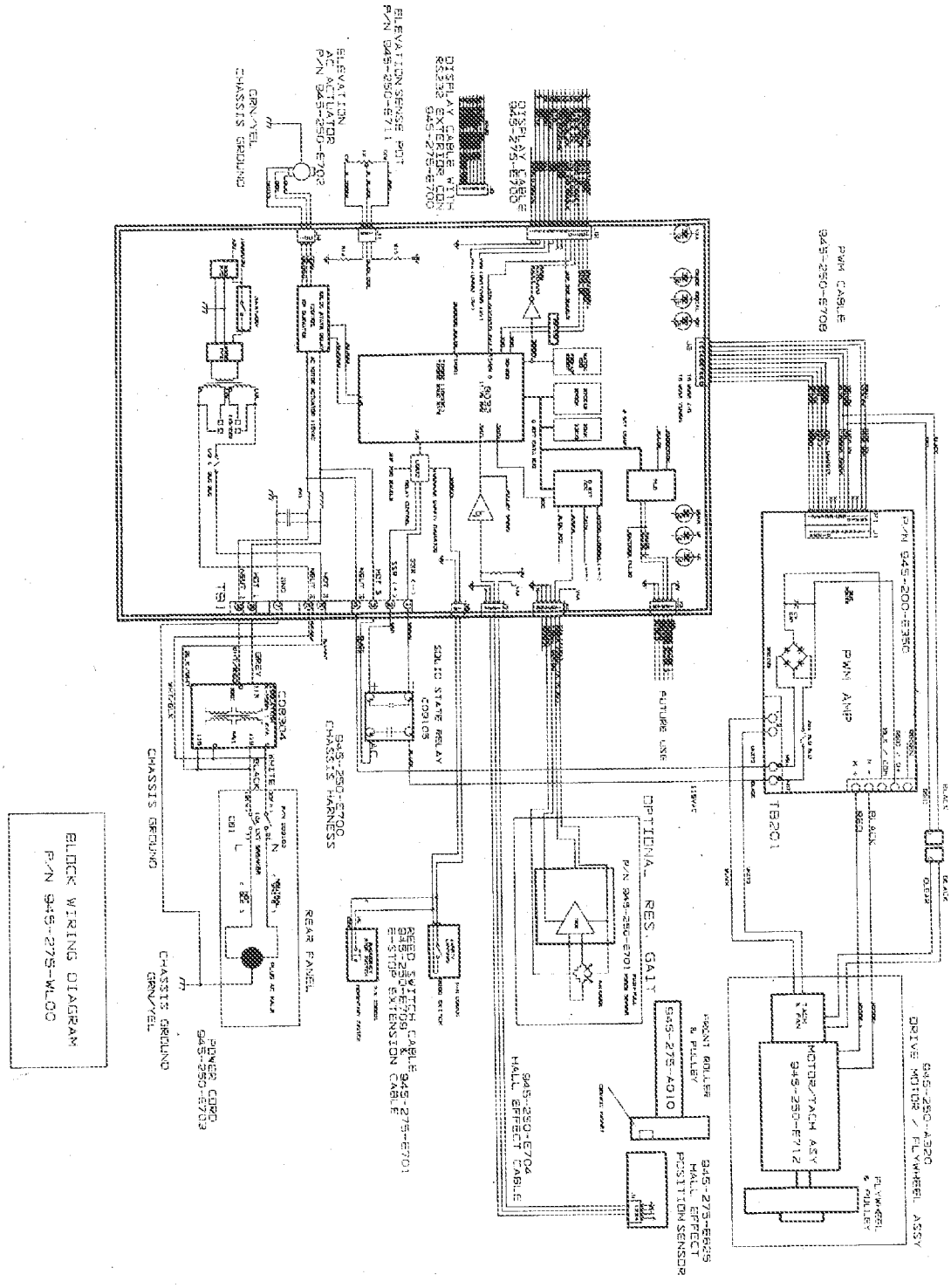

Figure 13. RTM Model 400 and Model 500 Schematic Illustration.

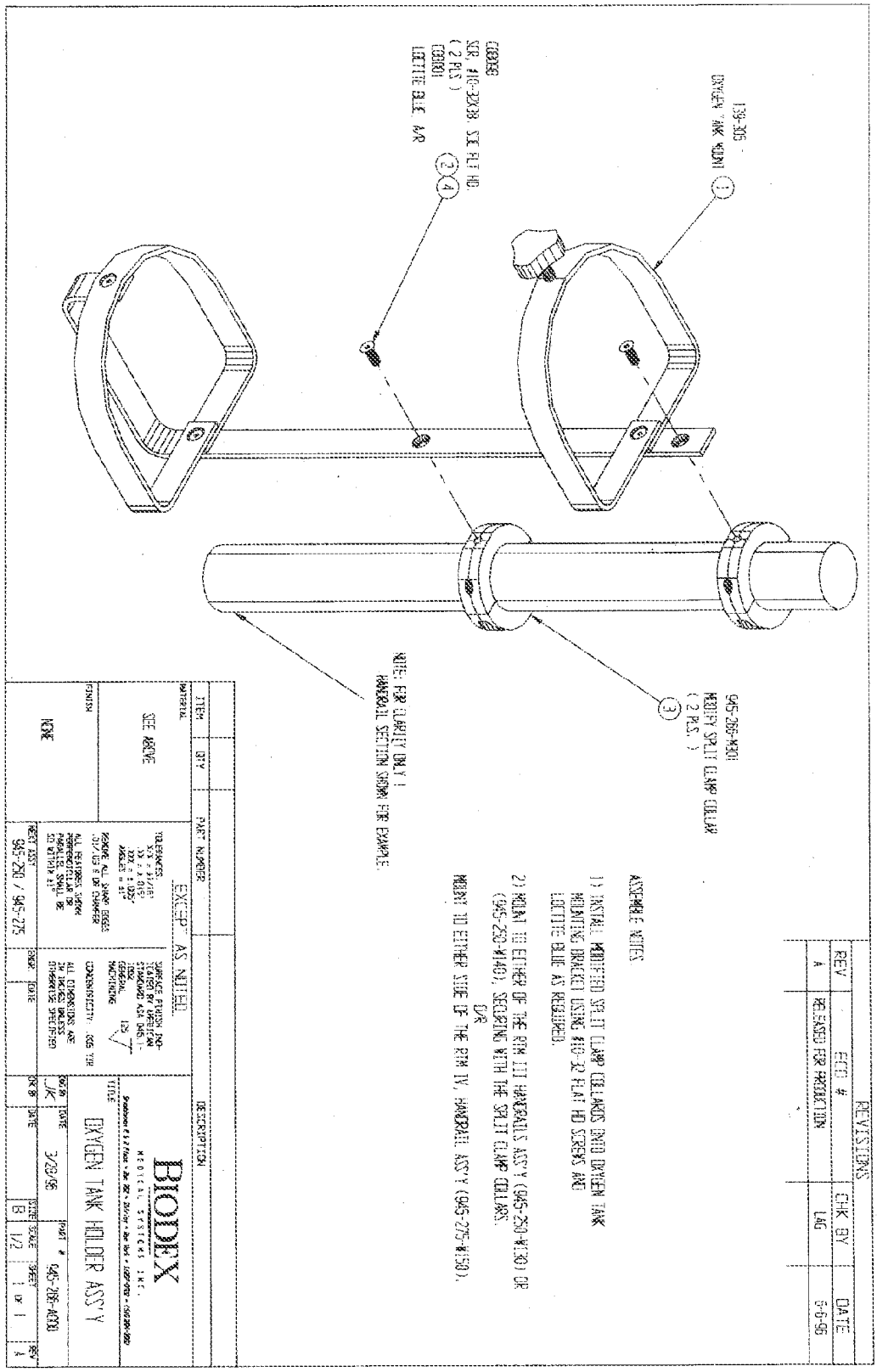

Figure 14. Optional Oxygen Tank Holder Assembly.

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Research article

Assessing Stride Variables and Vertical Stiffness with GPS-Embedded Accelerometers: Preliminary Insights for the Monitoring of Neuromuscular Fatigue on the Field

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Abstract

The aim of the present study was to examine the ability of a GPS-imbedded accelerometer to assess stride variables and vertical stiffness (K), which are directly related to neuromuscular fatigue during field-based high-intensity runs. The ability to detect stride imbalances was also examined. A team sport player performed a series of 30-s runs on an instrumented treadmill (6 runs at 10, 17 and 24 km·h^{-1}) with or without his right ankle taped (aimed at creating a stride imbalance), while wearing on his back a commercially-available GPS unit with an embedded 100-Hz tri-axial accelerometer. Contact (CT) and flying (FT) time, and K were computed from both treadmill and accelerometers (Athletic Data Innovations) data. The agreement between treadmill (criterion measure) and accelerometer-derived data was examined. We also compared the ability of the different systems to detect the stride imbalance. Biases were small (CT and K) and moderate (FT). The typical error of the estimate was trivial (CT), small (K) and moderate (FT), with nearly perfect (CT and K) and large (FT) correlations for treadmill vs. accelerometer. The tape induced very large increase in the right - left foot Δ in CT, FT and K measured by the treadmill. The tape effect on CT and K Δ measured with the accelerometers were also very large, but of lower magnitude than with the treadmill. The tape effect on accelerometer-derived Δ FT was unclear. Present data highlight the potential of a GPS-embedded accelerometer to assess CT and K during ground running.

Key words: Movement tracking, fatigue monitoring

Introduction

Monitoring acute neuromuscular fatigue is important for all run-based sports, and has various implications including training load management to prevent injuries and/or rotation/substitution strategies during matches. The ability to assess running strides asymmetries, and in turn, possible lower-limb muscle strength imbalances can also provide important information with respect to injury risk, during both normal and rehabilitation training (Fousekis, Tsepis et al., 2011). Classical time-motion analyses in team-sports, which include distance covered into specific speed (Carling, 2013), acceleration and deceleration (Aughey, 2011) zones, and accelerometer-derived measures of overall 'body load' (Barrett et al., 2014), are unfortunately largely dependent on match pace and might therefore lack of sensitivity to detect neuromuscular fatigue per se. It is actually well understood today that running activity during matches is more related to match tactics and score line than fatigue or fitness per se (Carling, 2013).

Recent results have nevertheless suggested that micro-sensors, such as the accelerometers included in the GPS units worn by the majority of team sport players (i.e., GPS-imbedded accelerometers) may provide, in comparison with classical locomotor-related data, more fatigue-sensitive measures. For example, in fatigued elite Australian Rules footballers showing at least an 8% decreased flight time: contraction time ratio from a countermovement jump, there was a reduction in the contribution of the vertical axis to the total accelerometer load during matches (Cormack et al., 2013). Unfortunately, the actual meaning of the vertical axis loading remains partially unclear, since it doesn't represent a clear biomechanical/locomotor entity. Possibly more promising accelerometer-derived measures may include contact time (CT) and vertical stiffness (K) (Gaudino et al., 2013), which are common stride variables, and have been shown to be largely affected by acute neuromuscular fatigue during repeated high-intensity runs (Morin et al., 2006, Girard et al., 2011). However, the validity of accelerometer-derived CT, flying time (FT) and K have not been examined yet. Whether accelerometer-derived data can also accurately detect stride asymmetries is also, to our knowledge, still unclear.

The aims of the present study were to examine the ability of GPS-imbedded accelerometers 1) to assess stride variables and vertical stiffness and 2) to detect stride asymmetries during running.

Methods

Participant and design

Using a single-subject design protocol, a 36-y old team sport player (1.82 m, 80 kg) performed a series of 30-s runs at a 1% incline on a motorized instrumented treadmill (ADAL3D-WR, MD, HEF Tecmachine, Andrézieux-Boutheon, France): 2 sets of 3 runs at 10 km·h^{-1}, 6 at 17 km/h and 6 at 24 km·h^{-1}) with or without his right ankle taped (aimed at slightly shortening/stiffening the Achilles tendon and in turn, creating a stride imbalance, Figure 1).

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The player was highly familiar with treadmill running, and had no history of lower-limb injury. Tapping the right side was an arbitrary choice. Given the fact that the player had no history of previous injury, there is no reason to think that the side of the taping would have influenced the outcome of the present study. There was a 45-s rest between each trial to minimize fatigue, and a 3-min break between each set. The duration of each set was therefore ~11-min long. At the end of each run, the player stopped running immediately and placed his feet on each side of the belt while holding the handlebars, before re-loading the treadmill at the end of each rest; the treadmill was never stopped so that the speed could be adjusted for the next run. The order of each run was randomized (e.g., 17, 10, 24, 17, 24, 10, 10, 27 $km \cdot h^{-1}$, etc.) within each set for each running condition, with the taped condition performed during set 2 and 4. The testing sequence was therefore the following: 3 runs at each speed untaped, 3 runs at each speed taped, 3 runs at each speed untaped and 3 runs at each speed taped. To make sure that the tape effect was consistent and reproducible across set 2 and 4, the same length of tape was used and it was repositioned at the same place on the player's leg. During the 4 series of runs, the player wore positioned between his scapulars and at the approximate level of T2, a commercially-available GPS unit (SPI HPU, GPSports, Canberra, Australia) with an embedded 100-Hz triaxial accelerometer. The GPS unit was held securely in a manufacturer recommended GPS-vest, as previously described (Aughey, 2011). The GPS unit and imbedded accelerometer was vertically-oriented (Z axis) when the player was standing upright, the Y axis was orientated to forward-backward horizontal movement and the X axis was orientated to the left-right lateral deviations. Similar accelerometer data have shown good reliability when collected on football players during football-specific training exercise (Boyd et al., 2011).

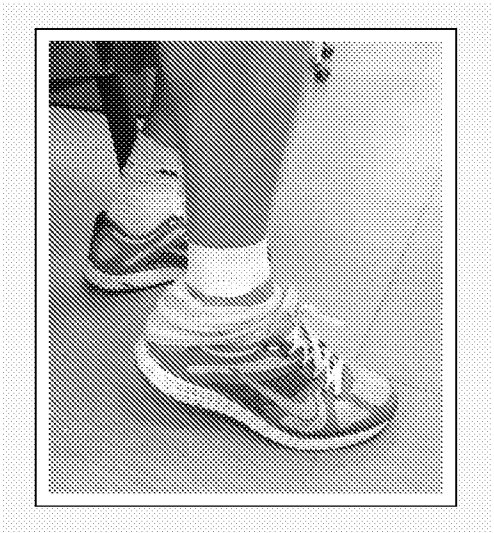

Figure 1. Achilles tendon taped to create the stride imbalance.

Methodology. CT and FT were computed as previously described from both treadmill (based the vertical ground reaction force signal) (Morin et al., 2005) and accelerometers (Gaudino et al., 2013) (Athletic Data Innovations, using the magnitude vector, Figure 2) data by two independent scientists. Both scientists were blind to the data obtained with the other device; the data were then pooled by a third scientist who calculated vertical stiffness for both devices using Morin et al.'s equation (Morin et al., 2005). Briefly, this equation is based on a sine-wave modeling of the vertical ground reaction force during the support phase, and uses CT, FT and subject's body mass as computation inputs. Vertical reaction force data obtained with the treadmill were sampled at 1000 Hz during a 30-s period. For each run, after appropriate filtering (Butterworth-type 30 Hz low-pass filter, based on pilot residual analyses), instantaneous values of vertical ground reaction force were analyzed for 10 consecutive steps. CT and FT were determined for each step using a 30 N threshold (Figure 2, once strides were stabilized, i.e., generally after the initial 10-12 steps). The accelerometer-derived data was processed using a fourth-order Butterworth filter (20-Hz cut-off, sampling frequency 100 Hz) aimed at reducing signal noise. Detection algorithms (Athletic Data Innovations) were used to recognize foot strikes based on the magnitude vector and the relationship between the Y and Z components of the accelerometer data. Due to the alignment of the unit on the subject's upper back, the axial components of the accelerometer data are not truly vertical or frontal, but change with the varying orientation of the subject's torso. The side of the foot strike (left vs. right) was assigned using a two-pass algorithm (Athletic Data Innovations) utilizing primarily the X component of the accelerometer. CT and FT were calculated using the filtered accelerometer-derived data by determining the time between the 'foot strike start positon' and the 'foot strike end position' (CT) using the previously mentioned detection algorithm. Consequently, the time between the 'foot strike end position' and the next 'foot strike start position' were used to determine FT. To increase the sample size and allow a correlation analysis with sufficient statically power representative of the wide range of steps encountered during training and matches, the data from the 18 runs were then pooled together for analysis (3 speeds x 6 runs x 10 steps = 180 steps).

Statistical analysis

The agreement between treadmill (criterion measure) and accelerometer-derived data was examined using a specifically-designed spreadsheet (Hopkins, 2000), which calculated the mean bias (90% confidence limits, CL) and the typical error of the estimate (TEE, 90% CL) both in percentage and standardized units, and Pearson correlation coefficients (r, 90% CL). We also compared the ability of the different systems to detect the stride imbalance using magnitude-based inferences (Hopkins et al., 2009). Threshold values for biases, TEE and standardized differences, were >0.2 (small), >0.6 (moderate), >1.2 (large) and very large (>2) (Hopkins et al., 2009). Finally, the following criteria were adopted to interpret the magnitude of the correlation: ≤0.1, trivial; >0.1-0.3, small; >0.3-0.5, moderate; >0.5-0.7, large; >0.7-0.9, very large; and >0.9-

1.0, almost perfect. If the 90% CI overlapped small positive and negative values, the magnitude was deemed unclear; otherwise that magnitude was deemed to be the observed magnitude (Hopkins et al., 2009).

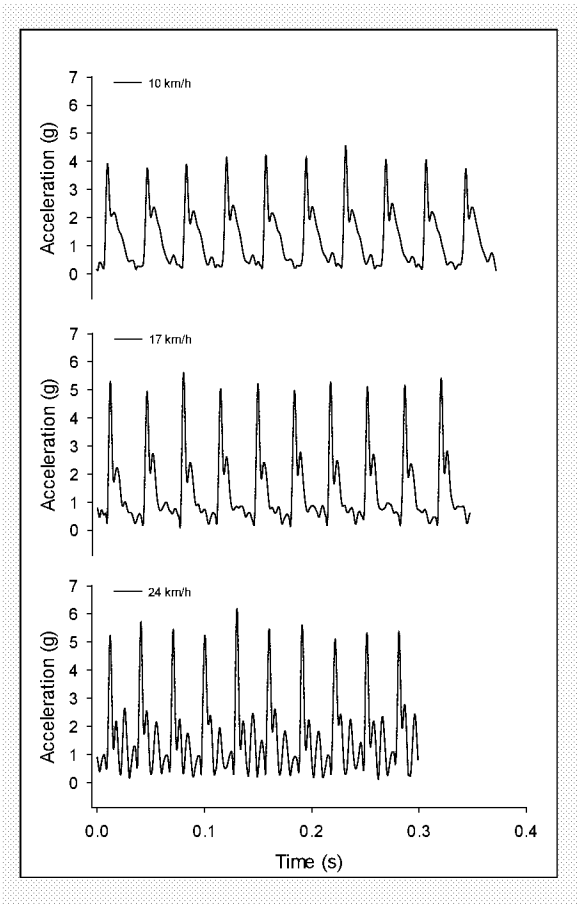

Figure 2. Accelerometer-derived magnitude vector during 10 successive steps, as measured for the three different running speeds (untaped condition).

Results

Biases were small (CT, -10.4%; 90CI: -12.3, -9.8; K -13.3%; -14.6, -11.9) and moderate (FT, -25.8%; -18.8, -27.7). The typical error of the estimate was trivial (CT: 3.9%, 3.4, 4.6), small (K: 6.3%; 5.5, 7.5) and moderate (FT: 15.7%; 13.5,18.9), with nearly perfect (CT: r = 0.98; 90%CI 0.97, 0.99; K: 0.98; 0.97, 0.99) and large (FT: 0.68; 0.55, 0.78) correlations for treadmill vs. accelerometer.

The tape induced very large increase in the right - left foot Δ in CT (4.5%; 4.2, 4.9), FT (7.0%; 2.3, 11.3) and K (10.3%; 8.6, 12.0) on the treadmill. The tape effect observed with the accelerometer on CT (3.7%, 2.3, 5.0) and K (6.4%, 3.8, 9.2) were also very large but of lower magnitude than with the treadmill (Δ in the Δ CT: -0.9%, -2.4, 0.7 and K: -3.9%, -7.5, -0.3). The accelerometer-derived tape effect on FT was unclear (0.3%, -3.7, 4.3).

Discussion

The first result of this preliminary study was that stride variables and vertical stiffness could be accurately estimated using 100-Hz GPS-embedded triaxial accelerometers. While the promise of such devices to detect stride variables have already been reported (Gaudino et al., 2013), this is to our knowledge the first time that the data derived from a GPS-embedded tri-axial accelerometer were directly compared with a gold standard (i.e., vertical ground reaction force obtained from an instrumented treadmill) over several steps. Compared with the criterion measures obtained with the treadmill, the biases and typical errors were of small-to-moderate amplitude only, with nearly perfect to large correlations between the two technologies. Considering both the practical (outdoor use of a portable and individual device vs. lab-based and stationary device) and economical aspects of the accelerometer technology (instrumented treadmill or force plates systems cost up to 100 times more than accelerometers), and since CT and K are two important determinants of high-intensity running performance (Girard et al., 2011; Morin et al., 2006), our preliminary results open new perspectives for the field monitoring of neuromuscular fatigue. The smaller relative bias and greater CV reported for FT compared with CT may not reflect real differences in validity and reliability *per se* given the strong interdependency of both measures (i.e., when the athlete's foot is not in contact with the ground it could only be in the air). This is likely the result of the smaller absolute values of FT (0.10-0.15 s) compared with CT (0.15-0.25 s), which artificial increases the magnitude of the bias and TEE values when expressed in percentage.

The second important finding of the present study was the ability of the GPS-embedded accelerometer to detect stride imbalances. While the tape-related imbalance could be detected via the analysis of all the treadmill variables (right-left differences in CT, FT and K were all very large), the imbalance was only apparent on CT and K measures with the GPS-embedded accelerometer, and of a smaller magnitude than with the treadmill. Despite a slightly lower sensitivity to the stride imbalance, the accelerometer-derived data are likely relevant enough to detect running asymmetries in the field, which highlights the interest of such devices for the monitoring of potential lower-limb strength asymmetries in athletes.

A limitation of the present preliminary study however is that all measures were collected on a single subject; whether similar results would be reported in various individuals with different anthropometrical attributes, stride patterns and running experiences still remains to be examined.

Practical applications

Today, almost all GPS systems, whatever the brand, include high-frequency tri-axial accelerometers in their individual units. Both manufacturer-provided (e.g., Team AMS for GPSports, Sprint for Catapult) and custom-made softwares (e.g., Athletic Data Innovations) allow automated and rapid stride analysis, which increases both the quantity and the quality of the data collected on each player. Since contact time and vertical stiffness are two important determinants of high-intensity running perfor-

mance (Morin et al., 2006, Girard et al., 2011), and given the possible prognostic of lower-limb strength asymmetries (Fousekis et al., 2011), our results open new perspectives for the field monitoring of neuromuscular fatigne. Another very important aspect of the present technology is that accelerometers can be used indoor (i.e., no GPS signal needed), which in fine allows their use for almost every type of run-based type of sports (e.g., basketball, handball).

Conclusion

Present data highlight the potential of GPS-embedded tri-axial accelerometers to assess contact time and vertical stiffness during ground running. Since these two latter variables are important determinants of high-intensity running performance (Morin et al., 2006, Girard et al., 2011), and since lower-limb strength imbalances may be related to a higher injury risk (Fousekis et al., 2011), our preliminary results open new perspective for the field monitoring of neuromuscular fatigue and performance in run-based sports.

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Key points

- GPS-embedded tri-axial accelerometers may be used to assess contact time and vertical stiffness during ground running.
- These preliminary results open new perspective for the field monitoring of neuromuscular fatigue and performance in run-based sports

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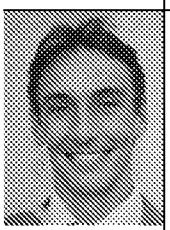

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Woodway EcoMill: A Non-Motorized Treadmill With Electronic Displays

JUNE 4, 2009

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Want the power savings of a manual treadmill but want to see displays of how much energy you're using up? Run a mile in the Woodway EcoMill, an unplugged treadmill with a bevy of digital displays on the panel and an electronically-controlled elevation system.

Designed with a kinetic generator built into its frame, running and walking on the EcoMill should generate just enough energy to light up the basic display, as well as allow a nifty one-touch control of the elevation system. That way, you get the same energy savings as you do from a pure push treadmill (along with all the "green" benefits, if you tend to lean that way), without suffering from the lack of visual feedback as to how well you are doing. Being able to increase the incline without having to get off the machine to pull it up sure sounds pretty dandy too.

The running surface sports 47 individual slats measuring a total of 22 x 52 inches, going around a drive system with toothed belts, drive wheels and 114 precision ball bearings. It can handle runners of up to 500 lbs from flat to an elevation of up to 15%. Integrated power module consists of a 12ah sealed rechargeable battery, with onboard kinetic generator and battery management.

If you take issue with the unnecessary power use in treadmills and exercise equipment, the Woodway EcoMill is a great way to get around it, all while still enjoying a few of the benefits of motorized units. The eco-friendly machine is currently available in tacky green color (as in the photos) or a less wretched-looking black for a pocket-unfriendly price of $8,500.

[Woodway (http://www.woodway.com/commercialtreadmills/ecomill.html)] via [Dvice (http://dvice.com/archives/2009/06/green-treadmill.php)]

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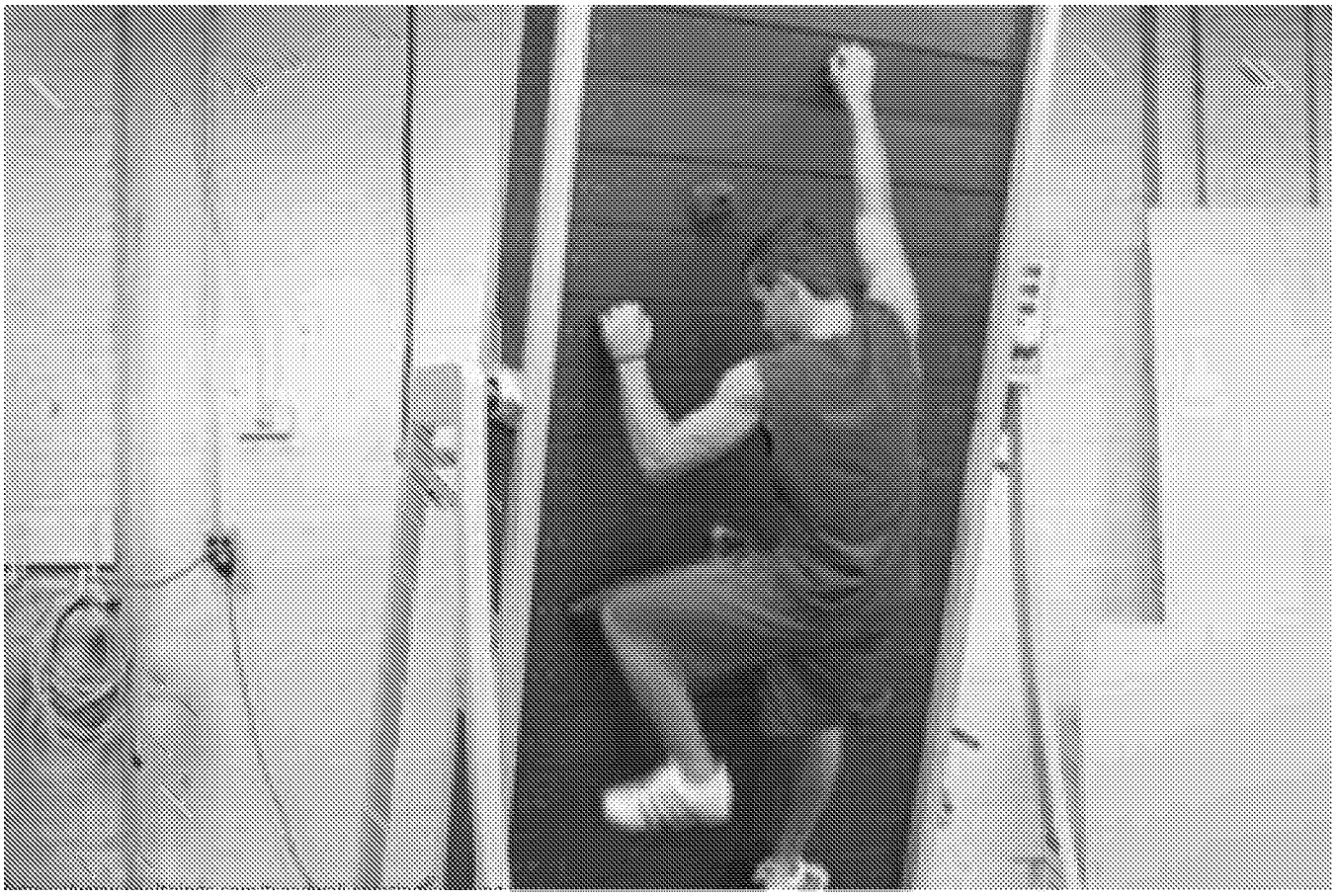

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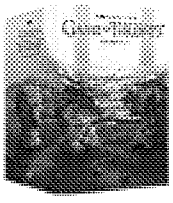

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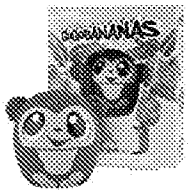

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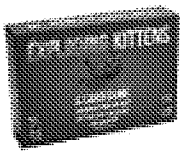

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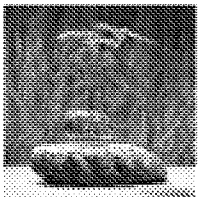

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Japanese style Levitating Air Bonsai Pot -... (https://www.amazon.com/Japanese-style-Levitating-Air-Bonsai/dp/B06XSYYG67?psc=1&SubscriptionId=AKIAJEAM3T22RMEPWSPQ&tag=ctreview-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=B06XSYYG67)

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Leatherman - Tread Bracelet, The Original Travel... (https://www.amazon.com/Leatherman-Bracelet-Original-Friendly-Multitool/dp/B018IOY0JG?psc=1&SubscriptionId=AKIAJEAM3T22RMEPWSPQ&tag=ctreview-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=B018IOY0JG)

(https://www.amazon.com/gp/prime/?tag=ctreview-20)

Leatherman Bracelet Original Friendly Multitool (https://www.amazon.com/Leatherman-Bracelet-Original-Friendly-Multitool/dp/B018IOY0JG?psc=1&SubscriptionId=AKIAJEAM3T22RMEPWSPQ&tag=ctreview-20&linkCode=xm2&camp=2025&creative=165953&creativeASIN=B018IOY0JG)

$174.95

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KineAssist-MX™

Owner's Manual v G

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Read this manual before using this product. This manual contains important safety, operation and maintenance information. Make this manual available to all persons responsible for the operation and maintenance of these products.

Document No: HDT-R001032-RevG

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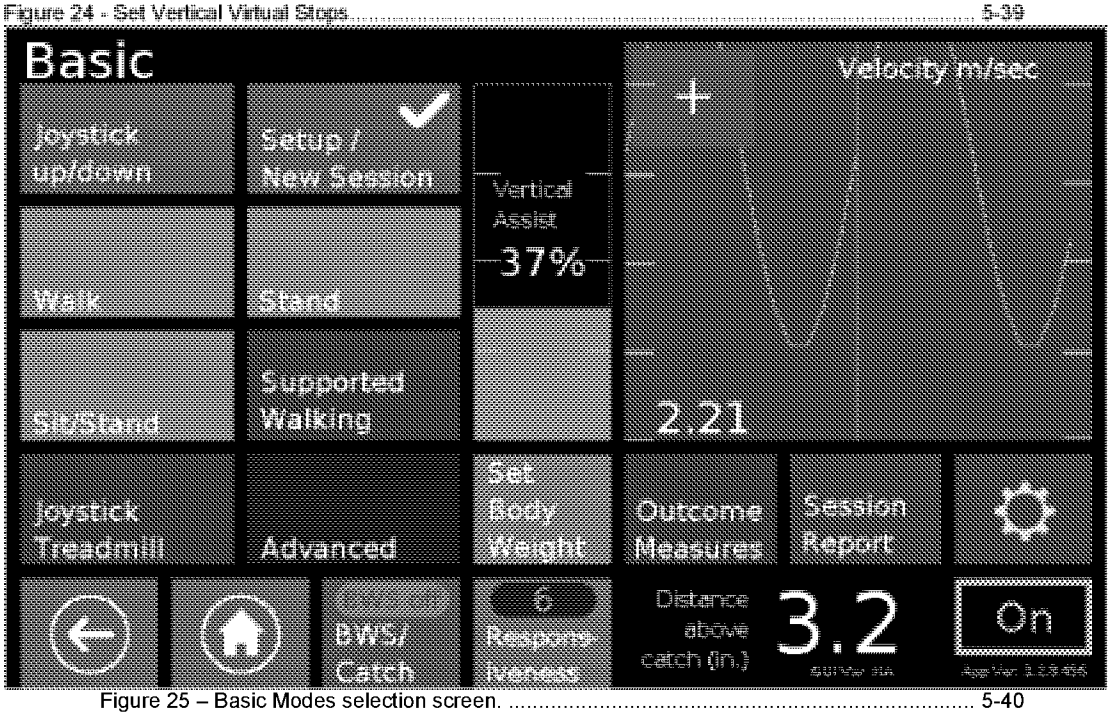

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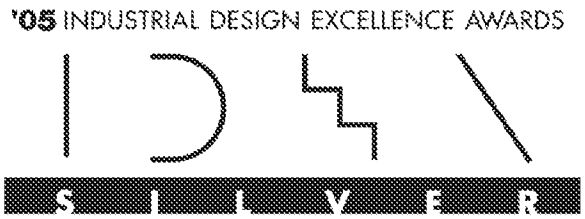
KineAssist® Technology History

The KineAssist began as a joint project of robotics researchers and physical therapy researchers and clinicians from Northwestern University and the Rehabilitation Institute of Chicago, together with professional engineers at Kinea Design LLC. In 2003 when the project began, members of the same team had been deeply involved in the invention and introduction of cobots, collaborative robots for direct physical interaction with people. This now-popular model was a marked departure from the prevailing fenced isolation of robots in industry. Opening the gates required advances in the sensing of human intent, shared control of force and motion, and safety.

Physical therapy promised a challenging and valuable new opportunity for robot/human interaction. With funding from the *Department of Commerce NIST-ATP* program and the *Rehabilitation Institute of Chicago*, the team began a disciplined exercise in user-oriented design, guided and assisted by the product design firm IDEO.

From the beginning the team's objective was to create a robotic tool for the clinician, as opposed to a robot that would itself provide physical therapy. Preserving the subtle physical give and take between a clinician and her patient was a key issue. The sensory environment presented to the patient was also crucial, as was making it possible for the clinician to work creatively and flexibly with the patient without hindrance by the machine or undue attention to its operation.

The team's intensive investigations, observations, prototyping, and ongoing integration of clinician feedback was recognized by an IDEA award as an exemplary design process. The up-front investment was also rewarded by a successful and rapid engineering design and development effort, with an FDA-approved product in clinical operation within 12 months.



In 2005, with early models of the KineAssist in use in several hospitals and clinics, the project was transferred to the ownership and control of the Rehabilitation Institute of Chicago. Today RIC continues to use, study, and share a new kind of robotic rehabilitation tool, one which coordinates motion with and responds to and respects the intentions of two people, both a patient and a clinician. Kinea Design's engineers, now members of HDT Expeditionary Systems, continue their commitment to support and advance the KineAssist.

Chapter 1: Getting Started

1.1 Product Description

The KineAssist-MX™ device is intended for use by physical and or occupational therapists in a rehabilitation setting for assisting/enabling therapeutic exercises prescribed to patients for gait and balance training.

The *KineAssist-MX*™ is a microprocessor controlled, motor actuated robotic device that will assist clinicians in maintaining patient safety while performing challenging therapeutic activities. The device has a relatively small foot print and does not require any changes to a clinic's infrastructure.

The device has programmable modes to address the needs of both low level in-patients with impaired mobility on a basic functional level as well as more advanced outpatients with fall risk.

1.2 Important Safety Instructions

All KineAssist-MX are built to specifications and intended for commercial use.

The main power switch is located near the location of the power cord. The switch has "I" and "O".

"I" Position: When the switch is in the "I" position the KineAssist-MX is turned on and the belt is held tight, and the device is functional.

"O" Position: When the switch is in the "O" position the treadmill is turned off and the belt is free moving.

This equipment must be operated by trained staff and serviced only by duly qualified service personnel. All information in this manual is directed towards such persons only. They ensure the safety of the patient, user and the equipment.

DANGER – *To Reduce the Risk of Electrical Shock*

- Read all instructions before using.
- Do not modify the plug provided with the treadmill. It is equipped with a power cord with a grounding plug. If it will not fit in the outlet, have a proper outlet installed by a qualified electrician.
- Do not use any adapters, especially ones without grounding provisions. To do so could result in electrical shock.
- Do not operate electrically powered treadmills in damp or wet locations.
- Before opening the electronic enclosure cover the power cord must be unplugged.
- Do not soak the treadmill surfaces with any liquid; use a sprayer or damp cloth. Keep all electric components, such as the motor, power cord, and power switch away from water.
- Do not place any open liquid containers on any part of the treadmill. The use of sport bottles with closeable tops is acceptable to be used.
- Do not attempt to service your treadmill yourself if you feel at risk.
- Always keep the running surface clean.

CAUTION:

- Proper heart rate, blood pressure, and symptoms of discomfort, anxiety or fear must be monitored by the clinician who works with patients under high intensity exercise conditions.
- A qualified mechanic should perform service or repair work. It is preferable that mechanics have successfully completed our factory-authorized service school or equivalent.

WARNING – ***To reduce the risk of injury***

- Set up and operate treadmills on a solid, level surface.
- Keep all loose clothing and towels away from the treadmill running surface. It is also important that shoe laces do not extend past the bottom of the sole of the shoe.
- Keep hands away from all moving parts.
- Never leave children unsupervised around a treadmill.
- Inspect the treadmill for worn or loose components prior to use. Tighten/replace any worn or loose components prior to use.
- Read, understand and test the emergency stop procedures.
- Care should be taken when mounting and dismounting the treadmill. Never mount or dismount the treadmill while the running belt is moving.
- Wear proper athletic shoes, such as those with rubber or high-traction soles. Do not use shoes with heels or leather soles. Make sure no stones are embedded in the soles.
- The safety and integrity designed into the machine can only be maintained when the treadmill is regularly examined for damage and repaired. It is the sole responsibility of the user/owner or facility operator to ensure that regular maintenance is performed. Worn or damaged components should be replaced immediately or the treadmill removed from service until the repair is made. Only manufacturer supplied or approved components should be used to maintain and repair the treadmill.
- Only trained individuals should operate the KineAssist-MX.
- These qualified individuals must have the accompanying documentation available at all times when operating the device.
- Do not carry out any exercises with the KineAssist-MX if it cannot be correctly adjusted to the patient.
- When the patient is harnessed in the KineAssist-MX following preparation for training check that the device has been attached correctly and that the buckles are secure.
- Check all locking pins to make sure they are in the desired position.
- Check that the un-weighting setting has been set correctly before each session.
- The KineAssist should not be operated if any of the protective covers has not been mounted correctly.
- In the event of faults or irregularities, or any indication of damage (e.g. abnormal noise), the session must be stopped immediately. Perform a maintenance check and do not carry out further therapy until the problem has been remedied.
- The clinician should always be in close proximity to the emergency stop.

- Make sure that the Body Weight Support is set to zero when there is no one in the KineAssist. Unintended upward motion of the support arms will result if BWS is active with no one in the KineAssist
- Improperly resetting the force sensors could result in unpredictable behavior of the KineAssist and possible injury. For example, if somebody is leaning on the pelvic arms or something other than the pelvic harness is hanging from it - while re-zeroing - the force sensors will not be properly reset.
- The patient should not be left unattended/unassisted in Sit/Stand mode. The therapist should use the PT assist rings to help lower and raise the patient (to and from the bench) until the patient has gained confidence in this activity.
- The instructions provided for replacing any components internal to the electronic enclosure must be followed exactly.
- When replacing the slat; it is vital that new parts are used. If the old screws are used again the new slats could come loose from the mat surface and cause severe injuries.
- When using the steps, make sure there is plenty of room for the patient to step up, and ensure that the patient's head does not hit the ceiling
- When the PT is on the device they should always be standing on the non-moving surfaces of the treadmill when the device is in an active mode.
- Incorrect installation of the Pelvic Harness connector could lead to a hazard.
- When reconnecting harness confirm that the Lock Tabs fall back into place in the PM Harness Anchor
- Do not pull on the PM sliders themselves as this may create a pinching hazard use the push-pull knobs provided.
- Always use a transfer board when transferring a patient from a seated position to another seated position
- Always buckle in torso harness strap, and adjust its length accordingly in order to prevent hitting his head on the floor if they lose their balance.
- Patient should not be left unattended without the Pelvic and Torso harnessed donned.
- Do not step on the electrical enclosure of the KineAssist.

1.2.1 Earthing the system

The KineAssist-MX must be correctly earthed. In the event of a malfunction or failure of components, the earthing device provides the route of least resistance for the electrical current, thus reducing the risk of electric shocks. The unit is equipped with a mains cable with earthed plug. The plug must be connected to a suitable, correctly fitted and earthed main socket.

DANGER: The plug supplied with the treadmill should not be manipulated in any way. If necessary, a suitable mains socket must be fitted by a qualified electrician. Adapters may not be used because of the risk of electric shocks.

1.3 Technical Data

1.3.1 User Data

Maximum Patient weight:	350 lbs	159 kgs
Maximum Patient unweighing during training:	175 lbs	79 kgs
Rated Patient Width Range:	11.5 – 22 in	29 – 56 cm
Rated Patient Height Range:	4'10" – 6'3"	147 – 190 cm

1.3.2 Mechanical Data

Overall dimensions (L x W x H):	92" x 48" x 86"	234 x 122 x 218 cm
Weight:	Approx. 1289 lbs	586 kgs
Stand:	Base frame (and 4ea "shimming" feet)	
MAX Treadmill speed:	6.7 mph	10.8 km/h (3 m/s)
Running Belt Hardness:	43-47 Shore A	
MAX Pelvic Rotation (about vertical axis)	± 45°	
MAX Lateral Pelvic Movement	± 4 in	± 10 cm
Vertical Range of Motion (measured from Surface of the treadmill)	16.5 – 60 in	42 – 152 cm

1.3.3 Electrical Data

Mains connection:	115 VAC or 230 VAC; 15 A, 50/60 Hz
Treadmill motor:	DC with tachometer, 1 kW
Lifting motor:	DC with absolute encoder, 1.27 kW
Mains cable:	5 m, 2 pole CEE 7/7 (earthed safety plug)
Mains circuit breaker:	240 VAC, 20 A, 2 poles
Logic power breaker:	32 VDC, 5 A, 1 pole, pushbutton

1.3.4 Treadmill Data

General	Slats, overlapping, replaceable
Slat Type	Rubber over aluminum support
Running Belt Hardness	Approximately 40 Shore A
Standard Color	Black
Support	114 roller bearings, 12 roller guides

1.3.5 Electrical Specifications

Electrical Requirements – Below are the standard electrical requirements, if you have a different electrical configuration please contact your sales representative. There are two different options depending on which model you own.

Power Requirements:

- 120 VAC: 15 Amp, 60 Hertz
- Optional 220 VAC, 15 Amp, 50/60 hertz

Outlet Compatibility:

- The 120 VAC input version comes standard with a 3-prong plug (NEMA 5-15 P).
- The US optional 220 VAC input version has a 3-prong plug (NEMA 6-15 P). DO NOT BEND OR REMOVE PRONGS. If other power cord plugs are required, please consult the factory. International installations will come with a country specific plug.

Note: For grounding reliability, only connect to the proper receptacle marked "Hospital Grade".

1.3.6 Electromagnetic Compatibility (EMC)

Electrical Medical Equipment is subject to special precautions regarding electromagnetic compatibility (EMC). They must be installed and operated accordingly.

The KineAssist-MX meets the requirements of EN 60601-1-2, EN 61000-3-2 and EN 61000-3-3.

It should be noted that portable and mobile RF communications equipment and other devices with interference beyond the permissible values can affect the electronics of the treadmill.

Detailed information and proof relating to electromagnetic compatibility can be viewed at the manufacturer upon request.

1.3.7 Environmental Specifications

Ambient conditions for operation:	
Temperature	+10°C to +40°C (0°F to +104°F)
Relative Humidity	20 - 95%, RH (noncondensing)
Atmospheric Pressure Range	700hPA to 1060hPA (20.67 to 31.3 inches of Mercury)
Ambient conditions for storage and transport:	
Temperature:	-10°C to +70°C
Relative humidity:	15 – 85% (noncondensing)
Air Pressure:	400hPA to 1060hPA

1.3.8 Classification and Mode of Operation

Classification: Safety Class I, Type B application

Degree of protection against ingress of water: IP2X

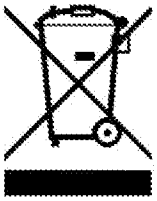
Mode of Operation: This device is designed for continuous operation.

1.4 Safety Symbols

Throughout this manual are NOTES, CAUTIONS, and WARNINGS. They are defined as follows:

	NOTES are general in nature and are intended to emphasize information
	CAUTIONS are to alert personnel to actions that could cause equipment damage, resulting in the equipment becoming unsafe.
	WARNINGS serve to make personnel aware of potentially hazardous actions that may result in personal injury.

1.5 Disposal



Disposal of the equipment must be in accordance with respective national regulations.

Electrical and electronic devices must be disposed of separately from normal household waste.

An appropriate waste disposal company should be contacted. Properly dispose of the device at the end of its service life.

- Device packaging is disposed of through resource recycling.
- Metal parts of the machine go to scrap metal disposal.
- Plastic parts are given to plastics recycling.
- Electric components and printed circuit boards are disposed of as electronic scrap unless an authorized recycler is available.
- Rubber parts are disposed of as hazardous waste unless an authorized rubber recycler is available.

Disposal of the equipment must be in accordance with the respective national regulations.

Wear parts are considered hazardous waste unless an authorized recycler for those parts is available. After being replaced, wear parts must be disposed of according to country-specific waste laws.

Chapter 2: KineAssist-MX Installation

2.1 Installation

It is recommended that transport, installation and assembly of the treadmill to be carried out by HDT or an authorized dealer or service provider. Otherwise damage or improper installation and assembly of the treadmill could cause a hazard when using the device.

	Before the device is installed the "ground" surface must be prepared. The total weight of the device with all the accessories and options is to be considered.

The following guidance for installation is to be observed:

- When installed on upper floors, the device must be placed as close as possible to a corner of the room so that sufficient stability is guaranteed, even at maximum speed. The structure of the building must be checked in advance.
- The KineAssist-MX should not be installed close to a radiator or other heat source. This could cause technical defects.
- Particular attention must be paid to the ceiling/floor load capacity at the installation site. This must be higher than 665 kg/m^2 and approved by an authorized authority with the treadmill representative. (*Calculation: Frame area: 80 x 201 cm = 1.6 m^2; KineAssist-MX weight: 586 kg; Weight of patient running (dynamic): 477 kg (=159kg x 3); Total weight on floor space; 1,063 kg; Therefore, the required capacity of the floor space in this case is 665 kg/m^2.*

2.1.1 Adjusting Shimming feet

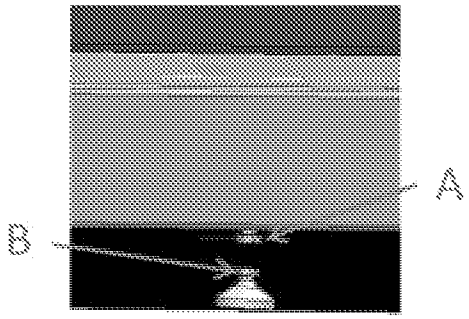


Figure 1 - Illustration of one of the shimming feet. There are 2ea shimming feet on the left and right sides of the KineAssist below the multi-purpose rails.

The KineAssist-MX's frame is designed to be in direct contact with the floor without having to deploy any of the shimming feet. To the extent the device is wobbling after installation due to an uneven (not flat) floor deploy the "shimming" feet by backing off jam nut 'A' and then turn nut 'B' (see Figure 1) until the device stops wobbling, and then re-securing nut 'A'. In most instances deploying only one shimming feet will be sufficient.

2.2 Transporting Your KineAssist-MX

DELIVERY:

- The KineAssist will be delivered and installed by HDT personnel or its designated agents.
- In case it is necessary to move the KineAssist, please contact HDT for support. It is possible to move it without on-site support, but the KineAssist is heavy and can cause injury if lifted incorrectly. HDT will provide written and phone support to help you properly accomplish the move, or you can hire HDT to perform the move for you.

2.3 Electrical Connection

	The formation of condensation on the cooled electronic parts may cause the KineAssist-MX to malfunction and damage the electronics. Before turning the system on, after storage or transport, the device must stand at room temperature for approximately 3 hours to become acclimatized.
	Improper handling of electrical equipment by unqualified persons can cause fatal electrical shock. • If necessary, allow only qualified personnel to perform electrical installation. • The power cord must not come into contact with hot surfaces or sharp edges. • Electrical parts such as motor, power cord and power switch must not come in contact with water.

In the US the KineAssist-MX is supplied with a 2-pole, 3-prong plug as standard feature and can therefore only be connected to a NEMA 5-15 R (120V) or NEMA 6-15 R (220V) socket. For installations in other countries the KineAssist-MX will be supplied with a country specific plug.

i	The power cord is to be used for mains disconnection.

The maximum electrical power requirements of your KineAssist-MX at top operating speed is 15 A at 120 VAC. The unit must therefore be connected to a correctly earthed and adequately fused mains socket, preferably a dedicated socket that is not fused by any other electrical appliances. If an extension lead has to be used, it must have the following properties: at least 12 AWG, earthed, maximum length of 10 feet.

Chapter 3: KineAssist-MX Description

The following describes the KineAssist-MX's theory of operation, subcomponents and labeling of the KineAssist-MX device.

3.1 Intended Use

The KineAssist™ -MX device is intended for use by licensed clinicians such as physical and/or occupational therapists, in a rehabilitation setting or in fitness centers (with adequate supervision over training regimens) for assisting/enabling therapeutic exercises prescribed for individuals with mobility disabilities to improve functional balance and walking ability so as to participate more fully in important life roles, and facilitate activities of daily living.

Use this appliance only for its intended purpose as described in the manual. Do not use attachments not specified by the manufacturer.

3.1.1 Indications

- Incomplete Spinal Cord Injury (patients must still be able to bear some weight on their legs)
- Cerebral Vascular Accident (Stroke)
- Traumatic Brain Injury
- Parkinson's Disease
- Multiple Sclerosis
- Cerebral Palsy
- Post-lower limb amputation
- Balance disorders/high fall risk
- Cardiac and pulmonary deconditioning
- Musculoskeletal disorders that impact walking ability

3.1.2 Contraindications

- Complete restrictions on weight-bearing
- Fractured Ribs
- Unresolved large vertebral disc herniation/rupture
- Infections/open wounds in the pelvic region
- Unhealed skin grafts in the pelvic region

3.1.3 Precautions

- Gastrointestinal tubes
- Colostomy
- Non-stabilized total hip replacements
- Non-stabilized hip fractures

- Unstable spine
- Compromised skin integrity
- Post cardiac events
- Low oxygen saturation levels at rest or with activity (less than 92%)

3.1.4 Adverse Effects

The KineAssist Walking and Balance System is uniquely designed to catch any participant who experiences a balance loss. The device can catch and hold anyone up to 350 lbs/159 kg of weight. The catching mechanism is triggered by a drop of the height of the pelvis by 3-4 inches/7-10 cm – the treadmill automatically stops and the person is held in the harness where they can be restored to a standing resting position by the experimenter who can lift a person using "lift rings" that exist on the pelvic mechanism. After 10 years of use in various experiments, no participant has experienced harm in this device. However, possible adverse effects are:

- Slight skin irritation around the harness and/or thigh straps

3.2 Theory of operation

The KineAssist provides greater ease and improved safety in treating patients with mobility impairments. The system is built to seamlessly integrate into the existing therapy framework. When used under the supervision of an occupational or physical therapist, the KineAssist can be used to help patients progress from basic motor training to more complex multi-plane movement patterns.

With the KineAssist, intelligent electronics sense when a patient wants to move and the device safely follows. The robotics, in combination with controls software for Neuro-Rehabilitation interventions, allow for safe and effective treatment to occur in the rehabilitation setting.

3.2.1 Intent Driven Motion

The KineAssist uses information it gathers continuously from several sources to determine what motion is being requested by the patient or patient/therapist combination. Components include a user interface screen, a joystick and a treadmill based frame. The system platform embeds system software in a robotic device that is worn and controlled by the end user. The KineAssist's control software continuously monitors the patient's movement forces at the pelvis. The system then filters and processes the data and sends commands to a motors to enable the desired motion. By transparently sensing the patient's intended movement, the KineAssist enables patients to self-initiate and complete complex gait and balance tasks without the fear of falling. This security is provided by a torso and pelvic harness system. Using the device, patients can alternate between balance and gait exercises.

3.3 KineAssist-MX Components

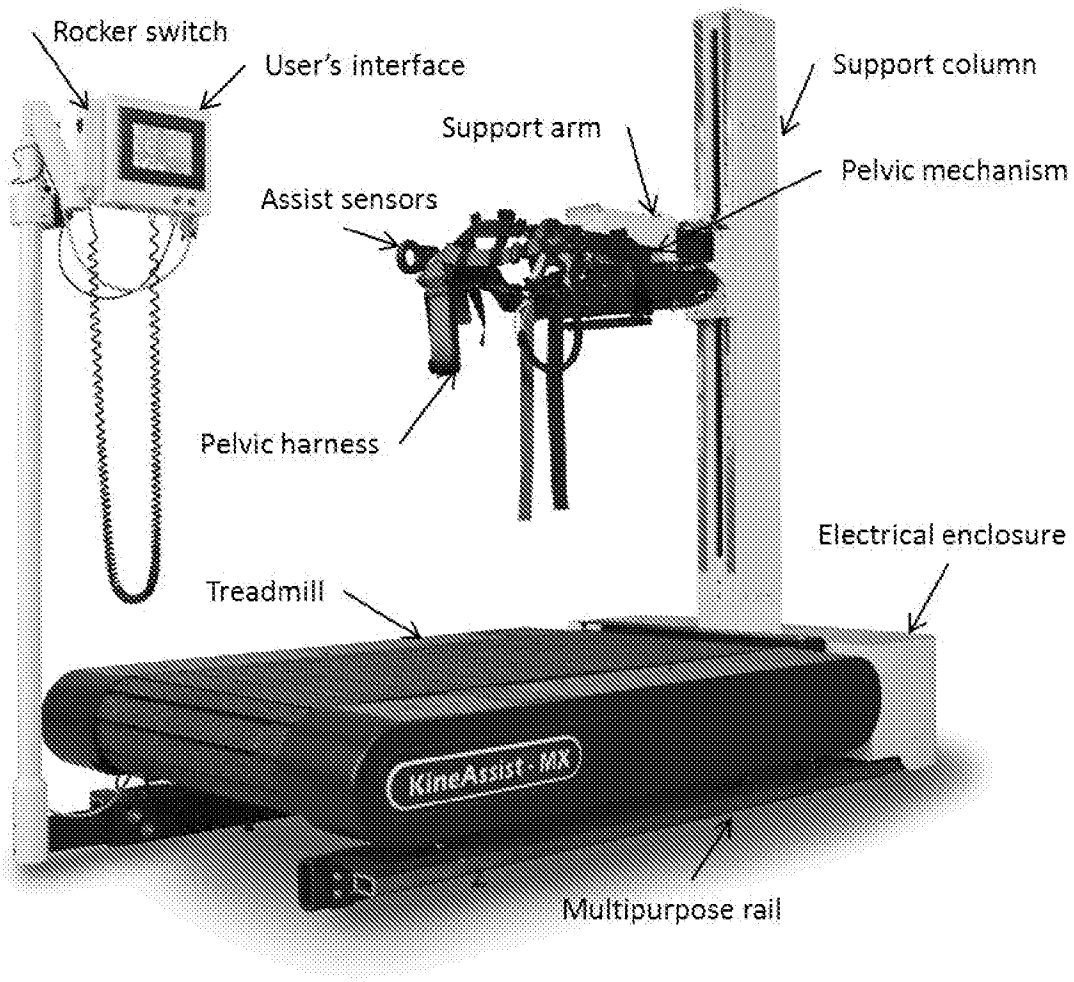


Figure 2 - Picture of a KineAssist-MX

⚠	Do not step on the electrical enclosure of the KineAssist.

3.3.1 Support Arm

The *Support Arm* carries the patient's weight and travels up and down along the *Support Column* under motorized control. Its main feature is a parallelogram linkage that can be locked to provide a rigid beam-like support for the patient or unlocked to allow for the natural lateral and rotational excursions of the pelvis that occur during walking. Together, the *Pelvic Mechanism*, and the Support Arm stabilize, limit and control the ranges of motion of the pelvis while still allowing the patient to walk and balance without fear of falling.

When the locking pin is released and both limiting brackets are in their widest positions the Support Arm is free to move 4" to the left or the right. The brackets can be used singly or symmetrically.

That is, they can be used to allow equal travel to both the right and left or different limits can be applied to the two directions.

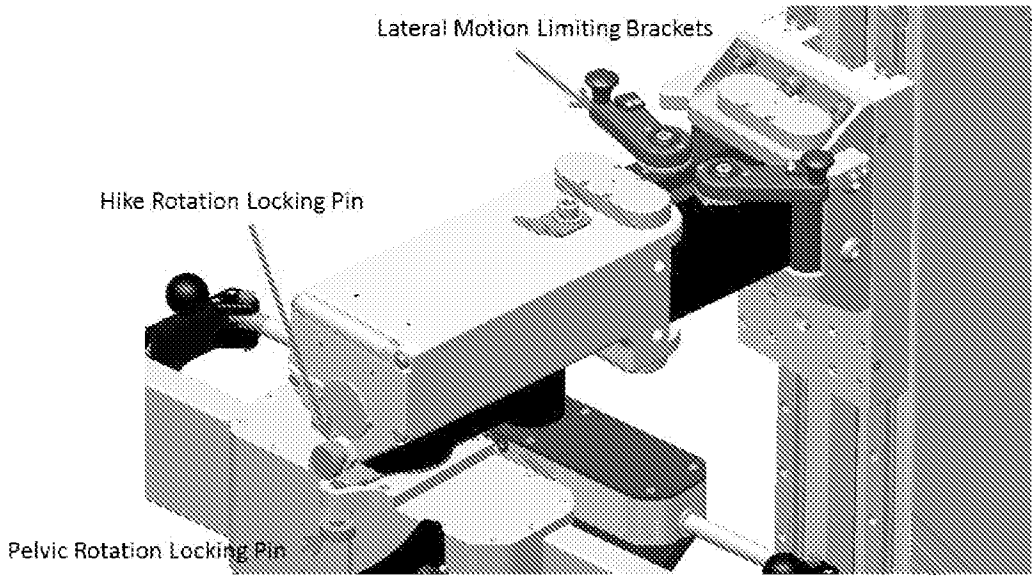


Figure 3 – Passive motion locking mechanisms.

3.3.2 Pelvic Mechanism

The Pelvic Mechanism and the torso harness are the mechanisms that support the person's trunk and pelvis while allowing the natural cyclical movements that occur in walking and balance exercises. The Pelvic Mechanism is designed to allow gait and balance activities to occur unimpeded while providing safety. It is used as a stabilizer, body weight support system and as a vertical fall prevention safety mechanism. It can also be used to limit the range of motion of hip roll (also known as hike), and hip yaw (rotation in the axial plane about axis of the spine). Either of these limits can be applied in combination or independently. The limitations on hip yaw can be applied either symmetrically to both the left and right side, or one side can be limited while the other is free. Hip roll is either locked or unlocked. It cannot be asymmetrically limited. Accommodation for flexion/extension is provided by the ball and socket joints where the pelvic harness attaches to the Pelvic Mechanism's arms. These joints do not limit flexion/extension. Overall support over flexion/extension is supplied by the torso harness.

The Torso Harness provides support to the trunk in the event the patient loses his balance and lunges forward. The strap connecting the torso harness to the support arm can be used to limit the range of motion of the trunk both in flexion/extension.

There are two harnesses, a vest-like torso harness and a pelvic harness which is similar to a rock climbing harness. The harnesses serve as the connection points between the patient and the machine and provide the means of comfortably applying desired forces to the body as well as acting as fall arrest devices. The pelvic harness is the main attachment point for the patient. The torso harness is attached directly to an anchoring point on the Support Arm. The two piece design further simplifies harness management issues that arise while the patient is being secured.

⚠	Always buckle in torso harness strap, and adjust its length accordingly in order to prevent the possibility of the patient hitting their head on the floor if they lose their balance and swing forward (see Figure 4).

⚠	Patient should not be left unattended without the Pelvic and Torso harnessed donned.

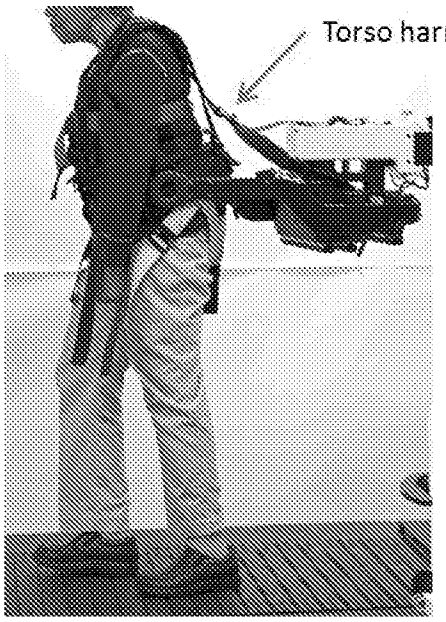


Figure 4 - Pelvic Mechanism with Torso Harness, showing torso harness and pelvic harness.

Pelvic Mechanism Arm Width Adjustment:

The spacing between the arms of the Pelvic Mechanism can be adjusted to accommodate the patient's hip. Once set to a particular width the spacing is held by an electrically powered brake. There are two brake release buttons, one on each arm. To release the brake, press and hold either one of the buttons. While holding the button in with one hand pull on the black, ball-shaped knob with the other to widen the spacing or push in to make the spacing narrower. If the pelvic harness has been fitted to accommodate a very narrow-hipped patient it may hinder pulling the arms apart so be sure to undo any straps that may have been drawn up tight across the back of the harness.

⚠	Do not pull on the PM sliders themselves as this may create a pinching hazard use the push-pull knobs provided (see Figure 5).

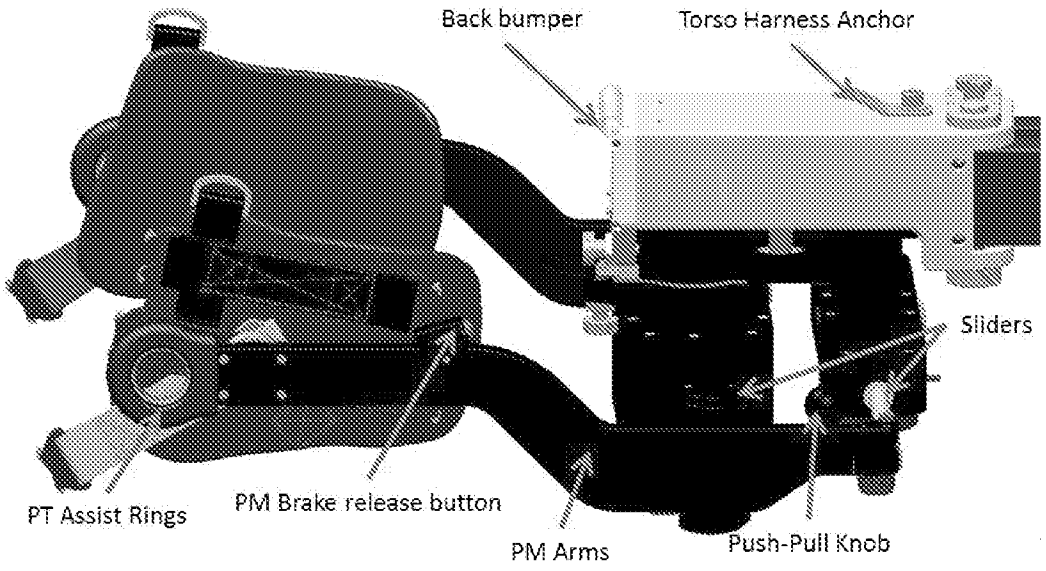


Figure 5 - Pelvic Mechanism components

Intent Sensors:

The KineAssist uses two pairs of force measuring sensors to determine the intended motion from the patient and the therapist. Because of this they are called Intent Sensors. Where the patient's pelvic harness attaches to each of the two support arms there is a ball-and-socket type connection that allows the harness attachment to rotate freely about three axes. Behind this socket is a load cell that measures the forces the patient applies to the support arms in the forward-backwards and up-down directions. When a patient walks, their hips apply forces to the arms. The KineAssist senses these forces and sends commands to the motors to make the KineAssist go in the same direction as the patient is moving (unless constrained by the parameters of the mode within which the KineAssist is operating; for example the treadmill belt will not move while in Setup mode even if the patient is pushing against the arms as if wanting to walk). These forces are not only used to command the KineAssist to move, they're also used to control the vertical height of the support arms. For example, when in Stand-Sit mode the patient's input to the patient intent sensors will cause the KineAssist to lower the support arms while at the same time still guarding against a fall.

Similarly, the PT assist rings measure forces applied against them by the therapist's fingers (also in the forward-backwards and up-down directions) and send this intended motion information to the KineAssist's computers to be resolved into the appropriate motor commands. The control algorithm applied to the commands make the PT assist rings "feel" more sensitive in the up direction than in going down. In other words they result in faster motion up for a given input force than when going down. This is because it has been determined to be better to limit the ability to "drive" the patient down quickly while still allowing crisp response in raising the patient. The PT assist rings also take precedence over the patient intent sensor, so the therapist can always override the patient's inputs to the KineAssist.

Figure 6 - PT Assist Ring sensors and PM Harness connector

3.3.3 User Interface Console

The user interface console is the primary control interface for the therapist to adjust and configure the system. It receives commands from two pushbuttons, a joystick, touch screen and a hand-held remote control unit. The touch screen displays system messages and the menu-driven command interface. Its features and operation are described in detail in 5.

Electronics Enclosure:

The electronics enclosure houses the computerized motor controller and its ancillary electronics.

Bump switches:

There are bump switches mounted along the bottom face of the pelvic mechanism. The switches respond to a bump anywhere along their length by prohibiting downward motion of the pelvic mechanism while the bump switches are engaged. Thus, they act as a safety in case the user runs into any object. A warning will be displayed on the LCD screen indicating when the bump switch is initially engaged. When the warning is displayed, move the pelvic mechanism upward until the obstruction no longer contacts the bump switches.

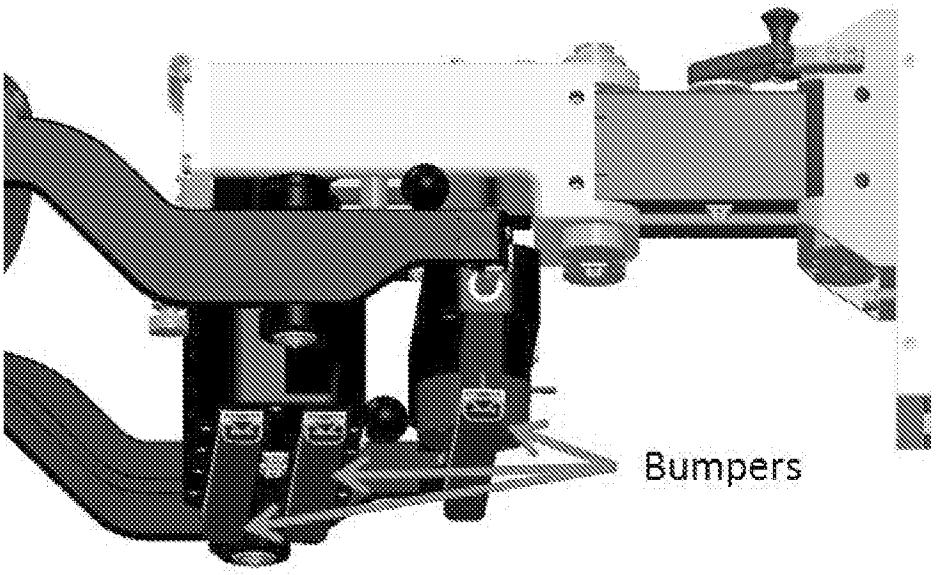


Figure 7 - Illustration of bumper switches.

Power Switch Block:

The power entry block is mounted on the back-right side of the electronic enclosure. It comprises the main power on/off switch, an Ethernet port and a resettable circuit breaker. The on/off switch follows the standard convention whereby "O" is OFF and "|" is ON. When it is off all power to the KineAssist is disconnected.

The Ethernet port can be used to communicate with the on-board computer by maintenance personnel.

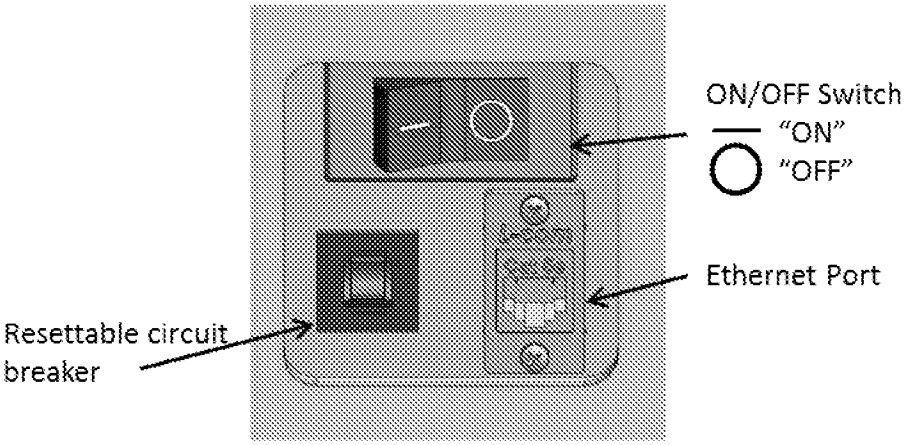


Figure 8 – KineAssist-MX power switch, resettable fuse, and Ethernet port.

i	Ethernet port is for use by maintenance personnel only.

3.3.4 Emergency Stop

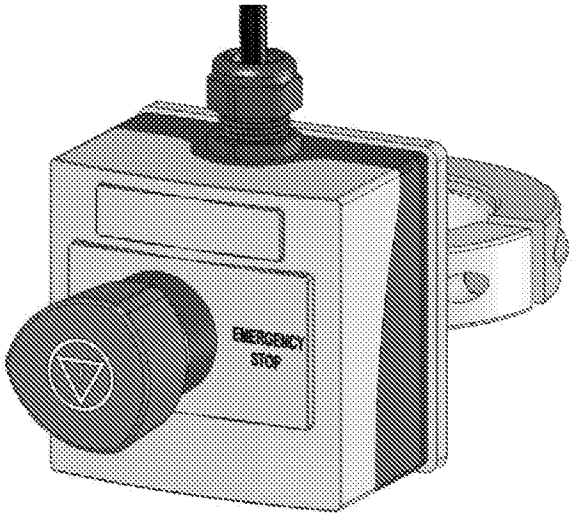
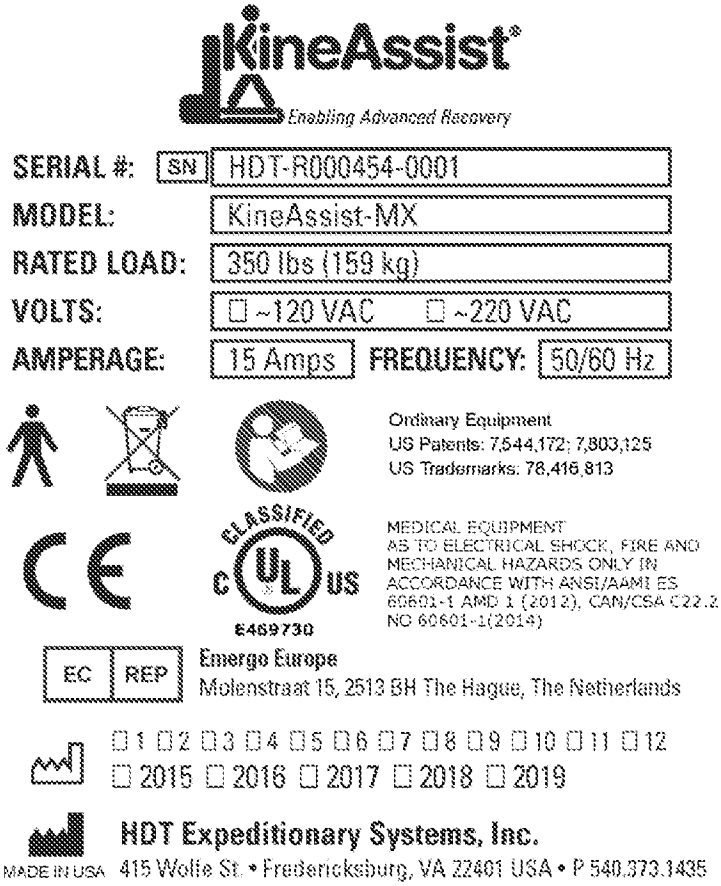


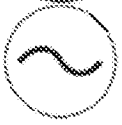
Figure 9 - E-stop Button

The emergency stop switch (red mushroom-shaped) is mounted on the display post and is to be used in an emergency. Pressing the emergency stop switch will interrupt the power to the motor amplifiers and prevent any motion. You can release the E-stop switch by turning the red mushroom head clockwise; its internal spring will make it pop out.

3.4 Product Labels



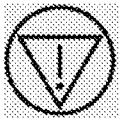
Consult instructions for use.



Alternating Current

“OFF” (power) / “ON” (power)

Symbol for type B, not conductive applied part and earthed.



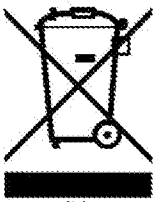
Emergency Stop

Date of manufacture

Manufacturer

Serial Number

European Representative



Disposal Information

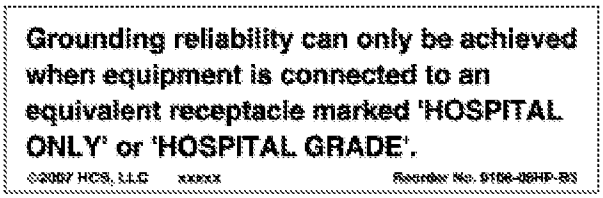
Do NOT step or stand on this surface

Disconnect Mains Plug

Connect an Earth Terminal to the Ground

Electrical Shock

Pinch Point



Grounding reliability

Chapter 4: Turning on & Setting Up the Device

4.1 Turning it on

1. Turn the power switch to ON (see Figure 8).
2. After the device boots up (in about 15 seconds), look at the user interface menu. It should display the main Basic Modes screen (Figure 10).
3. Press the Start button on the remote control. Pushing the green button on the user interface at this point will not enable the KineAssist to start. Instead a warning will appear on the screen indicating that the E-stop may still be engaged. Clear this warning by touching the OK button and then push the Start button on the remote. Pushing the Start button will start the KineAssist's short initialization procedure during which it tests for proper orientation of the wheels, checks that the pelvic mechanism is free to travel up and down, and that there are not undue forces already acting on any of the input sensors. After initializing is done, the screen will change from start to run mode.

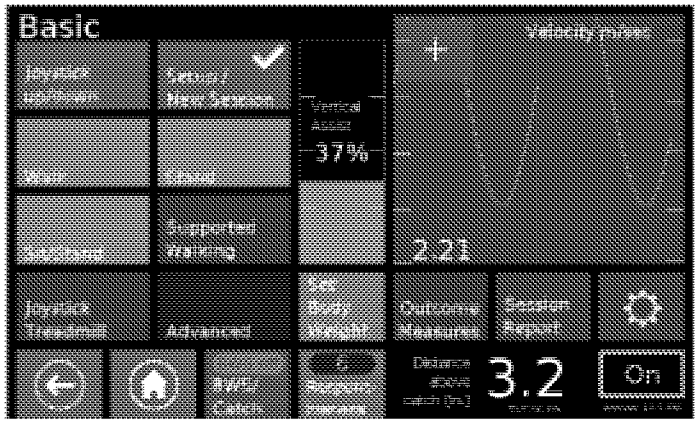


Figure 10 - Basic Screen

4.2 Donning the Harnesses

1. The patient should now put on the torso harness. The torso harness is a vest with two torso straps and two shoulder straps. The shoulder straps may be opened to accommodate for someone with shoulder pain or high tone. The straps should all be tightened so that the harness has a snug but not uncomfortable fit. If the patient is in a wheel chair it is recommended that the torso harness be donned while he/she is still in the wheel chair.
2. Make sure all the joints of the Pelvic Mechanism and the Support Arm are locked. Doing this involves turning and releasing the hike locking knob; the yaw

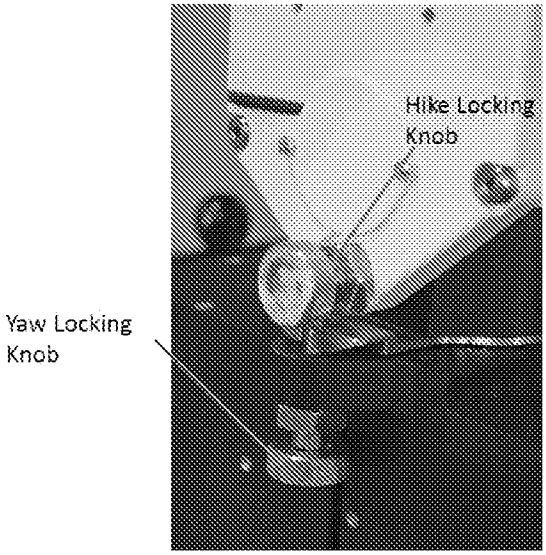


Figure 11 – Locking Knobs

locking knob (Figure 11). The Support Arm limiting brackets should also be engaged (Figure 3).

3. Push the **Setup** mode button on the user interface.
4. The arms of the pelvic mechanism can be spaced farther apart or closer together to comfortably accommodate wider or thinner patients. (Once set, the arms' spacing is held by a brake mechanism.) Widen the arms on the pelvic mechanism by depressing either of the red brake release buttons on the top of the pelvic arms and manually pulling the arms apart by grasping the large black ball on the top of the arm.

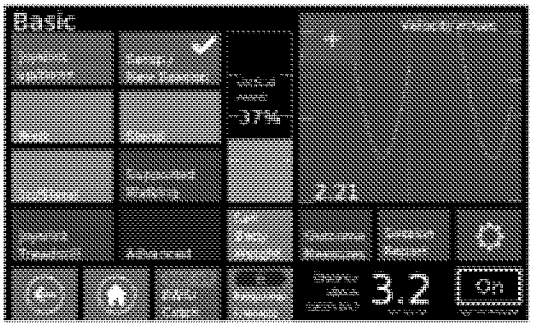


Figure 12 – Basic Screen

⚠	Do not pull on the PM sliders themselves as this may create a pinching hazard, use the Push-Pull knob provided (see Figure 5).

5. Gently guide the patient into the device by having him/her step backwards or in the seated position.
6. The next step is to attach the torso harness to the device. This is done by clipping the buckle on the strap attached to the top of the Pelvic Mechanism to the buckle on the back of the torso harness (see Figure 4). You will adjust this strap to its final length in a later step.

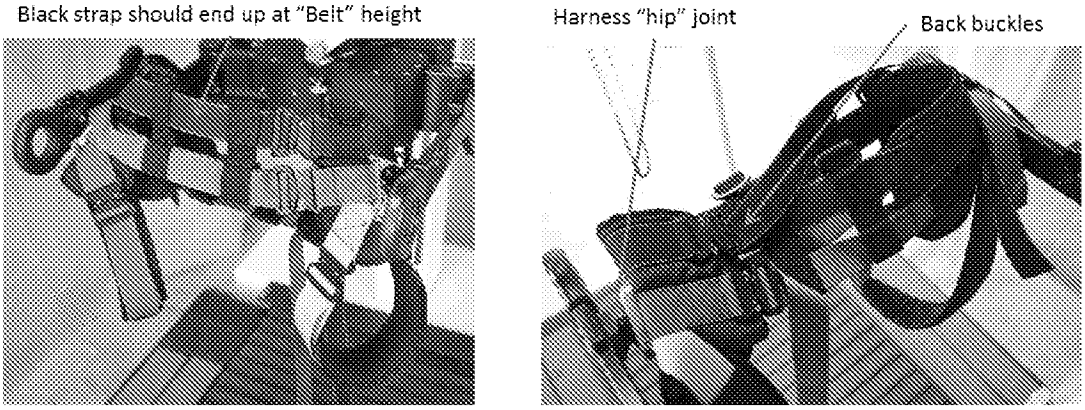


Figure 13 – Pelvic Harness

7. Lower or raise the pelvic mechanism so that top most horizontal strap is over the patients "belt" area.

8. Depress either of the red brake release buttons, and with the other hand provide medial pressure until the sides of the pelvic harness are snug on the patient, then release the red button.
9. To attach the pelvic harness first connect (but do not tighten) the front straps, and the back straps (NOTE: the straps are color coded). Tighten the front straps, and back straps while maintaining the harness' hip joint approximately in the center (forward/back) of the patient. Then buckle the leg straps making sure that the pads are flush with the legs. Now tighten all the straps by tugging gently.
10. Release the degrees of freedom. Release all the latches and locking pins you had engaged or locked previously. Have the patient rotate his/her hips. If the patient is unable to move freely a pin or latch is not disengaged. You can now proceed with the therapy session.
11. When the session is over hit the Red button and unstrap the patient from the harness. At this point the patient can walk away from the device.

Figure 14 – Patient Alignment

4.3 Removing the harness for cleaning

1. Locate the lock tabs on the PM Harness Anchor
2. Pull the tabs back and slightly twist the harness
3. To replace, simply match the slots, push, and twist slightly until the lock tabs fall back into the grooves on the PM Harness Anchor.
4. The harness can be sprayed with a disinfecting (cleaning) solution.
5. Do not place in a washer, as the components will cause damage to it.

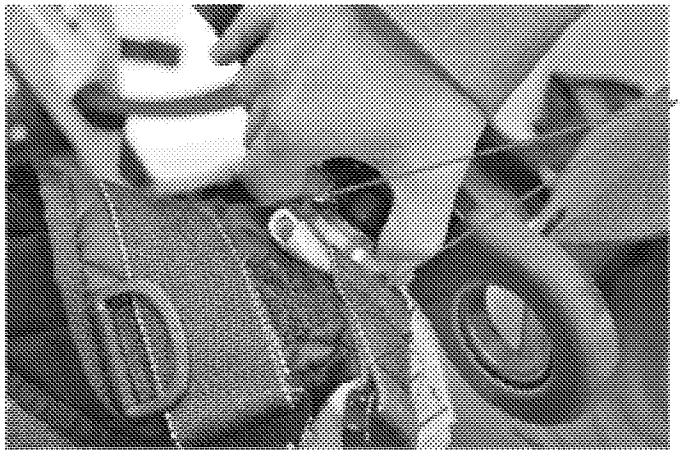


Figure 15 – Pelvic Harness Connector

	Incorrect installation of the Pelvic Harness connector could lead to an injury. When reconnecting harness confirm that the Lock Tabs fall back into place in the PM Harness anchor grooves.

Chapter 5: Description of KineAssist-MX Controls

5.1 Introduction

The user interface console is the primary user interfaces and the only point for adjusting and configuring the system. The user interface console consists of an LCD touch screen and joystick. The LCD touch screen interface is responsible for providing feedback to the user on the current status of the KineAssist as well as allowing the user to configure the KineAssist. The joystick can be used to move the KineAssist (when a patient is not strapped in).

5.2 The User Interface Console

This section details the operation of the user interface console on the KineAssist, which includes the joystick, LCD touch screen, and the start and stop buttons. These are the main input/output device for the operator, so the following sections are important both for system understanding and operating the system effectively.

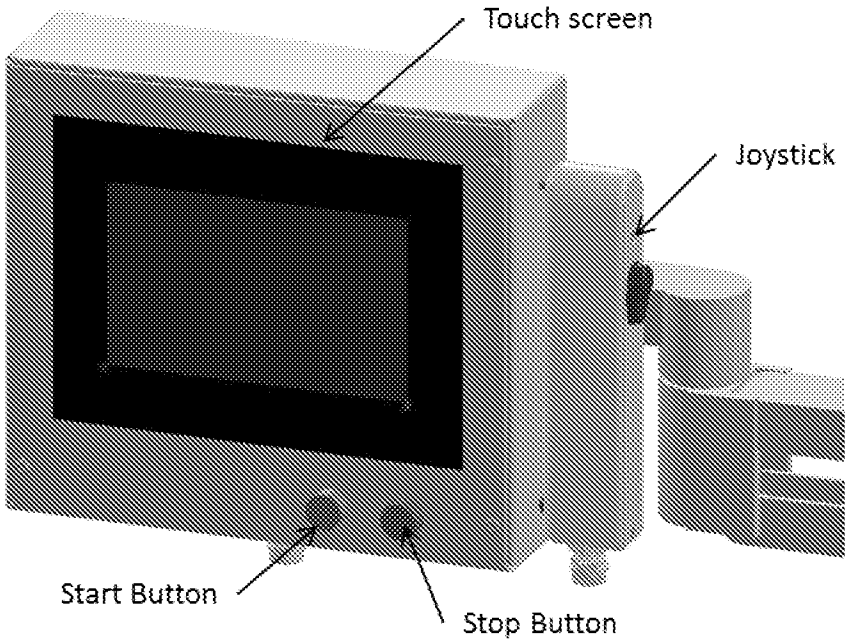


Figure 16 - Illustration of the operator interface.

5.2.1 Start and Stop Buttons

The Start and Stop buttons are the green and red buttons respectively, located at the lower right corner of the console, immediately beneath the touch screen. These buttons allow the user to switch the KineAssist from the STOP-to-RUN state (green button) and from the RUN-to-STOP state (red button). While in the STOP state, all the KineAssist's motors are disengaged, and the KineAssist will not actively move. When in RUN, the motors are engaged and allowed to move the

KineAssist. Stopping the KineAssist with the red STOP button will cause "stop" to be displayed as the status of the KineAssist on the bottom right corner of the screen.

⚠	When the PT is on the device they should always be standing on the non-moving surfaces of the treadmill when the device is in an active mode.

5.2.2 Joystick

The user can directly control the vertical position (height) of the pelvic mechanism via the joystick. When not in use, the joystick hangs from the console enclosure (see Figure 16). When using the joystick it is recommended that the corded side of the joystick (the side facing down in Figure 16) is towards the user. This orientation promotes intuitive manipulation of the KineAssist.

i	The joystick is only responsive when the KineAssist is in a Joystick mode or in specific modes described in section Sections 5.3 and 5.4.

5.2.3 Touch Screen

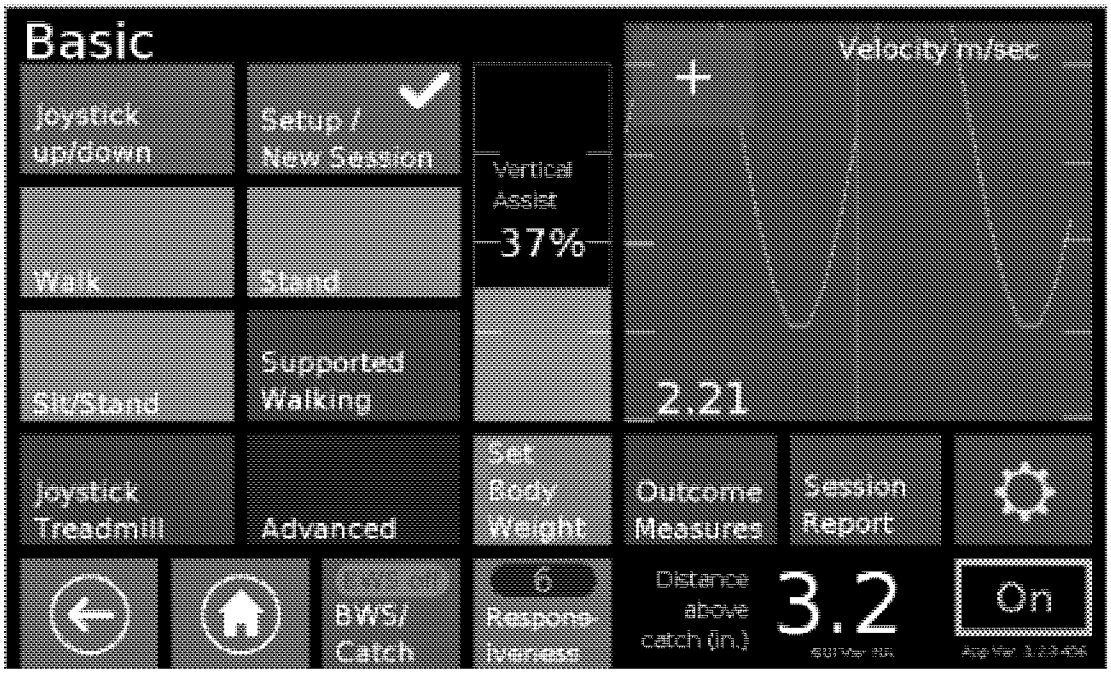


Figure 17 - Main menu screen of the User interface.

The Main Menu Screen is the initial screen displayed on the touch screen after startup and is the primary user interface of the KineAssist. The Touch Screen is the only means of selecting modes and specifying session parameters.

Choosing Different Modes

The columns of virtual buttons along the left edge of the Main Menu Screen allow the user to set the mode of the KineAssist. Details of each of the KineAssist's modes are described in Section 5.3 and 5.4. For example, touching the "Walk" button enables the walking exercise mode on the device.

Some buttons are single action buttons and other buttons will deploy a secondary screen with more parameters and options as required by that particular mode.

Set System Parameters

In the bottom region of the Main Menu Screen, the user can manipulate three parameters of the KineAssist.

CATCHING DISTANCE:

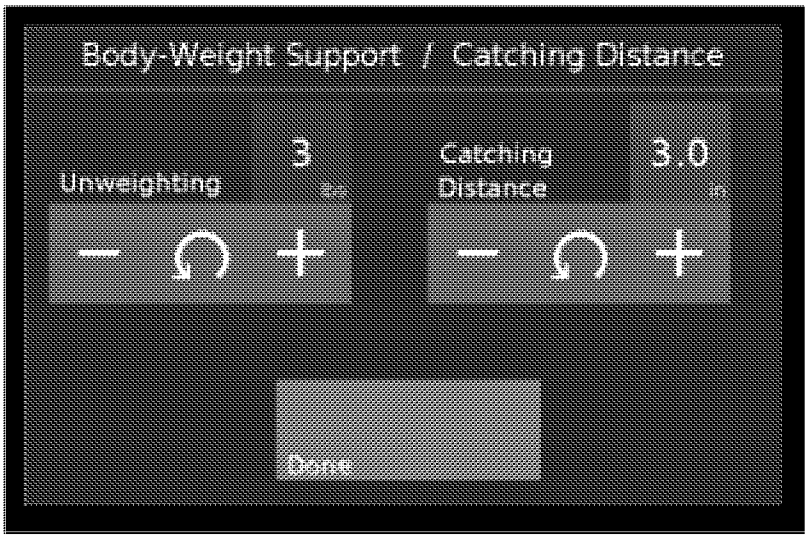


Figure 18 – Body Weight Support / Catching Distance parameters screen.

The Catching Distance parameter specifies how far the pelvic mechanism can nominally descend – from the height when entering a Walk mode – before a Safety Catch is invoked.

- Default Settings – 3 inches

i	The KineAssist can detect a patient's fall based by sensing a change in height of the arms that hold the pelvic harness that is beyond a threshold change set by the therapist (i.e. the catching distance). There is a normal change in the height of the support arms when the patient is walking or performing other tasks in the KineAssist so the therapist must set the Catching Distance to be larger than normal walking vertical motion. If the KineAssist detects the patient falling, it will invoke a safety catch. When in Safety Catch mode the treadmill is immobilized and the KineAssist will not allow downward motion of the pelvic mechanism below the preset catch height, but will still allow slow upward motion in response to either the PT assist rings or the pelvic harness or the joystick. Thus, either the PT or the patient himself can recover from the safety catch. After the patient has recovered his balance the KineAssist will still be in Safety Catch mode. The clinician must clear the Safety Catch Mode by pushing the "Resume" button on the screen.

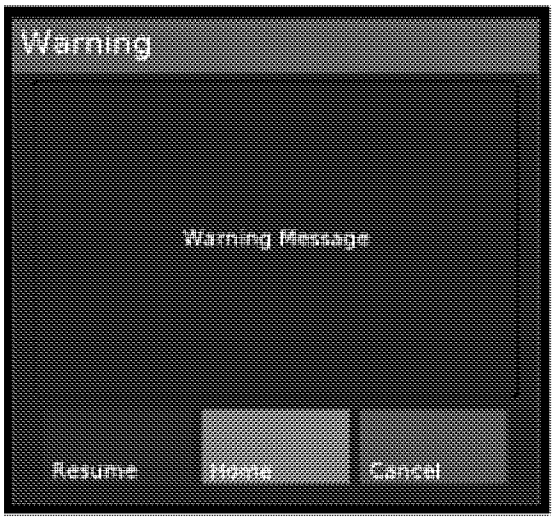


Figure 19 – Warning screen. A message will be displayed depending on the reason for the warning.

UNWEIGHTING

The Unweighting parameter specifies the body weight support provided by the KineAssist.

The KineAssist implements unweighting by pulling up with a constant force (the specified force) so that the patient's weight on the floor will be lessened. The therapist can set this force in 1 lb increments up to 175 lbs. The therapist should be aware that for the patient this mode will result in the pelvic harness carrying more of the patient's weight and therefore care should be taken that the harness is positioned in a comfortable and secure manner. The therapist should also take care that the BWS is set back to zero at the end of the session. If it is not set to zero and the patient is removed from the harness and then Walk mode is activated the empty support arms will start to rise up seemingly on their own. The speed at which they will go up is determined by how high the BWS force (in pounds) is set. So, for example, if BWS is set at 35 lbs and nobody is in the harness and Walk mode is activated the arms will rise up at a fast speed.

- Default Settings – 0 lbs.

	Make sure that the Body Weight Support is set to zero when there is no one in the KineAssist. Unintended upward motion of the support arms will result if BWS is active with no one in the KineAssist.

RESPONSIVENESS

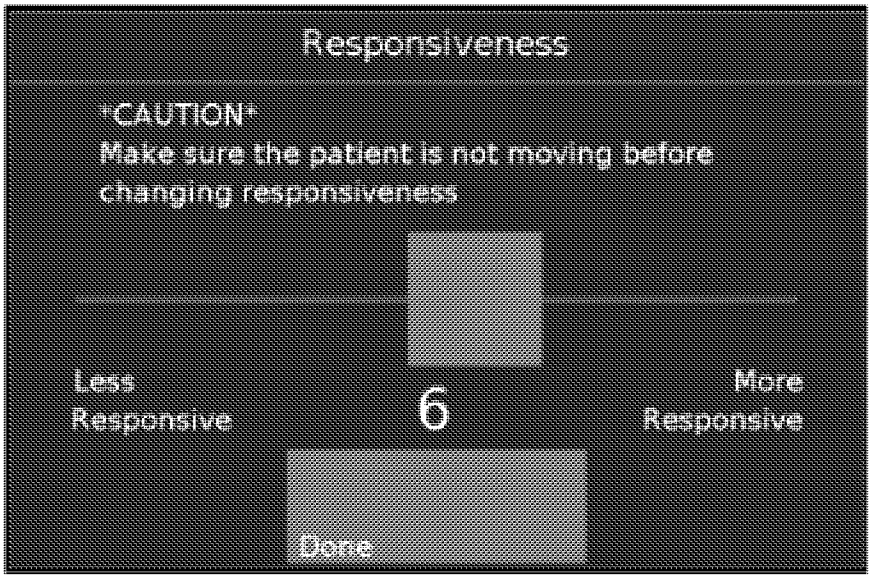


Figure 20 – Responsiveness parameter screen.

The Responsiveness parameter specifies how responsive the treadmill belt motion should be in relation to the patient's intent. The responsiveness is selected by sliding the green square along the blue line. The responsive scale ranges from 1 to 10, where 10 is the most responsive. If it is set towards the "More Responsiveness" setting (e.g., 8, 9, or 10) the treadmill requires less patient intent force than if it is closer to the "Less Responsiveness" side (e.g., 1, 2, or 3).

- Default setting – 6 out of 10.

i	When working with a weaker patient it is recommended that a less responsive setting is selected, such as 1, 2, or 3.

Observe System Measurements

In the Main Menu Screen the following system measurements can be observed:

1. Velocity in m/s: Displays the current velocity of the KineAssist in meters per second.
2. Velocity plot: A rolling plot of the velocity of the KineAssist

Observe System Information

The bottom portion of the Main Menu Screen displays pertinent information about the KineAssist:

1. Mode: Displays the current mode of the KineAssist (e.g., Joystick, or Stand to Sit)
2. State: The possible KineAssist states are RUN or STOP, which is indicated as "On" or "Off", respectively, in the lower-right corner. To operate the KineAssist it must be in RUN. Upon a fault, the KineAssist automatically enters STOP state.
3. Fault: When a fault occurs, its description is displayed here.

System Configuration

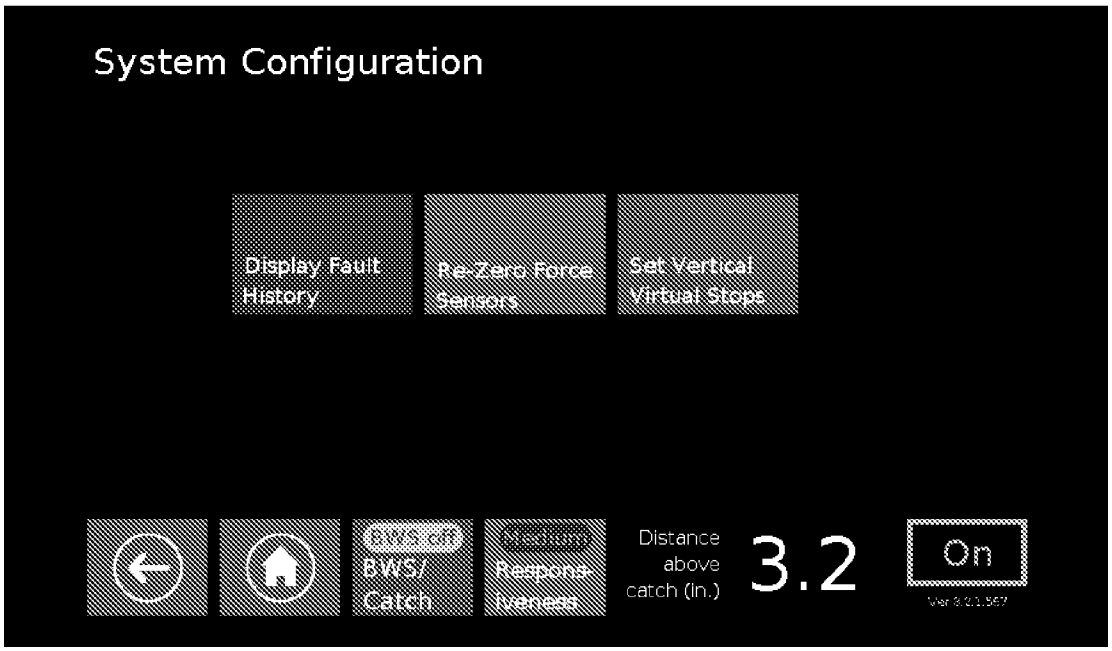


Figure 21 - System configuration screen.

The gear button near the bottom right portion of the Main Menu Screen will bring you to the System Configuration screen, where you can:

1. Re-Zero force sensors: This will allow the user to reset the KineAssist's force sensors. This functionality should only be used by trained personnel when there is a problem with a force sensor.

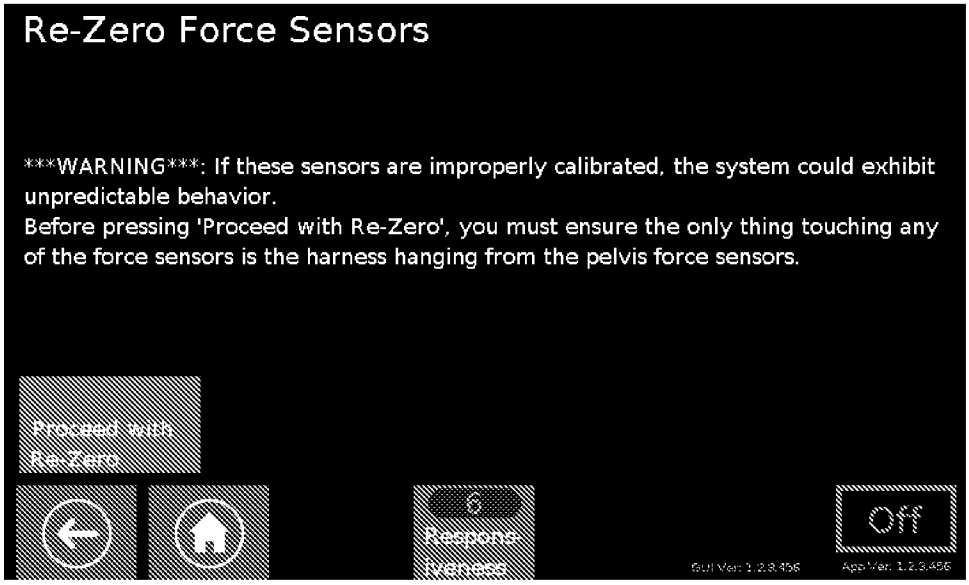


Figure 22 – Re-Zero force sensors screen.

For re-zeroing the force sensors please follow the instructions displayed on the screen. Note that nothing other than the pelvic harness should be touching the pelvic mechanism arms, it should look like Figure 5.

⚠	Improperly resetting the force sensors could result in unpredictable behavior of the KineAssist and possible injury. For example, if somebody is leaning on the pelvic arms or something other than the pelvic harness is hanging from it - while re-zeroing - the force sensors will not be properly reset.

2. View fault history: The user can review the most recent faults logged by the KineAssist.

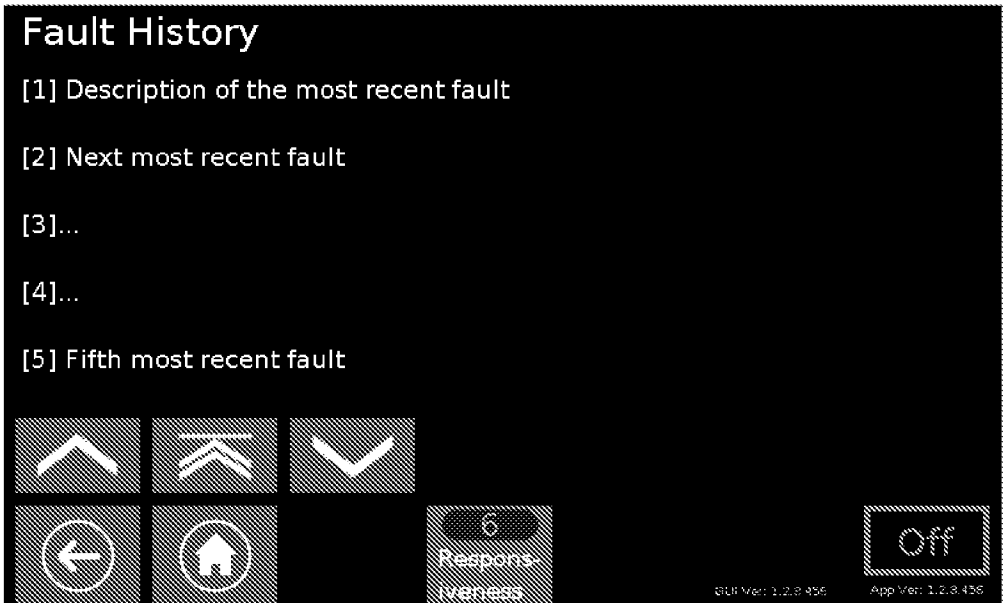


Figure 23 - Fault History Log

3. Set Vertical stops button: The user can set the upper and lower limits of the vertical stops. This is helpful if the KineAssist is in a room with a lower ceiling, or you want to accommodate for a very short patient, etc.

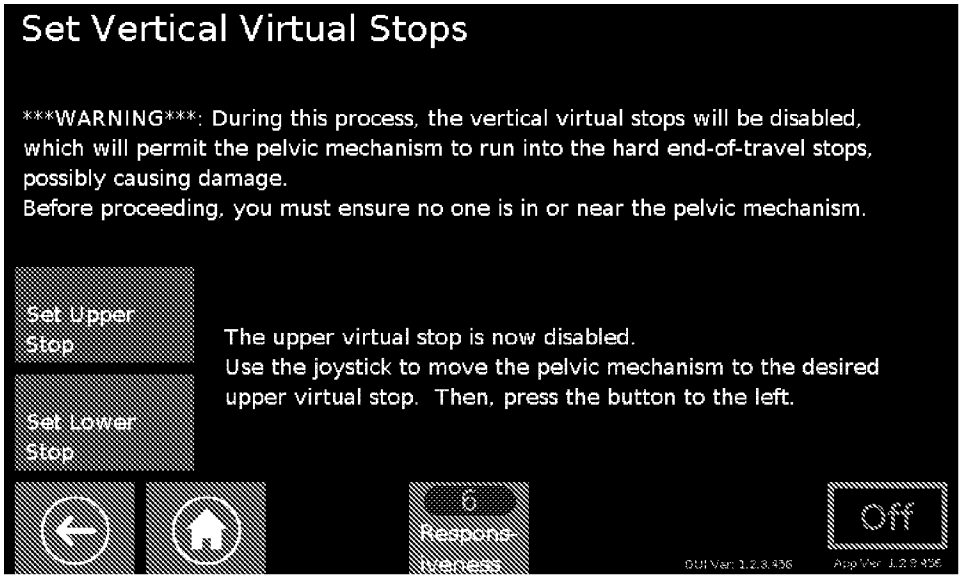


Figure 24 - Set Vertical Virtual Stops

⚠	While the virtual stops are being set, the software will not limit the travel of the pelvic mechanism. Thus, the operator is able to move the pelvic mechanism past the end of travel and run into the bumpers. It is strongly advised not to allow the pelvic mechanism to engage the end-of-travel bumpers. The virtual stops should be set without contacting the end-of-travel bumpers.

5.3 Modes of Operation

This section details the modes of operation available on the KineAssist.

⚠	When the PT is on the device they should always be standing on the non-moving surfaces of the treadmill when the device is in an active mode.

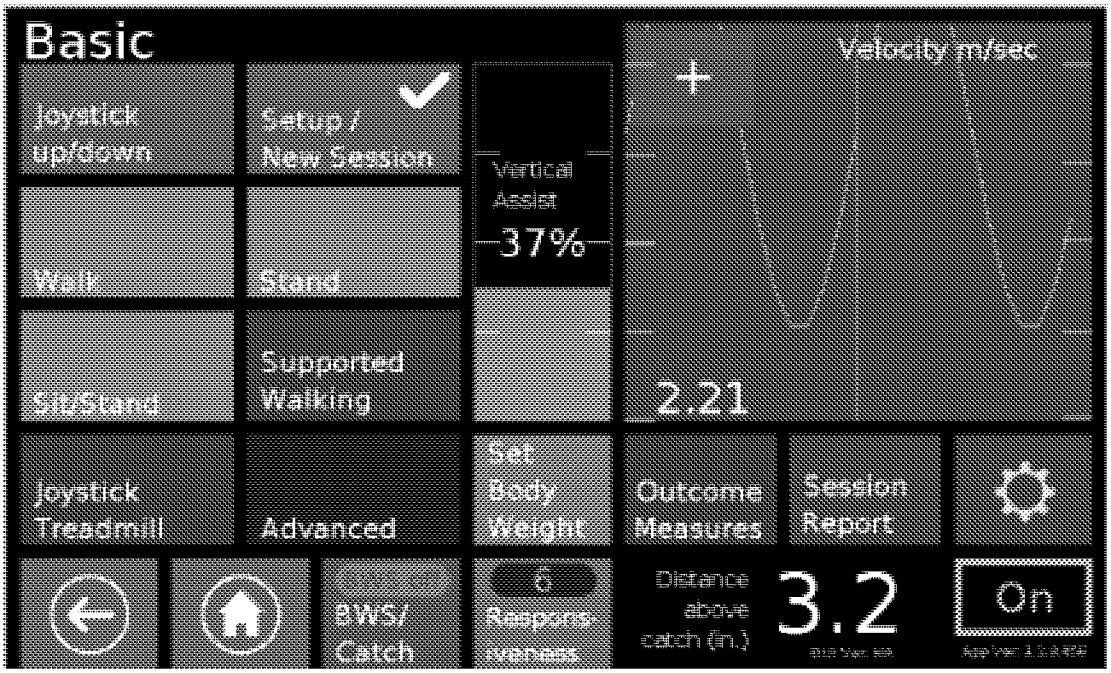


Figure 25 – Basic Modes selection screen.

5.3.1 Joystick up/down Mode

When in a joystick up/down mode the height of the pelvic mechanism is directly controlled via the corded joystick plugged into the side of the LCD touch screen. In Joystick up/down mode only the height of the pelvic mechanism can be controlled by the joystick. This mode is used when the clinician wishes to lift the patient from a lower height to a higher height.

5.3.2 Setup Mode

Setup mode is used for getting patients in and out of the KineAssist. While in this mode the treadmill belt is immobilized but the pelvic mechanism will move slowly up or down in response to inputs to either the PT assist rings or the pelvic harness sensors. However, the commands from the PT assist rings always take precedence. In this way the clinician always has full authority to control the vertical motion of the pelvic mechanism (and the patient) even if the patient were to stumble or slump.

5.3.3 Walk Mode

The Walk modes allow the patient to freely walk while safely harnessed into the KineAssist. The KineAssist will catch the patient if an impending fall is detected. The patient's motion dictates the motion of the KineAssist through the help of various sensors in the pelvic mechanism. These sensors include force sensors in the pelvic mechanism arms. In addition, forward and backward motion of the treadmill belt as well as up and down motion of the pelvic mechanism can be controlled via the PT assist rings on the arms of the pelvic mechanism. In Walk mode, the KineAssist should remain mostly transparent (feel as if it weren't there) to the patient unless the KineAssist detects the patient is falling. In other words, the KineAssist will follow the patient and only impede his or her motion when a fall is detected. However, the KineAssist will also constrain the allowable motions of the treadmill belt.

While in Walk mode the patient can control the treadmill belt to move forwards and backwards. Force sensors connecting the pelvic harness to the pelvic mechanism as well as force sensors in

the clinician rings dictate the forward/backward velocity of the treadmill belt. When the patient generates higher force against the pelvic mechanism, the KineAssist surface will move faster, up to its maximum velocity limit. Patients can practice walking with a variety of assistive devices, similar to activities that can be accomplished overground.

5.3.4 Stand Mode

Stand mode is similar to walk mode, except the treadmill is locked. The KineAssist will respond to vertical input forces, but horizontal inputs will be ignored. As with Walk mode the KineAssist will catch the patient if a fall is detected. Body-weight support also works in Stand mode.

While in either Walk or Stand modes, the "Distance above catch" in inches is displayed. This is how far the pelvic mechanism needs to drop before a safety catch is initiated. If there is currently a fault it will be displayed over the Distance above catch display.

5.3.5 Sit/Stand

In this mode the patient can safely practice standing up from a sitting position or sitting down from a standing position. The KineAssist will catch the patient when an impending fall is detected (i.e. sitting straight down). In addition the clinician can assist the patient via the clinician rings. Horizontal assistance is provided when the clinician adds force in the horizontal direction, whereas vertical assistance is provided when an upward force is added. Combinations of these two forces can be provided, proportionally, by adding force at intermediate positions between the vertical and horizontal directions. The treadmill belt motion is controlled via the force sensors in the clinician rings and in the pelvic harness (as in Walk mode). Additional constraints are imposed on the range of motion of the buggy and pelvic mechanism. The nature of these constraints depends on the particular action being performed (i.e. Standing, or Sitting) and is described below.

The patient should not be left unattended/unassisted in Sit/Stand mode. The therapist should use the PT assist rings to help lower and raise the patient (to and from the bench) until the patient has gained confidence in this activity.

Standing to Sitting Transition

In this mode the patient starts from a standing position and then proceeds to sit down. The treadmill is largely limited to moving backward only (with only a small amount of forward motion permitted). This allows for a posterior weight shift. If the pelvic mechanism moves down without also moving backward the KineAssist will enter Safety Slowdown mode, where the belt is immobilized and the downward velocity of the pelvic mechanism is limited.

While in the sitting position, the clinician can work with the patient on a variety of exercises.

Sitting to Standing Transition

In this mode the patient starts from a sitting position and then proceeds to stand up. The treadmill is mostly limited to moving forward with only a small amount of backward motion allowed. This allows for anterior weight shift. If the pelvic mechanism drops by more than 8 cm (about 3 inches) the KineAssist will enter Safety Slowdown mode.

While in the standing position, the clinician can work with the patient on a variety of exercises.

5.3.6 Supported Walking

This mode is designed for the more dependent patients who are practicing in the earliest phases of walking. It is a combination of BWS and Pre-gait activities. It allows the operator to

adjust the height of the pelvic mechanism using the joystick. They, while the pelvic mechanism supports the weight of the patient, the joystick is used to slowly walk a person's legs.

5.3.7 Outcomes Measures

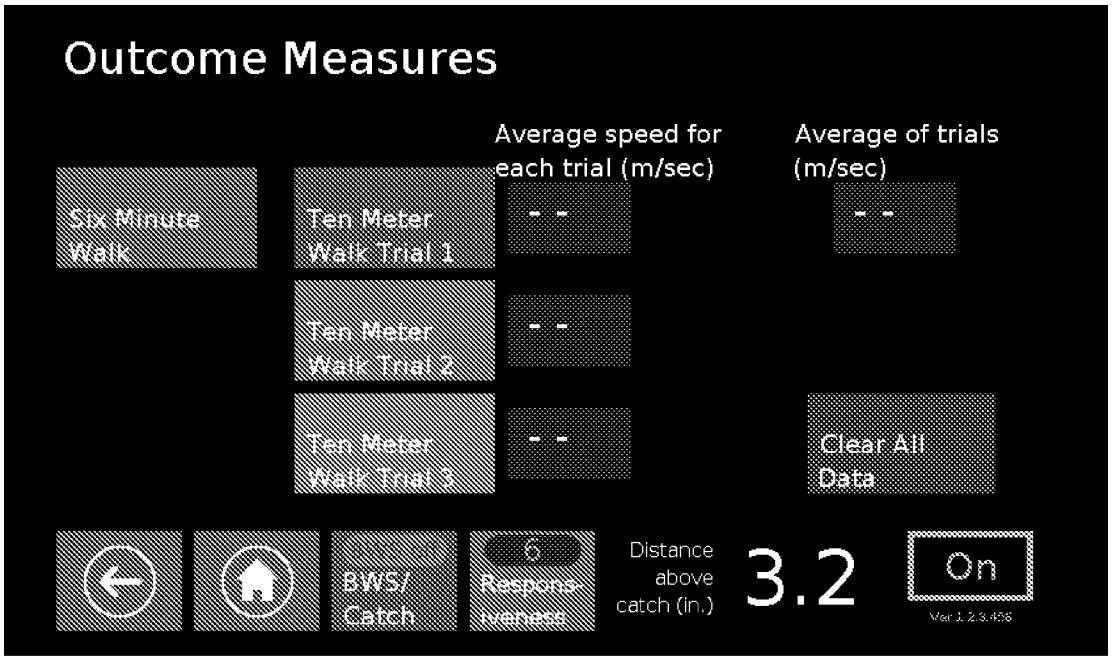


Figure 26 – Outcome Measures

Outcome measures allow clinicians to test and document 10m walk test and 6 min walk test outcomes. Testing both before and after a course of walking and balance training, will allow the clinician to document progress in a standardized and quantifiable manner.

- **Six minute walk test**; See Six Minute Walk Test description in earlier section.
- **Ten Meter Walk**: Opportunities for three separate trials allow the clinician to collect up to three samples and calculate an average speed.

Six Minute Walk Assessment

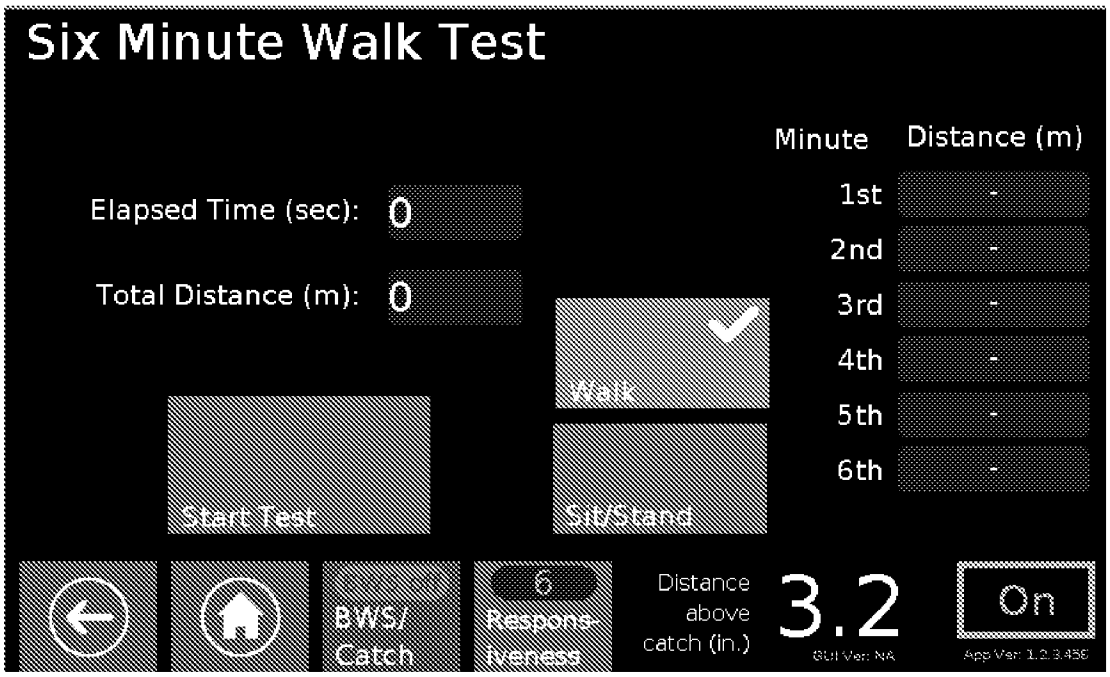


Figure 27 - Six Minute Walk Test screen.

This is a standardized clinical assessment tool to assess walking endurance. The test is meant to capture the amount of distance that a person can cover within a fixed amount of time (6 minutes). The test can be modified to shorter periods if desired by the clinician. Each one minute interval of testing generates a minute-by-minute distance measurement. Patients are advised to stop and rest during the test if they get tired, short of breath, etc. In this case, the timer will continue to run, and the distance values will remain until the patient is ready to continue with test. The Sit/Stand button is also provided should the person need to sit during the test. Results are reported as distance in meters.

10 m Walk Assessment

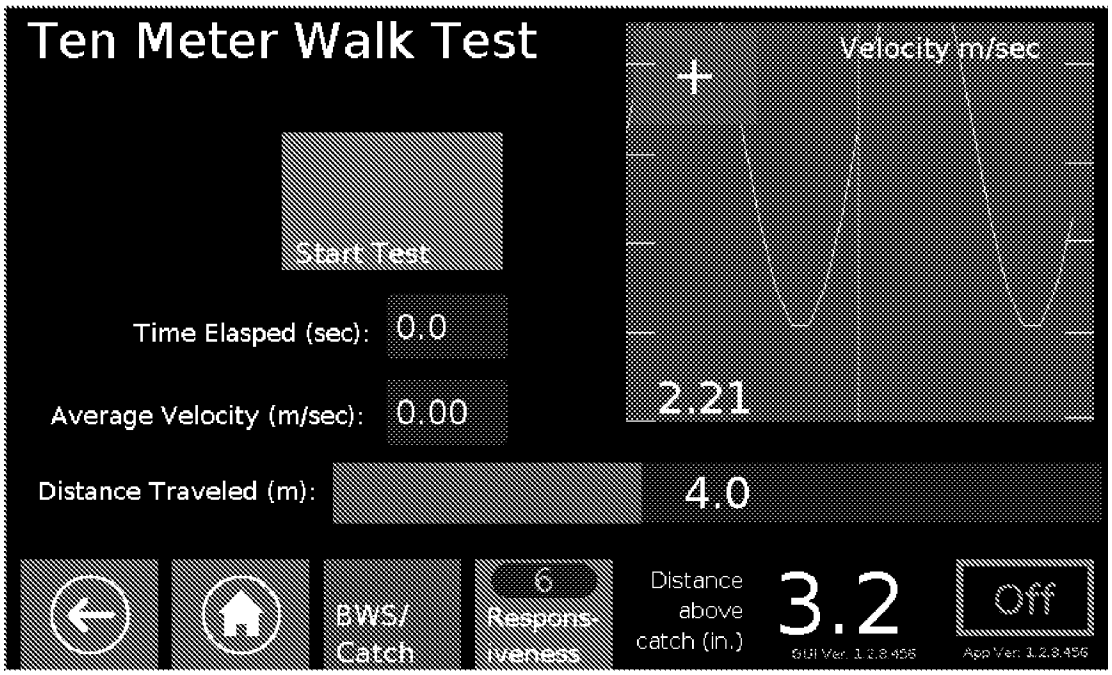


Figure 28 – 10m Walk Test screen.

This is a standardized clinical assessment tool to assess walking velocity. The test is meant to capture the amount of time that a person takes to walk over a 10m distance. The clinician asks the patient to begin walking until they reach a steady state of speed (as observed by viewing the velocity graph). Once steady state is achieved, the clinician hits the "start" button and the test begins until 10m of distance is covered by the patient. This test can be performed with the patient walking at a steady state comfortable velocity or at a steady state maximum velocity. Results are reported as velocity in meters per second.

5.3.8 Session Report

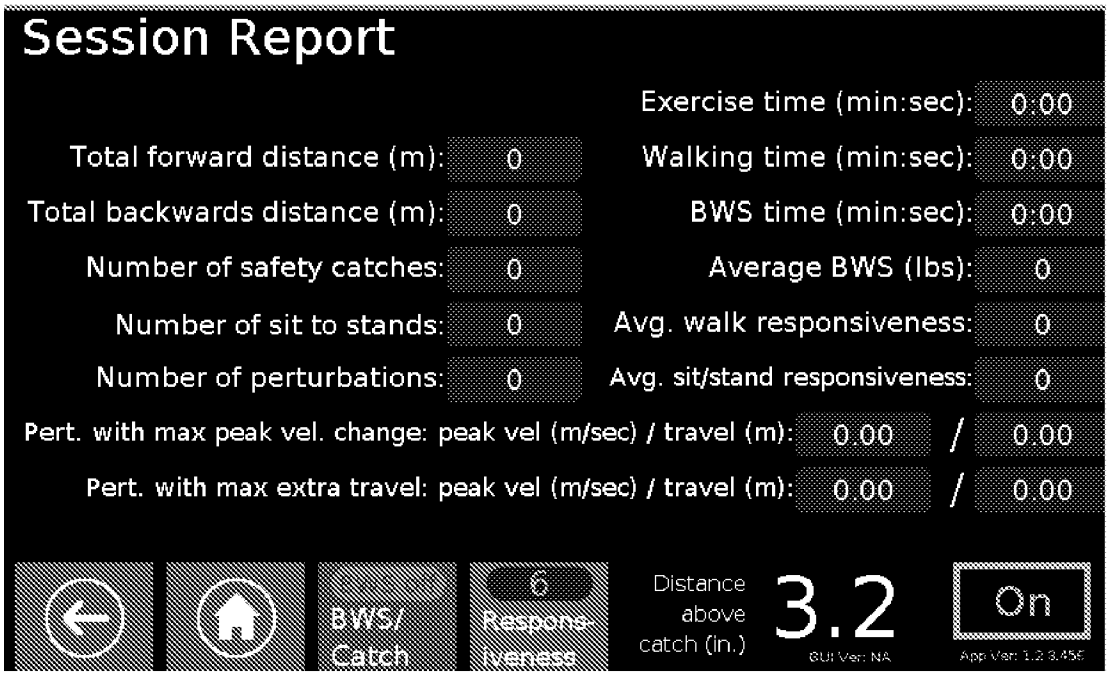


Figure 29 - Session Report screen

The Session Report Screen displays representative metrics of the current patient session. To start a new session press the "Setup / New Session" button on the Basic screen. A popup screen will then ask if a new session should be started. If "Yes" is selected, all data from the previous session will be reset (all session data is erased). If "No" is selected, the current session will continue (no data lost). To view the session metrics press "Session Report" from the Basic screen, which will subsequently display the screen shown in Figure 29. The screen displays the following metrics:

- **Total forward distance:** The cumulative forward travel (distance) of the treadmill. Backward walking and treadmill motion during sit-to-stand activities are ignored.
- **Total backwards distance:** The cumulative backward travel of the treadmill. Forward walking and treadmill motion during sit-to-stand activities are ignored.
- **Number of safety catches:** The total number of times the KineAssist caught the patient with a safety catch.
- **Number of sit to stands:** The total number of sit-to-stand transitions (stand-to-sit transitions are ignored).
- **Number of perturbations:** The total number of successful (patient did not "fall") perturbations executed.
- **Exercise time:** The total time since a new session was started and until the Red stop button is pressed or the New Session button is pressed.
- **Walking time:** The total time spent in walking modes, which include Walk, Supported Walking, Joystick Treadmill modes, as well as the other advanced activities.
- **BWS time:** The total time spent with non-zero body-weight support, includes the time in Walking modes as well as Stand mode.

- **Average BWS:** The time-weighted average body-weight support for the entire session (includes walking and standing activities with active BWS).
    - For example, if a patient walked for 10s at 20 lbs BWS and 20s at 10 lbs BWS the Average BWS is calculated as such: (10s * 20 lbs + 20s * 10 lbs)/(30s) = 13 lbs.
- **Average Walk responsiveness:** The time-weighted average responsiveness while in Walking modes.
    - For example, if a patient walked for 20s at 2 (responsiveness) and 10s at 5 and 5s at 10 the Average Walk Responsiveness is calculated as such: (20s * 2 + 10s * 5 + 5s *10)/(35s) = 3.5.
- **Average Sit/Stand responsiveness:** The sit-to-stand-weighted average responsiveness while in Sit-to-Stand mode.
    - For example, if a patient sit/stand 3 times at 2 (responsiveness) and 4 times at 5 and 5 times at 7 the Average Sit-to-Stand Responsiveness is calculated as such: (3sts * 2 + 4sts * 5 + 5sts *7)/(12sts) = 5.
- **Perturbation with MAX Peak Velocity Change:** Captures both Perturbation parameters (i.e. Peak Velocity Change and Extra Travel Distance) for the successful Perturbation with the largest Peak Velocity Change during the session. Note these parameters are only recorded for successfully completed perturbations, i.e. the patient did not “fall” during the activity.
- **Perturbation with MAX Extra Travel Distance:** Captures both Perturbation parameters (i.e. Peak Velocity Change and Extra Travel Distance) for the successful Perturbation with the largest Extra Travel Distance during the session. Note these parameters are only recorded for successfully completed perturbations, i.e. the patient did not “fall” during the activity.

5.4 Advanced Modes Of Operation

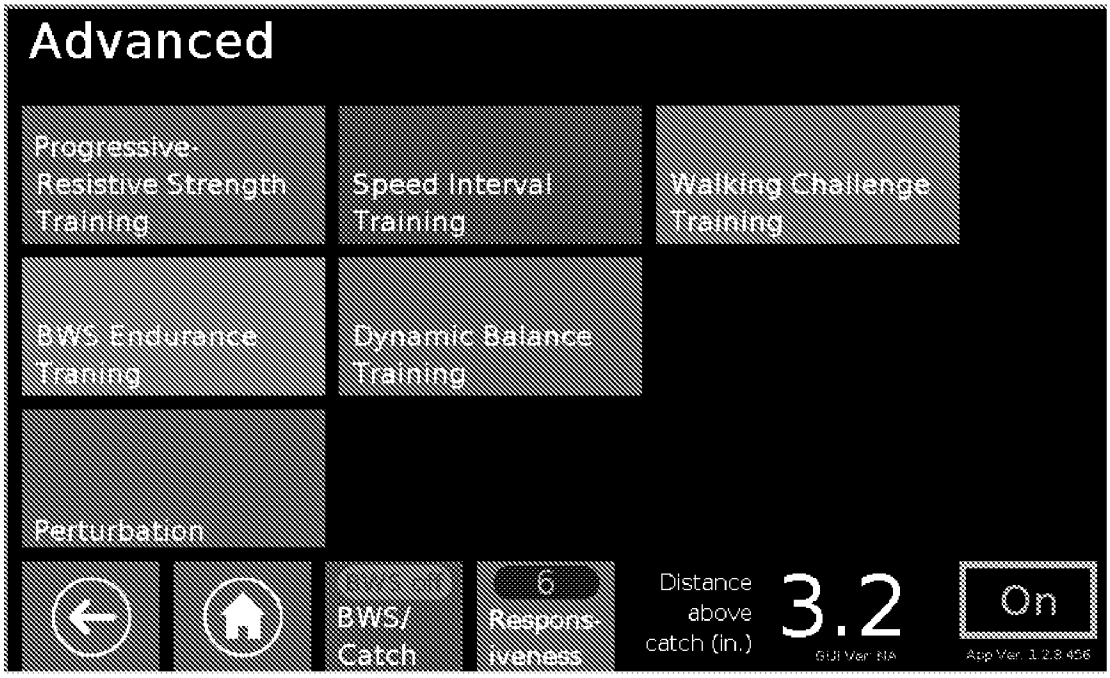


Figure 30 – Advanced Modes selection screen.

The "**Advanced Modes**" screen allows clinicians to choose advanced testing and training modalities for specific clinical patient problems.

Progressive-resistive strength training can be used to test and improve muscle strength and power in leg muscles used during walking.

Speed interval training can be used to test and improve speed of movement and balance at high speeds of walking.

Walking challenge training can be used to test and train individuals to walk while dealing with complex challenges, similar to those that are encountered in daily life.

BWS endurance training can be used to train patients to improve cardiovascular health and walking endurance.

Dynamic balance training can be used to test and train patients to improve balance under a wide variety of task conditions that are similar to those that are encountered in daily life.

Perturbation can be used to testing and training patients to respond to sudden/unexpected "disturbances".

5.4.1 Body-Weight Supported Endurance Training

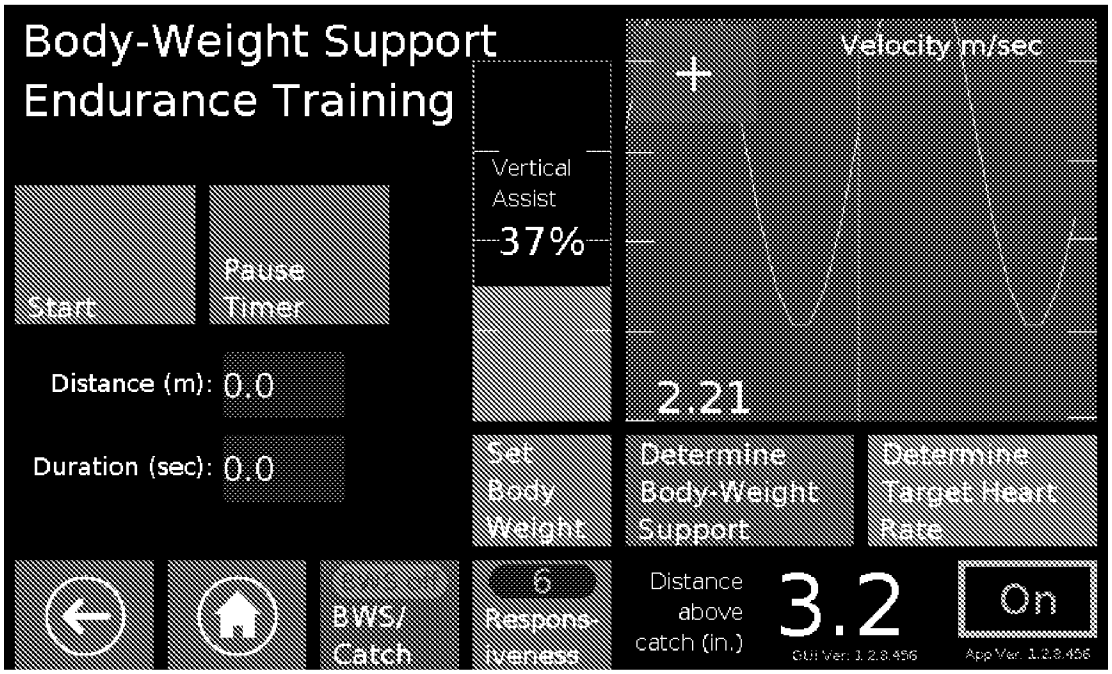


Figure 31 – Body-Weight Support Endurance Training screen.

BWS endurance training can be used to train patients to improve cardiovascular health and walking endurance. This mode allows clinicians to calculate a specific range of target heart rates (Using the Karvonen method for heart rate reserve). It also allows clinicians to determine an appropriate body-weight support level based upon actual walking velocity results at different BWS levels. When the patient is ready to begin, the "Start Timer" button is pressed and distance and duration are determined as a running total. Also, walking velocity is displayed so that the clinician can ask a person to speed up or slow down if they want the heart rate to be higher or lower.

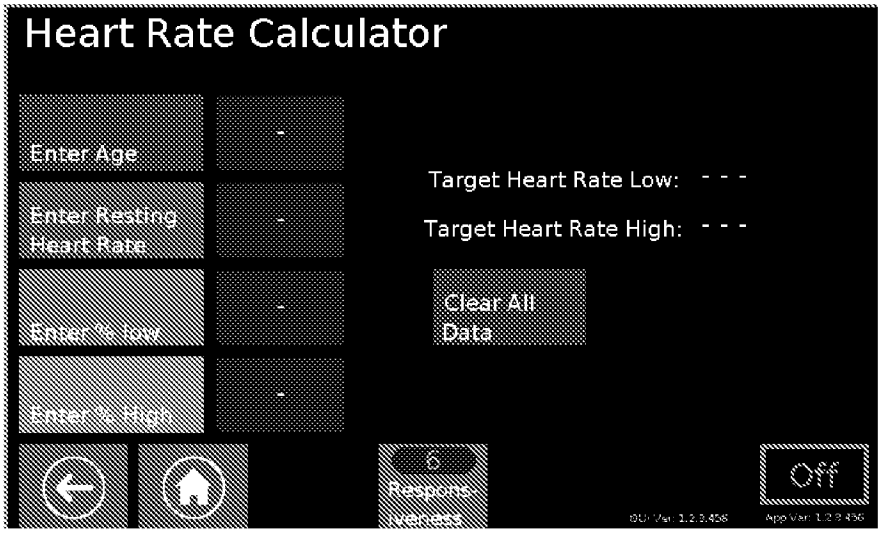


Figure 32 – Heart Rate Calculator screen

5.4.2 Progressive-Resistance Strength Training

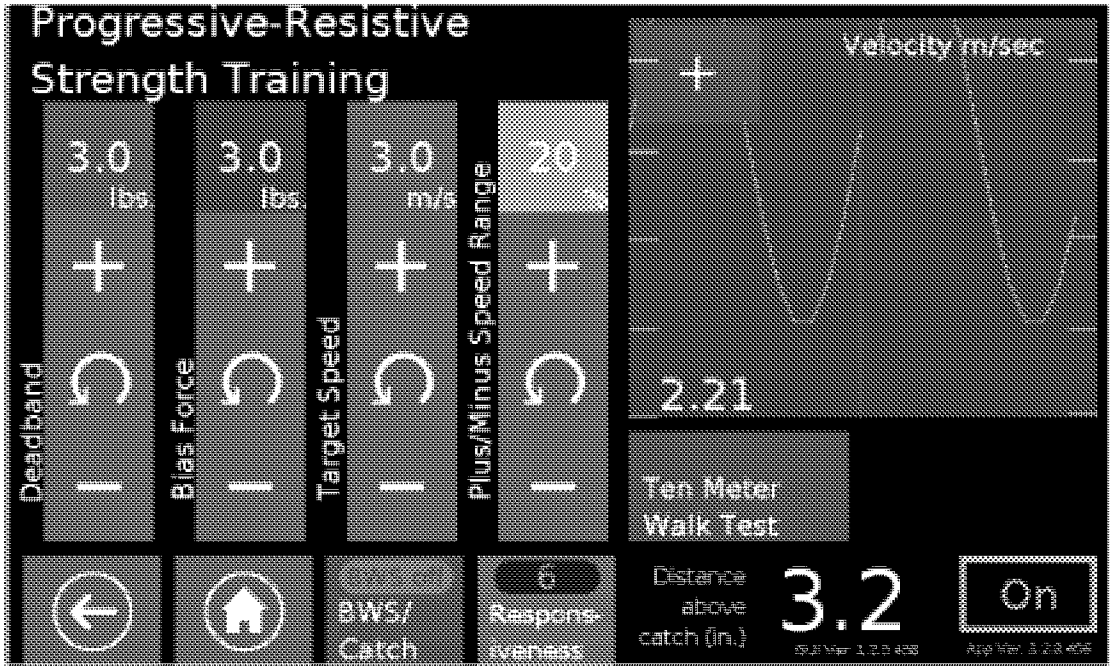


Figure 33 - Progressive-Resistance Strength Training screen.

Progressive-resistive strength training can be used to test and improve muscle strength and power in leg muscles used during walking. This mode allows a clinician to provide horizontally-directed forces as a resistance during walking. This is accomplished by asking the patient to walk at a comfortable speed while a ten meter walk test is conducted. Once the comfortable speed is determined, the clinician sets the target speed to the comfortable walking speed, and sets the % Speed Range function to an amount that is desired. The patient begins walking while trying to maintain walking speed in within the target speed range while the clinician gradually increases the "Deadband" value, which provides added resistance. The patient is asked to maintain walking speed against these higher resistive forces for a given number of steps. Due to the high intensity nature of this strength training regimen, it is highly recommended that clinicians count the number of steps that the patient attempts. Additionally, the "Bias Force" imposes a virtual horizontal force. When the bias force is positive, it will feel like the device is pulling forward, and the treadmill will go faster in the forward direction for the same intent input. As the bias force is increased, the treadmill will move forward without any intent input. When the bias force is negative, it will feel like the device is pulling in the backward direction, and treadmill will go slower in the forward direction for the same forward intent input.

⚠	The Bias Force adds a virtual intent force to the controller of the KineAssist. Increasing the Bias Force (in either positive or negative direction) could cause the treadmill to move at high velocities, without any other input from the operator or patient. Unlike the Deadband, which can only provide resistive force (i.e., force against the direction of motion), the Bias Force will continue to push/pull (via the treadmill) at a constant rate until the Bias Force is set to 0 or the KineAssist is set to STOP.

5.4.3 Speed Interval Training

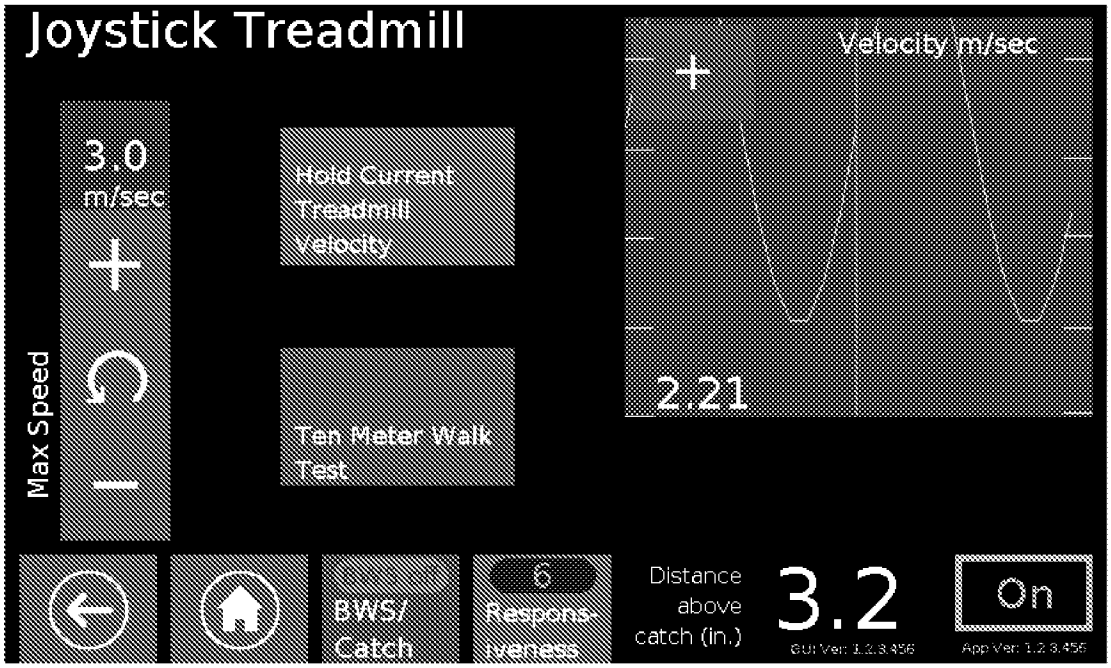


Figure 34 – Joystick Treadmill screen.

Speed interval training (i.e., Joystick Treadmill mode) can be used to test and improve speed of movement and balance at high speeds of walking. This mode allows a clinician to set treadmill-belt-driven speeds to high levels to challenge the patient to remain walking at fast speeds. First, the clinician performs a ten meter walk test to determine the patient's fastest self-driven walking speed. Once this is determined, the clinician can set the max speed for the treadmill at some faster speed to challenge the patient. When ready to begin, the clinician uses the "joystick" to control the treadmill-belt walking speed and gradually increases the belt speed until the max speed target has been reached. The clinician determines a suitable interval of time for the patient to remain at this max speed, and then the clinician uses the joystick to reduce the speed back down to a very slow and comfortable "recovery" speed. This sequence is repeated multiple times, as determined by the clinician. The Hold Current Velocity button will lock the treadmill speed so that the therapist does not to keep pressure on the joystick button.

5.4.4 Dynamic Balance Training

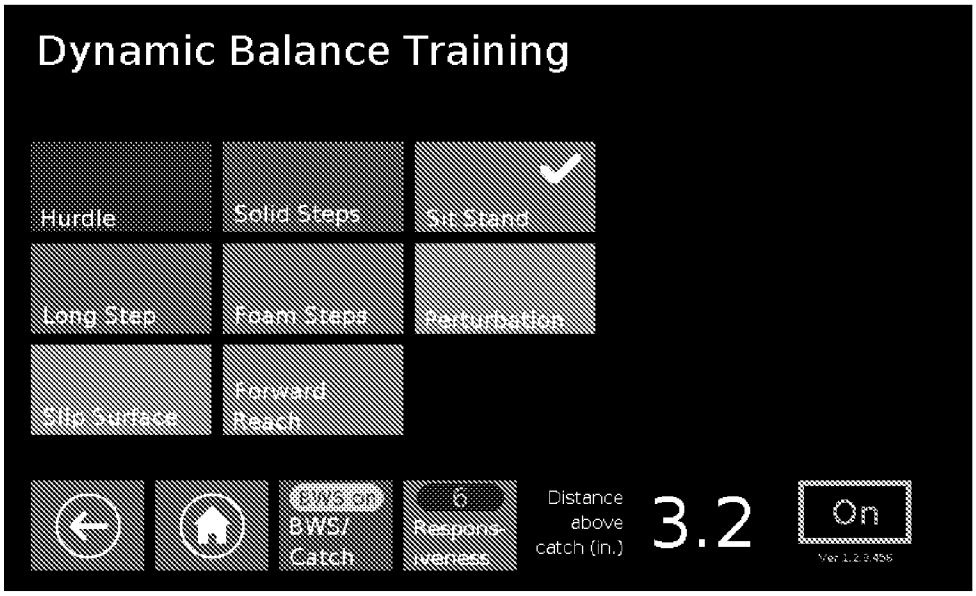


Figure 35 - Dynamic Balance Training screen.

Dynamic balance training can be used to test and train patients to improve balance under a wide variety of task conditions that are similar to those that are encountered in daily life. The clinician can choose from eight balance tasks. Each task is designed to address a key component to balance skill recovery.

- **Hurdle**: By placing the hurdle interface on the treadmill, patients are asked to stand in front of the hurdle and step over with either or both legs. The hurdle height can be adjusted to further challenge the step height that the patient must achieve to be successful.
- **Long Step**: By using the laser light interface on the treadmill, patients are asked to step forward as far as possible while stepping over the target laserlight. Patients can be challenged by gradually moving the laserlight target further away.
- **Solid Steps**: Solid steps are provided that can alter a step height challenge anywhere from 1 in to 16 ins. Patients are asked to step up onto the surface, with either leg leading, then stand on the surface and step backwards off of the surface. Patients can be challenged by adding one in. increments to the step height, as appropriate.

⚠	When using the steps, make sure there is plenty of room for the patient to step up, and ensure that the patient's head does not hit the ceiling.

- **Foam Surface**: A foam surface is provided that can alter a compliant step height challenge anywhere from 2 in to 16 ins. Patients are asked to step up onto the surface, with either leg leading, then stand on the surface and step backwards off of the surface. Patients can be challenged by adding two in. increments to the step height, as appropriate.

- **Forward reach**: By placing the forward reach target device on the treadmill, clinicians can provide a graded and measureable target for patients to reach forward towards. Patients can be challenged by gradually moving the target further away from the patient.
- **Sit to Stand**: By placing the solid steps on the treadmill surface, the clinician can provide graded-height surfaces for the patient to attempt sit to stand. Patients can be challenged by decreasing the height of the solid step surfaces in one in. increments.
- **Perturbation**: Disturbances can be provided in both the forward and backward directions. Both velocity and length of perturbation can be manipulated. See "Perturbation" section for further information about this mode of operation. Patients can be challenged by increasing the velocity or length parameters as appropriate.

5.4.5 Walking Challenge Training

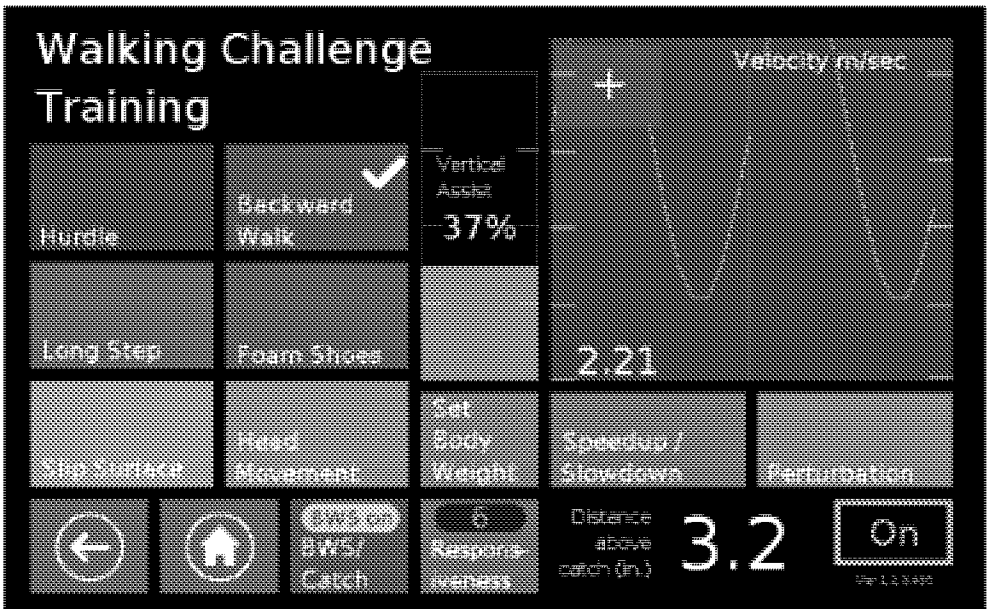


Figure 36 – Walking Challenge Training screen.

Walking challenge training can be used to test and train individuals to walk while dealing with complex challenges, similar to those that are encountered in daily life. The clinician can choose from eight walking challenge tasks. Each task is designed to address a key component to walking skill recovery.

- **Hurdle**: By placing the hurdle interface on the treadmill, patients are asked to walk and step over with either or both legs. The hurdle height can be adjusted to further challenge the step height that the patient must achieve to be successful.
- **Long Step**: By using the laser light interface on the treadmill, patients are asked to continually and repeatedly step forward as far as possible while stepping over the target laserlight. Patients can be challenged by gradually moving the laserlight target further away.
- **Backward walking**: Patients are asked to walk backwards while maintaining balance.
- **Foam Surface**: A foam surface is provided that can alter a compliant step challenge as patients are asked to continually and repeatedly step forward and back.

- **Head movement**: Patients are occasionally and repeatedly asked to "Look UP", "Look Down" "Look left" or "Look right" while continually and repeatedly asked to walk forward.
- **Speed up slow down mode:** Patients are occasionally and repeatedly asked to speed up or slow down to reach randomly changing target speeds. See below for further information about this mode.
- **Perturbation**: Disturbances can be provided in both the forward and backward directions. Both velocity and length of perturbation can be manipulated. See "Perturbation" section for further information about this mode of operation. Forward disturbances are provided during backward walking, and backward disturbances are provided during forward walking.

Speedup/Slowdown Mode

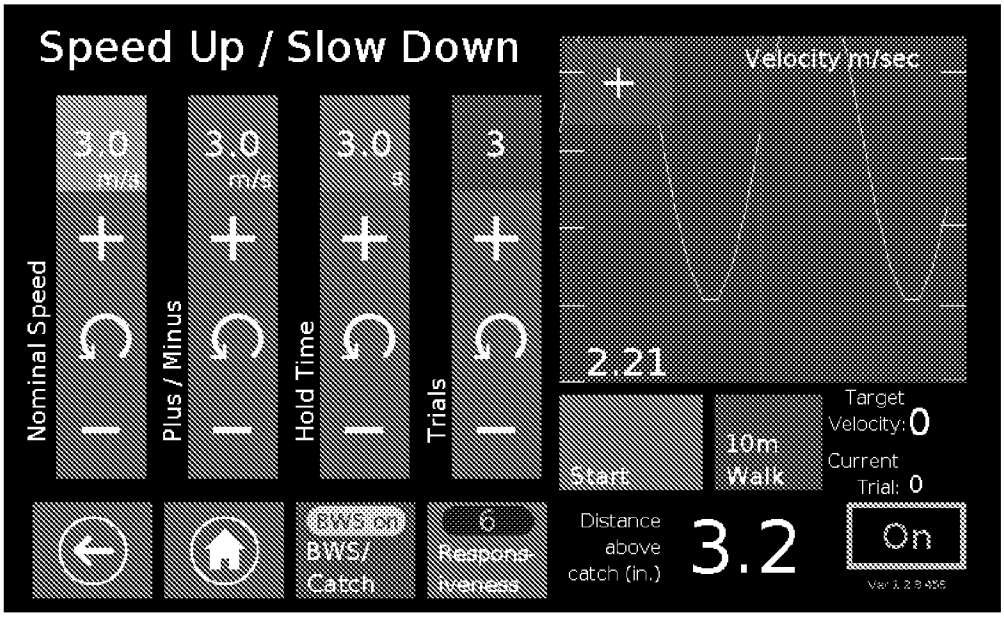


Figure 37 - Speed Up/Slow down Mode screen.

Patients are occasionally and repeatedly asked to speed up or slow down to reach randomly changing target speeds. See below for further information about this mode. The clinician first sets a nominal walking speed close to the patient's comfortable walking speed. The clinician then sets a plus/minus range of targets, a hold time for the amount of time that each target will be maintained, and a number of trial repetitions. When the patient is ready to begin, the clinician presses the start button and reminds the patient to try to achieve a walking sped that matches the target on the screen.

5.4.1 Perturbation Mode

Figure 38 – Perturbation Mode screen.

Perturbations or “disturbances” are used for both testing and training. As a test, perturbation distance and/or velocity can be methodically introduced while a patient is quietly standing or walking. The clinician can observe the patient’s response to the differing amounts of perturbation. When training, these perturbations can be used to teach a patient how to respond appropriately and remain upright and stable after the disturbance. Patients can be progressed by the clinician by increasing either peak velocity or travel distance or combinations of both parameters.

5.4.2 Supported Walking

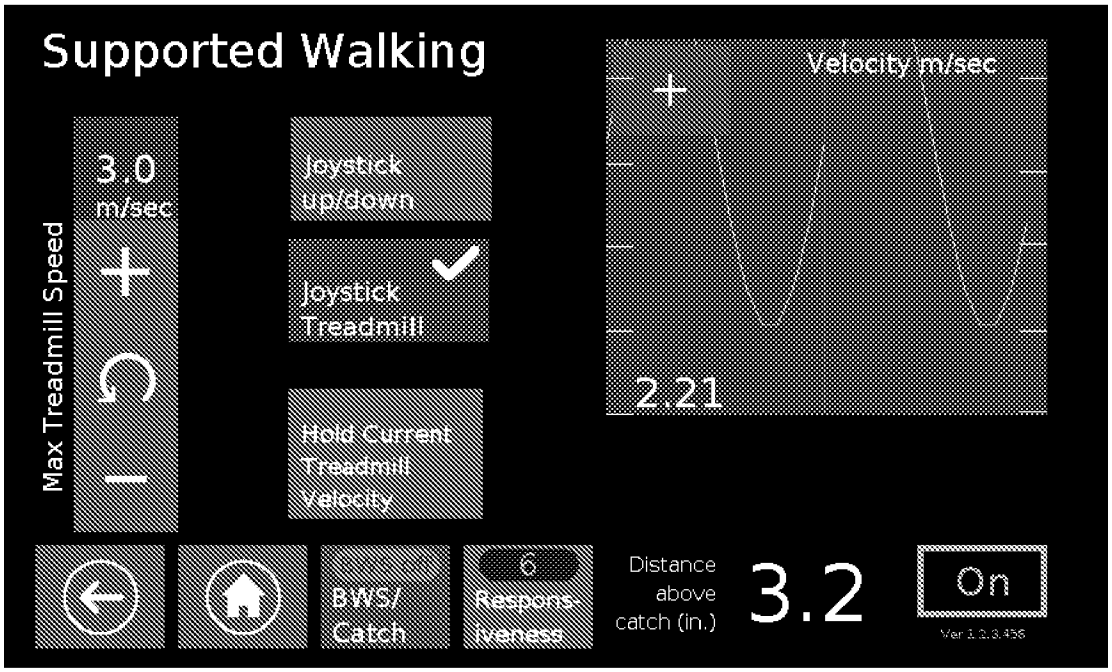


Figure 39 - Supported Walking Screen

Supported walking allows patients that do not have the ability to support their own weigh to experience walking by locking the pelvic mechanism in place and having the therapist move the treadmill in joystick mode. After transferring the patient and standing them using Sit/Stand, switch to Supported Walking. This locks the treadmill and the patient can rest in the harness. The therapist can adjust the patient's height by using Joystick up/down, and then push Joystick Treadmill to begin walking. The Hold Current Treadmill Velocity button allows the therapist to lock the speed so that the joystick button does not need constant pressure. When finished, ensure the patient is supported with the lift rings before you press the back or home buttons.

Chapter 6: Maintenance and Cleaning

6.1 Maintenance and Service Statement

If maintenance or repairs are not carried out by professionally qualified personnel, this may cause material damage and serious injury.

- Maintenance and repair work may only be performed by qualified personnel!
- It is the sole responsibility of the representative to assign qualified personnel for maintenance and repair work.
- In case of doubt or questions always contact the HDT customer service or dealer!
- The manufacturer is not liable for personal injury and material damage caused by a lack of qualifications!

Service work that goes beyond the routine maintenance described in this operation manual must be performed only by the manufacturer or their duly authorized service agents, never by the operator. We are not liable for damages resulting from unauthorized service or from improper maintenance performed by unauthorized persons.

Perform maintenance on the treadmill only as described in this chapter. Opening the housing can lead to electrical shock and other damage or injury. It is absolutely essential to pull the power cable plug out of the electrical socket before opening the housing. Modifications to the treadmill other than those described in the operation manual can cause damage and thereby necessitate repairs not covered under warranty.

After maintenance or repair of medical devices structural and functional features that are essential for the safety and functionality must be checked, insofar as they may have been affected by the maintenance measures.

6.2 Cleaning and Inspection

Periodic cleaning and inspection of your KineAssist-MX will help to lengthen its life while helping keep it looking like new. By performing preventive maintenance any issues can be identified and resolved before it becomes an issue.

Below is the recommended cleaning and maintenance intervals. If your KineAssist-MX is located in a dirty environment or under heavy-duty use, cleaning and inspection should be implemented more often. Clean using a damp cloth and do not use abrasive brushes or cleaners, as they may damage paint and anodized surfaces. Do not soak any surface; the sensitive electronics may be harmed.

Cleaning agent: For cleaning and disinfection of parts that are touched (pelvic mechanism arms, harness, display, etc…) a formaldehyde-free rapid disinfectant such as “Bacillol plus” or “Descosept” is recommended.

The slat-belt treadmill should be thoroughly cleaned at regular intervals, depending on the intensity of use.

	The use of water and liquid detergents as part of cleaning work can cause serious or fatal electrical shock. ➢ No liquids may come in contact with electrical parts such as motor, power cord and power switch, control monitors. ➢ Do not spray the device with a water jet. ➢ Pull power plug before cleaning, equipment must not be connected to power! Ensure the device cannot be switched back on.

6.3 Maintenance Intervals

In the addendum at the end of this manual is a convenient PM log for your record-keeping. It is also available in electronic form.

6.3.1 Monthly

- Clean pelvic mechanism, display, and cosmetic covers with a damp cloth.
- Clean the treadmill walking surface with a damp, lint-free cloth
- Visually inspect the main power cable to make sure it is not damaged.
- Check the wires/connectors to the display enclosure.
- Check calibration and re-zero sensors if needed (see section ***System Configuration***-Step 1).
- Check that the pelvic harness connectors and their locking tabs are well seated in the mating part (see Figure 15).
- Check the straps around the harness connectors for excessive wear.
- Check that the swing-arm and the monitor itself are free to rotate smoothly through their entire range of motion and is not tugging on the cables.
- Check overall condition of the treadmill, pelvic mechanism, and vertical tower.
- Verify that the pelvic mechanism moves freely in all its intended directions without sticking and with no grinding noises.

	Worn or damaged components must be replaced immediately. If the observed deficiency can cause danger to the user or operator of the treadmill, it needs to be taken out of service until repaired.

6.3.2 Quarterly Functional Check

A functional test of the KineAssist-MX must be carried out every quarter. The functional test includes:

1. Using the "Joystick Treadmill" mode at speeds of 2-3 m/s. Do unusual noises occur?
2. Using the "Joystick Up/Down" mode and moving the Support Arm through its entire range of motion, do unusual noises occur?

3. Using the "10 m Walk Test" mode confirm the "Distance Traveled" is correctly displayed (to within 10%).
4. Check the functionality of the emergency stop (E-Stop) mushroom switch. Is the emergency stop initiated?
5. Check calibration and re-zero sensors if needed (see section ***System Configuration***- Step 1).
6. Check the functionality of the red and green buttons on the User Interface enclosure. Do they toggle the system between On/Off states?
7. Set the device to "Setup" mode. Confirm that the running surface is very difficult to move.

	If there are deficiencies or deviations in the control function, notify the HDT customer service immediately. The device must be taken out of service and disabled until repaired. Repairs may only be carried out by trained and authorized personnel.

6.3.3 Every 6 to 10 Months

The check should also be performed if the KineAssist appears to be faulty (e.g. unusual noises, binding passive motions, etc…)

The check should follow the checklist below:

1) Treadmill

Before starting any maintenance on the treadmill the side panels are to be removed (NOT the electronic covers).

Preventive maintenance consists of the following measures:

-
- Clean the inside of the treadmill with a vacuum cleaner. Do not touch the electrical components (cable, connectors, etc…).
- Check the drive unit toothed belt (drive belt) for cracks and other wear and missing or broken teeth (visual inspection).
- Check the aluminum profiles of the slats with a flashlight for damage (visual inspection).
- Check all mechanical components for damage (welded frame, side panels, treadmill feet, railings) (visual inspection).
- In rare cases there may be bearing damage. Under certain circumstances this can be detected through excessive grease leakage from the bearing housing.

2) Support Arm and Column

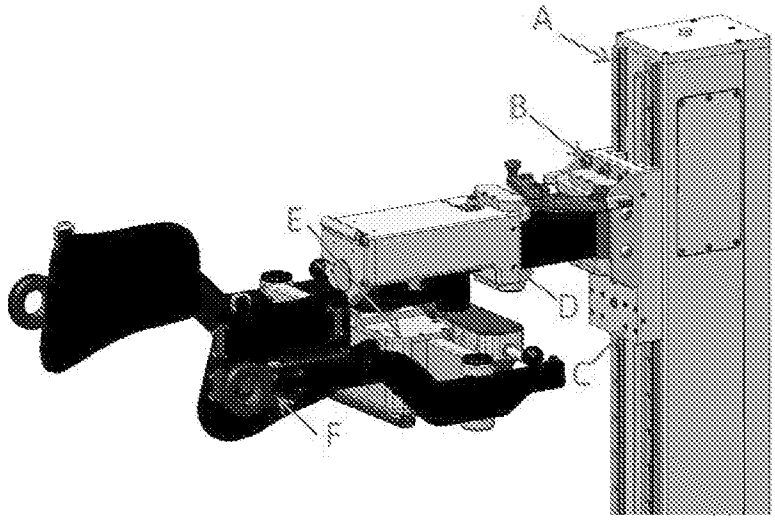


Figure 40 - Illustration marking referenced screws.

- Check that all screws are tight on the vertical rails (see Figure 40 – A).
- Check that the screws securing the carriage plate to the traveling bearing blocks are secure (see Figure 40 – B, C).
- Check that all the screws on the pelvic rotation locks and lateral motion limiting brackets are tight (see Figure 3).
- With the pelvic rotation locks disengaged, check that the arms of the pelvic mechanism swivel freely (see Figure 11).
- Check for proper operation of the bumper switches attached to the underside of the pelvic mechanism (see Figure 7).
- Check that the flat head screws along the top of the slide lateral tube are tight (see Figure 40 – E).
- Check that the flat head screws securing the lateral arm cover on the right (and left) side are secure (see Figure 40 – F).
    - NOTE: Tightening these screws will require a re-zeroing of the sensors.
- Check that the flat head screws securing the right (and left) side harness socket to the harness are tight (Figure 41 - G).
- Check that the flat head screws securing the right (and left) side harness plug to the pelvic arm are tight (Figure 41 - H).

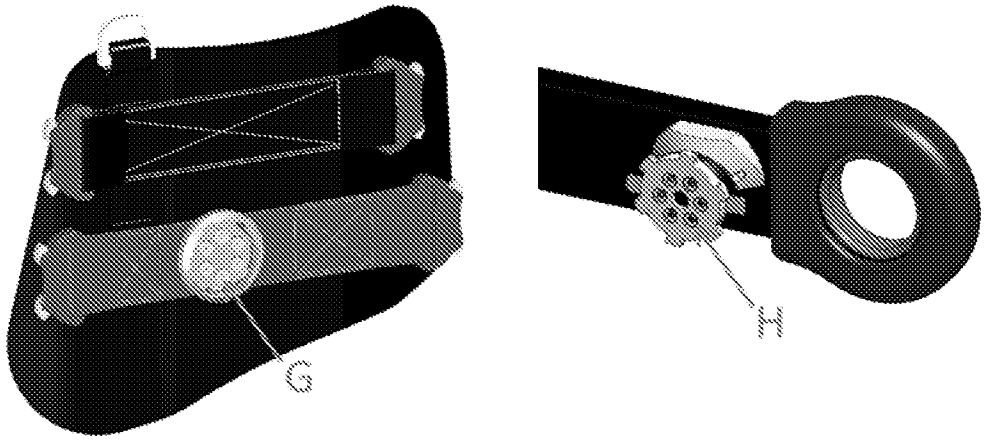


Figure 41 - Illustration showing Pelvic Harness screws

3) **Functional Tests:**

- See section *6.3.2-Quarterly* Functional Check

4) **A repair must take place:**

- If liquid has gotten into the device,
- with damaged power cord (cable, plug)
- if the treadmill or vertical tower drive systems show deficiencies
- in case of suspected bearing damage,
- if a defect on the device is suspected or has already been established
- in case bucking, sudden stopping or accelerating of the running surface,
- if buttons fail to function
- in case of burning smell, smoke, or unusual noises,
- in case of malfunction (failure) of the emergency stop button,
- in case of damage to the running surface belt and
- for all other defects which may affect the safety of the device

6.3.4 Yearly

The proper maintenance of the KineAssist must take place annually in conjunction with the technical safety checks (TSC).

Annual Maintenance:

- Check the tension on the Support Column belt. *This can be done by HDT personnel or customer maintenance personnel with HDT support and instruction. Please contact HDT for assistance in completing this task.*
- Check that the vertical belt is running between the pulley flanges on both top and bottom pulleys as the carriage is moved up and down. *This can be done by HDT personnel or*

customer maintenance personnel with HDT support and instruction. Please contact HDT for assistance in completing this task.

6.3.5 Technical Safety Checks

The KineAssist-MX is a device in protection Class I and has an application part Type B, and has a non-removable power cord.

Permanent connection

The KineAssist-MX is not intended for permanent connection. The installation of a permanent connection, if required, must be performed by suitably trained personnel. For the safety checks on permanently connected equipment, the applicable regulations in the country of use are to be observed.

Checks and measurements

Tests and measurements shall be carried out in a properly functioning device. Any repairs must be performed by qualified personnel before the technical safety inspection.

Country-specific requirements

When carrying out the prescribed measurements and checks, country-specific regulations, instructions and test steps are to be observed.

Manufacturer's Recommendations

Prior to the tests, manufacturer's recommendations for the maintenance of the KineAssist-MX are to be considered in accordance with EN 62353. For this reason these instructions are to be read completely and carefully. If accessories are used, the manufacturer recommendation for the accessory is to be observed accordingly.

Multiple devices

If the KineAssist-MX is used along with other medical electrical equipment, the requirements set out for Medical Electrical system ("ME- System") in accordance with definition 3.24 of standard EN 62353:2014 apply.

Data lines and functional grounds are to be separated for the duration of the measurements, along with other connections to other devices.

	For safety reasons, the use of power strips and the simultaneous operation of other equipment on the same supply line are prohibited.

Inspection intervalsThe Technical Safety Check must be performed annually by qualified personnel (electricians). These are "recurrent test(s)" in accordance with section 4.3 of EN 62353:2014.

Visual inspection

According to section 5.2 of EN 62353:2014, a visual inspection is carried out prior to the measurements. The following points must be checked on the KineAssist-MX device:

1. KineAssist-MX owner's manual. Is the owner's manual for the device immediately available for the user?
2. Accessory manual: Is the operating manual for accessories and options available?
3. Labels: Are all labels on the device legible and complete (product label, safety labels)?

4. Visual condition of the KineAssist-MX: is the device undamaged and properly cleaned? Are slats possibly broken/cracked? Are screws loose?
5. Harnesses: Condition of pelvic and torso harnesses?
6. Power strips: Are power strips used? For safety reasons the use of power strips is forbidden.

Measurements (per EN 62353:2014)

The values determined in these tests are to be documented together with the measurement method and evaluated. Measurements are to be carried out in accordance with section 5.3 of the standard. The (i) protective earth conductor resistance (section 5.3.2 of the standard), and (ii) the device leakage current (section 5.3.4) are to be measured. A measurement of the leakage current from the applied part according to section 5.3.4.3 of the standard is not required. For the measurement of the device leakage current, the direct measurement method or differential method may be used.

For the measurement of protective earth conductor resistance, the electrical enclosure cover must be removed. During the measurement the power cable must be moved over the entire length. If changes in resistance are observed during movement, it must be assumed that the ground wire is damaged or has a bad connection.

If the measured values are between 90% and 100% of the allowable limit, the previously measured values (reference values) for evaluation of the electrical safety of the device shall be considered. Note that the measured values of the factory test may differ slightly from the measured values at each KineAssist location due to different test conditions.

The measured values must not exceed the permissible limits specified in the following table:

Measurement	Limit Value
Protective earth conductor resistance – non-removable power cord Resistance between the protective earth conductor of the power cord and the protective conductor connected, exposed conductive parts of the unit (electrical enclosure base plate)	300 mΩ
Device leakage current – direct measurement or differential current measurement Measuring procedure defined in section 5.3.4 of EN 62353	0.5 mA

Functional test

After examination (inspection and measurement) a functional test must be performed in accordance with section 6.3.2 of this manual; this is to ensure that the treadmill has been restored to its necessary Condition for “Intended use”, i.e. that it is operational and safe.

Test report

The test report must meet the requirements in EN 62353:2014 (see section 6.1 and Annex G).

A final evaluation of the device must be carried out and the deadline for the next Technical Safety Check established. In accordance with section 6.2 of the standard this review can only be carried out by qualified electricians (as defined in IEC 61140), who have adequate training on the inspected device.

The tested KineAssist-MX must be marked with the test date (inspection sticker).

The examiner and the person responsible for maintenance of the KineAssist-MX sign the test report. This document is prepared with three copies, wherein a copy remains with the

representative of the KineAssist-MX and one for the tester's records. The third copy should be sent to HDT customer service. In this way, they can provide efficient and reliable support.

If technical safety inspections are required by the manufacturer, the operator must carry these out or have these carried out according to the generally recognized rules of technology and within the time specified by the manufacturer.

The reason for the safety checks is to determine if a medical device is operational at the time of the audit, if it is in good condition and it is also expected to correspond to safety inspection requirements until the next safety inspection.

Technical safety checks (after repeat tests or testing after maintenance and repair) may only be performed by, one who has the responsibility for proper implementation of safety controls due to their training, knowledge and experience and has the appropriate measuring and testing equipment.

Personnel requirements

The operator may only appoint persons that meet the above conditions for the implementation of safety-related controls. The fulfillment of the prerequisites must be presented at the request of the competent authority.

A report must be filled about the entire safety inspection, which is kept at least until the next Technical Safety Check. The following information should be included:

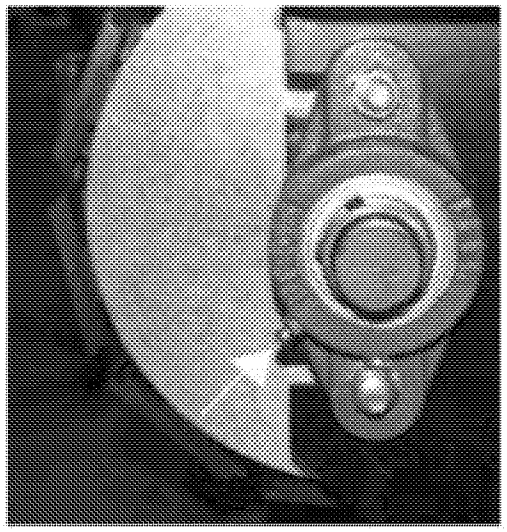
- Date that the technical safety checks were carried out
- Results of the technical safety checks
- Indication of the measured values
- Measuring procedure
- Other test results

The representative shall keep the report at least until the next safety inspection.

6.4 Lubrication

6.4.1 Treadmill Bearings

Almost all of the bearings used in the treadmill are pre-lubricated and do not need to be greased. On a yearly basis, the four (4) bearings located at the front and rear shaft will need to be lubricated, using a standard grease gun.



6.4.2 Tower Linear Bearings

If the tower rails become dry they should be lubricated by applying a thin film of oil (i.e. DTE Oil by Exxon Mobil or equivalent).

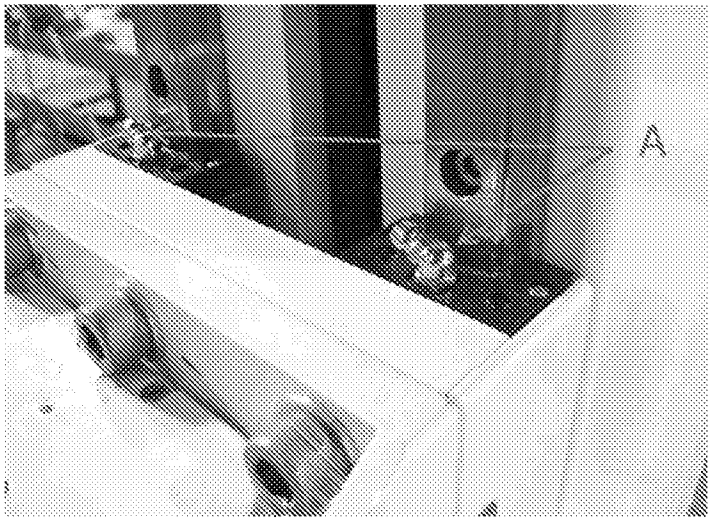
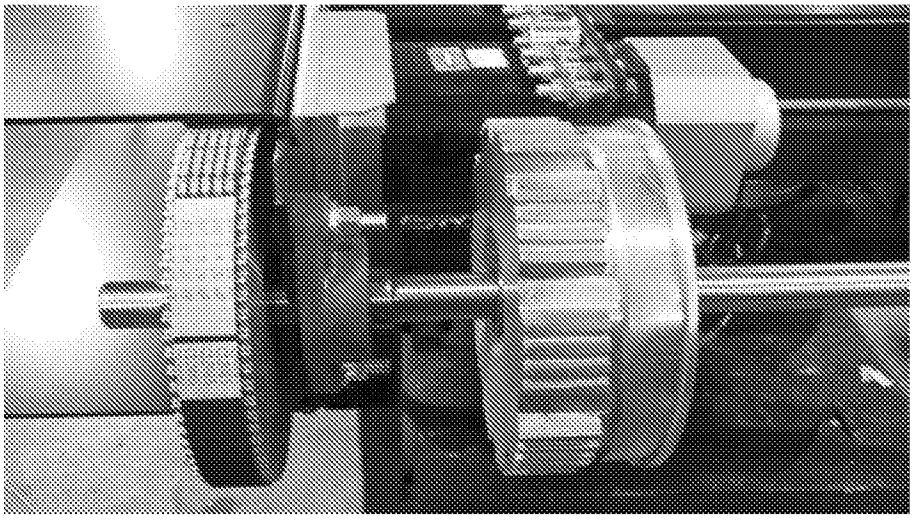


Figure 42 - Picture of the carriage linear bearing grease fittings. NOTE: There are two other bearings located on the bottom side of the carriage (not shown in this picture).

The four (4) linear bearings located behind the carriage plate (Figure 42 - A) on the tower are pre-lubricated, however they should inspected on a yearly basis and if need be lubricated using a standard grease gun.

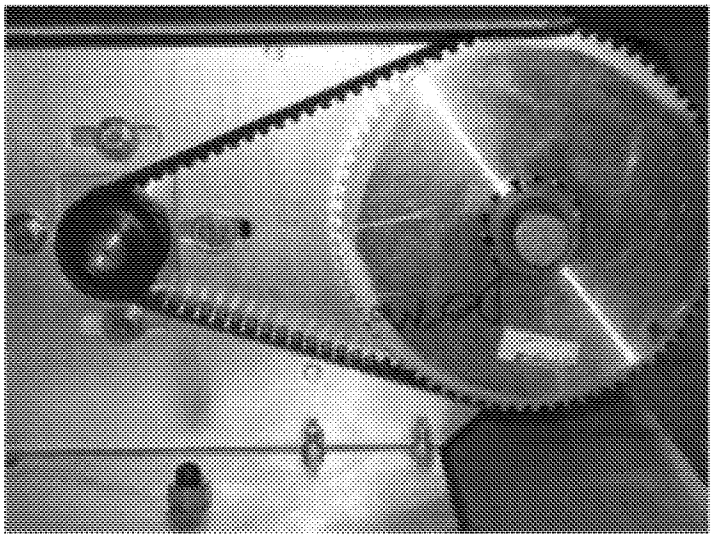
6.4.3 Running Belt/Drive Shaft

The teeth on the bottom of the running belt are pre-lubricated to aid in reducing noise. There is no need to lubricate the teeth. If running belt is rubbing against the side of the drive pulleys, then a small amount of grease (i.e. Molykote or equal) on the edges of the belt slats will help reduce noise. Apply grease to the teeth on the back drive shaft to help the belt stay aligned properly.



6.4.4 Drive Belt

As in the case of the running belt, the application of grease on the edge of the drive belt is only needed to reduce belt squeak and should be used sparingly.



***NOTE**: Use minimal amount of lubrication to prevent excess dirt and debris from sticking to the machine after cleaning.*

Chapter 7: Replacing Parts

7.1 Replacing Components in the Electronic Enclosure

It is highly unlikely that the parts listed below will require replacement. Should it be required, HDT personnel can provide the service or provide guidance and support to customer personnel.

Any component that requires replacement in the electronic enclosure will be delivered with specific instructions for replacement. In all instances however before the electronic enclosure cover is removed the power cable must be unplugged.

	The instructions provided for replacing any components internal to the electronic enclosure must be followed exactly.
	Before opening the electronic enclosure cover the power cord must be unplugged.

7.2 Treadmill Outer Coverings

Required Tools: Cross-recess screwdriver

Removal:

Disconnect the treadmill from the mains and remove the seven (7) large screws in the outer covering using a cross-recess screwdriver. The covers can then be pulled laterally from the frame of the treadmill.

Replacement:

Slide in the two outer coverings on both sides of the frame assuring that it fits/engages properly around the outside of the frame (and below). Then tighten the large screws. It is important to check whether the treadmill scrapes on the covering panels by moving the mat backwards and forwards. If this is in fact the case, the screws must be loosened again and the covers moved away from the mat.

7.3 Treadmill Drive Motor & Pulley

The instructions are supplied with the new or replacement motor, pulley is included.

7.4 Treadmill Drive Belt

Required tools: 2 ring fork wrenches 17, 17 / 10 socket nut, ratchet

Removal:

1) Mark the position of the right-hand bearing support. This bearing holds the front shaft on the frame. Then measure the distance between the upper and lower part of the treadmill belt (in

the middle). This measurement is made exactly between the inner edges of the belt teeth and the value is kept for future reference.

2) Unscrew the two screws of the bearing support, but DO NOT REMOVE.
3) Take the drive belt off the drive motor.
4) Remove the outer bearing screw and pull the drive belt out from under the bearing support.
5) Replace the outer bearing screw and nut. The nut must sit firmly on the screw.
6) Remove the inner bearing screw and pull the drive belt out from under the bearing support (alternatively, cut the old belt). Place the new drive belt under the bearing support (with the teeth UPWARDS).

Replacement:

1. Install the inner bearing block. Remove the outer bearing block and pull the drive belt out from the under the block. Then position the drive belt in the pulley on the front shaft, checking that the teeth engage correctly. Then replace the screw and all other parts.
2. Pull the front shaft using a rod or C clamp to pull the running belt tight. Measure the clearance between the running surfaces and adjust the value noted above. This should be approx. 20.5 cm (optimum running).
3. Screw the bearing block screws to 45-50 foot pounds.
4. Check that the drive belt runs correctly in both pulleys and can be moved easily in the middle by a width of 1 - 2 fingers.
5. Then push the mat on by hand and ensure that it runs smoothly and is not blocked anywhere.
6. Switch the treadmill on and let it run at the various speeds. If any unusual vibrations or noises occur, switch the treadmill off and check the dimensions. If the noises and vibrations persist, please contact your representative or the factory.
7. Replace the outer covers.

7.5 Individual Slats

Required tools: T20 TORX element: 10” extension and/or electric screwdriver

Removal:

1. Disconnect from the mains and remove the side covering. Turn the mat until the defect slat is at the front underneath the appliance. (The screws are most easily accessible in this position).
2. Remove the two screws and plates on either side. Then take the defect slat crosswise off the belt.

When replacing the slat; it is vital that new parts are used. If the old screws are used again the new slats could come loose from the mat surface and cause severe injuries.

Replacement:

1. Place the new slat crosswise on the mat. Screw in two new screws on either side. NOTE: All four (4) screws must be positioned in the slat before tightening the individual screws.
2. Then mount the covers back in position.

Chapter 8: Warranty Information

	Parts & Labor
Medical Use	2 years

Warranty: HDT Expeditionary Systems, Inc. ("HDT") warrants to the original purchaser/lessee of the KineAssist-MX (the "Customer") that the KineAssist-MX will be free from manufacturing defects for a period of two (2) years from the original date of purchase/lease. This Warranty does not cover damage or equipment failure due to misuse, damage, failure to comply with environmental, electrical requirements, failure to comply with KineAssist-MX User Manual, or failure to provide or obtain any maintenance specified in the KineAssist-MX User Manual. Any Customer or third-party modification of the KineAssist-MX without written authorization by HDT voids the Warranty. THIS WARRANTY IS EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE, AND OF ANY OTHER OBLIGATION ON THE PART OF MANUFACTURER. UNDER NO CIRCUMSTANCES SHALL HDT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, LOSS OF OPPORTUNITY OR LOST PROFITS AS A RESULT OF LOSS OF USE OF THE KINEASSIST-MX. BECAUSE SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, THE ABOVE LIMITATIONS MAY NOT APPLY TO THE CUSTOMER. IN THE EVENT THAT APPLICABLE LAW DOES NOT ALLOW THE COMPLETE EXCLUSION OR LIMITATION OF LIABILITY OF CLAIMS AND DAMAGES AS SET FORTH IN THIS AGREEMENT, HDT'S LIABILITY IS LIMITED TO THE GREATEST EXTENT PERMITTED BY LAW.

In the event that Customer notifies Distributor or Distributor's authorized agent of any defect in accordance with the Warranty, Distributor or Distributor's authorized agent will use commercially reasonable efforts to correct such defect, at its expense. In the event that Distributor or Distributor's authorized agent is unable to correct the defect, HDT may, at its option, replace the KineAssist-MX.

Warranty Service: HDT strives to provide the best possible Warranty service to the Customer. As soon as HDT receives a Warranty service request during normal business hours – 8:00 AM – 5:00 PM CST – HDT will respond via phone within 3 business hours. Many issues can be resolved over the phone or by remote connection, but should on-site service be required, HDT's goal is to resolve the issue within **72** hours, pending availability of parts and appropriate transportation to the Customer location.

When appropriate, HDT may work with the Customer to perform minimal repairs or install shipped replacement parts to minimize the down time of the KineAssist-MX during warranty repair. In the event that HDT chooses this course of action, HDT will provide the written and phone support to the Customer. HDT shall hold harmless and indemnify the Customer for any damages that occur to the KineAssist-MX when acting at the direction of HDT in providing warranty repair services.

Requesting Service: To request service, simply call HDT's Evanston, IL office at 540-479-8045 and provide the following:

- Name
- Facility
- Contact phone number
- Machine Serial Number
- Date/time of issue
- Type of issue

Chapter 9: Troubleshooting

The following matrix shows possible symptoms, causes, and fixes for various conditions that may be encountered. If a symptom is not listed or suggested fixes fail to solve the problem do not hesitate to call HDT technical support department for further assistance.

9.1 Possible Symptoms

The following are symptoms that may occur.

Table 1 – Troubleshooting table.

Symptom	Possible Cause	Potential Solution
KineAssist doesn't respond to Start command from green button; screen displays warning that the e-stop may be engaged.	E-stop button is pushed in.	Untwist and pull out the E-stop button and push start button.
KineAssist doesn't respond to Start button.	E-stop button is pushed in.	
KineAssist stops and displays "E-stop fault" on UI screen.	E-stop button may have been inadvertently pushed.	
KineAssist doesn't respond to joystick rocker switch.	Wrong mode selected.	KineAssist must be in the joystick modes.
Received "Unexpected Force" fault	Loading of the patient or PT load cells while changing modes	Unload the force sensors and try again.
Pelvic Mechanism drifts up/down or treadmill moves when unoccupied and in either Walk or Stand mode	Load cells are losing calibration	Re-zero load cells
Received "Unexpected Joystick Command" fault	Joystick is being pressed while entering active joystick mode	Do not activate joystick until after the KineAssist is in an active joystick mode

Preventive Maintenance Log

Note: Refer to electronic document HDT-R003375 – KineAssist-MX Preventive Maintenance Log for a comprehensive checklist and log of all PM activities.

Date	Maintenance Performed?	By	Result

DECLARATION OF CONFORMITY

KineAssist-MX

Class I device per directive 93/42/EEC with amendments by 2007/47/EC

In conformity with the following standards:

ISO 13785:2003

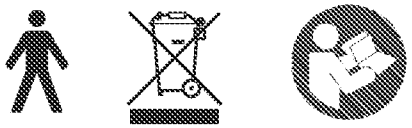
ISO 9001:2008

Directive 2007/47/EC

EN60601-1-2, EN61000-3-2, EN61000-3-3

AAMI ES60601-1, CAN/CSA-C22.2 No. 60601-1:14

IEC60601-1:2005+CORR. 1:2006 + CORR. 2:2007 + AM1:2012 (or IEC 60601-1:2012 reprint)



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EcoMill Treadmill Generates Its Own Power

By Andrew Liszewski on 06/04/09 • Leave a comment!

By Andrew Liszewski

Well this seems like a pretty obvious bit of synergy. The Woodway EcoMill is billed as an "all green" treadmill because it uses no external sources of electricity. Instead, the display and the elevation system are actually powered by a battery that's recharged while the EcoMill is being used.

And even though it isn't a motorized treadmill *(that would involve breaking some of those annoying laws of the universe)* it still features a 900 watt eddy-current braking system to regulate the walking or running speed, as well as a near frictionless drive system.

Surprisingly it can support a user up to 800 lbs in weight as long as they limit their activities to just walking *(probably not a problem)* or 500 lbs if they intend to run. It's also available in either green or black since it's important to provide options when you're charging $8,500.

[WOODWAY EcoMill] VIA [bookofjoe]

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COMBINED OPERATIONAL LOAD BEARING EXTERNAL RESISTANCE TREADMILL (COLBERT)

The Combined Operational Load Bearing External Resistance Treadmill (COLBERT) is packed and prepared for stowage aboard Discovery for its transport to the International Space Station.

Training for future exploration missions is a key goal for the International Space Station Program, and a new treadmill launching on STS-128 will help doctors determine just how important "training" is to humans on long-space journeys.

That's training as in exercise, and treadmill as in COLBERT, or the Combined Operational Load Bearing External Resistance Treadmill, so named for comedian Stephen Colbert of Comedy Central's "The Colbert Report."

The COLBERT will be the second treadmill on the space station, adding to a complement of six different exercise devices already in orbit that range from stationary bicycles to resistive exercise devices. First and foremost, the new treadmill is a critical countermeasure device that will be used to keep the international crew healthy while in orbit, and prepare them for return to Earth.

In addition, the COLBERT will feature data collection devices that will allow doctors and scientists to evaluate how effective the treadmill exercise is in reducing the amount of bone and muscle density loss due to life without gravity. Data on treadmill speed, session duration and body load of each crew member's exercise

session will help scientists understand spaceflight-induced physiological changes in the cardiovascular, muscle, bone and sensorimotor systems.

The first experiment to use the COLBERT will be the Functional Task Test (FTT), a multidisciplinary study designed to identify the key underlying physiological factors that contribute to performance of functional tests that are representative of critical mission tasks for lunar and Mars operations. FTT's principal investigator is Jacob Bloomberg of NASA's Johnson Space Center (JSC), Houston.

This is not the first treadmill on the station. Station residents currently are using the Treadmill with Vibration Isolation System (TVIS) that's recessed in the floor of the Zvezda service module. Expedition 20 flight engineers Mike Barratt and Koichi Wakata just performed a complete overhaul of that treadmill to extend its life. Both treadmills will continue to be used, which will nearly double the availability of this critical work-out device for six-person crews.

While the purpose and general functionality of TVIS and COLBERT will be the same, there are a couple of significant differences.

First, the actual treadmill for COLBERT was purchased from Woodway USA, Waukesha, Wis., while TVIS was developed in-house at JSC. The COLBERT and supporting subsystems (power, cooling, etc.) will be housed in an International Standard Payloads Rack (ISPR). The entire assembly will be housed initially in the station's Harmony module, then be moved to the Tranquility module after it is launched in early 2010. Tranquility is a pressurized module that will provide room for many of the space station's life support systems. Attached to the node is a cupola, which is a unique workstation with six windows on the sides and one on top.

Second, the two use different methods to keep the vibrations generated by runners from shaking the sensitive microgravity experiments on the station. TVIS uses an active system of throw masses that sense running forces and "throw" a counterweight in the opposite direction to counteract the vibrations. TVIS also uses some light tethers and a gyroscope. COLBERT was designed to be heavy, so that its inertial mass will be the primary method for dampening the vibrations. The total weight of the COLBERT rack is 2,200 pounds fully configured in orbit. Launch weight is around 1,600 pounds. Individual treadmill weighs about 300 pounds. The entire rack will have a modified Passive Rack Isolation System (PaRIS) that uses two-stage isolators, or springs, to dampen different vibration frequencies.

The main reasons for the different approach were to simplify the system, making it easier and less costly to maintain. The simpler design also is expected to result in higher reliability, making the new treadmill consistently available to the crew, which must work out daily to counteract the loss of bone and muscle density that is a side effect of long-duration stays in orbit. If all goes as expected, the COLBERT will have a five-year service life.

There are a number of COLBERT and TVIS similarities. Both have running surfaces made of aluminum. The COLBERT treadmill surface uses the exact same aluminum as a commercial treadmill, but a rubber coating is stripped off the top of the treads and that aluminum is anodized to provide surface roughness and protection.

Both treadmills meet the payload requirements for vibration isolation. COLBERT and TVIS are very close in most frequencies, but each is able to dampen some frequencies better than the other.

COLBERT's maximum speed is 12.4 miles an hour, but don't expect crew members to run that fast because 12.4 miles an hour is faster than the Olympic 100-meter race record. An average person runs 7- to- 8 miles an hour, and most crew members will run about 4- to- 8 miles an hour.

Another improvement is that COLBERT is designed so that ground experts tracking crew health in orbit can create individual exercise prescriptions and uplink them to the crew as a profile. COLBERT will use the same control interface as that used for the Advanced Resistive Exercise Device (ARED) so that crew members won't have to learn a new interface. The interface is modeled on commercial treadmills and looks nearly identical to what you'd find in many gyms on Earth. The standard rack connection device, the same seat tracks used in Boeing airliners, will provide locations where the crew can mount devices such as laptop computers so they can entertain themselves while exercising.

Each crew member is required to work out a total of two and a half hours a day, about an hour of that on the treadmill. Astronauts are expected to burn between 250 and 500 calories while working out on COLBERT, which has instrumented load cells and three-axis accelerometers that can measure the foot force of running. Ground experts will be able to use this information to determine how well they are being conditioned or losing their deconditioning, and adjust exercise prescriptions accordingly.

Setting up for an exercise session on COLBERT should be fairly simple. The first runner of the day will turn it on by flipping the rack power switch. After waiting a couple minutes for all systems to activate, they'll position the control interface to a location comfortable for them. They'll connect bungee cords to provide a load that will generate the foot force necessary to give the astronaut's bones and muscles a workout in the absence of gravity. They'll put on the harness that connects them to the bungees, set the desired load and verify that they agree with their prescription. Then, they'll log into the system, pick a profile, hit start and go. In the future, a new load system being developed by the European Space Agency will provide highly accurate, continuous force that's closer to a full one-gravity body weight.

The two treadmills provide side benefits for the entire crew, because as humans exercise they respire (breathe) and perspire (sweat) and that moisture is reclaimed by the station's systems that recycle moisture from the station's atmosphere.

NASA chose the acronym COLBERT after the television comedian's campaign for write-in votes to name the next module after himself. NASA chose to name the module Tranquility instead, in honor of the 40th anniversary of the first Apollo landing on the moon. Expedition 14 and 15 astronaut Suni Williams made the announcement on "The Colbert Report" two years after running the Boston Marathon in space.

The COLBERT rack, treadmill and support hardware will launch in the Leonardo Multi-purpose Logistics Module and be transferred to the station on flight day 5. The new workout machine will be set up and used after the shuttle Discovery departs.

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International Space Station

Combined Operational Load Bearing External Resistance Treadmill (COLBERT) - 07.19.17

Summary | Overview | Operations | Results | Publications | Imagery

ISS Science for Everyone

Science Objectives for Everyone

The Combined Operational Load Bearing External Resistance Treadmill (COLBERT) will be used to maintain bone, muscle, and cardiovascular conditioning on the International Space Station crewmembers. The COLBERT is instrumented to collect inflight research-grade data for experiments that are representative of critical mission tasks on future long-duration exploration missions.

Science Results for Everyone

Information Pending

The following content was provided by Kevin MacNeill, and is maintained in a database by the ISS Program Science Office.

Facility Details

OpNom:

Facility Manager(s)

Kevin MacNeill, Johnson Space Center, Houston, TX, United States

Facility Representative(s)

Information Pending

Developer(s) Information Pending

Sponsoring Space Agency

National Aeronautics and Space Administration (NASA)

Sponsoring Organization

Human Exploration and Operations Mission Directorate (HEOMD)

ISS Expedition Duration

April 2009 - May 2012

Expeditions Assigned

19/20,21/22,23/24,25/26,27/28,29/30

Previous Missions

The COLBERT will be the second treadmill on the space station. The first was Treadmill with Vibration Isolation System (TVIS) which was overhauled during Expedition 20.

Availability

Onboard

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Facility Description

Facility Overview

- The COLBERT (Combined Operational Load Bearing External Resistance Treadmill) will be the second treadmill on the International Space Station, adding to a complement of six different exercise devices already on board the ISS.

- This new treadmill is a critical countermeasure device that will be used to keep the ISS crewmembers healthy while on-orbit and helps prepare them for return to Earth.

- The COLBERT features data collection devices that will allow scientists and doctors to evaluate how effective the treadmill exercise is in reducing the amount of bone and muscle density loss due to microgravity exposure.

- The COLBERT is designed so that ground experts can track crew health on orbit to create individual exercise prescriptions and uplink them to the crew. The information sent down to the ground experts will be used to determine how well the crewmembers are being conditioned or lack thereof and to adjust exercise prescriptions accordingly.

In mid 2009 the International Space Station program expanded from three man to six man operations. The Combined Operational Load Bearing External Resistance Treadmill (COLBERT) will accommodate the exercise needs of a six member crew and is a critical countermeasure device required to maintain crew health while on-orbit and prepare them for return to Earth. In microgravity, astronauts do not use their muscles as much as on Earth; without exercise, these muscles begin to atrophy (wasting). This can lead to bone density loss with symptoms similar to osteoporosis. To maintain crew health during extended visits to the ISS, several pieces of exercise equipment are employed. The COLBERT enables the ISS crews to meet medical and health needs by preventing bone, muscle and cardiovascular loss as well as neuromotor deconditioning in a microgravity environment. The COLBERT will compensate for the negative influence of microgravity on the ISS crewmembers. The treadmill is designed to allow walking and running exercises in a microgravity environment for maintenance of cardiovascular fitness, muscular strength and the exercise of neurophysiological pathways and reflexes required to walk upon return to Earth. The COLBERT is also designed to minimize the transfer of dynamic forces caused by the operation of the treadmill so as not to disturb the microgravity environment of the ISS or impart excessive loads into the space station structure. The COLBERT utilizes a significant amount of existing NASA Program Hardware coupled with a commercially available high reliability treadmill. The Treadmill and supporting subsystems (power, cooling, etc.) are housed in an International Standard Payloads Rack (ISPR) and the vibration isolation system is a modified Passive Rack Isolation System (PaRIS). The harness that the subjects wear can be tightened or loosened depending on how much load you want to put on the muscles/bones during exercise. The Treadmill will operate in the following modes:

- (Powered) Active Mode: Tread belt driven by an electric motor (normal treadmill)

- (Powered) Passive Mode: Runner moves belt by pushing with his/her feet, motor resists tread motion, motor peak current provides adjustable resistance

- Unpowered Mode: Motor is completely unpowered, runner pushes the belt with his /her feet, and the resistance is solely from the rolling resistance of the system

In addition, the Treadmill will operate in a series of time-controlled stages, where each stage consists of a constant load and speed during that time with each stage having a 15-second minimum stage duration, and maximum stage duration of at least 3 hours. The Treadmill will have the capability to operate from a pre-programmed protocol, individualized and uplinked from the ground, for powered active and passive modes, as well as allowing crewmembers to input and adjust exercise protocols, in powered active and passive modes, before and during exercise. Furthermore, a crewmember can extend an exercise session without re-starting the protocol, and without interrupting data acquisition. In the active mode, the Treadmill will be able to provide speeds from 2.4 to 20 kilometers per hour (km/h) (1.5 to 12.4 mile per hour (mph)), with tread belt speed adjustment in 0.16 km/h (0.1 mph) increments. The COLBERT will maintain tread belt speed within 2 percent of the specified steady state speed for the maximum load of one body weight for a 95th percentile male. Tread belt speed ramp-up (acceleration) and ramp-down (deceleration) rates are both within 3.2 km/h/s (2 mph) per second, within load of one body weight for a 95th percentile male. Weekly tasks of the COLBERT will include cleaning of the handrails and display covers. Additionally, an overall inspection of the treadmill's condition will need to be done. Routine maintenance tasks will need to be done every 6 months. All nuts and bolts should be thoroughly inspected. The rack space should be checked for vacuum accumulated debris. The running surface will also need to be cleaned. Checks will need to be done on the drive belt, the belt tension and for sharp edges and burrs on slat surfaces. Annual maintenance tasks include grease

lubrication of the front and rear drums as well as rear drive shaft. The condition and alignment of the belt and drive shaft teeth should also be checked.

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Operations

Facility Operations

- The COLBERT will allow a single crewmember to configure the device for any exercise configuration in less than 10 minutes from the untended or stowed configuration, or from any other exercise configuration and toggle power on and off with a single control.

- The treadmill belt will begin movement and the exercise session initiated via crew action. The crewmember will be able to log into the system by selecting their name from a list and entering a unique private Personal Identification Number (PIN). A cool down protocol is also implemented that will take no more than a discrete single action for operation, last for five minutes and maintain speed of no less than 3.2 km/hr (2 mph) during the cool-down period.

- The Treadmill will have a safety stop to remove power from the motor.

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Decadal Survey Recommendations

Information Pending

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Results/More Information

Information Pending

Results Publications

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Ground Based Results Publications

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ISS Patents

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Related Publications

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Related Websites

- NASA Portal - COLBERT Ready for Serious Exercise

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Imagery

NASA Image: JSC2008E140813 - The COLBERT is adapted from a regular treadmill available on Earth. Engineers designed a structure to support the device that will allow ISS crewmembers to operate the COLBERT without shaking the rest of the ISS.

+ View Larger Image

NASA Image: ISS020E043681 - Canadian Space Agency astronaut Robert Thirsk assembles and installs the COLBERT in its temporary place in the Harmony node of the International Space Station.

+ View Larger Image

NASA image: ISS029E039888 - NASA astronaut Mike Fossum, Expedition 29 commander, is equipped with a bungee harness as he exercises on the Combined Operational Load Bearing External Resistance Treadmill (COLBERT) in the Tranquility node of the International Space Station.

+ View Larger Image

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International Space Station

Feature

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Do Tread on Me

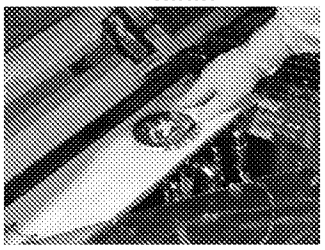
05.19.09

On Earth, we all know that exercise is good for us. But do we know exactly how good?

The situation is similar on the International Space Station. Astronauts and cosmonauts have been working out on orbit for close to 10 years, and researchers believe the exercise is a good countermeasure for the bone and muscle density loss that occurs when humans live for a long time without gravity.

But the exercise equipment on the station doesn't have the ability to record details about the workouts. Two new workout tools do have that capability. One, the Advanced Resistive Exercise Device, is on orbit already. A second was transferred to the station on Sept. 1 during the STS-125 shuttle mission.

+View the transfer and installation of the COLBERT treadmill



The C.O.L.B.E.R.T decal is placed on the Combined Operational Load Bearing External Resistance Treadmill. Image credit: NASA/Jim Grossmann
› View larger image

The Combined Operational Load Bearing External Resistance Treadmill, or COLBERT, will be the second treadmill on the space station, adding to a complement of six different exercise devices already in orbit that range from stationary bicycles to resistive exercise devices.

Named after comedian Stephen Colbert of Comedy Central's "The Colbert Report," the new treadmill, first and foremost, is a critical countermeasure device that will be used to keep the international crew healthy while in orbit and prepare them for return to Earth.

According to Project Manager Kevin MacNeil of NASA's Johnson Space Center, Houston, the COLBERT will have data collection devices that will allow doctors and scientists to see how well the treadmill exercise is minimizing the amount of bone and muscle density loss due to life without gravity. They'll use data on treadmill speed, session duration and body loading.

"COLBERT's maximum speed is 12.4 miles an hour," said MacNeil, an industrial engineer who has worked at NASA for 20 years, most of it with contractor Wyle Life Sciences. "But don't expect crew members to run that fast because 12.4 miles an hour is faster than the Olympic 100-meter race record. An average person runs 7- to- 8 miles an hour, and most crew members will run about 4- to- 6 miles an hour."

The first experiment to use the COLBERT will be the Functional Task Test (FTT), a study designed to identify the key underlying physiological factors that contribute to performance of of critical mission tasks for lunar and Mars operations.

The actual treadmill for COLBERT was purchased from Woodway USA, Waukesha, Wis. The COLBERT and supporting subsystems (power, cooling, etc.) will be housed in an International Standard Payloads Rack (ISPR). The entire assembly will be housed initially in the station's Harmony module, then be moved to the Tranquility node after it is launched in early 2010.

The total weight of the COLBERT rack is 2,200 pounds, including a modified Passive Rack Isolation System (PaRIS) that uses two-stage isolators, or shock absorbers to keep the exercise from interfering with microgravity sensitive experiments.

"The main purpose to the treadmill, of course, is to work out those walking and running muscles that would otherwise go unused up here," wrote Astronaut Ed Lu in one of his Expedition 7 journals in 2003. "To get a good aerobic workout, I walk for a mile, then run a couple of sets of half a mile each, then walk for a while longer. The pounding from the running may be helpful for preventing bone loss in the hips and legs, although the astronauts who flew on the Mir Space Station ran on the treadmill there and still suffered significant bone loss."

COLBERT is designed so that ground experts tracking crew health in orbit can create individual exercise prescriptions and uplink them to the crew as a profile. COLBERT will use the same control interface as that used for the ARED so that crew members won't have to learn a new one. The interface looks nearly identical to what you'd find in many gyms on Earth. Runners also will be able to set up a laptop computer and watch their favorite video on the go.

Each crew member is required to work out a total of two and a half hours a day, about an hour of that on the treadmill. Astronauts are expected to burn between 250 and 500 calories while working out on COLBERT, and researchers will measure that by tracking the foot force of running. Ground experts finally will be able to figure out how well runners are being conditioned or losing their deconditioning, and adjust exercise prescriptions accordingly.

Setting up for an exercise session on COLBERT "should be fairly simple," MacNeil said. "The first runner of the day will turn it on by flipping the rack power switch. After waiting a couple minutes for all systems to activate, they'll position the control interface to a location comfortable for them. They'll connect bungee cords to provide a load that will generate the foot force necessary to give the astronaut's bones and muscles a workout in the absence of gravity. They'll put on the harness that connects them to the bungees, set the desired load and verify that they agree with their prescription. Then, they'll log into the system, pick a profile, hit start and go ..."

NASA selected the treadmill's name after Colbert took interest in NASA's online Node 3 naming poll and urged his viewers to submit the name "Colbert." Although NASA ended up choosing the suggested name "Tranquility" for the node, the agency designated its new treadmill "COLBERT" in honor of the name that received the most entries. Expedition 14 and 15 astronaut Suni Williams made the announcement on "The Colbert Report" two years after running the Boston Marathon in space.

The COLBERT rack, treadmill and support hardware will launch in the Leonardo Multipurpose Logistics Module and be transferred to the station on flight day 5. The new workout machine will be set up and used after the shuttle Discovery departs.

+View Stephen Colbert's inspirational message

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Page Last Updated: October 23, 2010
Page Editor: Amiko Kauderer
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International Space Station

Treadmill with Vibration Isolation and Stabilization System (TVIS) - 05.17.18

Summary | Overview | Operations | Results | Publications | Imagery

ISS Science for Everyone

Science Objectives for Everyone

The Treadmill with Vibration Isolation and Stabilization System (TVIS) is an exercise system that is designed for use as a component of the CHeCS. In microgravity, astronauts do not exert as much force on their muscles as on Earth; without exercise, these muscles begin to atrophy. This can lead to bone density loss with symptoms similar to osteoporosis.

Science Results for Everyone A treadmill in the ISS gives astronauts a way to exercise and so maintain muscle and bone health. Because exercise causes vibrations and micro-acceleration, the treadmill has stabilizing systems to minimize their transfer to the ISS structure and to keep the exercise surface relatively stable. The most powerful low frequency vibrations on the ISS come from air conditioning compressors and gyrodynes which are rotors that stabilize the spacecraft. Treadmill use typically causes frequencies of 11 Hz (beats per second) and less, with spikes from changes in exercise modes, such as switching from walking to running. The data show that horizontal vibrations typically exceed those along the ISS's longitudinal axis, and distribution depends largely on where measurements are taken.

The following content was provided by Melissa Murray, and is maintained in a database by the ISS Program Science Office.

Facility Details

OpNom:

Facility Manager(s)

Melissa Murray, Johnson Space Center, Houston, TX, United States

Facility Representative(s)

Chad Zaruba, Engineering Science Contract Group, Houston, TX, United States

Randy Svetlik, Engineering Science Contract Group, Houston, TX, United States

Developer(s) Information Pending

Sponsoring Space Agency

National Aeronautics and Space Administration (NASA)

Sponsoring Organization

Human Exploration and Operations Mission Directorate (HEOMD)

ISS Expedition Duration

November 2000 - December 2002; November 2002 - May 2003; April 2003 - March 2013

Expeditions Assigned

1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19/20,21/22,23/24,25/26,27/28,29/30,31/32,33/34

Previous Missions

Information Pending

Availability

Retired/Returned/Disposed

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Facility Description

Facility Overview

- The Treadmill with Vibration Isolation and Stabilization (TVIS) was the first treadmill on the ISS, along with the Cycle Ergometer with Vibration Isolation System (CEVIS), and the Advanced Resistive Exercise Device (ARED) adding to a complement of three different exercise devices on board the ISS (TVIS is supplemented with the second generation Combined Operational Load Bearing External Resistance Treadmill (COLBERT) during expedition 19 during August 2009).

- TVIS is one of the critical countermeasure devices that is used to keep the ISS crewmembers fit while on-orbit and helps prepare them for return to Earth.

- During nominal on-orbit operations, data is recorded to the TVIS System PCMCIA cards that are inserted into the TVIS System Control Panel prior to exercise. Many parameters are recorded including temperatures, voltages, elapsed time, speed, heart rate and subject load. The crew downloads the TVIS System PCMCIA data to the SSC T61P for downlink to the ground for analysis. This allows scientists and doctors to evaluate how effective the treadmill exercise is in reducing the amount of bone and muscle density loss due to microgravity exposure, and allows for Engineering to monitor hardware performance and troubleshoot any anomalies.

- The TVIS is designed so that ground experts can track crew health on orbit to create individual exercise prescriptions and uplink them to the crew. The information sent down to the ground experts used in conjunction with other medical monitoring equipment is used to determine how well the crewmembers are being conditioned or lack thereof and to adjust exercise prescriptions accordingly.

On the ISS, the TVIS is suspended within an opening in the SM floor and allows limited movement in six degrees of motion. The Vibration Isolation & Stabilization (VIS) System is intended to minimize the dynamic forces of exercise being transferred to the structure of the ISS Service Module, while maintaining a relatively stable exercise surface. Movement of the TVIS is counteracted with active (gyroscope and stabilizer) and passive (bungees and wire ropes) vibration isolation systems. The active VIS components are software controlled and work in unison to counteract the pitch and roll forces imparted and provide a flexible mechanical connection to the ISS by stabilizing TVIS against excessive motion caused by exercise. The active components of the VIS System are the Gyroscope, four linear slide-mass Stabilizers, four Motor Controllers and a VIS Controller. The VIS System also serves to provide current peak smoothing of the TVIS power sources.

The running surface of the treadmill is used in much the same way as any conventional treadmill, except the user is held to its surface by the Series Bungee Systems (SBS), which uses latex rubber tubes and/or by the Subject Load Device (SLD), which attach to a shoulder and waist Treadmill Harness to counter the microgravity (µg) environment. When used without the SLDs, the SBSs are considered the contingency loading configuration.

The SLDs are the primary subject restraint system. Prior to exercise, the crewmember dons the Treadmill Harness and clips the harness y-straps to the respective end stops on the SLD's cables. The SLDs provide loading from 40 to 220 lb. The load variation of the SLD is approximately 6 lb/in. of cable extension. Each SLD makes use of 2 adjustable torsion springs tied to a cable-feed pulley. The crewmember used the Control Panel to enter the desired load. Mechanical limit switches in each SLD are used to prohibit over adjustment in either direction. Each SLD is instrumented with a load cell, which measures tension in the cable attached to the subject. This tension reading is used to determine the subject load supplied by the SLD. While the applied loads are continuously monitored and recorded every 5 seconds on the PCMCIA card, the system does not attempt to maintain constant load during exercise.

The TVIS System Electronics Box (EB) is responsible for distributing power and processing commands/data for the TVIS System. A battery circuit is used to maintain the real-time clock and maintain the relay configuration settings in case of a power failure or when the SM circuit breakers are turned off, e.g., for TVIS System maintenance. The battery has a 6-month operational life and can be

changed out by the crew via a door located on the aft end of the EB. The Device Interface Board (DIB) provides subsystem interconnectivity and is used to transfer commands and data to and from the VIS System, SLDs, Control Panel, and Motor Box. TVIS System circuit breakers are located on the aft end of the EB for over current protection of the system. Weekly tasks of the TVIS include cleaning of the handrails, closeout panels, and display covers to remove any dust, debris, sweat (Dry Wipe). Additionally, routine maintenance tasks are done Monthly, Quarterly, and every 6 months to inspect several general TVIS components, verify torque on accessible fasteners, lubricate needed components, set time and date on Control Panel, perform Speed Characterization Tests, replace electronic box battery, check gyroscope ropes and pivot spacers and check corner wire ropes. The rack space is checked for vacuum accumulated debris. Checks are done on the drive belt, belt alignment, belt tension, and for sharp edges and burrs on the running surface. Annual maintenance tasks include grease lubrication of the front and rear drums as well as rear drive shaft. With humans currently occupying the International Space Station (ISS) for six months and space exploration missions of one to three years on the horizon, preservation of crewmember health and fitness is a major objective of the international space community. Exercise has been the primary utility used by the space agencies in an effort to protect cardio-vascular, bone, and skeletal muscle health while in space for extended stays.

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Operations

Facility Operations

- TVIS user can override any exercise protocols when desired. The PCMCIA card is used to store the following parameters: Tread Speed, restraint Force, distance, elapsed time, heart rate, gyro speed, pre-programmed exercise protocol, fault messages, actual protocol performed, real-time clock, electronics box temperature, motor box temperature.

- The Generalized Controller Module processes data from the Electronics Box for display and storage onto the LCD and PCMCIA card, processes heart rate data for storage and display, and processes commands to the Electronics Box. The Control Panel also provides a switch pad with membrane switches and LED indicators, which are located on top of the panel. The membrane switches control solid state relays which can be used to enable/disable power to the VIS Stabilizers, VIS Gyro, Treadmill Motor, and Treadmill Control Panel/Electronics Box assembly in case of a TVIS subsystem failure.

- The treadmill can be operated in the motorized or non-motorized modes. In the motorized mode, the belt speed is adjustable from 0.0 to 16 km•h-1 (0.1 to 10.0 mph) in 0.16 km•h-1 (0.1 mph) increments. In the non-motorized mode, the belt speed is dependent upon the effort provided by the exerciser, and the resistance to belt motion can be manipulated with a braking system.

- The treadmill belt will begin movement and the exercise session initiated via crew action. Prescribed exercise regiment is currently 30-40 min at 70-85% of maximum heart rate (HRmax) on TVIS. Aerobic Intervals of 20-30 second "all out sprints." Eight (8) sets of 20 sec sprint with 10 sec recovery 2 min interval is sometimes used on ISS with 7 minute warm up at 40% of maximal oxygen uptake (VO_2max) , followed by 5x2 minute stages at 60, 70, 80, 90, 80% VO_2max then 5 min cool down. Also, two-minute interval is sometimes used on ISS with 7 minute warm up at 40% of VO_2max, followed by 5x2 minute stages at 60, 70, 80, 90, 80% VO_2max then 5 min cool down.

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Decadal Survey Recommendations

Information Pending

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Results/More Information

Investigations of the influence of low frequency vibrations on the microgravity environment on the Russian segment of the ISS begun after the first partial replacement of sensors IMU_128 (small acceleration meter) on the service module in March 2003. The most powerful vibrations are those created by air conditioning system (ACS) compressors and gyrodynes of the ISS stabilization system. The magnitude of these background perturbations vary from several meter-kilogram (mkg) to tens of meter-gram (mg) depending on the modes of operation and locality of the disturbance. Crewmembers performing physical exercises (PE) on the suite of exercising equipment onboard also produce micro accelerations which are collected and analyzed by researchers.

The TVIS is located in the service module of the Russian segment. The treadmill's damper system allows a maximum displacement of 12 cm and rotation of 2.5° relative to any axis and is designed to transfer minimal impact forces, however this does not provide for complete damping of movements. Vibrating frequencies of 11 Hz (cycle per second) and less can be attributed as frequencies characteristic for exercises on the treadmill. Periodic sharp increases of low frequency perturbations for approximately two minutes can be observed, within the greater power and higher frequency vibrations of ACS compressors and air-duct fans, and are indicative of changes in modes of exercises (walking, running, etc.). Significant differences in measurements are recorded when different compressors are operating along with the normal working activity of the crew and are responsible for greater perturbations than exercises on the treadmill. However, in all compartments and at various modes, characteristic frequencies are practically identical, but the amplitudes during physical exercises are several times higher than corresponding parameters of the background environment. In the Destiny module, perturbations below 1.0 Hz is dominated by treadmill exercises, but the total power of perturbations in the frequency band 0–6 Hz is approximately 2.5 times higher for the Russian bicycle ergometer than the treadmill. In the frequency band 0–10 Hz during PE on the service module (SM), perturbations in the American segment increase almost by an order of magnitude in comparison with the "quiet conditions." Similarly disturbances were previously recorded on the Mir space station during exercise equipment operations.

Overall, the main power of perturbations, concentrated in the band 50–200 Hz, is caused both by crew vital activity and by functioning standard onboard systems. The microgravity and vibration conditions in different compartments of the ISS at various modes of station operation can vary by more than an order of magnitude as sensors in the American segment also indicate. The data presented above show that, practically in all cases, the perturbations in the transverse plane of the *Destiny* module exceed perturbations along the longitudinal ISS axis, and the distribution of perturbations substantially depends on the location of measurements (Belyaev et al. 2009).

Results Publications

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Ground Based Results Publications

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ISS Patents

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Related Publications

Moore C, Svetlik R, Williams A. Designing for reliability and robustness in International Space Station exercise countermeasures systems. 2017 IEEE Aerospace Conference. Big Sky, MT; 2017 March 4-11 17 pp.

Moore C, Svetlik R, Williams A. Practical applications of cables and ropes in the ISS countermeasures system. 2017 IEEE Aerospace Conference, Big Sky, MT; 2017 March 4-11 21 pp.

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Related Websites

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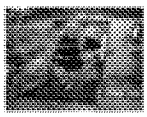
Imagery

NASA image: ISS028E041515 - NASA astronaut Nicole Stott, Expedition 28 flight engineer, equipped with a bungee harness, exercises on the Treadmill Vibration Isolation System (TVIS) in the Zvezda Service Module of the International Space Station (ISS).

+ View Larger Image

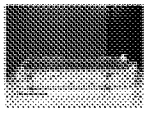


NASA image: ISS040E071309 - Russian cosmonaut Oleg Artemyev,Expedition 40 flight engineer, equipped with a bungee harness, exercises on the Treadmill Vibration Isolation System (TVIS) in the Zvezda Service Module of the International Space Station (ISS). Photo part of IVA clothing study.

+ View Larger Image

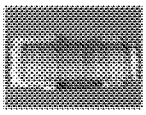
NASA image: ISS043E208128 - Cosmonaut G.I. Padalka, Expedition 43 flight engineer, equipped with a bungee harness, exercises on the Treadmill Vibration Isolation System (TVIS) (ELD-3/BD-2) in the Zvezda Service Module of the International Space Station (ISS).

+ View Larger Image



NASA image: JSC2002E38731 - Overall oblique view of the Treadmill Vibration Isolation System (TVIS) Chassis Assembly for use in the International Space Station (ISS) Service Module (SM).

+ View Larger Image



NASA image: JSC2002E38738 - Top view of the Treadmill Belt Assembly on the Treadmill Vibration Isolation System (TVIS) Chassis Assembly for use in the International Space Station (ISS) Service Module (SM).

+ View Larger Image

UNITED STATES DISTRICT COURT
DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC Plaintiffs,	:	CIVIL CASE NO. 3:15-CV-1665 (JCH)
v.	:	
WOODWAY USA, INC. Defendant.	:	JULY 24, 2018

RULING RE: PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT OF NON-INFRINGEMENT AND INVALIDITY (DOC. NO. 252) AND WOODWAY'S MOTION FOR SUMMARY JUDGMENT OF INFRINGEMENT (DOC. NO. 255)

I. INTRODUCTION

Pending before the court are the parties' Cross-Motions for Summary Judgment regarding the recently introduced Generation III TrueForm Runner treadmill (the "Gen. III"). See Plaintiffs' Motion for Summary Judgment of Non-Infringement and Invalidity ("Plaintiffs' MFSJ") (Doc. No. 252); Woodway's Motion for Summary Judgment of Infringement ("Woodway's MFSJ") (Doc. No. 255).

For the reasons stated below, both Motions are **DENIED**.

II. BACKGROUND

On December 29, 2015, the plaintiffs, Chapco, Inc. ("Chapco") and Samsara Fitness, LLC ("Samsara"), filed the Amended Complaint against the defendant, Woodway USA, Inc. ("Woodway"). See Amended Complaint ("Am. Compl.") (Doc. No. 27). The Amended Complaint seeks, inter alia, a declaratory judgment that the TrueForm Runner treadmill (the "Gen. II") does not infringe Woodway's U.S. Patent No.

9,039,580 (the "'580 Patent") and that the '580 Patent is invalid.[1] See id. at ¶¶ 33–40. Woodway filed its Answer to the Amended Complaint on July 25, 2016, asserting a number of counterclaims including, inter alia, infringement of claims 1, 4–6, 10–14, 18–20, and 25 of the '580 Patent. See Answer, Affirmative Defenses, and Counterclaims ("Answer") (Doc. No. 54) at ¶¶ 18–26.

On December 8, 2016, after briefing and oral argument, the court issued a Claim Construction Ruling, construing the 9 terms identified by the parties to be in dispute. See Claim Construction Ruling (Doc. No. 76). These 9 terms included 3 terms that were used in claim 25 of the '580 patent: frame, bearing rail, and running belt. See Woodway's Local Rule 56(a)(1) Statement of Facts ("Woodway's L.R.56(a)(1)") (Doc. No. 257, Ex. B ("'580 Patent") (Doc. No. 257-2) at Col. 36, L. 1–17. Neither party asked the court to construe any other terms.

The deadline for dispositive motions was May 1, 2017. See Minute Entry (Doc. No. 72). The plaintiffs and Woodway both filed Cross-Motions for Summary Judgment on May 1, 2017. See Plaintiffs' Motion for Summary Judgment ("Plaintiffs' Original MFSJ") (Doc. No. 88); Woodway's Motion for Summary Judgment ("Woodway's Original MFSJ") (Doc. No. 94). The court issued its Ruling on September 26, 2017. See Ruling on Plaintiffs' Motion for Summary Judgment and Woodway's Motion for Summary Judgment ("SJ Ruling") (Doc. No. 144).

As to infringement of the '580 Patent, Woodway moved for summary judgment against Samsara that the Gen. II infringes claims 1, 6, 19, and 20 of the '580 Patent.

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[1] Although the Amended Complaint and the Answer assert a number of other claims and counterclaims, the court focuses here only on those relevant to the '580 Patent.

See Memorandum in Support of Woodway's Original MFSJ ("Woodway's Original Mem. in Supp.") (Doc. No. 97) at 20–28. Woodway did not move for summary judgment as to claim 25. Chapco and Samsara moved for summary judgment that the Gen. II does not infringe any of the claims of the '580 Patent, including claim 25. See Memorandum in Support of Plaintiffs' Original MFSJ ("Plaintiffs' Original Mem. in Supp.") (Doc. No. 88-1) at 8–17 (arguing that the accused products do not infringe the "Asserted Claims"); id. at 1 (defining the "Asserted Claims" as claims 11–16 of the '169 Patent and claims 1, 4–6, 10–14, 18–20, and 25 of the '580 Patent). The court granted Woodway's Motion as to infringement of claims 1, 6, 19, and 20 of the '580 Patent and denied the plaintiffs' Motion as to noninfringement of the Asserted Claims. See SJ Ruling at 19.

As to invalidity of the '580 Patent, Woodway moved for summary judgment that the '580 Patent was not anticipated by Socwell or Schmidt; made obvious by combinations of Schmidt and Chickering, Schmidt and Magid, or Schmidt and Ziebell; or invalid under section 112 of title 35 of the United States Code for indefiniteness, lack of written description, or lack of enablement. See Woodway's Original Mem. in Supp. at 30–39. Chapco and Samsara moved for summary judgment that the "Asserted Claims," including claim 25, are invalid because they are rendered obvious by Socwell either alone or in combination with Chickering, Magid, and/or Schmidt. See Plaintiffs' Original Mem. in Supp. at 27–37.

Because the court declined to consider the plaintiffs' expert report to the extent the opinion was not disclosed in the plaintiffs' Invalidity Contentions, the court granted summary judgment for Woodway as to obviousness based on combinations of Schmidt and Chickering, Schmidt and Magid, and Schmidt and Ziebell. See SJ Ruling at 38–39.

On all other combinations of obviousness raised, however, the court denied summary judgment because it found that there was a genuine issue of material fact as to what a person of ordinary skill in the art would be, and whether such a person would have had a motivation to combine. See id. at 35–39. The court also granted summary judgment for Woodway on the issues of anticipation by Socwell and Schmidt, indefiniteness, lack of written description, and enablement. See id. at 39–41.

Finally, on the issue of Chapco's liability, the plaintiffs moved for summary judgment that Chapco is not liable for infringement of the patents under a theory of direct infringement, alter ego, or indirect infringement. See Plaintiffs' Original Mem. in Supp. at 4–8. The court granted summary judgment for the plaintiffs on the theory of indirect infringement because Woodway failed to disclose that theory in its Infringement Contentions. See SJ Ruling at 8–10. The court denied summary judgment on the theories of direct infringement and alter ego, however, because it found a genuine issue of material fact existed as to whether Chapco makes the products and as to whether Chapco and Samsara are alter egos of Weinstein. See id. at 6–8, 10–12.

With trial set to begin on May 14, 2018, the court held three Pretrial Conferences on April 10, 2018, April 12, 2018, and April 30, 2018. In preparing the case for trial, Woodway dismissed with prejudice a number of its counterclaims, including its claim that the Gen. II infringes claims 4–5, 10–14, 18, and 25 of the '580 Patent. See Motion to Dismiss (Doc. No. 244) at 2.

While the parties were preparing for trial, Chapco and Samsara had redesigned the Gen. II into a new Generation III model ("the Gen. III") that they intended to introduce on the market on May 15, 2018, in the middle of trial. See Transcript, April

12, 2018, Pretrial Conference ("4/12/18 Tr.") (Doc. No. 238) at 279. Based on its expert's evaluation of the Gen. III, Woodway asserted that the Gen. III infringes claim 25 of the '580 Patent and sought leave to add the issue of the Gen. III's infringement to the current litigation. See id. at 279–80. Claim 25 is a method claim. See '580 Patent at Col. 36, L. 1–17. Although Woodway withdrew its claim for infringement of claim 25 as to the Gen. II, it argued that claim 25 had been present in the case from the beginning and was properly alleged in the Amended Complaint. See id. at 280–81. The plaintiffs stated a preference for excluding the Gen. III from this case and instead resolving it in a separate lawsuit, but recognized that permitting Woodway to try the Gen. III along with the Gen. II was within the court's discretion. See id. at 283–84, 290. Partly as a result of unrelated scheduling conflicts that required the case to be continued until October, the court permitted the parties to add Gen. III to the current case. See Transcript, April 30, 2018, Pretrial Conference ("4/30/18 Tr.") (Doc. No. 247) at 367–68.

The parties agree that "[t]he only changes made between the Gen II TrueForm Runner treadmill and the Gen III relate to the wheels' location when the treadmill is in use, and the rear shaft assembly and its attachment to the frame." Woodway's L.R.56(a)(1) at ¶ 1; Plaintiffs' Local Rule 56(a)(2) Statement of Facts in Opposition to Summary Judgment ("Plaintiffs' L.R.56(a)(2)") (Doc. No. 265) at Resp. No. 1 (admitting the above statement from Woodway's Local Rule 56(a)(1) Statement of Facts). The parties further agree that "[c]laim 25 of the '580 patent does not require the elements of 'wheels' or a 'rear shaft.'" Woodway's L.R.56(a)(1) at ¶ 2; Plaintiffs' L.R.56(a)(2) at Resp. No. 2 (also admitting the above statement).

III. LEGAL STANDARD

A motion for summary judgment may be granted only where "there is no genuine dispute as to any material fact and the moving party is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a); see also Redd v. N. Y. Div. of Parole, 678 F.3d 166, 173–74 (2d Cir. 2012). The moving party bears the burden of "showing—that is pointing out to the district court—that there is an absence of evidence to support the nonmoving party's case." PepsiCo, Inc. v. Coca-Cola Co., 315 F.3d 101, 105 (2d Cir. 2002) (internal quotation marks and citations omitted). "Once a party moving for summary judgment has made the requisite showing that there is no factual dispute, the nonmoving party bears the burden of presenting evidence to show that there is, indeed, a genuine issue for trial." Santos v. Murdock, 243 F.3d 681, 683 (2d Cir. 2001). "For summary judgment purposes, a 'genuine issue' exists where the evidence is such that a reasonable jury could decide in the non-moving party's favor." Cambridge Realty Co., LLC v. St. Paul Fire & Marine Ins. Co., 421 Fed. App'x 52, 53 (2d Cir. 2011).

In reviewing the record, the court must "construe the evidence in the light most favorable to the non-moving party and draw all reasonable inferences in its favor." Gary Friedrich Enters., L.L.C. v. Marvel Characters, Inc., 716 F.3d 302, 312 (2d Cir. 2013).

> The function of the district court in considering the motion for summary judgment is not to resolve disputed questions of fact but only to determine whether, as to any material issue, a genuine factual dispute exists. . . . Summary judgment is inappropriate when the admissible materials in the record make it arguable that the claim has merit, for the court in considering such a motion must disregard all evidence favorable to the moving party that the jury is not required to believe.

Rogoz v. City of Hartford, 796 F.3d 236, 245–46 (2d Cir. 2015) (internal quotation marks, citation, and emphasis omitted).

IV. DISCUSSION

Woodway seeks a summary judgment that "the assembly of the recently available Gen III TrueForm Runner treadmill literally infringes claim 25 of the '580 patent." Memorandum in Support of Woodway's MFSJ ("Woodway's Mem. in Supp.") (Doc. No. 258) at 2 (emphasis in original). Woodway does not seek a summary judgment as to whether either plaintiff is responsible for the infringement. See id. at 29–30.

Chapco and Samsara seek a summary judgment of non-infringement, arguing that neither party performs all the steps of claim 25 and that Woodway has not pled a theory of joint infringement. See Memorandum in Support of Plaintiffs' MFSJ ("Plaintiffs' Mem. in Supp.") (Doc. No. 253) at 1. Chapco and Samsara also seek a summary judgment that claim 25 is invalid due to obviousness. See id.

A. Successive Summary Judgments

"[D]istrict courts enjoy considerable discretion in entertaining successive dispositive motions." Grabin v. Marymount Manhattan Coll., 659 Fed. App'x 7, 8 (2d Cir. 2016) (quoting Sira v. Morton, 380 F.3d 57, 68 (2d Cir. 2004)). However, "successive motions for summary judgment may be procedurally improper if the arguments in the second motion could have been raised in the first motion." Brown v. City of Syracuse, 673 F.3d 141, 147 n.2 (2d Cir. 2012); see also Ramos v. SimplexGrinnell LP, No. 07-CV-981 SMG, 2011 WL 4710814, at *2 (E.D.N.Y. Oct. 4, 2011) (stating that "[c]ourts are more likely to find a successive motion appropriate when it is supported by additional facts that were not available at the time of the first motion"); Singleton v. Grade A Mkt., Inc., No. 08-CV-1385 (JCH), 2009 WL 10689210, at *2 (D. Conn. Sept. 21, 2009) ("In the absence of a good reason to exercise its discretion and entertain a successive

summary judgment motion, a court ought not allow litigation to be conducted in piecemeal fashion.").

In this case, the court permitted the successive Cross-Motions for Summary Judgment because the introduction of the Gen. III into the case created the potential for additional discovery and new facts that were not considered in the original Cross-Motions for Summary Judgment.[2] The purpose of permitting the successive Motions was not to give the parties a second opportunity to raise arguments that could have been raised at the original summary judgment stage, but rather to allow the parties to address issues raised only by the Gen. III and that were not present with the Gen. II. None of the parties has done that here, as all of the arguments raised now were available and equally applicable to the Gen. II at the time of the court's prior Ruling on Summary Judgment.

Indeed, each side recognizes this fault in the other's Motion and asks the court to preclude the other from making arguments that could have been raised at an earlier stage in the litigation. See, e.g., Woodway's Memorandum in Opposition to Plaintiffs' MFSJ ("Woodway's Mem. in Opp.") (Doc. No. 268) at 11–18 (arguing that Chapco and Samsara should not be allowed to argue for summary judgment on invalidity based on new obviousness combinations that could have been brought in their first Motion for Summary Judgment); Woodway's Mem. in Supp. at 5–9 (arguing that none of the changes from the Gen. II to the Gen. III are relevant to claim 25, so all of the plaintiffs' arguments for non-infringement of claim 25 could have been made as to the Gen. II at

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[2] The court notes that it was initially not inclined to consider a successive summary judgment motion, see 4/12/18 Tr. at 361–65, but agreed to do so as a result of the continued trial date, see 4/30/18 Tr. at 372–74.

the time of the first summary judgment); Memorandum in Opposition to Woodway's MFSJ ("Plaintiffs' Mem. in Opp.") (Doc. No. 264) at 1–6 (arguing that Woodway's Infringement Contentions and expert report never argued that assembly satisfied the limitations of claim 25 as to the Gen. II, so it should not now be allowed to advance that new theory as to the Gen. III); Plaintiffs' Mem. in Supp. at 12–15 (arguing the same for Woodway's theory of divided infringement). Ironically, each side seeks to preclude the other from raising arguments that could have been raised previously, while at the same time failing to see the implications of such a principle for its own arguments.

Because the parties' arguments all "could have been raised in the first motion" regarding the Gen. II, see Brown, 673 F.3d at 147, the court declines to exercise its discretion to entertain such arguments in either successive Motion for Summary Judgment now. While it is true that additional discovery was conducted regarding the Gen. III, none of the arguments advanced by the parties are "supported by additional facts that were not available at the time of the motion." See Ramos, 2011 WL 4710814, at *2. As Woodway notes, the changes made from the Gen. II to the Gen. III are irrelevant to claim 25. See Woodway's Mem. in Opp. at 14–15; Woodway's Mem. in Supp. at 8–9. This is true, not only for the plaintiffs' arguments for invalidity and non-infringement, as Woodway points out, but also to Woodway's own arguments for infringement. The court briefly addresses the impropriety of each party's arguments for summary judgment.

As to the plaintiffs' Motion for Summary Judgment on invalidity, the court agrees with Woodway that the addition of the Gen. III to the case is immaterial to the validity or invalidity of claim 25. See Woodway's Mem. in Opp. at 11–18. In determining the

validity of a patent on a challenge of obviousness, the court must "compare the prior art to claims as one of ordinary skill of art at the time of the invention would have done." National Steel Car, Ltd. v. Canadian Pacific Ry., Ltd., 357 F.3d 1319, 1334 (Fed. Cir. 2004). "[T]his legal determination is to be made on the basis of the following underlying findings of fact: '(1) the scope and content of the prior art; (2) the differences between the prior art and the claims; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.'" Id. (quoting Riverwood Int'l Corp. v. Mead Corp., 212 F.3d 1365, 1366 (Fed. Cir. 2000)). Nothing in the analysis requires the court to consider at all the product accused of infringement. Therefore, any invalidity argument now raised in the plaintiffs' Motion for Summary Judgment could have been raised in their original Motion for Summary Judgment.

Indeed, the plaintiffs did move for summary judgment of invalidity in the first summary judgment. See Plaintiffs' Original Mem. in Supp. at 27–37. The plaintiffs' original Motion encompassed all "Asserted Claims," including claim 25 of the '580 Patent. See id. The plaintiffs now attempt to argue that the court's Ruling on Summary Judgment did not reach all of the invalidity references specific to claim 25. See Plaintiffs' Mem. in Supp. at 15. The court, however, ruled on all of the invalidity references that were raised in the plaintiffs' original Motion, denying the plaintiffs' request for summary judgment. See SJ Ruling at 35–39. To the extent that the plaintiffs' Motion now re-raises the same obviousness combinations, the court declines to reconsider or revise its prior Ruling. See Plaintiffs' Mem. in Supp. at 15 (arguing that "the Court has discretion to revise any ruling before entry of judgment"). To the extent that the plaintiffs' Motion raises new obviousness combinations that were not previously

raised, the court considers them procedurally improper because they could have been raised in the first Motion. The court therefore declines to consider them on the merits. The court agrees with Woodway that the plaintiffs may present timely disclosed obviousness combinations at trial,[3] see Woodway's Mem. in Opp. at 13, but are not entitled to summary judgment on them now.

As to the plaintiffs' Motion for Summary Judgment on noninfringement, the court also agrees with Woodway that all of the arguments raised by the plaintiffs now regarding the Gen. III were available and equally applicable to the Gen. II at the time of the first summary judgment. See Woodway's Mem. in Supp. at 5–9; Woodway's Mem. in Opp. at 11–15. The Gen. III differs from the Gen. II with respect to the location of the wheels and the absence of the rear shaft. See Woodway's L.R.56(a)(1) at ¶ 1; Plaintiffs' L.R.56(a)(2) at Resp. No. 1. Neither the wheels nor the rear shaft is mentioned in claim 25 or relevant to any of the plaintiffs' arguments for summary judgment. See Woodway's L.R.56(a)(1) at ¶ 2; Plaintiffs' L.R.56(a)(2) at Resp. No. 2. Therefore, there is no reason that these arguments could not have been raised as to the Gen. II at the prior summary judgment. That the plaintiffs chose not to raise the arguments earlier does not require the court to consider them belatedly now.

The court notes, however, that Woodway mischaracterizes the import of the plaintiffs' failure to raise the arguments at the prior summary judgment. Woodway argues that, because the only arguments plaintiffs made previously regarding claim 25

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[3] The plaintiffs may not, however, present combinations based on Schmidt and Chickering, Schmidt and Magid, or Schmidt and Ziebell. The court has granted summary judgment for Woodway as to obviousness based on these combinations in its prior Ruling on Summary Judgment. See SJ Ruling at 38–39.

were to the frame and the bearing rail, the plaintiffs conceded that all other limitations were satisfied and that "the Gen II TrueForm Runner would infringe as a matter of law if the Court determined that it includes the 'frame' and 'bearing rail' elements." Woodway's Mem. in Supp. at 7. Woodway quotes this court as saying, "[T]he court concludes that the evidence supports a finding that, if the components identified by Woodway to be the 'frame' and 'bearing rail' satisfy the limitations as defined by the court's Claim Construction Ruling, then a judgment of infringement as to the Accused Products should enter." Id. at 7–8 (quoting SJ Ruling at 15). The court's statement was made, however, in the context of evaluating Woodway's Motion for Summary Judgment, which included only claims 1, 6, 19, and 20, not claim 25. See SJ Ruling at 14. Therefore, Chapco and Samsara were not required to defend against claim 25 at the prior summary judgment.

Chapco and Samsara did move for summary judgment of noninfringement of claim 25 and, in doing so, did not advance the arguments in their current Motion. While this failure to raise the arguments in their previous Motion prevents them from now seeking summary judgment on such arguments, it does not constitute waiver of those arguments. A party is not required to affirmatively move for summary judgment on an argument in order to preserve that argument for trial, as long as the claim is adequately pled and disclosed. See Street v. Corr. Corp. of Am., 102 F.3d 810, 816 (6th Cir. 1996); Move, Inc. v. Real Estate Alliance Ltd., 221 F. Supp. 3d 1149, 1157 (C.D. Cal. 2016) ("[W]e are aware of no authority suggesting that [the party] was required to move for summary judgment on its . . . argument in order to preserve this argument."). Thus, while it is procedurally improper for the plaintiffs to attempt to raise the omitted

arguments now in a successive summary judgment motion, they are not precluded from presenting timely disclosed[4] noninfringement arguments to the jury at trial.

As to Woodway's Motion for Summary Judgment on infringement, the court notes that it is inconsistent for Woodway to argue that Chapco and Samsara are prevented from raising arguments that they could have raised at the prior summary judgment without holding itself to the same standard. As stated above, Woodway argues that the changes from the Gen. II to the Gen. III are irrelevant to claim 25. See Woodway's Mem. in Supp. at 8–9. Thus, following the same logic that Woodway applies to the plaintiffs' Motion, Woodway could have moved for summary judgment on claim 25 as to the Gen. II during the original summary judgment. In choosing only to move for summary judgment on claims 1, 6, 19, and 20, Woodway made a strategic decision. To quote Woodway's own words, "The Court should not indulge Plaintiffs' serial motion practice particularly when Plaintiffs made a strategic choice to handle their prior Summary Judgment Motion the way they did." Woodway's Mem. in Opp. at 14. Thus, applying Woodway's reasoning evenly to both parties, neither Woodway nor the plaintiffs can use the addition of the Gen. III in this case to circumvent their prior strategic decisions for a second chance at summary judgment that should have been sought the first time around. Like Chapco and Samsara, Woodway can present its previously disclosed infringement arguments to the jury, but it cannot now argue for summary judgment of infringement of claim 25 as to the Gen. III when it failed to do so previously as to the Gen. II.

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[4] To the extent that either party argues that the other failed to timely disclose a theory in the Infringement, Invalidity, or Noninfringement Contentions, the court will entertain those arguments on Motions in Limine prior to trial.

In sum, both Motions for Summary Judgment are denied as improper uses of a successive summary judgment motion.

B. Claim Construction

Finally, the court briefly addresses the construction of "providing" and "disposing on" in claim 25. In their respective Motions for Summary Judgment, the parties appear to dispute the construction of these two terms, which neither party requested to be construed at the claim construction stage of the litigation. See Woodway's Mem. in Supp. at 18, 25; Plaintiffs' Mem. in Supp. at 7, 9–11; Woodway's Mem. in Opp. at 4. Each side accuses the other of advancing an argument that was not disclosed in the Infringement Contentions or Noninfringement Contentions. See Plaintiffs' Mem. in Opp. at 1–7, 24 (arguing that Woodway's Supplemental Preliminary Infringement Contentions did not advance the theory that "providing" includes assembly); Woodway's Mem. in Supp. at 17 (arguing that Chapco and Samsara admitted that the claim limitation of "providing" was satisfied because they did not challenge it in their Supplemental Noninfringement Contentions). Indeed, neither the plaintiffs' Noninfringement Contentions nor Woodway's Infringement Contentions contains any discussion of the terms "providing" or "disposing on." See Woodway's Infringement Contentions (Doc. No. 67-1) at 45–52; Woodway's Supplemental Infringement Contentions (Doc. No. 90-7) at 48–56; Plaintiffs' Noninfringement Contentions (Doc. No. 96-12) at 45–52; Plaintiffs' Supplemental Noninfringement Contentions (Doc. No. 96-8) at 49–57.

Moreover, each side also accuses the other of failing to identify "providing" and "disposing on" as disputed terms at the claim construction stage. See Woodway's Mem. in Supp. at 9–12, 17, 24; Plaintiffs' Mem. in Opp. at 23–25. Each side characterizes the other party as untimely requesting new claim construction while itself

purporting to apply the plain and ordinary meaning of the terms. See Woodway's Mem. in Supp. at 18 (arguing that "providing" should be given its plain and ordinary meaning); id. at 25 (arguing that "disposing on" does not require construction and should be given its plain and ordinary meaning); Plaintiffs' Mem. in Opp. at 24–25 ("Plaintiffs and Dr. Giachetti apply the plain and ordinary meaning for those terms, consistent with Federal Circuit precedent.").

"It is routine case management to require litigants to identify the aspects of their case that are material to the dispute." Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999). Thus, "only those terms need to be construed that are in controversy, and only to the extent necessary to resolve the controversy." Id. The Federal Circuit has held that a party waives an argument with respect to a term if it fails to raise the argument during the claim construction phase. Cent. Admixture Pharmacy Servs., Inc. v. Advanced Cardiac Sols., P.C., 482 F.3d 1347, 1356 (Fed. Cir. 2007); see also Advanced Steel Recovery, LLC v. X-Body Equip., Inc., No. 2:12-CV-1004-GEB-DAD, 2014 WL 3939356, at *4 (E.D. Cal. Aug. 11, 2014), aff'd, 808 F.3d 1313 (Fed. Cir. 2015). In this case, both parties failed to identify "providing" and "disposing on" as material to the dispute at the claim construction stage.

Nonetheless, claim construction is a question of law for the court, and "[w]hen the parties present a fundamental dispute regarding the scope of a claim term, it is the court's duty to resolve it." O2 Micro International Ltd. v. Beyond Innovation Technology Co., Ltd., 521 F.3d 1351, 1362 (Fed. Cir. 2008). In O2 Micro, the parties agreed that the term "only if" had a common meaning, but disagreed as to the scope of the claim term. Id. at 1361. The Federal Circuit held that the district court erred by failing to

adjudicate the disputed scope because it resulted in the parties improperly presenting their claim construction arguments to the jury. Id. Therefore, despite the untimely nature of the parties' arguments regarding the proper construction of "providing" and "disposing on," the court construes these terms and addresses the arguments that the parties now belatedly advance. See Cioffi v. Google, Inc., No. 213-CV-00103-JRG-RSP, 2017 WL 275386, at *5 & n.2 (E.D. Tex. Jan. 9, 2017), report and recommendation adopted, No. 213-CV-00103-JRG-RSP, 2017 WL 235011 (E.D. Tex. Jan. 19, 2017); Koninklijke Philips N.V. v. ZOLL Lifecor Corp., No. 2:12-CV-1369, 2015 WL 12781198, at *6–*9 (W.D. Pa. July 15, 2015).

1. "Providing"

Claim 25 uses the term "providing" in two steps: "[p]roviding a manually powered treadmill," and "[p]roviding a first bearing rail and a second bearing rail." '580 Patent at Col. 36, L. 2–9. Both parties purport to adopt the plain and ordinary meaning of the term "providing." See Woodway's Mem. in Supp. at 18, 25; Plaintiffs' Mem. in Opp. at 24–25. Generally, when the plain and ordinary meaning of a disputed term is clear and resolves the dispute between the parties, the court is not required to give the term any further construction. See Summit 6, LLC v. Samsung Elecs. Co., Ltd., 802 F.3d 1283, 1291 (Fed. Cir. 2015). However, "[a] determination that a claim term 'needs no construction' or has the 'plain and ordinary meaning' may be inadequate when a term has more than one 'ordinary' meaning or when reliance on a term's 'ordinary' meaning does not resolve the parties' dispute." O2 Micro, 521 F.3d at 1361.

In this case, despite the characterization of their arguments as arguments relating to claim construction, the parties do not appear to actually disagree about the construction of the term "providing," only its application to the facts of this case. The

parties agree that Federal Circuit precedent indicates that claim terms "are generally given their ordinary and customary meaning." Phillips v. AWH Corp., 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (citation omitted). The ordinary and customary meaning is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention . . . ." Id. at 1313. The Federal Circuit states that, in some cases, the plain and ordinary meaning "may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." Id. at 1314. In such circumstances, the court may look to general purpose dictionaries. See id.; Meyer Intellectual Properties Ltd. v. Bodum, Inc., 690 F.3d 1354, 1368 (Fed. Cir. 2012) (holding that "judges are free to rely on dictionary definitions when construing claims, so long as the dictionary definition does not contradict any definition found in or ascertained by a reading of the patent documents" (internal quotation marks and citation omitted)).

Both parties here appear to agree that the meaning of "providing" is apparent, as none of the parties points the court to any intrinsic or extrinsic evidence beyond the claim terms themselves. The Merriam-Webster Dictionary defines "provide" as "to supply or make available (something wanted or needed)." Merriam-Webster Dictionary, "Provide," https://www.merriam-webster.com/dictionary/provide. A number of courts, including the Federal Circuit, have adopted a similar definition as the plain and ordinary meaning of the term. See Meyer Intellectual, 690 F.3d at 1369 (construing "providing" to mean "furnishing, supplying, making available, or preparing"); On Demand Mach. Corp. v. Ingram Indus., Inc., 442 F.3d 1331, 1341 (Fed. Cir. 2006) (construing

"providing" to have "its usual and customary meaning, including to supply for use, contribute, or furnish"); Timeline, Inc. v. Proclarity Corp., No. C05-1013JLR, 2007 WL 321387, at *4–*5 (W.D. Wash. Jan. 31, 2007) (construing "providing a driver" as "supplying or making available a driver"); Applied Interact, LLC v. Vermont Teddy Bear Co., No. 04 CIV.8713 HB, 2005 WL 2133416, at *7 (S.D.N.Y. Sept. 6, 2005).

Indeed, in this case, the parties actually appear to agree that the dictionary definition of providing is the plain and ordinary meaning of the term. Plaintiffs argue that "providing" should be construed to mean "furnishing, supplying, making available, or preparing," as in Meyer Intellectual. See Plaintiffs' Mem. in Supp. at 7. Woodway similarly cites the construction of "providing" used in Lego Systems A/S v. Rubicon Communications, LP: "'to supply what is needed for sustenance or support,' . . . which is synonymous in its function with 'having.'" Woodway's Mem. in Supp. at 18 (quoting Lego Sys. A/S v. Rubicon Comm'ns, LP, No. 3:15-CV-000823 (VLB), 2017 WL 4280866, at *15 (D. Conn. Sept. 27, 2017)). Applying the same meaning of "providing" as the plaintiffs, Woodway then argues, "There can be no dispute of material fact that the employees who assemble the Gen III supply the treadmill with the claimed elements, including, for example, a first and second bearing rail, such that the treadmill contains or has these elements. By assembling the Gen III, Plaintiffs' employees are making it available for use." Id. (emphasis added).

Thus, the dispute between the parties is not over the construction of the term "providing," but, rather, whether Chapco's assembly of the Gen. III satisfies this claim limitation. Specifically, Chapco argues that it does not furnish or supply the manually powered treadmill because it does not assemble the running belt, nor does it supply or

make available the bearings on the bearing rail.[5] See Plaintiffs' Mem. in Supp. at 8–9. This is a factual dispute that depends in large part on whether Chapco can be found to complete the assembly of the final product if its employees do so while leased to Samsara. See SJ Ruling at 6–8 (finding that a genuine issue of material fact exists as to this issue). This is not a dispute over the construction of the term "providing."

The Federal Circuit has held that, "[i]f the claim language is clear on its face, then our consideration of the rest of the intrinsic evidence is restricted to determining if a deviation from the clear language of the claims is specified." Interactive Gift Exp., Inc. v. Compuserve, Inc., 256 F.3d 1323, 1331 (Fed. Cir. 2001). Intrinsic evidence includes "the patent itself, including the claims, the specification and, if in evidence, the prosecution history." Id. Neither party has made any argument based on the intrinsic evidence, nor is the court aware of any intrinsic evidence that would indicate a deviation from the clear language of the claims.

Accordingly, "providing" should be given its plain and ordinary meaning of "furnishing, supplying, making available, or preparing," which is not disputed by the parties. See Meyer Intellectual, 690 F.3d at 1368.

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[5] The plaintiffs also argue that Woodway cannot seek summary judgment based merely on the assembly of the product without identifying a liable entity because that would not satisfy the claim limitation of "providing." See Plaintiffs' Mem. in Opp. at 12–16. The plaintiffs do not appear to be arguing that, during the assembling process, the assembler does not "provide" the components. Rather, the plaintiffs argue that abstract assembly is insufficient without an entity to do the action of "providing." This is not an argument about claim construction, however. Rather, it is an argument challenging the nature of the summary judgment Woodway seeks. Therefore, it does not affect the court's claim construction analysis.

Moreover, such an argument is relevant only to Woodway's summary judgment argument, which the court has already declined to consider. At trial, Woodway will need to prove liability against Chapco, Samsara, or both.

2. "Disposing On"

The third step in claim 25 of the '580 Patent requires "[d]isposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rail." '580 Patent at Col. 36, L. 10–14. As with "providing," both sides claim to be applying the plain and ordinary meaning of the term "disposing on." See Woodway's Mem. in Supp. at 25 (arguing that "disposing" is a common term that does not require construction); Plaintiffs' Mem. in Supp. at 11. Here, however, the parties agree that the plain and ordinary meaning should apply, but disagree as to what that meaning should be. See O2 Micro, 521 F.3d at 1361 (noting that the parties agreed that the term had a common meaning, but nonetheless disputed the scope of the claim term, thereby requiring the court to resolve the dispute).

The plaintiffs argue that "[t]he plain and ordinary meaning of 'disposing' a running belt 'on' is locating the belt on the bearings so that they touch without intermediary components." Plaintiffs' Mem. in Supp. at 11. Woodway argues, to the contrary, that "disposing on" may be satisfied if the running belt and bearings are touching, but does not require them to do so. See Woodway's Mem. in Opp. at 4–8. Woodway argues that "disposing on" merely requires the actor "to provide a running belt and locate it above the bearing rails such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails." Id. at 5.

The court begins by looking to the general purpose dictionary's definition of the terms. The Merriam-Webster Dictionary defines "dispose" as "to put in place; set in readiness; arrange." Merriam-Webster, "Dispose," https://www.merriam-webster.com/dictionary/dispose. The parties do not appear to dispute this meaning of

the term "dispose," but, rather, concentrate their attention on the preposition "on." Dictionaries provide a number of varying definitions for "on," some, but not all, of which reference direct contact. For example, the Merriam-Webster Dictionary's definitions of "on" include "used as a function word to indicate position in contact with and supported by the top surface of." Merriam-Webster, "On," https://www.merriam-webster.com/dictionary/on (emphasis added). The Merriam-Webster Dictionary offers as an example, however, the following: "the book is lying on the table." Id. The court notes that, even though the definition requires contact and support, this example is more ambiguous. In common parlance, people are likely to consider a book to be "on" the table, even when the book is on a tablecloth or a place mat rather than directly touching the table. Moreover, the Oxford-English Dictionary defines "on" as "above and in contact with; at rest on the upper surface of; above and supported by." Oxford-English Dictionary, "On," http://www.oed.com/view/Entry/131297?isAdvanced=false&result=5&rskey=q1jZBc& (emphasis added); see also id. ("Of local position outside of, but in contact with or close to, a surface." (emphasis added)). Thus, general purpose dictionaries appear to permit both constructions of the term that require contact and constructions that do not.[6]

[6] In one case, the district court for the Southern District of New York considered these two constructions of the words "disposed on." See Seoul Viosys Co., Ltd. v. P3 Int'l Corp., No. 16-CV-06276 (AJN) (SN), 2017 WL 4011493, at *3–*6, *8 (S.D.N.Y. Sept. 11, 2017). The Seoul Viosys court held that, in three of the four patents at issue, based on the specification, "on" meant "directly on or directly connected to the other element or layer, or intervening elements or layers may be present." See id. In one of the four patents, the court held that "on" meant "directly on or directly connected to the other element or layer." See id. at *5–*6. While the patent in that case was different from the '580 Patent before this court in that the specification provided more explicit guidance regarding the meaning of the term "on," the case does support the conclusion that the word "on" is capable of reasonably bearing both constructions.

Here, the court must read the term in the context of the claim language, as well as of the entire patent. See Phillips, 415 F.3d at 1313. In this case, there is nothing in the claim language to indicate that "disposing on" is limited to the more restrictive definition of "on." The claim does include specific requirements as to the relationship between the running belt and the bearing rails, i.e. that the running belt must be disposed "such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails." '580 Patent at Col. 36, L. 11–14. The fact that the specific relationship between the running belt and the bearing rails is described without expressly requiring that the two must touch supports Woodway's interpretation that direct contact between the two components is not required.

Additionally, the court looks to the rest of the patent, including the specification, to determine how a person of ordinary skill in the art would read the claim term. See Interactive Gift, 256 F.3d at 1331 ("If . . . the claim language is not clear on its face, then our consideration of the rest of the intrinsic evidence is directed to resolving, if possible, the lack of clarity."). The only intrinsic evidence referenced by either party is the use of the language "supported by" in claim 1.[7] See Plaintiffs' Mem. in Supp. at 10–11. The plaintiffs argue that Dr. Blair opined that the term "supported by" does not require the components to directly touch. See id. at 10. Therefore, the plaintiffs contend that "'disposing on' cannot mean indirect support, or the patentee would have used 'supported by.'" Id. (citing CAE Screenplates, Inc. v. Heinrich Fiedler GmbH & Co. KG,

[7] The parties make no arguments based on the specification or the prosecution history. Any arguments not made at the claim construction stage are waived. See Cent. Admixture, 482 F.3d at 1356.

224 F.3d 1308, 1317 (Fed. Cir. 2000) (instructing courts to "presume that the use . . . of different terms in the claims connotes different meanings")). Woodway counters by arguing that it is appropriate to assign the same or similar meanings to two distinct terms that are similar in meaning. See Woodway's Mem. in Supp. at 6–7 (quoting, inter alia, Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc., 381 F.3d 1111, 1120 (Fed. Cir. 2004) ("[T]he context does not show that 'connected' and 'associated' should be differentiated into the definitions proposed by [defendant], and we must conclude that this is simply a case where the patentee used different words to express similar concepts, even though it may be confusing drafting practice.").

The court is not persuaded by the plaintiffs' argument. First, a more natural explanation for the use of the two different terms is that the patentee likely uses "disposing on" instead of "supported by," not to distinguish between direct and indirect support but, rather, to distinguish between an action done by the assembler of the product and a passive description of the relationship between the components. Claim 1 is an apparatus claim, and "supported by" describes the relationship between the running belt and bearing rails. Claim 25, on the other hand, is a method claim, which requires certain steps to be taken by the patent infringer. In that context, "disposing on" describes what the assembler does to the running belt and the bearing rails. Thus, the court is not persuaded by the plaintiffs' argument that the use of the term "disposing on" rather than "supported by" should be read to import the added requirement that the two components be directly touching. Rather, it is more likely that claim 1 and claim 25 describe the same or similar positioning between the running belt and bearing rails, but that claim 25 uses terms that describe the steps taken by the assembler.

Second, the specification further supports a construction of "disposing on" that requires the running belt to follow the curved running surface corresponding to the curved profile of the bearing rails, as specified expressly in claim 25, but without necessarily requiring the running belt to directly touch the bearings or bearing rails. The plaintiffs have not pointed to any language in the specifications that would require direct contact between the two components or indicate why direct contact is relevant to the claim. See KCJ Corp. v. Kinetic Concepts, Inc., 223 F.3d 1351, 1356 (Fed. Cir. 2000) ("[W]hen the claim language or context calls for further inquiry, this court consults the written description for a clear intent to limit the invention to a singular embodiment.").

The specification of the '580 Patent discusses the relationship between the running belt and the bearing rails primarily in the context of the need to maintain the non-planar shape of the running belt. See '580 Patent at Col. 13, L. 13–15 ("Following the shape of the bearing rails [200] is not the natural tendency of the running belt for the particular contour seen in FIG. 5."). In this context, the focus is on ensuring that the shapes correspond, not that the components directly touch. See id. at Col. 13, L. 50–57 ("In the exemplary embodiment shown in FIG. 5, when positioning the running belt [16] about the front and rear running belt pulleys [62, 66], a length of the running belt [16] sufficient to permit the running belt [16] to correspond to (e.g., follow, be positioned against or above, etc.) the desired contours of the bearing rails [200] and the front and rear running belt pulleys [62, 66] is generally disposed between the front and rear shafts [64, 68]."). A running belt can follow or be positioned above a bearing rail without necessarily touching the bearings. For example, an intermediary component that

similarly follows the shape of the bearing rails would not prevent the running belt from corresponding to, following, or being positioned above the bearing rails.

The court notes that the specification does describe an exemplary embodiment in which the "running belt [16] contacts and is supported in part by the bearings [208] of the bearing rails." '580 Patent at Col. 11, L. 58–59. However, the specification does not indicate that contact is required. Therefore, the court does not read this particular exemplary embodiment as precluding an embodiment in which the running belt is supported by, but not in contact with, the bearings. See KCJ Corp., 223 F.3d at 1356 ("Moreover, standing alone, a disclosure of a preferred or exemplary embodiment encompassing a singular element does not disclaim a plural embodiment. '[A]lthough the specifications may well indicate that certain embodiments are preferred, particular embodiments appearing in a specification will not be read into the claims when the claim language is broader than such embodiments.'" (quoting Electro Medical Systems, S.A. v. Cooper Life Sciences, Inc., 34 F.3d 1048, 1054 (Fed. Cir. 1994))); Probatter Sports, LLC v. Sports Tutor, Inc., No. 3:05-CV-01975 (VLB), 2014 WL 1315991, at *4 (D. Conn. Mar. 31, 2014). Indeed, in this context, the specification expressly provides that "other suitable shape-providing components may be used in combination with the bearing rails." '580 Patent at Col. 12, L. 7–10. Thus, the specification contemplates other embodiments that maintain the shape of the running belt, as required by the claim language.

Therefore, based on the claim language itself and the intrinsic evidence, the court construes "disposing on" to mean "placing above," such that the running belt may, but is not required to, touch the bearings or the bearing rails.

V. CONCLUSION

For the reasons stated above, Plaintiffs' Motion for Summary Judgment is **DENIED**, and Woodway's Motion for Summary Judgment is **DENIED**. Woodway's corresponding three Motions to Seal are **GRANTED**. See Motion to Seal Second Supplemental Expert Report of Kim B. Blair (Doc. No. 237); Motion to Seal Memorandum in Support of Woodway's MFSJ (Doc. No. 260); Motion to Seal Memorandum in Opposition to Plaintiffs' MFSJ (Doc. No. 270).

SO ORDERED.

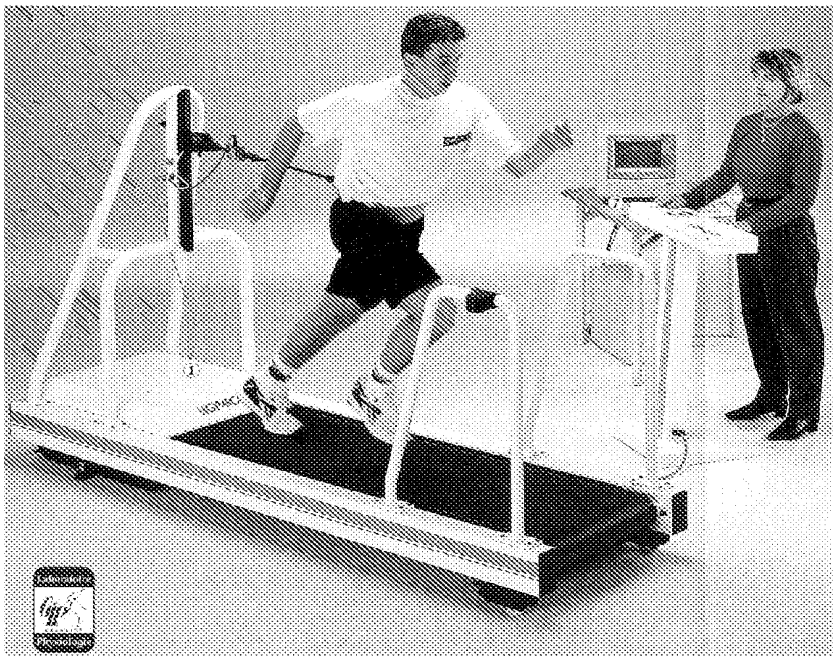
Dated at New Haven, Connecticut this 24th day of July, 2018.

/s/ Janet C. Hall
Janet C. Hall
United States District Judge

MEDICAL DEVELOPMENT *a trade-mark of TECMACHINE*

SPRINT CLUB

Explosive power measurement system for Sprint application .



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SPRINT CLUB

The SPRINT CLUB is a patented French-manufactured machine for measuring muscular effort. Thanks to the SPRINT2000[8] software, it is possible to measure, under practically real-life conditions, the external mechanical force exerted by an athlete when sprinting.

The machine can also be used as a traditional treadmill for warm up and training.

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< TECHNICAL PART

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- Interface box
- Measurement box
- Installing SPRINT2000© software
- SPRINT2000© software informations

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PREFACE

Congratulations on your new purchase of a SPRINT CLUB treadmill.

This treadmill has undergone a rigorous manufacturing quality inspection, making it an extremely reliable muscular measurement machine.

The experience we have gained over the years, particularly with teams of scientists of world renown, has enabled us to know the precise requirements of users and can offer them a machine adapted to every use.

GUARANTEE

- Our equipment is guaranteed for a period of 12 months, as of its delivery date, against all manufacturing defects or material defects.
- The guarantee covers parts identified as being defective and the labour required to replace them in our workshops.
- Transport, handling, packaging or any call-out costs for work on site are not covered by our guarantee.
- The guarantee does not apply to repairs resulting from mistakes, damage, accident, faulty installation, lack of supervision or any other aspect beyond our control.
- Our guarantee is null and void if any modifications, repairs or works are carried out without our written consent.
- Any work we perform during the guarantee period shall not have the effect of extending this period.
- In no case whatsoever does our guarantee imply the possibility of making a claim for damages or for any compensation.

CONDITIONS OF USE

A training treadmill is a dynamic machine fitted with a motor to drive the belt. It must be used in compliance with the environment for which it was designed.

1/ Electrical environment

This training treadmill complies with the European low voltage standard (EN 60204-1, dated 1993).

However, the customer must, for the part for which he is liable, i.e. the electrical connection to his power network, check or have checked that his installation is in compliance with the latest standards in force.

2/ Climatic environment

This treadmill shall be installed in a closed room, sheltered from bad weather.

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Amongst other things, the following is prohibited:

< any installation outside or in an environment that is not protected from external climatic variations,

< any installation in a damp room, bearing traces of humidity or leaking water.

ELECTRICAL CONNECTION

The SPRINT CLUB measurement system has to be connect on a 100 to 130Vac network power supply

In all cases, your network shall be fitted with an earth socket and protected in compliance with the standards in force.

GENERAL DESCRIPTION

The SPRINT CLUB is an original treadmill which can fulfil 2 functions:

- a traditional treadmill
- a free treadmill function

↔ TRADITIONAL TREADMILL, SPEED MODE:

< The treadmill belt is driven by an electric motor at a constant speed which can be set between 1 and 18 km/h,

< The treadmill imposes the walking or running speed. The runner has to adapt his speed. This function is used to train or warm up the subject.

↔ FREE TREADMILL, TORQUE MODE:

< This is the SPRINT CLUB's original operating mode, which measures the external mechanical force exerted by the subject while running.

< In this case, the motor can driven in TORQUE mode and only used to compensate all or part of the belt's rubbing against the base, so that the runner experiences the same sensations as when running on the ground.

< It is the runner who drives the treadmill belt.(constant torque between 1 and 36km/h)

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To this end, he is held in a fixed position by a band attached around the waist and connected to a supporting bar, articulated at the ends so as to allow vertical and side movements.

TRADITIONAL TRAINING TREADMILL or SPEED MODE
The treadmill imposes the running speed.

FREE TREADMILL or TORQUE MODE
The runner drives the treadmill belt.

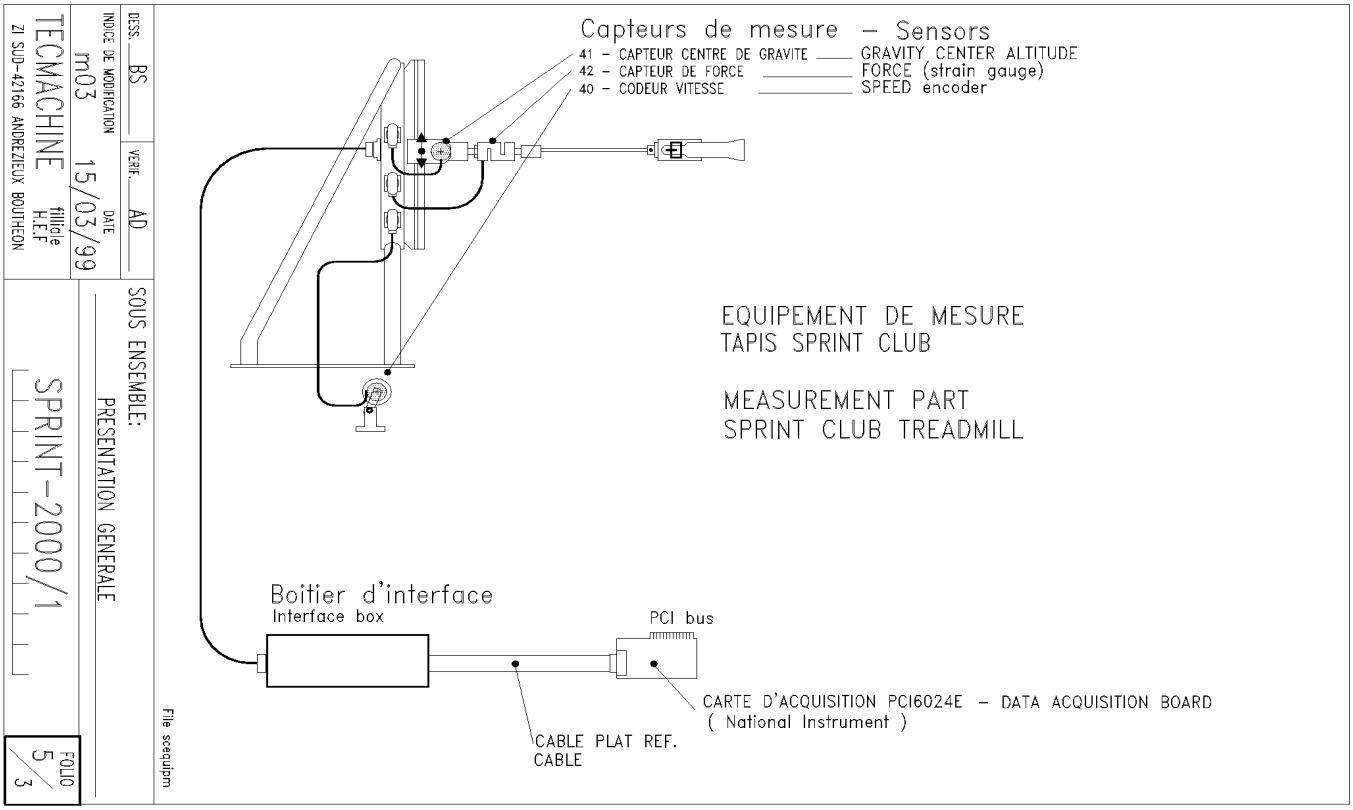
MEASUREMENT INSTRUMENTS - see figure

< NOTE: The measurements described below can only be used in free treadmill mode.

< Sensors mounted on the treadmill and connected to an electronic interface are used to obtain electronic signals corresponding to the following data:

- treadmill speed,
- horizontal traction force of the runner,
- vertical displacement of the runner's centre of gravity. (It is considered that the altitude of the runner's centre of gravity is represented, approximately, by the point attached to the subject's waist).

< The speed of the treadmill is calculated using a signal generated by an optical encoder mounted on the axis of the cylinder driving the treadmill.
The vertical and horizontal forces exerted by the runner are calculated using a signal generated by a stress-gauged force sensor mounted on the supporting bar.
The runner's vertical movement is calculated using a signal generated by an optical encoder mounted of the axis of rotation of the supporting bar.



< Measurements captured by a PC type computer, installed with the "SPRINT2000" operating software, are used to calculate and display the following information:

- the horizontal traction force of the subject,
- the speed of the treadmill,
- the vertical movement of the subject,
- the instantaneous and mean vertical power developed by the subject,
- the instantaneous and mean horizontal power developed by the subject.

< The vertical force (Pv) exerted is the result of the runner's successive rising and falling (variation in the altitude of the centre of gravity).

$$Pv = Vv*(M* (g+Accv)+Fv \quad \text{where}$$

M: subject's mass (in kilograms)
g: acceleration of gravity (9.81 m/s/s)
Accv vertical acceleration of gravity center In m/s/s
V(v): subject's vertical speed in m/s
Fv vertical force in N

< The horizontal force (Ph) exerted is calculated using the horizontal efforts and speeds measured during the run.

Ph = Fh.Vh where

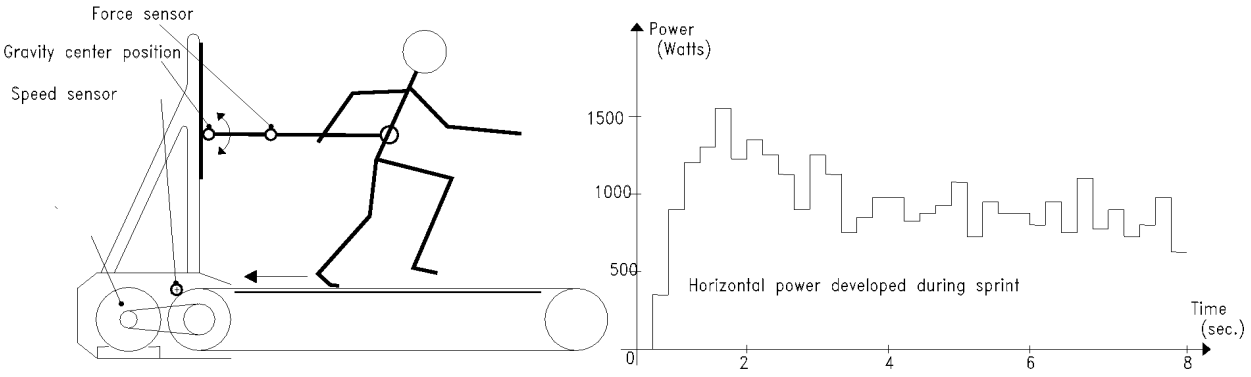
Fh: horizontal force produced in Newton
Vh: subject's horizontal speed in m/s

The total force (Pt) exerted is the sum of the horizontal force exerted and the vertical force exerted .

Pt = Pv + Ph

The SPRINT CLUB can therefore be used to measure and analyse biomechanical running data using measured or calculated values: speed, effort, force.

Figure 2 illustrates a typical line graph of the total force obtained from SPRINT start-up.



USE WARNINGS AND RESTRICTIONS

< Generally, running on a treadmill is very different from running on the ground:

- the speed of running is imposed by the treadmill and the runner has to synchronise his stride with the treadmill's speed so as to remain on the limited space of the belt,
- the visual landmarks are different.

< Treadmill running presents no special hazards, but does require gradual training:

- tests at increasing speed,
- use of stop controls,
- use of barriers, safety position.

SPECIAL CASE: THE FREE TREADMILL

< This practice is even more unusual for the sportsman, for 2 main reasons:

- he is "attached" to the fixed structure of the treadmill,
- he drives the treadmill belt.

For these reasons:

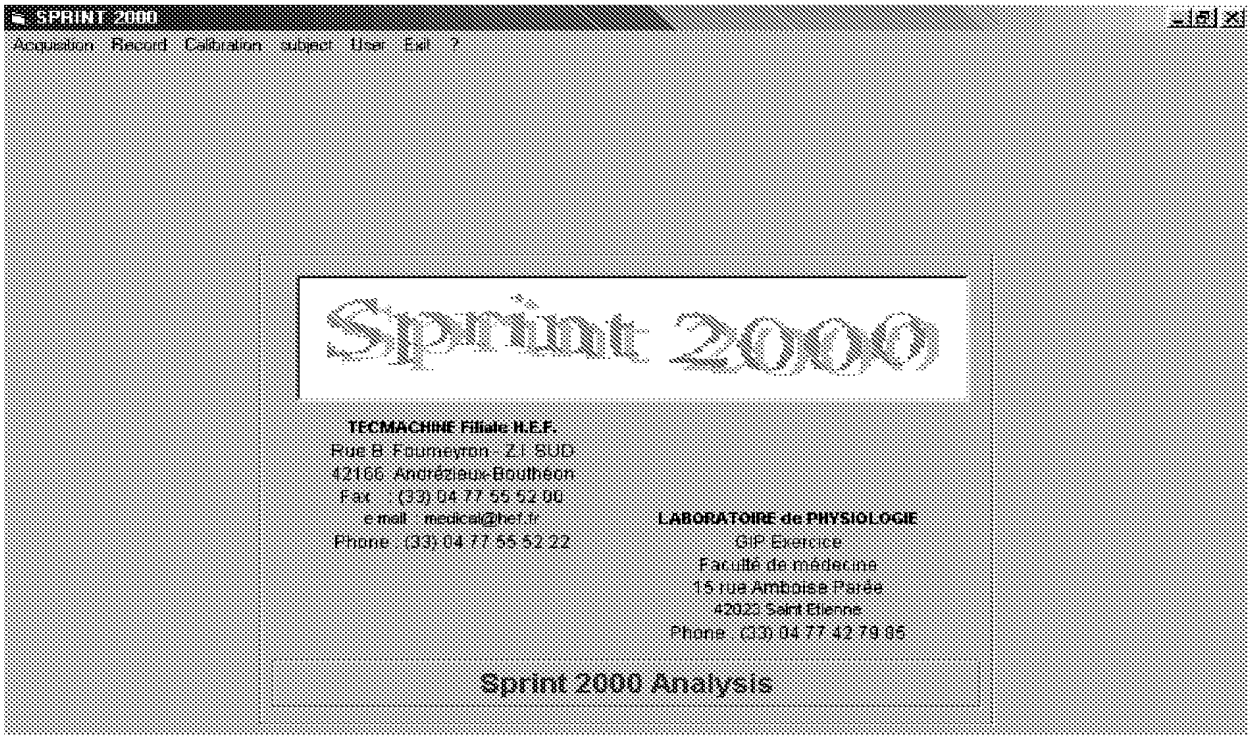
1. **The sportsman must initially spend one or more training sessions in traditional treadmill mode (speed).**

2. **Gradually discover how FREE TREADMILL mode (torque) feels. These tests must always be carried out under the supervision of the testing manager.**

3. **SPRINTING on the free treadmill is reserved for subjects whose physical abilities have previously been evaluated by the doctor in charge of tests, who will adapt the operating conditions of the treadmill to the individual's physical ability.**

4. **The emergency stop(s) shall always be enabled outside of running phases, including the time during which the athlete is being prepared or installed.**

SPRINT2000© SOFTWARE



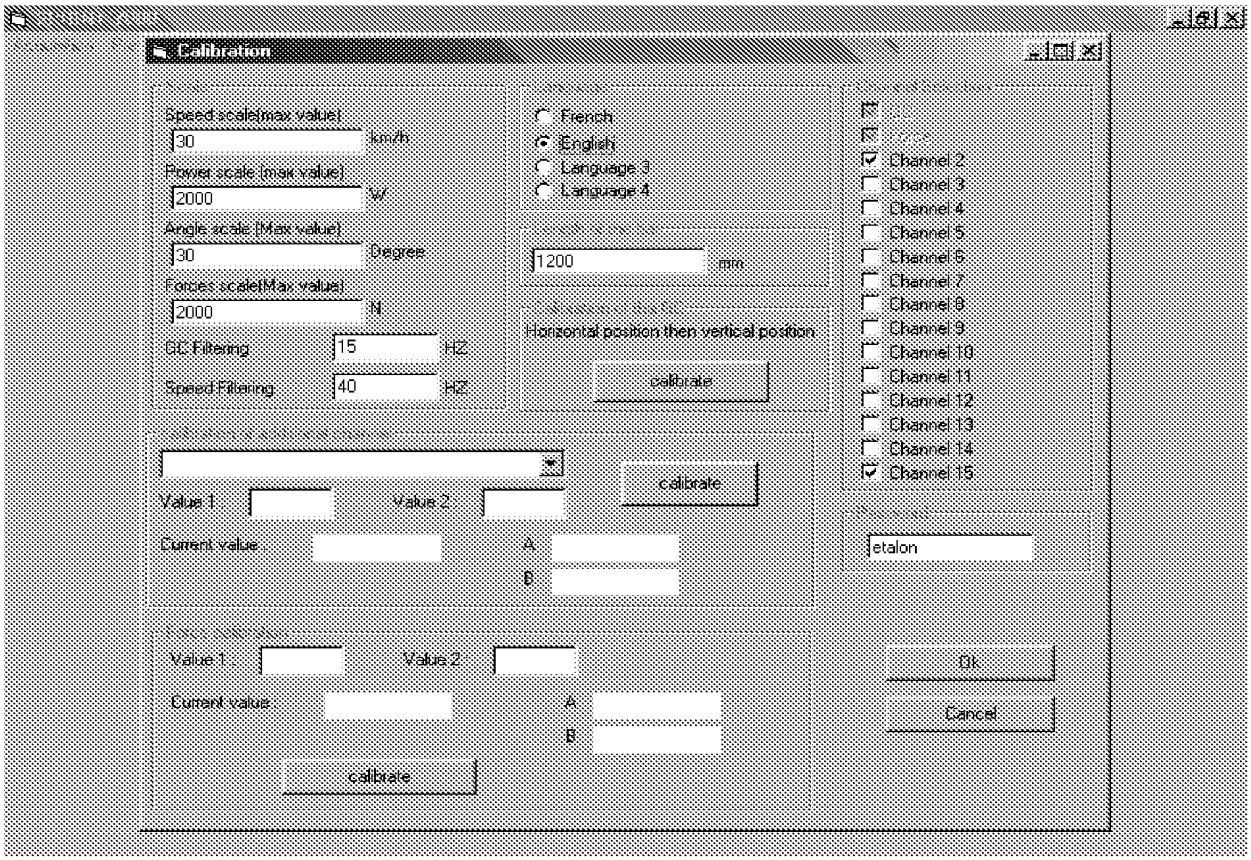
Main menu

Acquisition : to start a new acquisition
Records : analysis of a previous record
Calibration : calibration module :
To calibrate : Force sensor ,Gravity center sensor ….
Subject : to create ,select or delete a subject file
User : to create ,select or delete a user file

User 1	User 2	……User n
I	I	I
Subject1	subject1	subject1
Subject2	subject2	subject3
	Ect…	

Exit : to leave SPRINT2000 and exit to Windows desk.

PROCEDURES FOR CALIBRATING SENSORS



Run the SPRINT2000 program (double-click the SPRINT2000 icon).
Select Calibration in the main menu ,
The original password is : **etalon**

1 – Scales :
To change the scale for : speed, power , gravity center angle ,force.

2 - <u>Calibrating speed</u>
Not necessary .
Optical incremental encoder on a measurement roller
3600 points/round and 1round=200mm

2 - Calibrating force

- The force sensor answer is y=ax+b
- You must select 2 values in the windows

Ex : value 1=0 value2=20kg

Start « calibrate « with value1 → OK

Install the second value (Ex. 20kg) → OK

Software calculate automatically the a and b coefficient.

Click OK button on the right of the display screen to memorise.

3 - Calibrating the altitude of the centre of gravity

To catch the corresponding sensor value for :

Horizontal position of the bar

Vertical position of the bar

4 - Calibrating other free channels

See force calibration procedure.

5 - Channel selection

To select the displayed channels .

6 - Password :

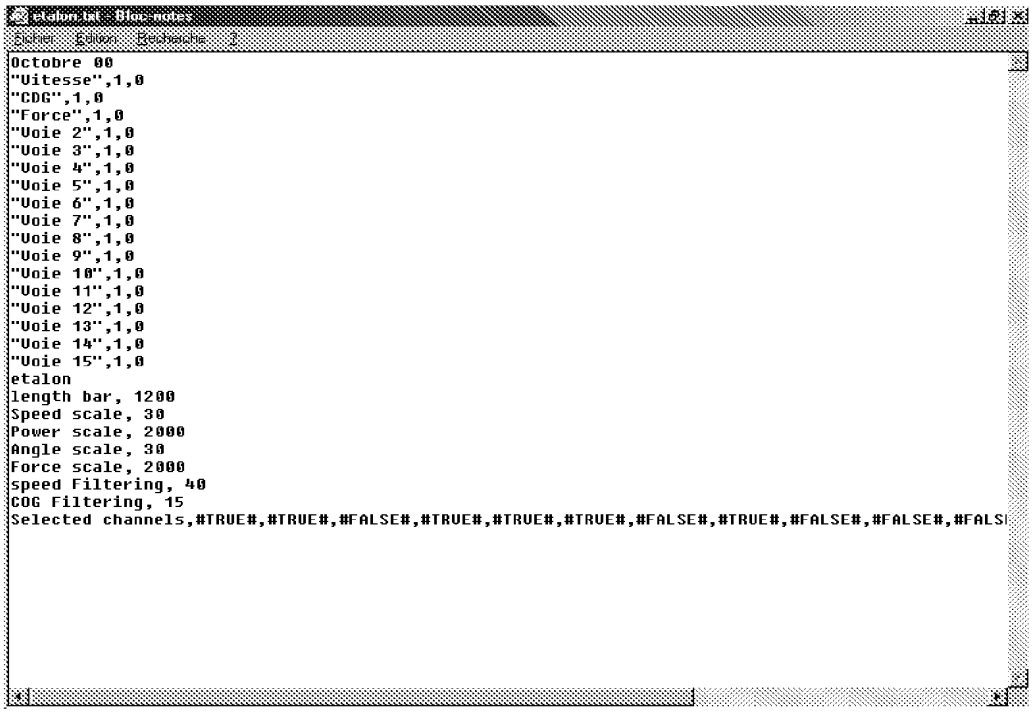
Original password is « etalon « but you can change.

7 - Language : to select your language English or French.

* All the calibration data are save in a special text file : etalon.txt

C : \ sprint2000 \Reptrav \ etalon.txt

Example :



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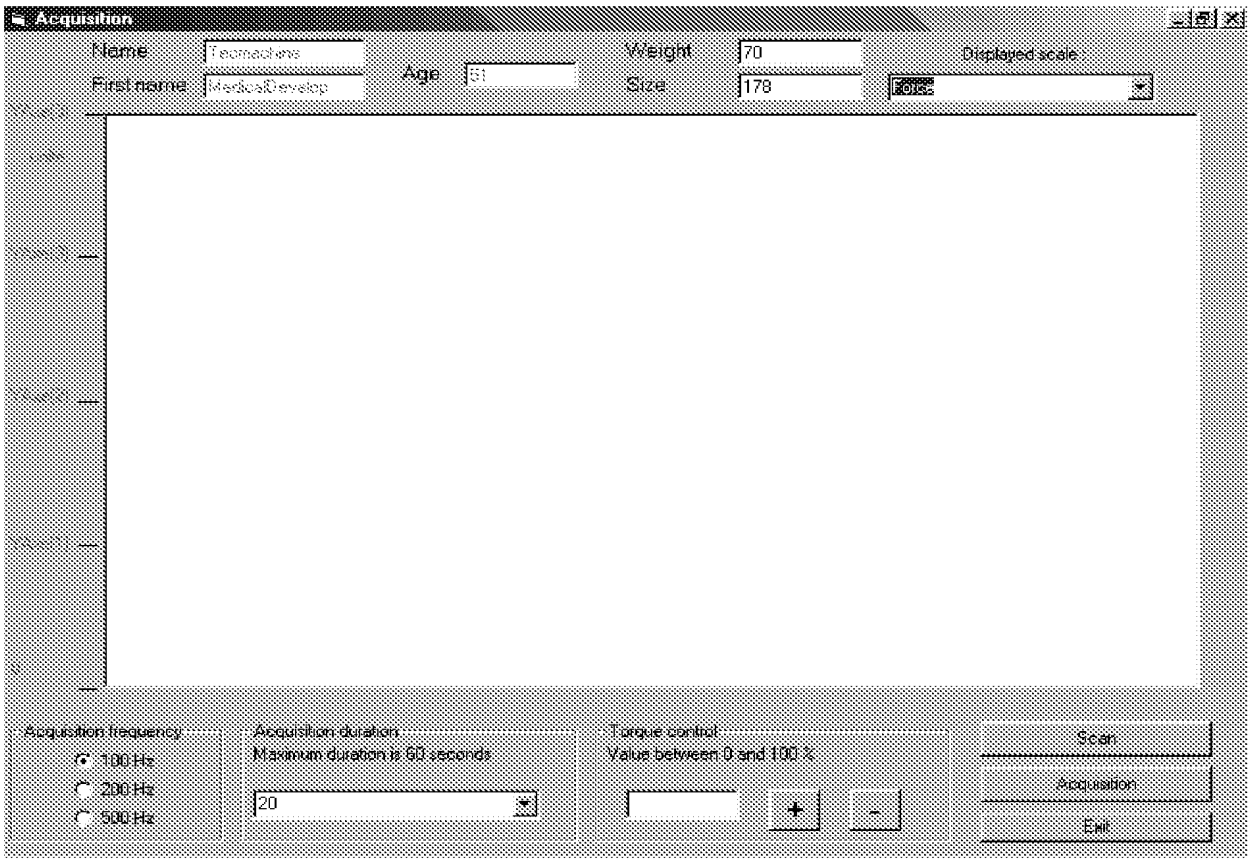
To start an ACQUISITION

–

Run the SPRINT2000 program (double-click the SPRINT2000 icon).
Select a « User « file
Select « Acquisition « in the main menu ,
Select a « Subject « file
Enter if necessary subject information's. Valid to confirm

Note : You must enter the subject weight .
software need this information to calculate vertical power.

Acquisition sheet will be displayed.



Displayed scale : to choose another displayed scale (speed , force , gravity center)
Select an acquisition frequency
Select an acquisition duration
Motor torque : not used

Scan mode button: to display acquisition values – Exit to leave
Acquisition button : to start an acquisition.
" Visu acq" button : to go directly in analysis screen after acquisition.
Exit : exit scan mode and exit to main menu.

At the end of an acquisition , the measurement points are automaticaly save in 2 files :

File name.spt and File name.des

The path is : C : \ Sprint2000 \ user name \ subject name \ measurement file name

Measurement file name . spt contains all the acquisition points.
Measurement file name . des contains the description of the acquisition

The name is automaticaly create with the Windows® clock.

Ex : 03180238.spt
03180238.des
With 0 last digit of the year (2000)
3 number of the month
(1 : january , 2 : February ,....,A : October , B : November , C :December)
18 the day.
02 the hour
38 the minute

Example of file.des :

"Octobre 00" (Is a flag , software version identification)
100,3.50,0
"recording date","mercredi 8 mars 2000"
"Name","SBO"
"First name",""
"Age",""
"Weight",75
"Size",0
"Vitesse",1,0
"CDG",74.02409,-102.8313 (a and b calibration coefficients)
"Force",200.3914,-5.18591 (a and b calibration coefficients)
"Voie 2",1,0
"Voie 3",1,0
"Voie 4",1,0

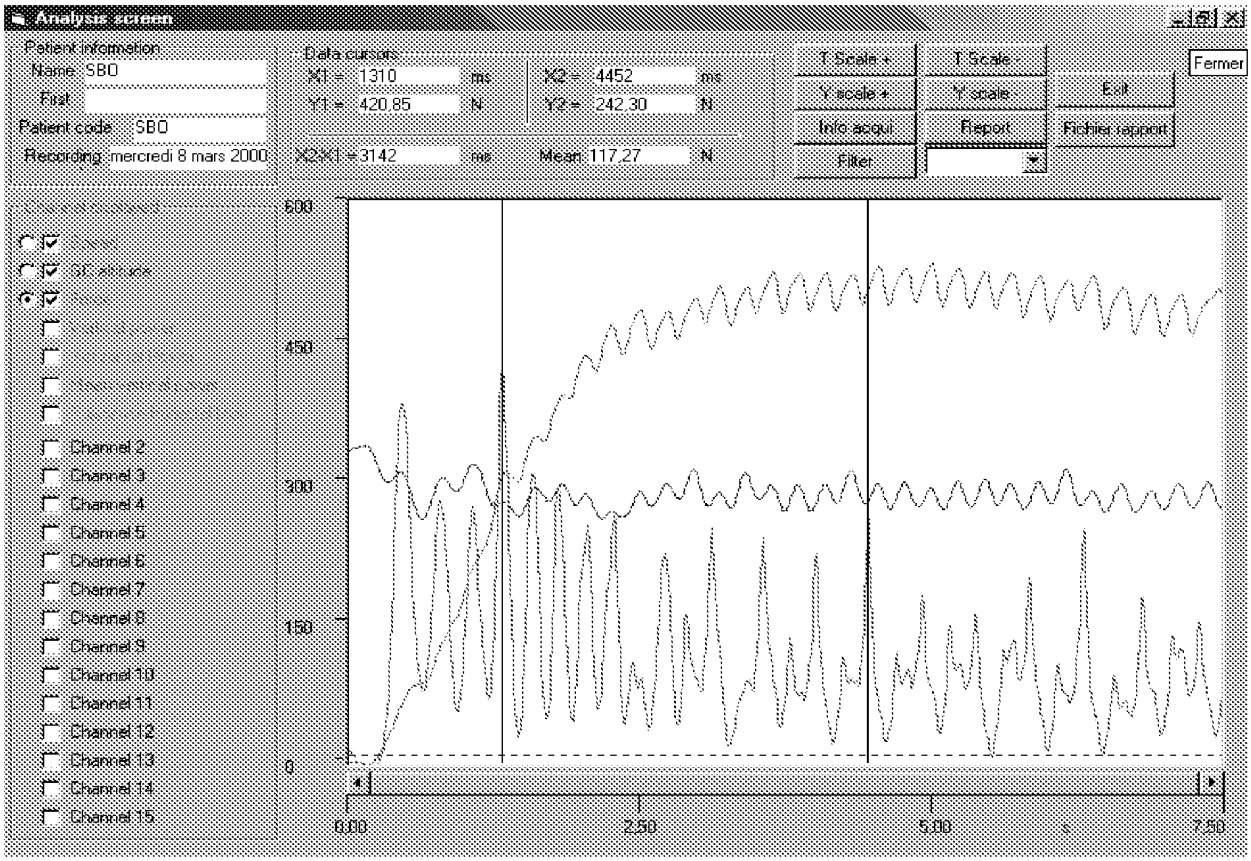
17
"Voie 5",1,0
"Voie 6",1,0
"Voie 7",1,0
"Voie 8",1,0
"Voie 9",1,0
"Voie 10",1,0
"Voie 11",1,0
"Voie 12",1,0
"Voie 13",1,0
"Voie 14",1,0
"Voie 15",1,0
"Mean speed",0
"Doctor code",""
"recording code",""
"Sequence number",""
"Speed scale",30 → (Vmax.30km/h)
"Power scale",2000 → (Pmax.2000W)
"Angle scale",30 → (angle 30degrees)
"Force scale",600 → (Fmax.600N)

Example of file.spt

```
248,1327,1558,0,0,0,0,0,0,0,0,0,0,0,0,0,0
257,1327,1627,0,0,0,0,0,0,0,0,0,0,0,0,0,0
270,1327,1700,0,0,0,0,0,0,0,0,0,0,0,0,0,0
281,1327,1783,0,0,0,0,0,0,0,0,0,0,0,0,0,0
293,1328,1871,0,0,0,0,0,0,0,0,0,0,0,0,0,0
306,1330,1979,0,0,0,0,0,0,0,0,0,0,0,0,0,0
317,1331,2121,0,0,0,0,0,0,0,0,0,0,0,0,0,0
329,1334,2292,0,0,0,0,0,0,0,0,0,0,0,0,0,0
340,1336,2498,0,0,0,0,0,0,0,0,0,0,0,0,0,0
353,1339,2728,0,0,0,0,0,0,0,0,0,0,0,0,0,0
367,1343,2968,0,0,0,0,0,0,0,0,0,0,0,0,0,0
383,1347,3193,0,0,0,0,0,0,0,0,0,0,0,0,0,0
392,1350,3394,0,0,0,0,0,0,0,0,0,0,0,0,0,0
400,1354,3551,0,0,0,0,0,0,0,0,0,0,0,0,0,0
409,1359,3604,0,0,0,0,0,0,0,0,0,0,0,0,0,0
418,1363,3507,0,0,0,0,0,0,0,0,0,0,0,0,0,0
```

1°column Speed (Nb.points of encoder)
2° column Gravity center in mV
3° column Force sensor in mV
4° to 17° column Other channels in mV

ANALYSIS screen



T scale+/- : zoom on x axe
Y scale +/- : zoom on y axe
Info acqui : display acquisition data sheet to comment.
Print : print a report
Filter : select a filter frequency and click Filter button (12db/octave numeric filter)
Display channel :

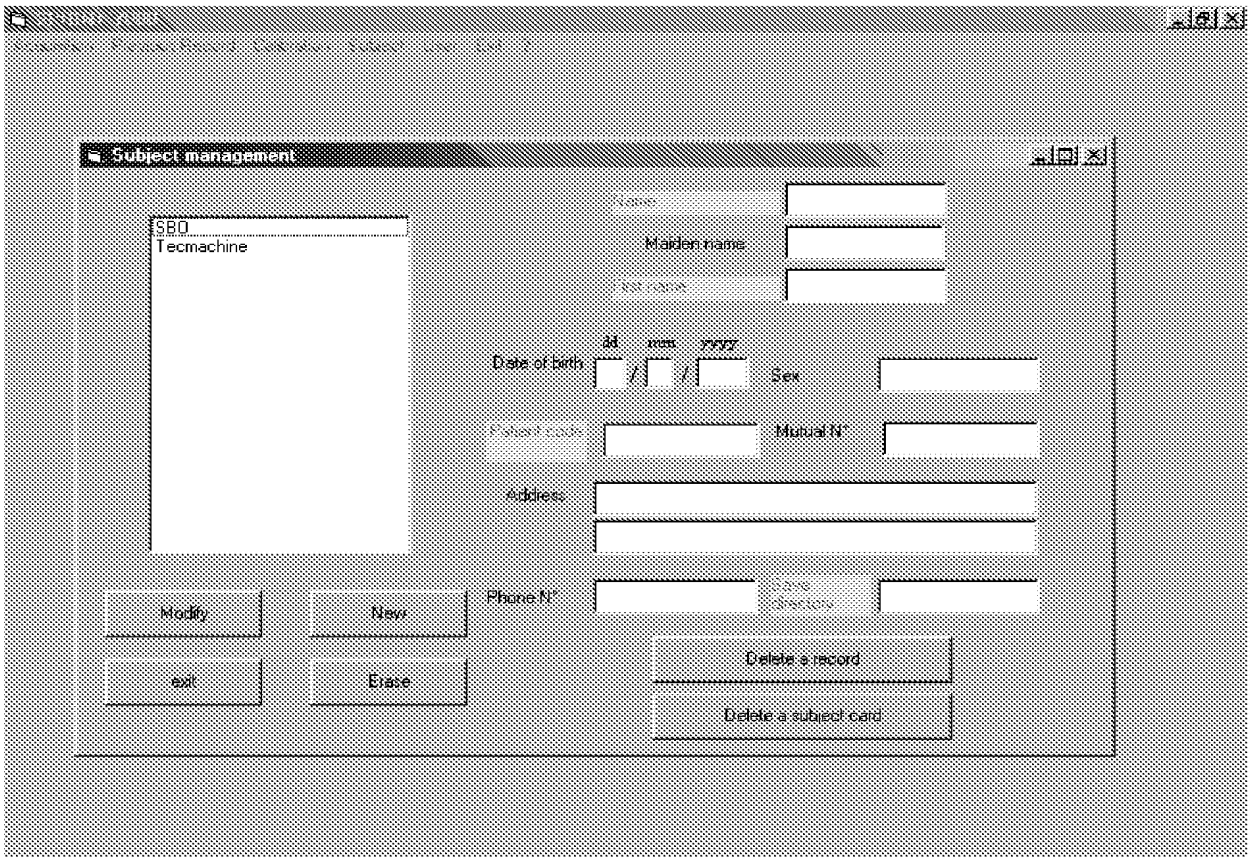
9 click to display or undisplay the curve
active or inactive for cursors calculation.

Cursors :

19

Original positions on the left and the right of curves window.
Click left mouse button to catch cursors.

Create ,modify or delete a subject file



To create ,modify ,delete a new Subject file.

Note : To create a new file : you must enter : Name ,subject code and directory name.

Others are optional information's.
Click « NEW » to save .

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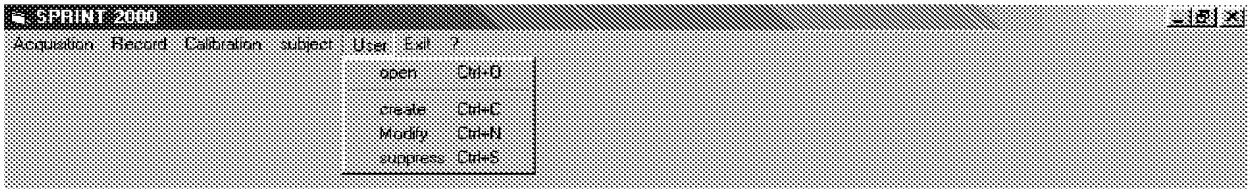
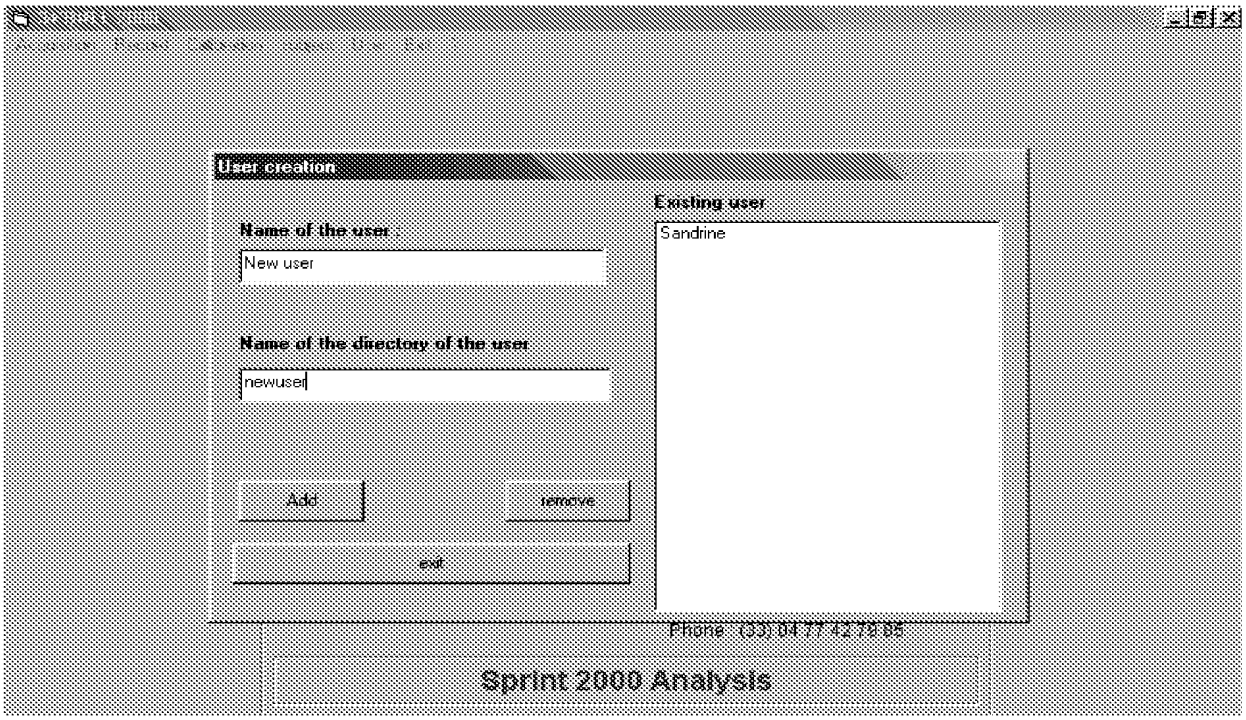
Select ,Create , Modify or Delete a user file

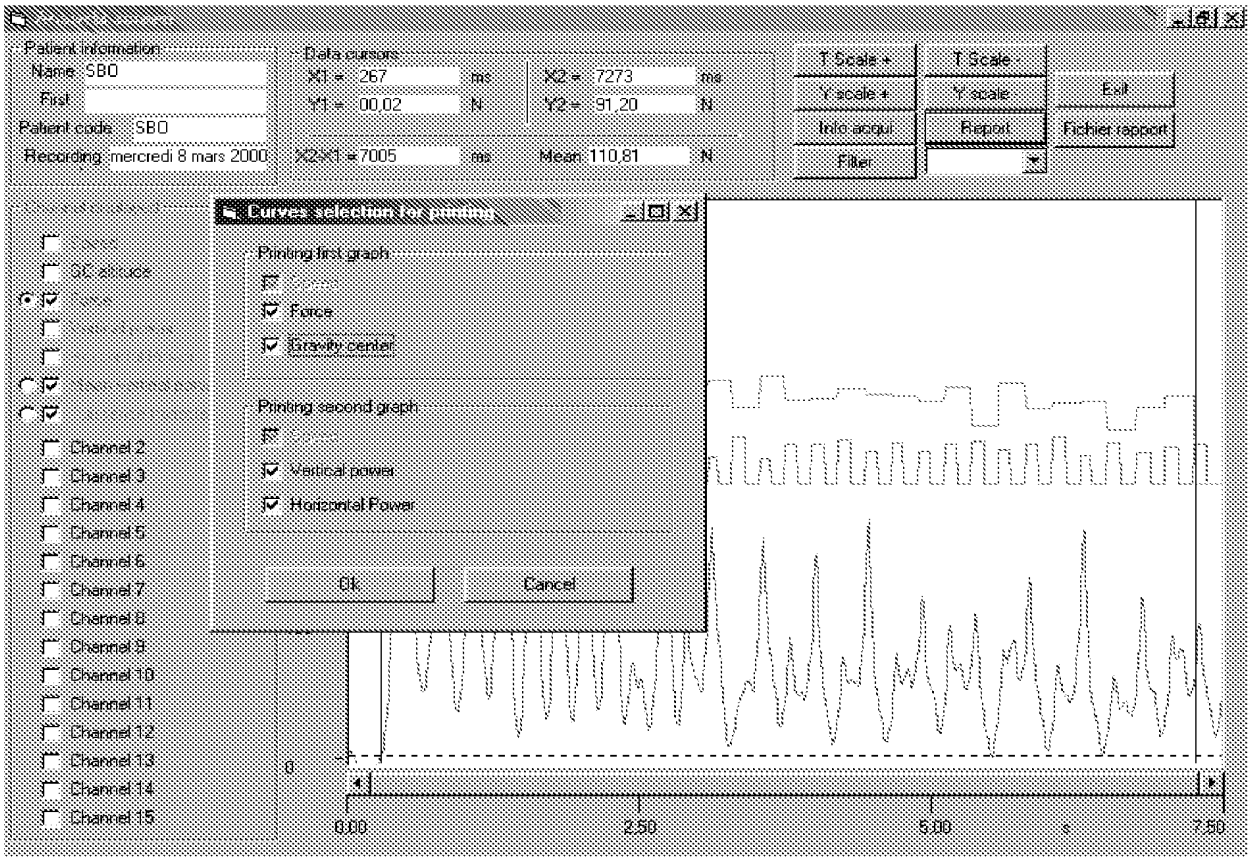


Open : to open the existing subject list and select a user.

To Create a new subject file : enter user name , directory name and click « Add » button



TO EDIT A REPORT



To edit a report :

Click « report « button on the analysis screen ,
Select the curves you have to print,
Click OK button

The software edit 2 folios :

- On the 1° folio

Test and subject identifications
Graph N°1 : 3curves if selected before (speed , force and gravity center)
Graph N°2 : 3curves if selected before (speed ,vertical and horizontal power)

- On the second folio

Test and subject identifications
Results of calculation :
Maximum values for speed , force , horizontal and vertical power.

A comment part to write your observations

TO EXPORT RESULTS AND THE MEASUREMENT FILE

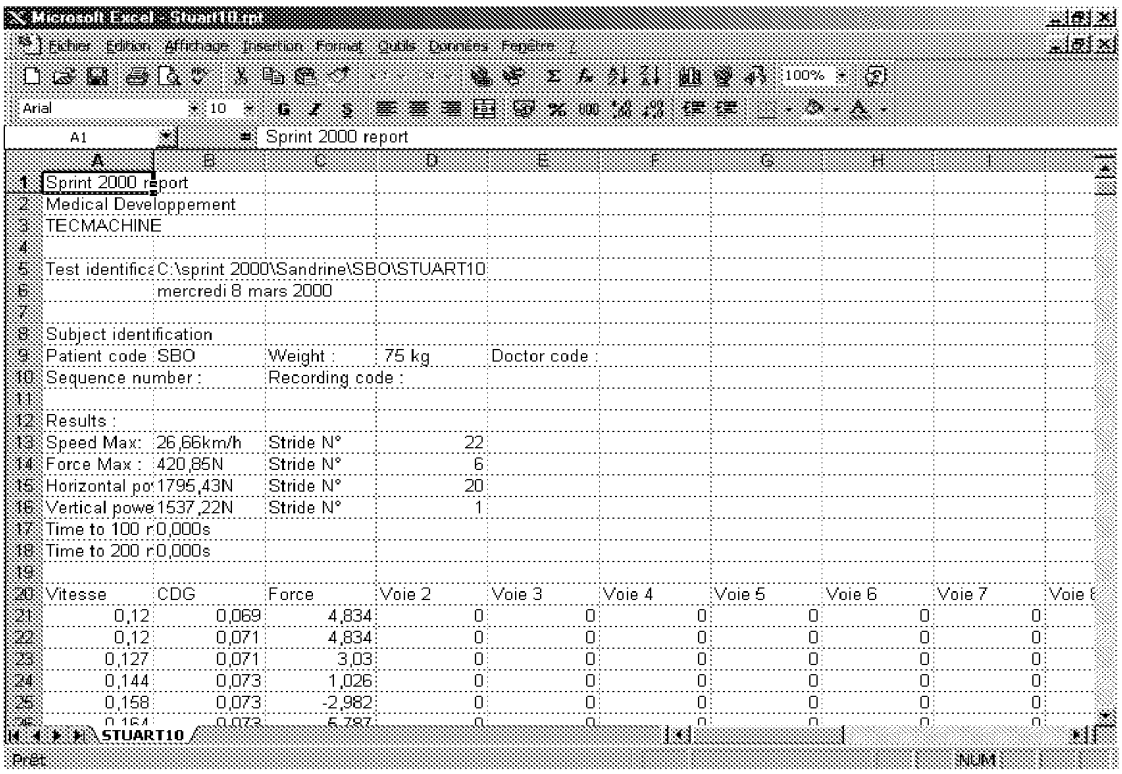
In the previously screen , click « EXPORT « button
A special export file is created with the following format : File name . rpt
The path is :

C : \ sprint2000 \ user \subject \ file name .rpt

Method to open it with EXCEL®

- Start Excel
- Open file , select C : \ sprint2000 \ user \subject \ file name .rpt
- Select : delimited → Next
- Select : coma separator → Next
- End .

The following screen appears :



	A	B	C	D	E	F	G	H	I
1	Sprint 2000 report								
2	Medical Developpement								
3	TECMACHINE								
4									
5	Test identifica	C:\sprint 2000\Sandrine\SBO\STUART10							
6		mercredi 8 mars 2000							
7									
8	Subject identification								
9	Patient code	SBO	Weight :	75 kg	Doctor code				
10	Sequence number :		Recording code :						
11									
12	Results :								
13	Speed Max:	26,66km/h	Stride N°	22					
14	Force Max :	420,85N	Stride N°	6					
15	Horizontal po	1795,43N	Stride N°	20					
16	Vertical powe	1537,22N	Stride N°	1					
17	Time to 100 r	0,000s							
18	Time to 200 r	0,000s							
19									
20	Vitesse	CDG	Force	Voie 2	Voie 3	Voie 4	Voie 5	Voie 6	Voie 7
21	0,12	0,069	4,834	0	0	0	0	0	0
22	0,12	0,071	4,834	0	0	0	0	0	0
23	0,127	0,071	3,03	0	0	0	0	0	0
24	0,144	0,073	1,026	0	0	0	0	0	0
25	0,158	0,073	-2,982	0	0	0	0	0	0
26	0,164	0,073	5,767	0	0	0	0	0	0

Columns description :

- Speed - meter/second
- Gravity center altitude - meter
- Force - Newton
- Free channels 2,3,4,5,6,7,8,9,10,11,12,14,15
- Vertical power
- Horizontal power
- Mean vertical power

- Mean horizontal power
- Stride identification

SPRINT CLUB

TECHNICAL PART

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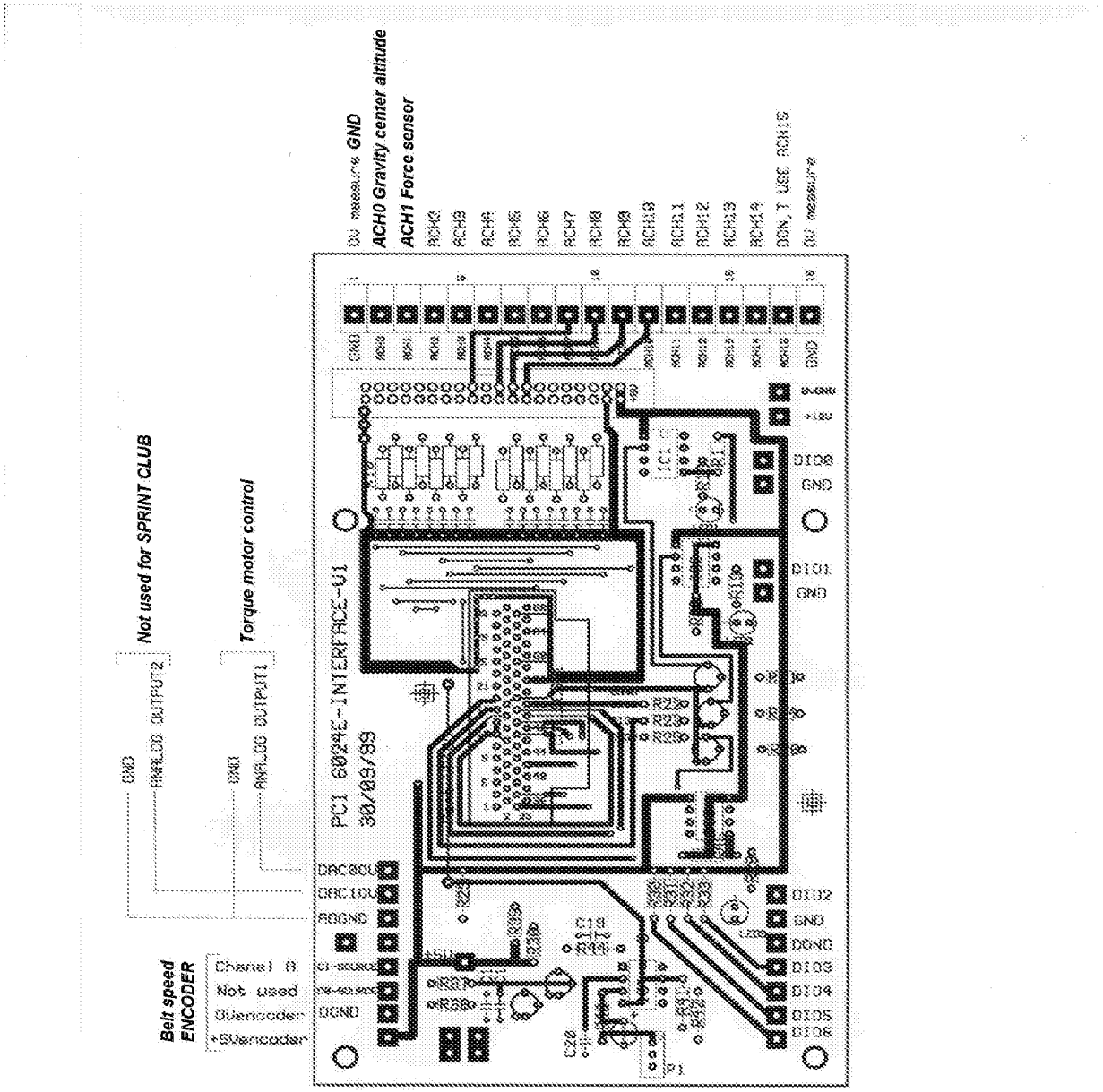
INTERFACE DATA ACQUISITION BOARD



INTERFACE BOARD IN MEASUREMENT BOX

SPRINT CLUB measurement system

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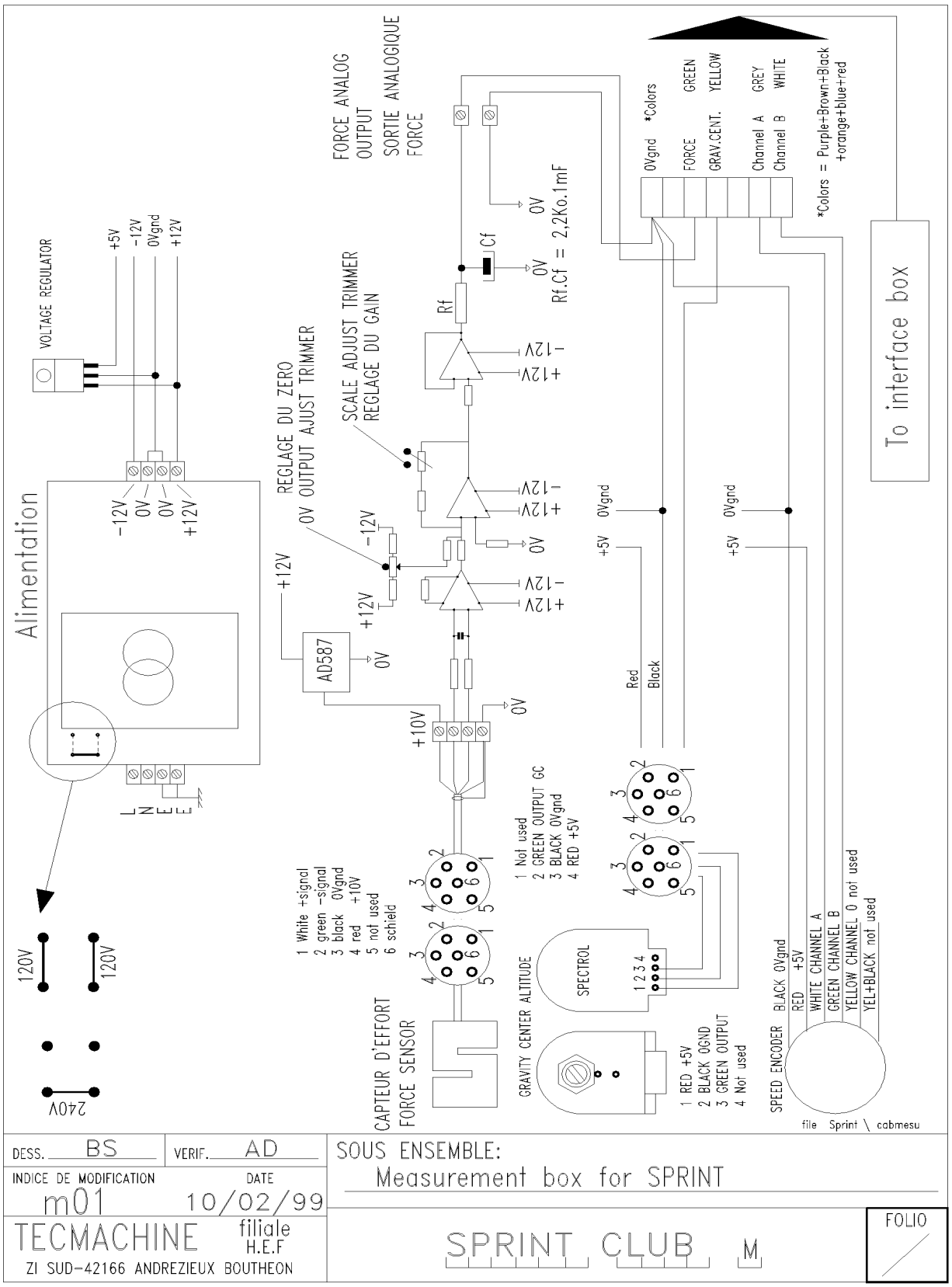

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MEDICAL DEVELOPPEMENT

Technical note 29-10-2000

TECMACHINE
Tel 33 4 77 55 52 22
Fax 33 4 77 55 52 00
Email medical@hef.fr
(Your contact : Sandrine Bois or Bernard Sauvignet)

NEW SOFWARE INSTALLATION

Explosive power measurement system – SPRINT2000© software

General :

All MEDICAL DEVELOPPEMENT new software are developed with the same structure.

- ***Measurement acquisition with the National Instrument data acquisition board.***
  Ref.PCI-6024E with a special cable ref.R6868
- ***Interface box with PCI 6024E-Interface board. (see attached drawings)***
- ***Software written with Visual Basic V6.***
- ***The install CD-ROM contains***
  - Software-Acquisition : complete software for acquisition and analysis,
  Need data acquisition board install inside the computer to run.
  - Software-Analysis : running without data acquisition board – specially designed
  to work and study previous records without the ergometer, on a portable computer for example.
  - a special file "etalon.txt" : contains all calibrations coefficient for the treadmill or VP.

Section 1 - Sprint2000©

Installing SPRINT2000©-acquisition :

1- Install the National Instrument data acquisition board

- ***install before NI DAQ drivers : CD-ROM National Instrument – Disc N°1 Follow the National Instrument instructions.***
- ***At the end shut down the computer and install the data acquisition board inside the computer (PCI bus).***
- ***Start the computer – Windows normally recognises the board.***
- ***You have now to change NI parameters with "Measurement & Automation" normally installed on the desk of the computer.***
  - ***Double click on "Measurement & Automation" icon.***
  - ***Double click on "peripheric and interface"***
  - ***Double click on "PCI 6024E"***
  - ***Double click on "peripheric number"***
  - ***Select "AI"***
  - ***Select " asymmetrical reference" in the mode zone.***

2- Install SPRINT2000©-Acquisition (complete software)

Preliminary remark :
MEDICAL DEVELOPPEMENT software are written with a French version of Visual basic.
So, you have to select the following parameters in the regional settings of Windows.

In the start menu select : Settings -> Control panel -> Regional settings ->Numbers
You must select :

- ***","*** ***coma ,decimal separator***
- ***"9"*** ***decimal number***
- ***"."*** ***Point, thousand separator***
- ***"0"*** ***no digit separator***
- ***"-"*** ***minus ,negative indicator*** ***(no change)***
- ***"-1.1"*** ***(no change)***
- ***"0.7"*** ***(no change)***
- ***the first of the list*** ***(no change)***
- ***"."*** ***(no change)***

Click on "Apply"
Select "Time"
For a good format of measurement recordings you must select the following time format :
HH:mm:ss (hour hour : minute minute : second second
Click on "Apply" and "OK"

Install SPRINT2000©-Acquisition on Windows 98
(Only with Windows 98 second edition – impossible to install with windows

98-1°edition)

Insert SPRINT2000 CD-ROM
With WINDOWS explorer, start "setup.exe"
Follow the install instruction.
Take care : the install directory must be "C:\Sprint2000", you have to change because it's not the default directory.
At the end of set up , start "install.exe"

Install SPRINT2000©-Acquisition on Windows millennium

The 6.7 version of NI DAQ sold with the data acquisition board today by NATIONAL INSTRUMENT don't run on WINDOWS millennium. NI prepares a new version (available within some months).

However, it's possible to install on WINDOWS millennium, with the provisionally 6.8 version, communicate by NI.

Install NI DAQ CD-ROM –V6.8 and follow NI instructions up to the instruction " restart the computer" to install NI documentation.
Don't restart the computer at this moment and leave the installation of NI DAQ.

With WINDOWS explorer , go on :
C:\ windows \ start menu \ programs \ start up \
Delete the short cut "Set-up" the documentation NI DAQ"

Information : this short cut starts automatically the second step of installation, essentially the NI DAQ documentation used to develop and not requisite for a good running of SPRINT2000.

- ***shut down the computer and install the data acquisition board inside the computer (PCI bus).***
- ***Start the computer – Windows normally recognises the board.***
- ***You have now to change NI parameters with "Measurement & Automation "normally installed on the desk of the computer.***
    - ***Double click on "Measurement & Automation" icon.***
    - ***Double click on "peripheric and interface"***
    - ***Double click on "PCI 6024E"***
    - ***Double click on "peripheric number"***
    - ***Select "AI"***
    - ***Select " asymmetrical reference" in the mode zone.***

Install SPRINT2000©-Acquisition on Windows NT

Follow the Windows 98 instruction

3- Install SPRINT2000©-Analysis on Windows 98,millenium or NT.

Preliminary remark :

- Sprint2000-Analysis : is running without data acquisition board – specially designed to work and study previous records without the ergometer, on a portable computer for example.

- ***Sprint2000–analysis needs the same regional settings as Sprint2000-acquisition.***
- ***If you install Sprint2000-analysis and Sprint2000-acquisition in the same computer you must change the main directory name of Sprint2000-analysis.***

Ex: Sprint2000-acquisition installed in C:\Sprint2000
Sprint2000-analysis installed in C:\Sprintana

4- Interface box

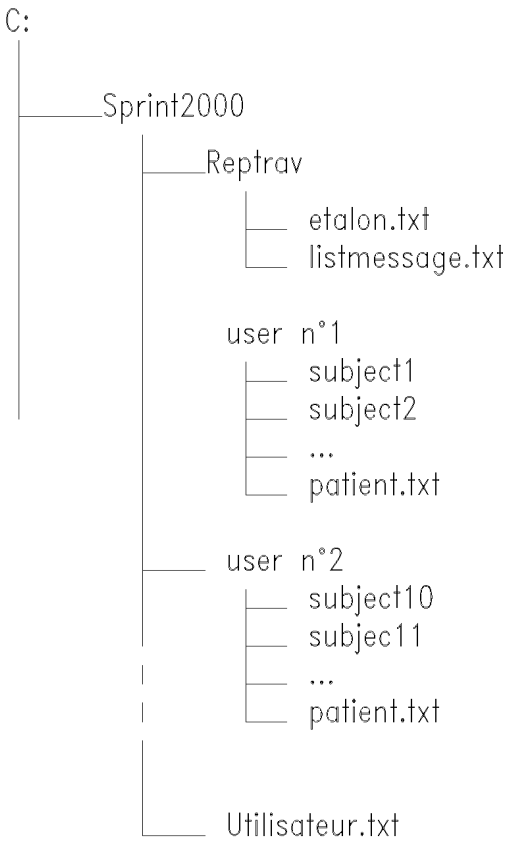
For sprint measurement :

Real speed :	encoder 3600pts/round Channel a on C1 source Power supply : 5Vdc (computer) Numeric signal Use a timer of the acquisition board to calculate speed
Traction force	stain gauge sensor ACH1 analog input
Gravity center altitude	Analog angle sensor ACH0 analog input
Torque command	Analog output DAC0 Ground reference AGND 0 to 5V - not used

Analog input : ACH2 to ACH15 free channels

SOFTWARE INFORMATIONS

Sprint2000© as the following organisation :



Reptrav directory contains :

- etalon.txt file with all calibration coefficients
- listmessage.txt with the listing of text ,message, used on the different screen of the sofware .

Example :

1
28/11/2000,0,0,"0"
Acquisition,Acquisition,0,"0"
Enregistrement, Previous Record,0,"0"
Etalonnage,Calibration,0,"0"
Sujet,Subject,0,"0"
Utilisateur,User,0,"0"
Ouvrir,Open,0,"0"
Créer,Create,0,"0"
Modifier,Modify,0,"0"
Supprimer,Delete,0,"0"
Sortir,Exit,0,"0"
?,?,0,"0"
Aide,Help,0,"0"
Veuillez sélectionner un utilisateur, Please select a user,0,"0"
OK,OK,0,"0"

With 1° column :text and message in French language
2° column : text and messages in English language
other column : other language ; in progress

Λ The right format of all the text files are very important :

separators are coma (,) so don't use coma in data.
the number of coma must be right
in case of mistake , the software don't recognise the file and he don't run.
Please , before changing data in a text file save the original file.

In USER directories :

Patient.txt contains all the subject and test description.

utilisteur.txt contains all user descriptions.

Subject1,2...n contains all the measurement files of the subjects.

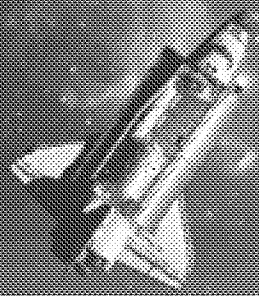
Λ Note that one test is save with two files :

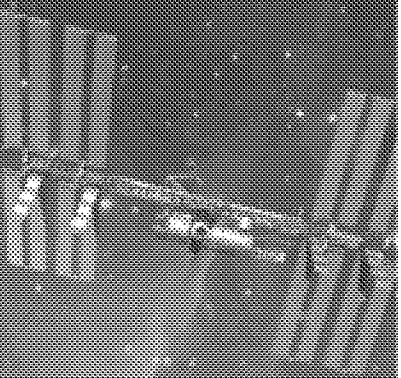
File.spt : contains all the acquisition data. ASCII format
File.des : contains the description of the test , calibration coefficient
Used during acquisition, subject parameters ...etc

Note : to read a previous record , with Sprint2000 acquisition or sprint2000 analysis,
you need the two files (*.spt and *.des)

National Aeronautics and Space Administration

NASA





SPACE SHUTTLE MISSION

STS-128

Racking Up New Science

www.nasa.gov

PRESS KIT/AUGUST 2009

USA

United Space Alliance

LIFECORE Ex. 1002

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STS-128 MISSION OVERVIEW

The STS-128 crew members take a break during a training session in the Space Vehicle Mockup Facility at NASA's Johnson Space Center. From the left are astronauts Rick Sturckow, commander; Patrick Forrester, European Space Agency (ESA) astronaut Christer Fuglesang, astronauts Nicole Stott, Jose Hernandez, John "Danny" Olivas, all mission specialists; and Kevin Ford, pilot. Stott is scheduled to join Expedition 20 as flight engineer after launching to the International Space Station with the STS-128 crew.

On the heels of the completion of the Japanese segment of the International Space Station, the shuttle Discovery is poised to blast off on a 13-day mission to deliver more than 7 tons of supplies, science racks and equipment, as well as additional environmental hardware to sustain six crew members on the orbital outpost.

Led by veteran shuttle Commander Rick Sturckow (STUR-coe) (Col., USMC), 48, Discovery is set for launch no earlier than 1:36:02 a.m. EDT Aug. 25 from Launch Pad 39-A at the Kennedy Space Center. This will be Sturckow's fourth flight into space. Kevin Ford (Col., USAF, ret.), 49, will serve as Discovery's pilot in his first flight into space. Patrick Forrester (Col., USA, ret.), 52, is making

his third flight into space. The flight engineer for launch and landing is Jose Hernandez, 47. The son of an itinerant Mexican farming family, he did not learn English until he was 12 years old. Hernandez, on his first flight, will be involved in cargo transfer operations and the operation of the shuttle's robotic arm. Lead spacewalker John "Danny" Olivas (oh-LEE-vuhs), 44, is making his second flight into space, having also flown with Sturckow on his previous mission. Olivas will participate in all three of the mission's spacewalks. Christer Fuglesang (FYU-gel-sang) of the European Space Agency, 52, will conduct two spacewalks with Olivas in his second flight into space.

They are joined by NASA's Nicole Stott, 46, a former processing director for the shuttle Endeavour at the Kennedy Space Center, who replaces NASA astronaut Tim Kopra (CO-prah) (Col., USA), 46, as a long-duration crew member on the space station and a member of the Expedition 20 and 21 crews. Stott, who will conduct the mission's first spacewalk with Olivas, is scheduled to spend three months on the complex while Kopra returns home aboard Discovery. Stott plans to return in November on the shuttle Atlantis as part of the STS-129 crew.

The day after launch, Ford, Forrester and Hernandez will take turns at Discovery's aft flight deck as they maneuver the shuttle's robotic arm to reach over to the starboard sill of the orbiter to grapple the Orbiter Boom Sensor System, a 50-foot-long crane extension. The extension is equipped with sensors and lasers that will be used in the traditional daylong scan of Discovery's thermal protection heat shield and the reinforced carbon-carbon on the leading edges of the shuttle's wings. This initial inspection of the heat shield will provide imagery experts on the ground a close-up look at the tiles and blankets on the shuttle's skin to determine if the shuttle is ultimately safe to re-enter the Earth's atmosphere. A follow-up inspection will take place after Discovery undocks from the station.

While the inspection takes place, Olivas, Fuglesang and Stott will prepare the spacesuits they will wear for the three spacewalks to be conducted out of the Quest airlock at the station. Other predocking preparations will occupy the remainder of the crew's workday.

The following day, on the third day of the flight, Discovery will be flown by Sturckow and Ford on its approach for docking to the station. After a series of jet firings to fine-tune Discovery's path to the complex, the shuttle will arrive at a point about 600 feet directly below the station about an hour before docking. At that time, Sturckow will execute a one-degree-per-second rotational "backflip" to enable Expedtion 20 Commander Gennady Padalka and Flight Engineer Mike Barratt, using digital cameras with 400 and 800 millimeter lenses, to snap hundreds of detailed photos of the shuttle's heat shield and other areas of potential interest – another data point for imagery analysts to pore over in determining the health of the shuttle's thermal protection system.

Astronaut Nicole Stott, STS-128 mission specialist, attired in a training version of her Extravehicular Mobility Unit (EMU) spacesuit, is pictured during a spacewalk training session in the waters of the Neutral Buoyancy Laboratory (NBL) near NASA's Johnson Space Center. Divers are in the water to assist Stott in her rehearsal, intended to help prepare her for work on the exterior of the International Space Station.

Once the rendezvous pitch maneuver is completed, Sturckow will fly Discovery to a point about 600 feet in front of the station before slowly closing in for a linkup to the forward docking port on the Harmony module. Less than two hours later, hatches will be opened between the two spacecraft to begin almost nine days of work between the two crews.

Discovery's arrival at the station two days after launch will again place 13 crew members on the complex. The shuttle crew will join Padalka of Russia, and flight engineers Barratt and Kopra of NASA, Roman Romanenko of Russia, Bob Thirsk of the Canadian Space Agency and Frank De Winne of the European Space Agency.

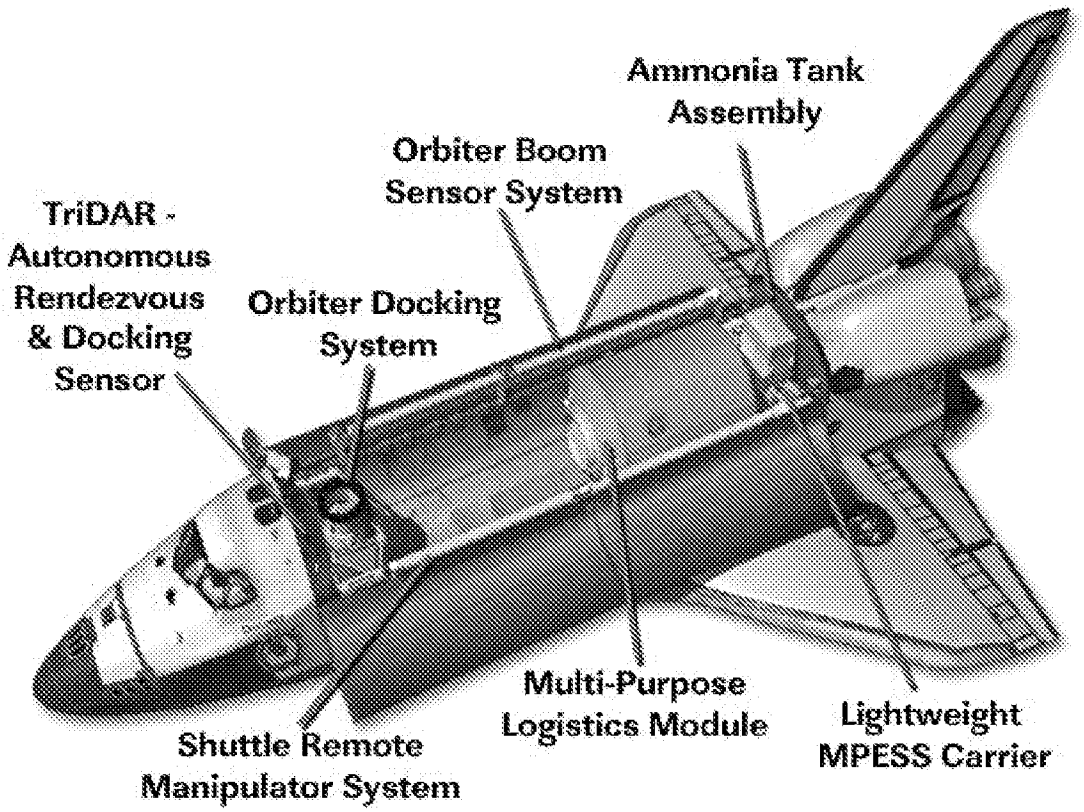
Aside from the delivery of Stott to join the station crew, the primary objective of the flight will be the transfer of the science and environmental racks to the complex to mark a quantum leap in the scientific capability of the orbital laboratory.

Housed for the ride to the station in the Leonardo Multi-Purpose Logistics Module in Discovery's payload bay are the Materials Science Research Rack (MSRR-1), the Minus Eighty Degree Laboratory Freezer for ISS (MELFI) and the Fluids Integration Rack (FIR). MSRR-1 will be used for basic materials research related to metals, alloys, polymers, semiconductors, ceramics, crystals and glasses in the microgravity environment. MELFI will be used for long-term storage of experiment samples that are to be returned to Earth for detailed analysis. The FIR is a fluid physics research facility designed to host investigations in areas such as colloids, gels, bubbles, wetting and capillary action, and phase changes, including boiling and cooling.

Attired in training versions of their shuttle launch and entry suits, astronauts Rick Sturckow (center), STS-128 commander; Patrick Forrester (left) and European Space Agency (ESA) astronaut Christer Fuglesang, both mission specialists, listen as a crew trainer (out of frame) briefs the crew in preparation for a training session in the Space Vehicle Mockup Facility at NASA's Johnson Space Center.

Leonardo, which serves as a large moving van for supplies and equipment back and forth from the station, also is carrying a new crew quarters to provide more sleeping space for the expanded station crew members and a new exercise device called the Combined Operational Load Bearing External Resistance Treadmill, or COLBERT, coined after late-night cable entertainment personality Stephen Colbert. COLBERT will be transferred to a temporary location in the Harmony node, but will ultimately reside in the new Node 3 module – Tranquility – that will be launched to the station in 2010 as a final connecting point for other modules on the U.S. segment of the complex, including the Cupola, a multi-windowed module to provide a vista-like view of the universe. COLBERT will not be checked out and activated until later this year.

In addition to the new treadmill, also referred to as "T2," the crew will transfer a new Air Revitalization System (ARS) rack to the station for use in Tranquility to maintain a pristine environment for the expanded six-person crew on the outpost. The system includes another carbon dioxide removal system bed similar to the Carbon Dioxide Removal Assembly (CDRA) that resides in the U.S. Destiny laboratory. The rack will be temporarily stowed in the Japanese segment of the station until Tranquility is in place to accept it on a permanent basis.



If the CDRA is operating when Discovery arrives at the station, the new ARS rack will be temporarily stowed in the Japanese Kibo module and not activated until it is installed in Tranquility next year. If a problem develops with the CDRA, however, the new rack could be temporarily installed in the Destiny lab in place of the current CDRA and activated to assist in the removal of carbon dioxide.

Ford and Barratt will hoist Leonardo out of Discovery's cargo bay using the station's Canadarm2 robotic arm on the fourth day of the flight and will berth it to the Earth-facing port on the Harmony module. Once leak checks are performed, the hatch to Leonardo will be opened to mark the start of transfer operations that will be supervised by Fuglesang and Hernandez.

Three spacewalks will be conducted on flight days 5, 7 and 9 during the docked phase of the mission.

Astronaut John "Danny" Olivas, STS-128 mission specialist, dons a training version of his Extravehicular Mobility Unit (EMU) spacesuit before being submerged in the waters of the Neutral Buoyancy Laboratory (NBL) near NASA's Johnson Space Center. Astronaut Jose Hernandez, mission specialist, assists Olivas.

The first spacewalk will see Olivas, who conducted two spacewalks on STS-117, and Stott venture outside to remove an empty ammonia tank from the port 1 (P1) truss of the station. The tank, which itself weighs about 1,800 pounds, contains 600 pounds of ammonia to provide the proper cooling for the thermal control system in the truss. Ammonia in the tank flows in the truss' Pump Module Assembly, which is the heart of the thermal control system. Olivas will work in tandem with Stott to remove the used tank that will be grappled by the Canadarm2 through a fixed grapple bar. The grapple bar will be attached to the tank before it is parked on a cargo carrying platform in Discovery's payload bay for the trip home. The tank that will be removed still will contain about 200 pounds of ammonia but is considered used and ready for replacement.

Olivas and Stott also will remove two experiments from the hull of the European Columbus module during the first spacewalk. The European Technology Exposure Facility, or EuTEF, was installed during the STS-122 mission in February 2008. EuTEF is a suite of nine experiments designed to collect data during its lengthy stay in the microgravity environment. The spacewalkers also will remove a materials science experiment called Materials International Space Station Experiment (MISSE), a device resembling an open suitcase that enables a variety of experiments to be exposed to the space environment. This latest in the series of MISSE experiments was moved to the outside of Columbus from a prior location on the station during the STS-123 mission in March 2008.

Olivas will be joined by Fuglesang for the second spacewalk. Fuglesang conducted three spacewalks on his first mission, STS-116. This excursion will be exclusively devoted to installing a new Ammonia Tank Assembly on the P1 truss and stowing the empty tank on the cargo carrying platform in Discovery's payload bay.

Olivas and Fuglesang team up for the final spacewalk two days later to begin preparations for the arrival of the Tranquility connecting module, Node 3, and its Cupola viewing port scheduled for launch next year.

Astronaut Jose Hernandez, STS-128 mission specialist, uses the virtual reality lab in the Space Vehicle Mockup Facility at NASA's Johnson Space Center to train for some of his duties aboard the space shuttle and space station. This type of computer interface, paired with virtual reality training hardware and software, helps to prepare the entire team for dealing with space station elements.

The spacewalkers will begin by completing a task that could not be accomplished during the STS-127 mission; i.e., the deployment of a payload attachment bracket on the starboard truss to which several critical spare parts will be attached during the STS-129 mission later this year. Next, Olivas and Fuglesang will route avionics systems cables from the S0 truss at the midpoint of the station's backbone to the port side of the complex where Tranquility will be permanently attached. After that, they will rig cables for heaters that will keep the berthing port warm on the port side of the Unity connecting module to which Tranquility will be mated.

They will replace a failed component on the S0 truss called a rate gyro assembly that works with the station's Global Positioning System (GPS) hardware to tell the station what its orientation is in relation to the Earth, replace a faulty power control module on the S0 that is used to route electricity to various components inside the complex and install two new GPS antennas on the S0 truss.

On the following day, flight day 10, the crew will enjoy some off-duty time and complete transfer operations before closing the hatch to Leonardo on flight day 11 so it can be unberthed from Harmony and returned to Discovery's payload bay. Ford and Hernandez will operate Canadarm2 from the robotics workstation on the station to demate Leonardo from its temporary parking spot and lower it onto latches in the shuttle's cargo bay.

Once the cargo module is berthed in Discovery, the two crews will say goodbye to one another and close the hatches between the shuttle and station to set the stage for undocking.

With Ford at the controls on flight day 12, Discovery will separate from the station. He will slowly back the shuttle away to a distance of about 400 feet from the station. At that point, he will conduct a radial flyaround of the complex before firing jets to depart the vicinity of the outpost.

With undocking complete, Ford, Forrester and Hernandez will use the shuttle's robotic arm and its Orbiter Boom Sensor System extension to conduct a "late" inspection of the orbiter's thermal heat shield – one more opportunity to ensure that it is in good shape to support landing.

Sturckow, Ford and Hernandez will conduct the traditional checkout of the shuttle's flight control systems and steering jets on flight day 13, setting Discovery up for its supersonic return to Earth on flight day 14. A special recumbent seat will be set up in the shuttle's lower deck for Kopra to ease his reorientation to a gravity environment for the first time in almost two months.

Finally, weather permitting, Sturckow and Ford will guide Discovery to a landing at the Kennedy Space Center on the evening of Sept. 6 to wrap up the 37th flight for the shuttle's fleet leader, the 128th mission in shuttle program history and the 30th shuttle visit to the International Space Station.

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TIMELINE OVERVIEW

Flight Day 1

- Launch
- Payload Bay Door Opening
- Ku-Band Antenna Deployment
- Shuttle Robotic Arm Activation and payload bay survey
- Umbilical Well and Handheld External Tank Photo and TV Downlink

Flight Day 2

- Discovery's Thermal Protection System Survey with Shuttle Robotic Arm/Orbiter Boom Sensor System (OBSS)
- Extravehicular Mobility Unit Checkout
- Centerline Camera Installation
- Orbiter Docking System Ring Extension
- Orbital Maneuvering System Pod Survey
- Rendezvous tools checkout

Flight Day 3

- Rendezvous with the International Space Station
- Rendezvous Pitch Maneuver Photography of Discovery's Thermal Protection System by Barratt and De Winne of the Expedition 20 Crew
- Docking to Harmony/Pressurized Mating Adapter-2
- Hatch Opening and Welcoming
- Stott and Kopra exchange Soyuz seatliners; Stott joins Expedition 20, Kopra joins the STS-128 crew

Flight Day 4

- Unberthing of the Leonardo Multi-Purpose Logistics Module (MPLM) from Discovery's cargo bay and installation on the Earth-facing port of the Harmony node
- Leonardo systems activation and hatch opening
- Spacewalk 1 Procedure Review
- Spacewalk 1 Campout in Quest airlock by Olivas and Stott

Flight Day 5

- Spacewalk 1 by Olivas and Stott (Preparation of P1 Truss Ammonia Tank Assembly for removal, EuTEF and MISSE experiment removal from the Columbus module)
- Rack transfers from Leonardo to the station; transfer of the COLBERT treadmill from Leonardo to the space station

Flight Day 6

- Focused inspection of Discovery's thermal heat shield by the shuttle robotic arm/OBSS, if necessary
- Rack and cargo transfers from Leonardo to the station

- Spacewalk 2 Procedure Review
- Spacewalk 2 Campout in Quest airlock by Olivas and Fuglesang

Flight Day 7

- Spacewalk 2 by Olivas and Fuglesang (Completion of Ammonia Tank Assembly swapout on P1 truss)
- Cargo transfer from Leonardo to space station

Flight Day 8

- Crew off-duty time
- Joint Crew News Conference
- Cargo transfer from Leonardo to the station
- Spacewalk 3 Procedure Review
- Spacewalk 3 Campout in Quest airlock by Olivas and Fuglesang

Flight Day 9

- Spacewalk 3 by Olivas and Fuglesang (Routing avionics cables for Tranquility Node 3 installation, replacement of Rate Gyro Assembly on the S0 truss, installation of two GPS antennas on the S0 truss)
- Cargo transfer from Leonardo to the station

Flight Day 10

- Cargo transfer from Leonardo to the station
- Crew off-duty time

Flight Day 11

- Final transfers
- Leonardo egress and systems deactivation
- Leonardo demating from Earth-facing port on Harmony node and berthing back in Discovery's cargo bay
- Farewells and Hatch Closure
- Rendezvous tools checkout

Flight Day 12

- Discovery undocking from station
- Flyaround of station and final separation
- Late inspection of Discovery's thermal protection system with the OBSS

Flight Day 13

- Flight Control System Checkout
- Reaction Control System hot-fire test
- Crew Deorbit Briefing
- Cabin Stowage
- Recumbent Seat Setup for Kopra

Flight Day 14

- Deorbit preparations
- Payload Bay Door closing
- Deorbit burn
- KSC Landing

MISSION PROFILE

CREW

Commander:	Rick Sturckow
Pilot:	Kevin Ford
Mission Specialist 1:	Patrick Forrester
Mission Specialist 2:	Jose Hernandez
Mission Specialist 3:	Danny Olivas
Mission Specialist 4:	Christer Fuglesang
Mission Specialist 5:	Nicole Stott (Up)
Mission Specialist 5:	Tim Kopra (Down)

LAUNCH

Orbiter:	Discovery (OV-103)
Launch Site:	Kennedy Space Center Launch Pad 39A
Launch Date:	No Earlier Than Aug. 25, 2009
Launch Time:	1:36:02 a.m. EDT (Preferred In-Plane launch time for 8/25)
Launch Window:	3 minutes
Altitude:	122 Nautical Miles (140 Miles) Orbital Insertion; 188 NM (213 Miles) Rendezvous
Inclination:	51.6 Degrees
Duration:	12 Days 19 Hours 04 Minutes

VEHICLE DATA

Shuttle Liftoff Weight:	4,522,852 pounds
Orbiter/Payload Liftoff Weight:	267,689 pounds
Orbiter/Payload Landing Weight:	225,860 pounds
Software Version:	OI-34

Space Shuttle Main Engines:

SSME 1:	2052
SSME 2:	2051
SSME 3:	2047
External Tank:	ET-132
SRB Set:	BI-139
RSRM Set:	107

SHUTTLE ABORTS

Abort Landing Sites

RTLS:	Kennedy Space Center Shuttle Landing Facility
TAL:	Primary – Zaragoza, Spain. Alternates – Moron, Spain and Istres, France
AOA:	Primary – Kennedy Space Center Shuttle Landing Facility. Alternate – White Sands Space Harbor

LANDING

Landing Date:	No Earlier Than Sept. 6, 2009
Landing Time:	8:40 p.m. EDT
Primary landing Site:	Kennedy Space Center Shuttle Landing Facility

PAYLOADS

Multi-Purpose Logistics Module (MPLM), Leonardo; Lightweight Multi-Purpose Carrier (LMC) with Ammonia Tank Assembly (ATA)

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MISSION OBJECTIVES

MAJOR OBJECTIVES

1. Dock Discovery to the International Space Station's Pressurized Mating Adaptor-2 port and perform mandatory crew safety briefing for all crew members.

2. Berth Multi-Purpose Logistics Module (MPLM) to the station's nadir port on the Harmony module using the station robotic arm, activate and check out MPLM.

3. Transfer mandatory quantities of water from Discovery to the space station.

4. Rotate Expedition 20 crew member Tim Kopra with Expedition 20/21 Flight Engineer Nicole Stott, transfer mandatory crew rotation equipment and perform mandatory tasks consisting of customized seatliner install and Sokol suit checkout.

5. Transfer and install Node 3 Air Revitalization System (ARS) rack.

6. Transfer Treadmill-2 (T2) rack and associated system components to the station and temporarily install in interim rack location.

7. Transfer and stow critical items.

8. Transfer and install remaining MPLM racks to the space station.
   - Deck Crew Quarters
   - Minus Eighty-Degree Laboratory Freezer for ISS-2 (MELFI-2)
   - Fluids Integration Rack (FIR)
   - Materials Science Research Rack (MSRR)

9. Transfer, remove, and replace Ammonia Tank Assembly (ATA) from the Lightweight Multi-Purpose Experiment Support Structure (MPESS) Carrier (LMC) to the P1 site using the station robotic arm.

10. Return empty P1 ATA to the LMC using the station robotic arm.

11. Return MPLM to Discovery's payload bay using the station robotic arm.

12. Transfer European Technology Exposure Facility (EuTEF)/Flight Support Equipment (FSE) Integrated Assembly (IA) from the station's Columbus Exposed Payload Facility (EPF) to the LMC using the station robotic arm.

13. Perform minimum crew handover of 12 hours per rotating crew member including crew safety handover.

14. Transfer Materials International Space Station Experiment (MISSE) 6a and 6b Passive Experiment Containers from the station's Columbus EPF to the Discovery's cargo bay using the station robotic arm.

15. Transfer remaining cargo items.

16. Remove and replace the S0 Rate Gyro Assembly (RGA).

17. Perform additional Node 3 (Tranquility) prep tasks.
    - Pre-route external channel 1/4 power and data cable and channel 2/3 power and data cables from S0 panel across Destiny to (Node 1) Unity.
    - Temporarily connect Node 1 port/PMA3 heater umbilical and install grounding on Node 1 nadir launch-to-activation connector.
    - Remove and replace RPCM S0-1A-D.
    - Remove Node 1 slidewire.
    - Reposition Zarya LAN connector on Node 1 port.
18. Perform Hydrogen ORU Calibration Kit (HOCK) verification on the OGS pressure sensor.
19. Perform daily station payload status checks as required.
20. Perform daily middeck activities to support payloads.
21. Perform station payload research operations tasks.
22. Remove MPLM Baseplate Ballast Assemblies (BBAs) and Lamp Housing Assemblies (LHAs) and transfer to the space station. If required, install the failed space station BBAs/LHAs back into MPLM.
23. Perform crew quarters outfitting and activation as required to support minimal crew habitation.
24. Perform TriDAR Automated Rendezvous and Docking Sensor DTO-701A activities.
25. Perform an additional four hours per rotating crew member of station crew handover (16 hours per crew member total).
26. The following spacewalk tasks are deemed to fit within the existing timelines; however, they may be deferred if the spacewalk is behind schedule. The spacewalk will not be extended to complete these tasks.
    - Install Global Positioning System AA No. 2 and No. 4 on S0
    - Install Node 1 micrometeoroid orbital debris shield
    - Install the station arm camera lens cover on Latching End Effector B wrist camera
27. Transfer oxygen from Discovery to the station airlock high-pressure gas tanks.
28. Perform water sampling for return for ground testing.

29. Perform program-approved intravehicular activity get-ahead tasks. The following intravehicular activity get-ahead tasks do not fit in the existing timelines; however, the team will be trained and ready to perform should the opportunity arise.
    - Complete remainder of crew quarters outfitting and activation as required to support full crew habitation
    - Perform Node 1 port bulkhead feed-through modifications (for 20A)
        - Potable Water (J33)
        - Waste Water (J30)
        - ARS Air Sample (J40)
        - Nitrogen (J44)
        - Oxygen (J45)
    - Perform coarse leaks checks of Node 1 port bulkhead feed-throughs using PMA-3 partial depressurization.
30. Perform program-approved spacewalk get-ahead tasks. The following get-ahead tasks do not fit in the existing spacewalk timelines; however, the spacewalk team will be trained and ready to perform should the opportunity arise.
    - Tuck down Lab/Node 2 cables.
    - Install a gap spanner on Node 2.
    - Relocate Fixed Grapple Bar in preparation of 19A ATA R&R.
    - Install Bootie/Grounding Connector Sleeves (launch in 17A MPLM).
    - Install station arm camera lens cover on station arm's elbow camera.
31. Perform payload of opportunity operations to support Shuttle Ionospheric Modification with Pulsed Localized Exhaust Experiments, Maui Analysis of Upper Atmospheric Injections (MAUI) and Shuttle Exhaust Ion Turbulence Experiments (SEITE).
32. Reboost the space station with the shuttle if mission resources allow and are consistent with station trajectory analysis and planning.
33. Perform imagery survey of the station exterior during orbiter flyaround after undock.
34. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, during shuttle mated reboost.
35. Perform SDTO 13005-U, ISS Structural Life Validation and Extension, during 17A shuttle undocking, if crew time available.
36. Perform SDTO 13005-U, ISS Structural Life Validation and Extension for MPLM Berthing and Unberthing.

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MISSION PERSONNEL

KEY CONSOLE POSITIONS FOR STS-128 (DISCOVERY)

	Flt. Director	CAPCOM	PAO
Ascent	Richard Jones	Eric Boe TBD (Wx)	Rob Navias
Orbit 1 (Lead)	Tony Ceccacci	Chris Ferguson Tony Antonelli	Rob Navias
Orbit 2	Kwatsi Alibaruho	Stan Love	Josh Byerly
Planning	Gary Horlacher	Shannon Lucid	Nicole Cloutier
Entry	Richard Jones	Eric Boe TBD (Wx)	Rob Navias
Shuttle Team 4	Mike Sarafin	N/A	N/A
ISS Orbit 1	Ron Spencer	Chris Zajac	N/A
ISS Orbit 2 (Lead)	Heather Rarick	Robert Hanley	N/A
ISS Orbit 3	Royce Renfrew	Mike Jensen	N/A
Station Team 4	Derek Hassmann		

JSC PAO Representative at KSC for Launch – Lynnette Madison

KSC Launch Commentator – Mike Curie

KSC Launch Director – Pete Nickolenko

NASA Launch Test Director – Charlie Blackwell-Thompson

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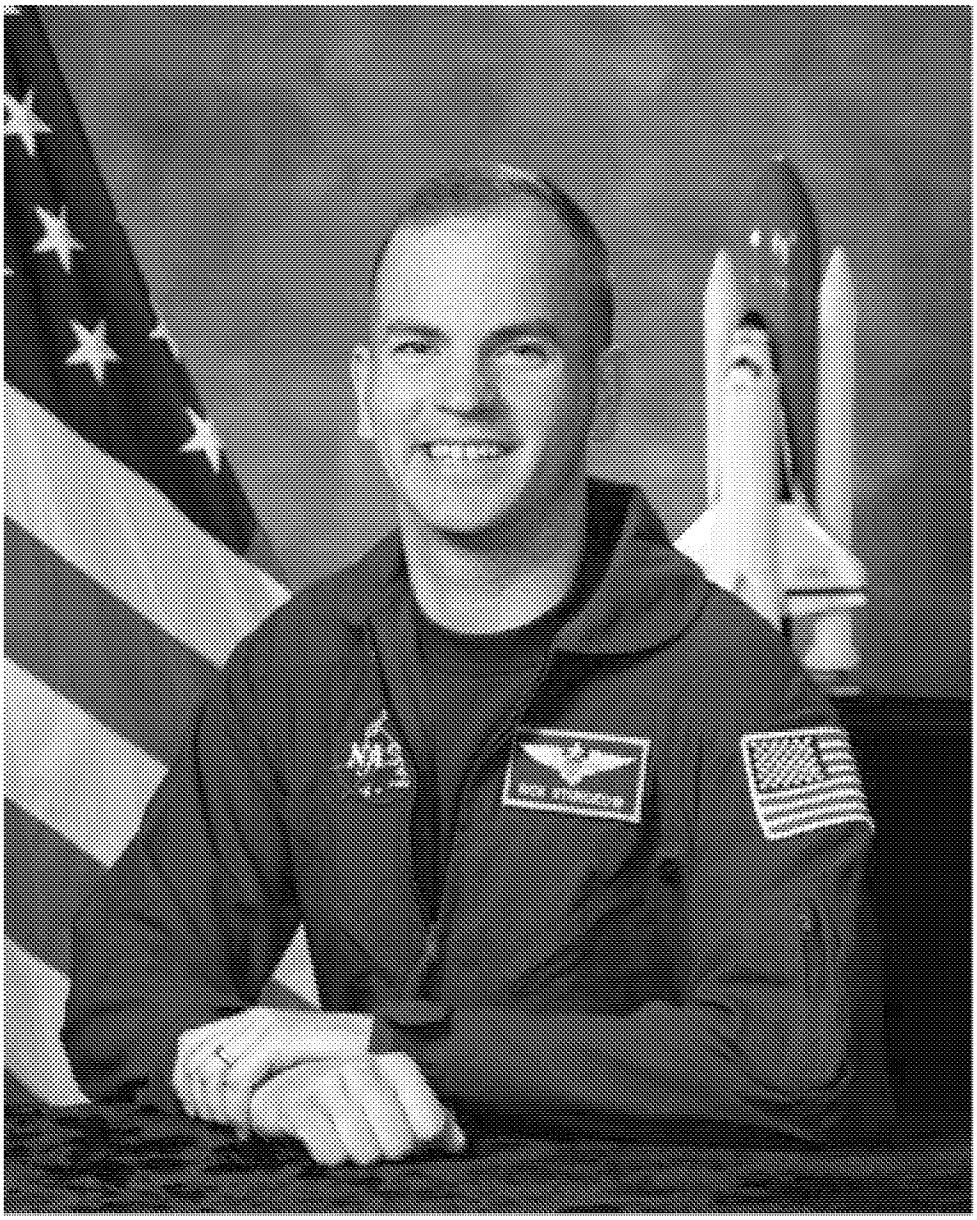
STS-128 DISCOVERY CREW

The STS-128 patch symbolizes the 17A mission and represents the hardware, people and partner nations that contribute to the flight. The space shuttle Discovery is shown in the orbit configuration with the Multi-Purpose Logistics Module (MPLM) Leonardo in the payload bay. Earth and the International Space Station wrap around the Astronaut Office symbol reminding us of the continuous human presence in space. The names of the STS-128 crew members border the patch in an unfurled manner. Included in the names is the expedition crew member who will launch on STS-128 and remain on board the station, replacing another Expedition crew member who will return home with STS-128. The banner also completes the Astronaut Office symbol and contains the U.S. and Swedish flags representing the countries of the STS-128 crew.

Attired in training versions of their shuttle launch and entry suits, these seven astronauts take a break from training to pose for the STS-128 crew portrait. Seated are NASA astronauts Rick Sturckow (right), commander; and Kevin Ford, pilot. From the left (standing) are astronauts Jose Hernandez, John "Danny" Olivas, Nicole Stott, European Space Agency's Christer Fuglesang and Patrick Forrester, all mission specialists. Stott is scheduled to join Expedition 20 as flight engineer after launching to the International Space Station on STS-128.

Short biographical sketches of the crew follow with detailed background available at: http://www.jsc.nasa.gov/Bios/

STS-128 CREW BIOGRAPHIES



Frederick Sturckow

Frederick Sturckow, a colonel in the U.S. Marine Corps, will lead the crew of STS-128. He served as pilot on STS-88 in 1998 (first International Space Station assembly mission) and STS-105 in 2001, and as commander of STS-117 in 2007. Sturckow has overall responsibility for the safety and execution of the mission, orbiter systems operations and flight operations, including landing. He also will fly Discovery through its rendezvous and docking to the International Space Station.

Kevin Ford

Astronaut Kevin Ford, a retired U.S. Air Force colonel, will serve as the pilot for Discovery. This will be his first journey into space. Selected by NASA in 2000, he has served in various shuttle technical jobs and as a CAPCOM. He will be responsible for orbiter systems operations, will assist Sturckow with rendezvous, and will fly the orbiter during undocking and the flyaround. He will be the primary operator of the space station robotic arm during docked operations, and will also assist with shuttle robotic operations during the thermal protection system inspections.

Patrick Forrester

Veteran astronaut Patrick Forrester will serve as a mission specialist for the space shuttle Discovery. He will choreograph the three planned spacewalks, as well as participate in robotics operations to inspect Discovery after launch and before re-entry. Forrester flew on STS-105 in 2001 and STS-117 in 2007. He has conducted four spacewalks totaling 25 hours, 22 minutes.

Jose Hernandez

This is the first spaceflight for Jose Hernandez. He was selected as a NASA astronaut in 2004 and completed his initial training in February 2006. He is slated to perform robotic operations to inspect Discovery after launch and assist with cargo transfer from shuttle to station.

Christer Fuglesang

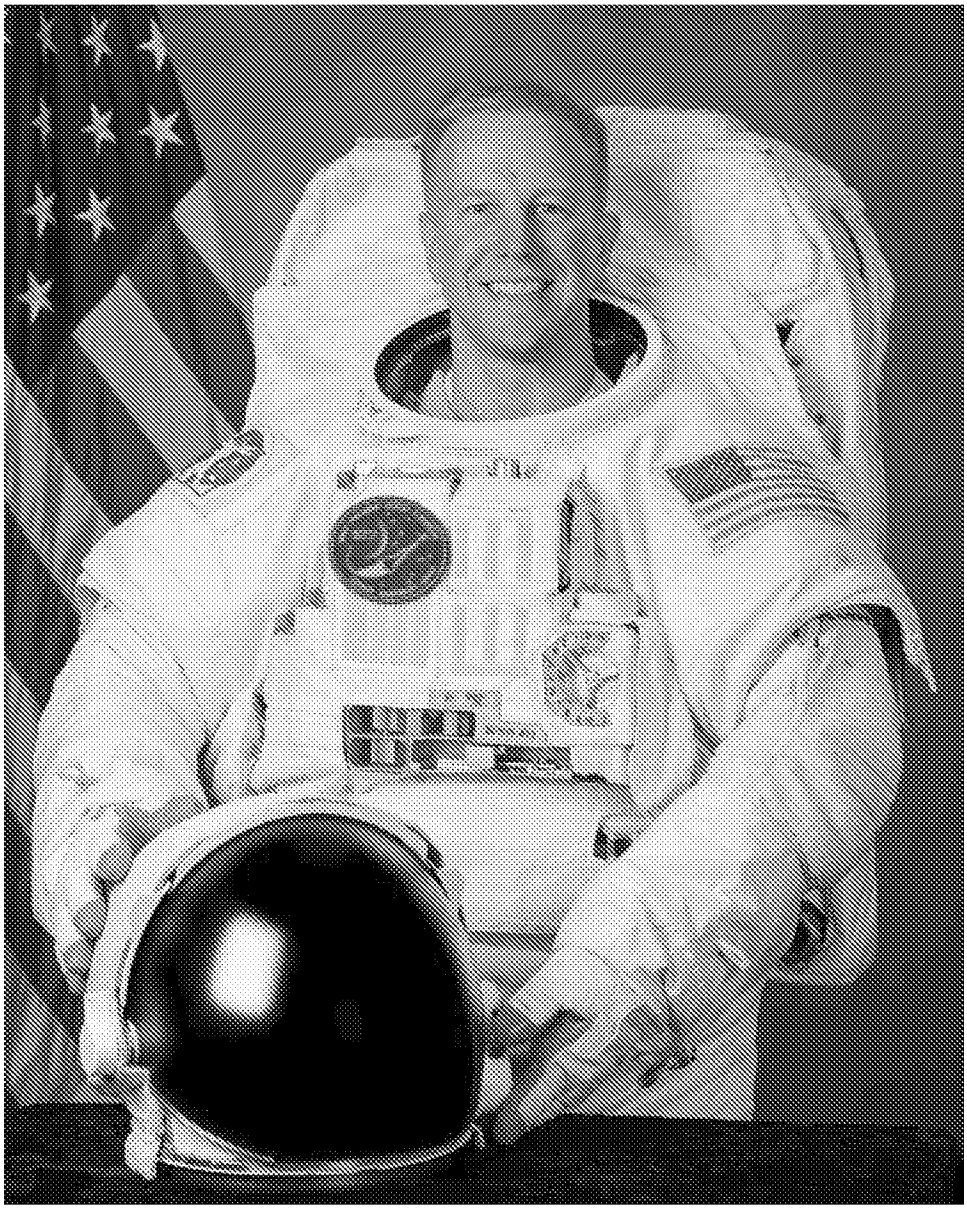
An astronaut with the European Space Agency since 1992, Christer Fuglesang joined NASA in 1996 as a mission specialist. He will conduct two spacewalks with Olivas to assist with installation of a new Ammonia Tank Assembly (ATA) and make preparations for the arrival of the Tranquility connecting module. He will serve as the loadmaster for the Multi-Purpose Logistics Module during the mission. This will be Fuglesang's second spaceflight, the previous being STS-116 in 2006 that installed the P5 spacer truss segment.

Danny Olivas

Astronaut Danny Olivas will serve as the lead spacewalker for this mission. He will participate in all three spacewalks during the mission. Spacewalk tasks include installing a new ATA on the station's Port 1 truss and stowing the empty tank on the cargo carrying platform in Discovery's payload bay, retrieving two experiments from the hull of the European Columbus module and routing power cables for Tranquility (Node 3). Olivas also flew on STS-117 in 2007, which delivered the second starboard truss segment, third set of solar arrays, batteries and associated equipment.

Nicole Stott

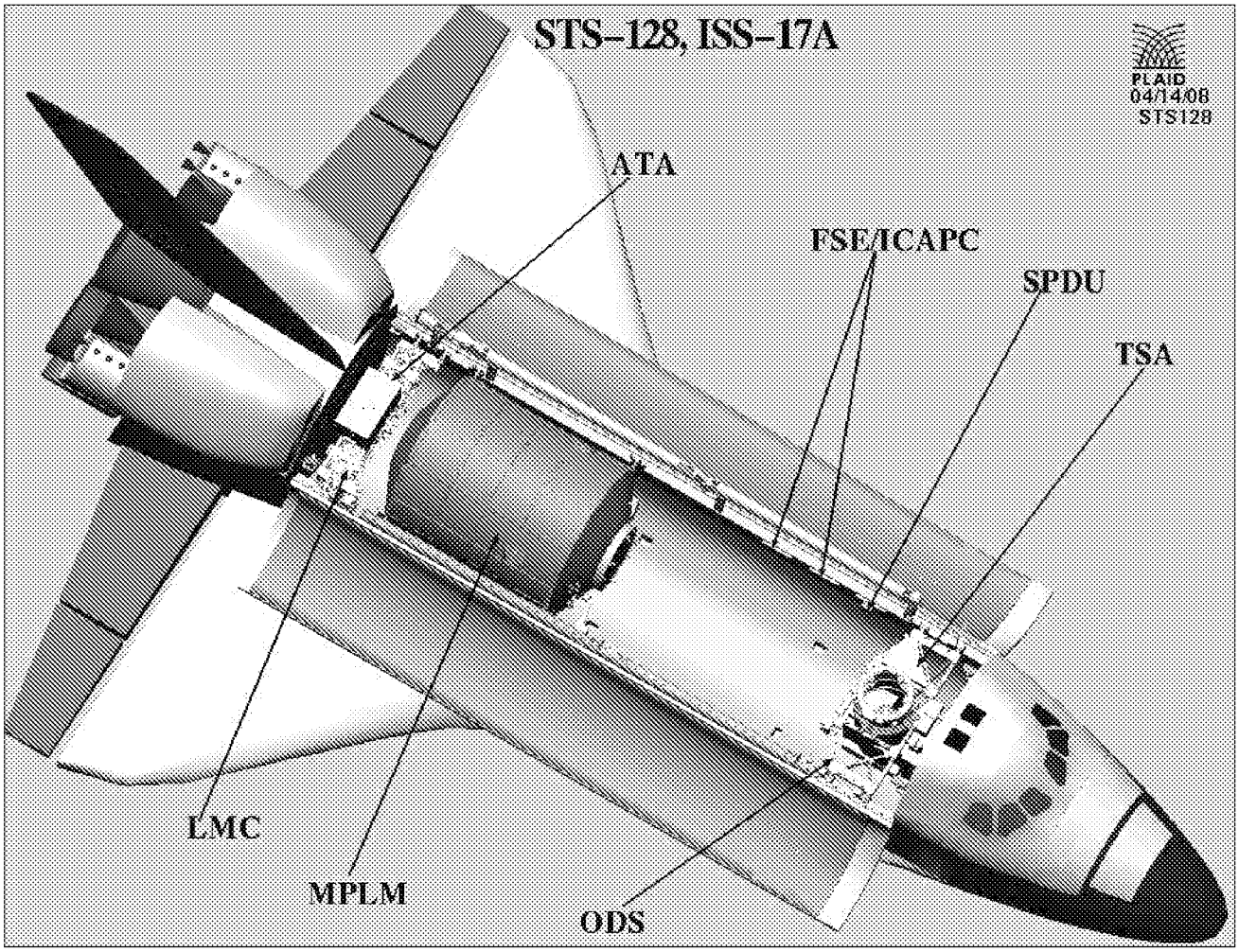
This will be the first spaceflight for Nicole Stott who will serve as flight engineer for Expedition 20 and 21 replacing Tim Kopra. Aside from serving as a long-duration crew member, along with Olivas she will conduct the first spacewalk of space shuttle Discovery's mission. Stott was selected as a NASA astronaut in 2000. She has worked technical aspects of station payloads, supported Expedition 10 and has served as a station CAPCOM. Stott will launch with the crew of STS-128 and return on STS-129.



Tim Kopra

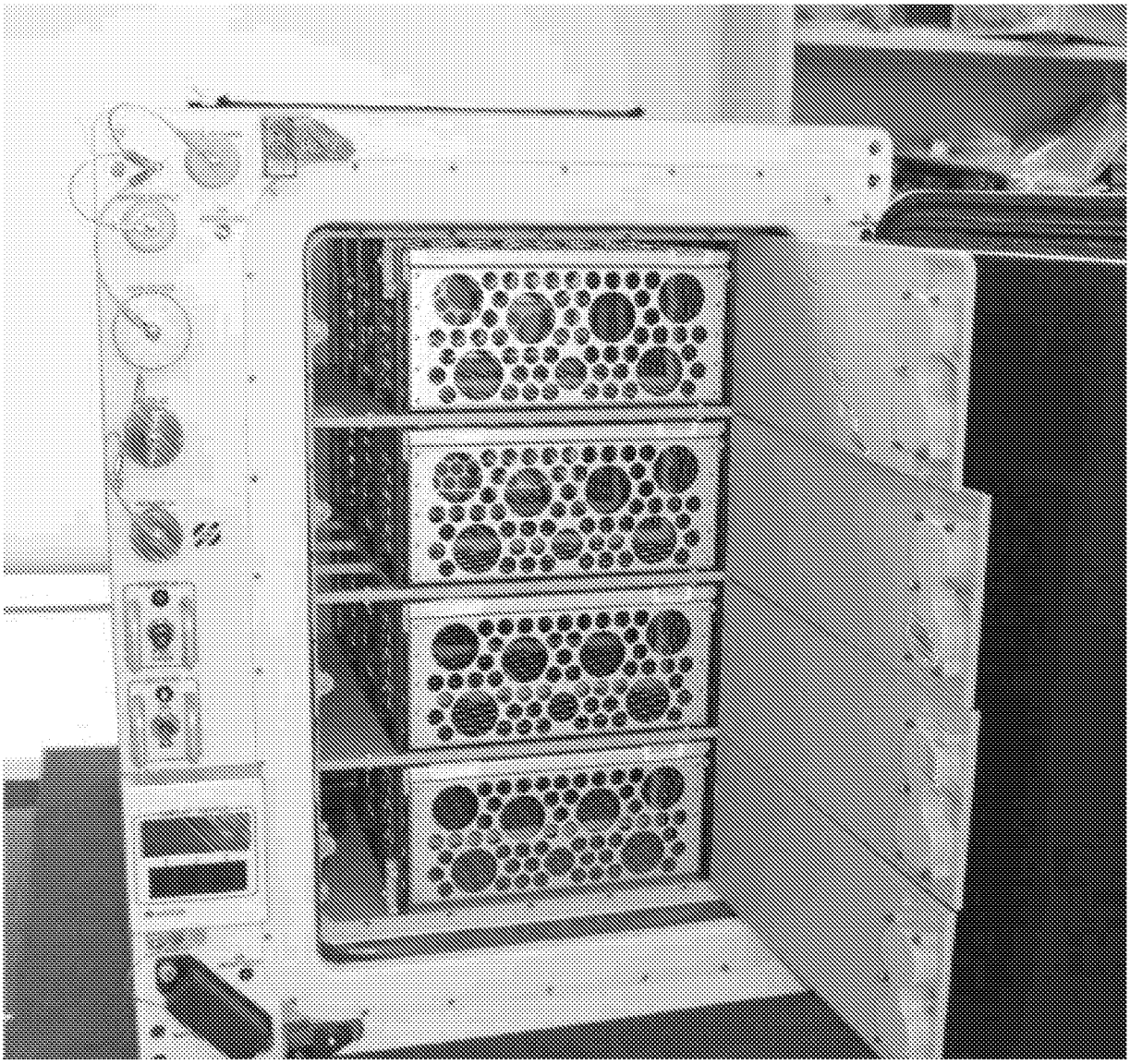
Tim Kopra, a colonel in the Army, has a history at NASA that precedes his joining the astronaut corps. Kopra was assigned to NASA at the Johnson Space Center in September 1998 as a vehicle integration test engineer. In this position, he served as an engineering liaison for space shuttle launch operations and space station hardware testing. He was selected as an astronaut in 2000. Since then, he has completed training at each of the international partner training sites and served as a backup crew member to Expeditions 16 and 17. Kopra launched to the station with the crew of STS-127 to replace Koichi Wakata as the Expedition 20 flight engineer. He will return with the STS-128 shuttle crew.

PAYLOAD OVERVIEW



The space shuttle payload will include the Leonardo Multi-Purpose Logistics Module (MPLM) and the Lightweight Multi-Purpose Experiment Support Structure Carrier (LMC). The total payload weight, not counting the middeck, is 31,694 pounds. The expected return weight is 19,053 pounds.

On the middeck of the space shuttle, it will carry GLACIER, a freezer designed to provide cryogenic transportation and preservation capability for samples. The unit is a double locker equivalent unit capable of transport and operation in the middeck and in-orbit operation in the EXPRESS Rack.



The space shuttle will carry on its middeck (ascent) the following items: GLACIER (Sortie) with refrigerated samples, NLP-Vaccine (Sortie), MDS & Support HDW, HRP Integrated Immune (SDBI 1900), HRP Sleep Short (SDBI 1634) and Sleep Long, JAXA Area Dosimeter (PADLES3), JAXA Space Seed, JAXA Payload Maintenance, JAXA Rad Silk Refrigerated Samples, ESA-CARD, and ESA SOLO. On its return, among the items carried on the middeck will be GLACIER (Sortie) with frozen samples, NLP-Vaccine (Sortie), ESA 3D-Space, Integrated Immune, Lada-VPU P3R root modules and frozen plant samples, HRP ISSMP frozen samples, JAXA Area Dosimeter (PADLES2), JAXA RAD Silk & Microbe refrigerated and frozen samples, and a double coldbag with refrigerated samples.

LEONARDO MULTI-PURPOSE LOGISTICS MODULE (MPLM) FLIGHT MODULE 1 (FM1)

The Leonardo Multi-Purpose Logistics Module (MPLM) is one of three differently named large, reusable pressurized elements, carried in the space shuttle's cargo bay, used to ferry cargo back and forth to the station. The STS-128 flight will be the second to the last time that Flight Module 1 (FM1) will be launched in its full configuration. After STS-128, FM1 will be modified to remove hardware to reduce the weight of the module so that more hardware can be launched on STS-131/Flight 19A. The cylindrical module includes components that provide life support, fire detection and suppression, electrical distribution and computers when it is attached to the station. The cylindrical logistics module acts as a "moving van" for the space station, carrying cargo, experiments and supplies for delivery to support the six-person crew on board the station, and to return spent materials, trash and

unneeded hardware to Earth. The MPLM is designed to fit in the space shuttle cargo bay and can take up six bays. Each module is approximately 21 feet long and 15 feet in diameter.

On the STS-128 mission, Leonardo will carry two research racks, four station system racks, seven Resupply Stowage Platforms (RSPs), two Resupply Stowage Racks (RSRs), one Zero Stowage Rack (ZSR) and one Integrated Stowage Platform (ISP) and will include Aft Cone Stowage (first used on STS-126/ Flight Utilization Logistics Flight 2 on Nov. 14, 2008). The aft cone modification allows 12 additional cargo bags which are similar to the size of carry-on suitcases. In the aft endcone, additional Lithium Hydroxide (LiOH) canisters, which support the station's Environmental Control Life Support System (ECLSS), additional Remote Power Control Modules (RPCM), which support the Electrical Power System (EPS), as well as food containers and other hardware to support the crew will be flown.

In addition, the sixth set of Materials International Space Station Experiment (MISSE) labeled 6a and 6b will be removed by the spacewalk crew from Columbus and transferred into the MPLM for return to Earth. MISSE is a series of experiments mounted externally on the station that investigate the effects of long-term exposure of materials to the harsh space environment. MISSE 6a and 6b were launched by space shuttle Endeavour during mission STS-123 on March 13, 2008, and contained more than 400 specimens of various materials.

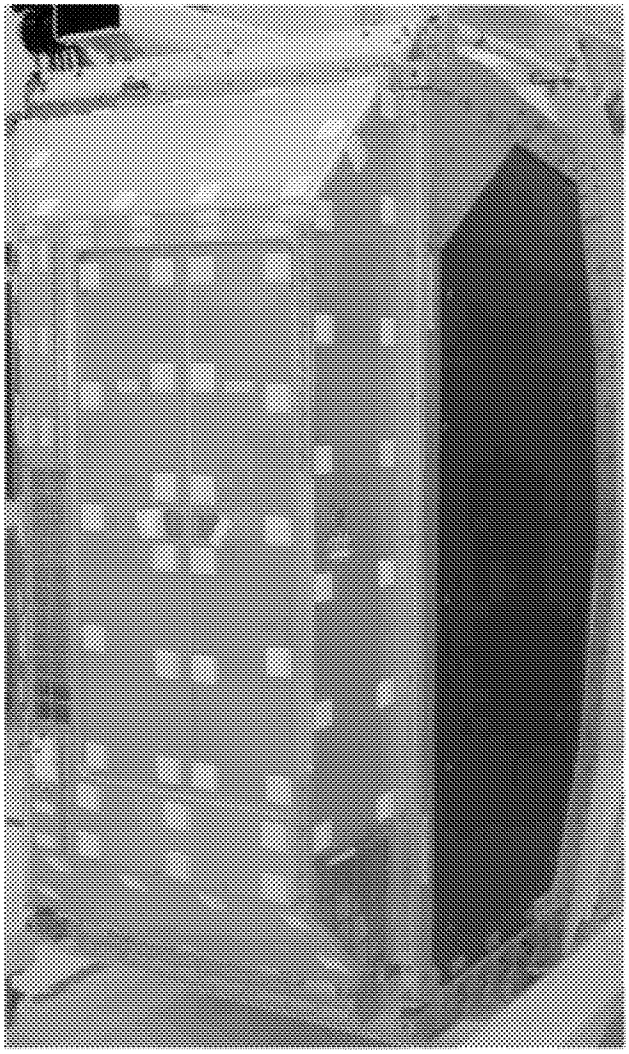
The two research racks carried in Leonardo are: Fluid Integrated Rack (FIR) and Materials Science Research Rack (MSRR). The four station system racks are: Crew Quarters (CQ), Minus Eighty-Degree Laboratory Freezer for ISS-2 (MELFI-2), Node 3 Air Revitalization System Rack (ARS), and Treadmill 2, which was renamed Combined Operational Load Bearing External Resistance Treadmill or COLBERT for short by NASA.

The following are more detailed descriptions on each of these racks:

Crew Quarters (CQ)

The crew quarters delivered on STS-128/17A will be installed in the Japanese Experiment Module (JEM) pressurized module. Two crew quarters are already installed in Node 2 and able to accommodate two crew members. The CQ provides private crew member space with enhanced acoustic noise mitigation, integrated radiation reduction material, controllable airflow, communication equipment, redundant electrical systems, and redundant caution and warning systems. The rack-sized CQ is a system with multiple crew member restraints, adjustable lighting, controllable ventilation, and interfaces that allow each crew member to personalize their CQ workspace.

Crew quarters (interior view)



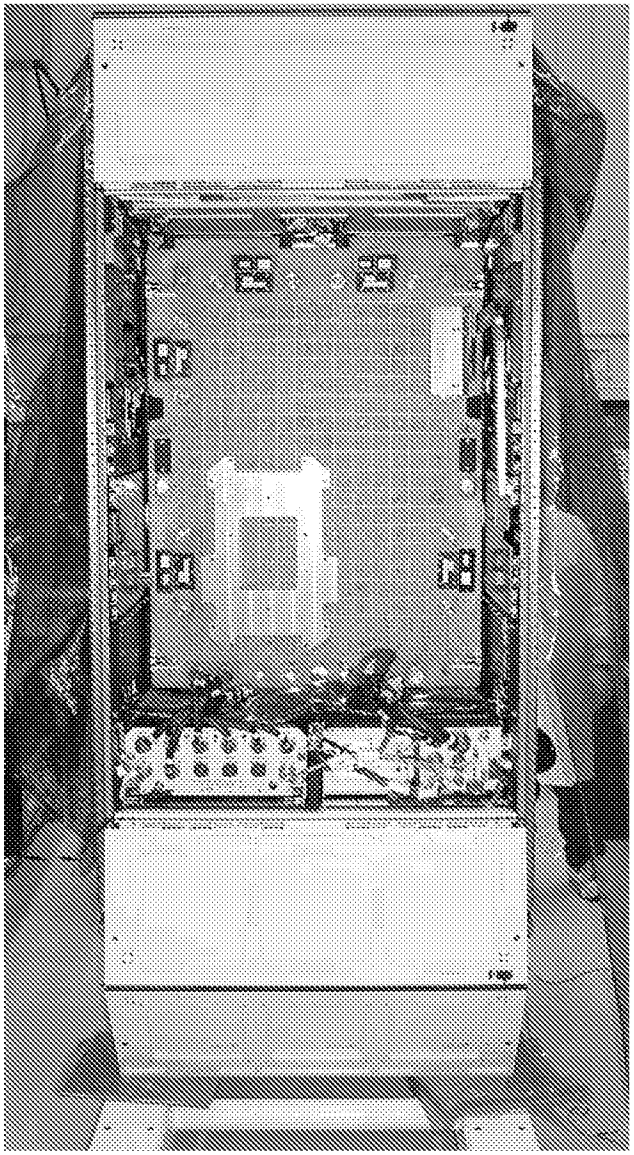
Crew quarters (exterior view)

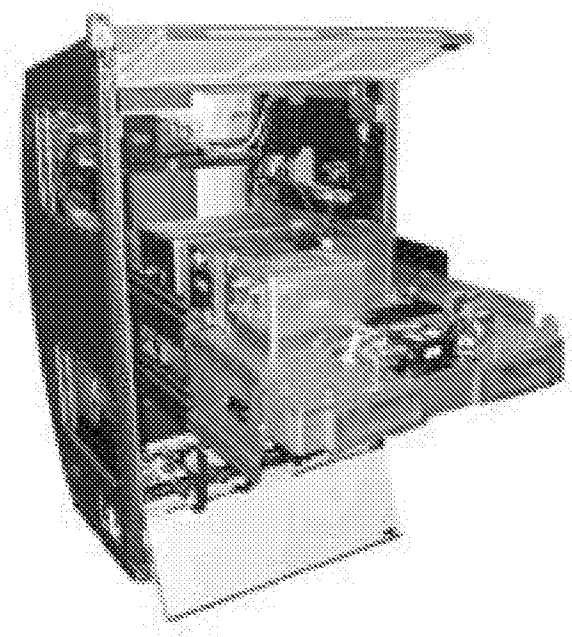
Fluids Integrated Rack (FIR)

The Fluids Integrated Rack (FIR) is a complementary fluid physics research facility designed to host investigations in areas such as colloids, gels, bubbles, wetting and capillary action, and phase changes including boiling and cooling. Fluids under microgravity conditions perform differently than those on Earth. Understanding how fluids react in these conditions will lead to improved designs on fuel tanks, water systems and other fluid-based systems.

The FIR features a large user-configurable volume for experiments. The volume resembles a laboratory optics bench. An experiment can be built up on the bench from components, or it can be attached as a self-contained package, or a combination. The FIR provides data acquisition and control, sensor interfaces, laser and white light sources, advanced imaging capabilities, power,

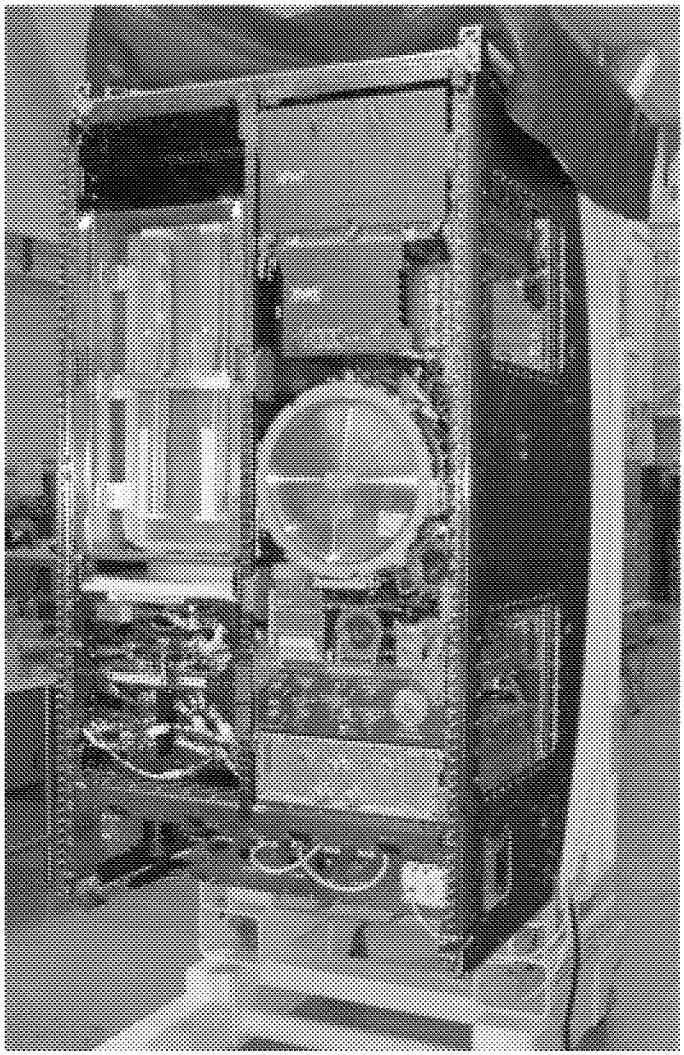
cooling, and other resources. Astronauts can quickly mount and set up the experiment with final operations accomplished by remote control from the NASA Glenn Research Center's Telescience Support Center (TSC) in Cleveland or from the principal investigator home institution. The FIR offers the crew members easy access to the back of the optics bench for maintenance and experiment reconfiguration.





Materials Science Research Rack 1 (MSRR-1)

The Materials Science Research Rack-1 (MSRR-1) will be used for basic materials research in the microgravity environment of the station. MSRR-1 can accommodate and support diverse Experiment Modules (EMs). In this way many material types, such as metals, alloys, polymers, semiconductors, ceramics, crystals, and glasses, can be studied to discover new applications for existing materials and new or improved materials. Initially, the MSRR-1 will house the European Space Agency-developed Materials Science Laboratory (MSL) and the Low Gradient Furnace (LFG). Sample cartridge assemblies will be inserted into the furnace and heated, then cooled down to resolidify the sample material free from the effects of gravity. MSRR-1 will be moved by the crew from the MPLM to its rack location in the Destiny laboratory.

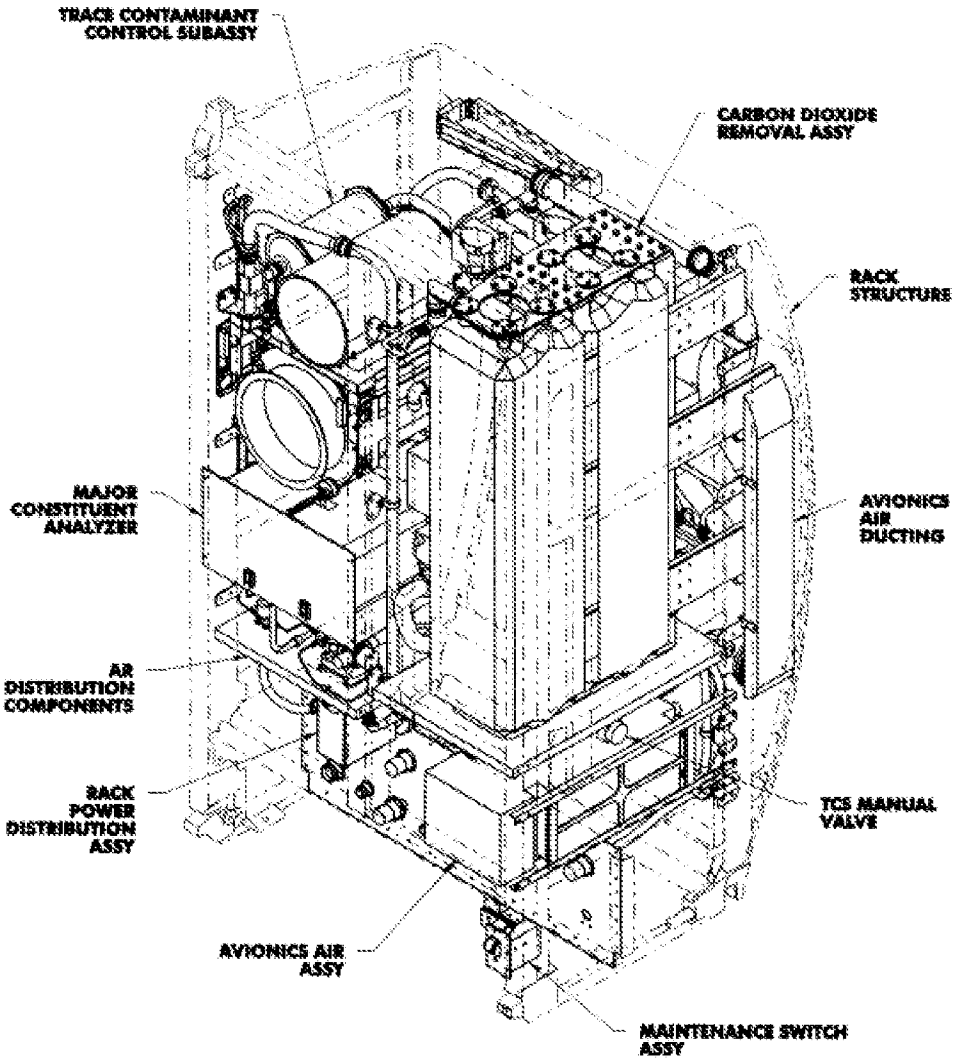


Minus Eighty-Degree Laboratory Freezer 2 (MELFI-2)

Minus Eighty-Degree Laboratory Freezer for ISS (MELFI) is a European Space Agency-built, NASA-operated freezer that allows samples to be stored on the station at temperatures as low as -80 degrees centigrade. It comprises four independent dewars which can be set to operate at different temperatures. Each dewar is a cylindrical vacuum-insulated 75-liter container and can accommodate samples of a variety of sizes and shapes. The total capacity of the unit is 300 liters. The first MELFI unit, FU-1, was flown to the station on STS-121, installed in the Destiny laboratory, and commissioned by Thomas Reiter. The MELFI was subsequently relocated to the "Kibo" Japanese Experiment Module. The second one will be installed in the U.S. laboratory.

Node 3 Air Revitalization System Rack (N3 ARS)

The N3 ARS will provide a Carbon Dioxide Removal Assembly (CDRA) to remove carbon dioxide from the cabin atmosphere in the International Space Station. The rack also contains a Trace Contaminant Control Subassembly (TCCS) that removes potentially hazardous trace contaminants from the cabin atmosphere. The third element contained in the rack is called a Major Constituent Analyzer (MCA), which monitors the cabin atmosphere for major constituents (N2, O2, CO2, CH4, H2, and water vapor). The N3 ARS will be temporarily installed in the JEM pressurized module and eventually transferred to Node 3 when it arrives.



AR RACK FRONT ISOMETRIC VIEW

RACK FACEPLATES NOT SHOWN FOR CLARITY

COMBINED OPERATIONAL LOAD BEARING EXTERNAL RESISTANCE TREADMILL (COLBERT)

The Combined Operational Load Bearing External Resistance Treadmill (COLBERT) is packed and prepared for stowage aboard Discovery for its transport to the International Space Station.

Training for future exploration missions is a key goal for the International Space Station Program, and a new treadmill launching on STS-128 will help doctors determine just how important "training" is to humans on long-space journeys.

That's training as in exercise, and treadmill as in COLBERT, or the Combined Operational Load Bearing External Resistance Treadmill, so named for comedian Stephen Colbert of Comedy Central's "The Colbert Report."

The COLBERT will be the second treadmill on the space station, adding to a complement of six different exercise devices already in orbit that range from stationary bicycles to resistive exercise devices. First and foremost, the new treadmill is a critical countermeasure device that will be used to keep the international crew healthy while in orbit, and prepare them for return to Earth.

In addition, the COLBERT will feature data collection devices that will allow doctors and scientists to evaluate how effective the treadmill exercise is in reducing the amount of bone and muscle density loss due to life without gravity. Data on treadmill speed, session duration and body load of each crew member's exercise

session will help scientists understand spaceflight-induced physiological changes in the cardiovascular, muscle, bone and sensorimotor systems.

The first experiment to use the COLBERT will be the Functional Task Test (FTT), a multidisciplinary study designed to identify the key underlying physiological factors that contribute to performance of functional tests that are representative of critical mission tasks for lunar and Mars operations. FTT's principal investigator is Jacob Bloomberg of NASA's Johnson Space Center (JSC), Houston.

This is not the first treadmill on the station. Station residents currently are using the Treadmill with Vibration Isolation System (TVIS) that's recessed in the floor of the Zvezda service module. Expedition 20 flight engineers Mike Barratt and Koichi Wakata just performed a complete overhaul of that treadmill to extend its life. Both treadmills will continue to be used, which will nearly double the availability of this critical work-out device for six-person crews.

While the purpose and general functionality of TVIS and COLBERT will be the same, there are a couple of significant differences.

First, the actual treadmill for COLBERT was purchased from Woodway USA, Waukesha, Wis., while TVIS was developed in-house at JSC. The COLBERT and supporting subsystems (power, cooling, etc.) will be housed in an International Standard Payloads Rack (ISPR). The entire assembly will be housed initially in the station's Harmony module, then be moved to the Tranquility module after it is launched in early 2010. Tranquility is a pressurized module that will provide room for many of the space station's life support systems. Attached to the node is a cupola, which is a unique workstation with six windows on the sides and one on top.

Second, the two use different methods to keep the vibrations generated by runners from shaking the sensitive microgravity experiments on the station. TVIS uses an active system of throw masses that sense running forces and "throw" a counterweight in the opposite direction to counteract the vibrations. TVIS also uses some light tethers and a gyroscope. COLBERT was designed to be heavy, so that its inertial mass will be the primary method for dampening the vibrations. The total weight of the COLBERT rack is 2,200 pounds fully configured in orbit. Launch weight is around 1,600 pounds. Individual treadmill weighs about 300 pounds. The entire rack will have a modified Passive Rack Isolation System (PaRIS) that uses two-stage isolators, or springs, to dampen different vibration frequencies.

The main reasons for the different approach were to simplify the system, making it easier and less costly to maintain. The simpler design also is expected to result in higher reliability, making the new treadmill consistently available to the crew, which must work out daily to counteract the loss of bone and muscle density that is a side effect of long-duration stays in orbit. If all goes as expected, the COLBERT will have a five-year service life.

There are a number of COLBERT and TVIS similarities. Both have running surfaces made of aluminum. The COLBERT treadmill surface uses the exact same aluminum as a commercial treadmill, but a rubber coating is stripped off the top of the treads and that aluminum is anodized to provide surface roughness and protection.

Both treadmills meet the payload requirements for vibration isolation. COLBERT and TVIS are very close in most frequencies, but each is able to dampen some frequencies better than the other.

COLBERT's maximum speed is 12.4 miles an hour, but don't expect crew members to run that fast because 12.4 miles an hour is faster than the Olympic 100-meter race record. An average person runs 7- to- 8 miles an hour, and most crew members will run about 4- to- 8 miles an hour.

Another improvement is that COLBERT is designed so that ground experts tracking crew health in orbit can create individual exercise prescriptions and uplink them to the crew as a profile. COLBERT will use the same control interface as that used for the Advanced Resistive Exercise Device (ARED) so that crew members won't have to learn a new interface. The interface is modeled on commercial treadmills and looks nearly identical to what you'd find in many gyms on Earth. The standard rack connection device, the same seat tracks used in Boeing airliners, will provide locations where the crew can mount devices such as laptop computers so they can entertain themselves while exercising.

Each crew member is required to work out a total of two and a half hours a day, about an hour of that on the treadmill. Astronauts are expected to burn between 250 and 500 calories while working out on COLBERT, which has instrumented load cells and three-axis accelerometers that can measure the foot force of running. Ground experts will be able to use this information to determine how well they are being conditioned or losing their deconditioning, and adjust exercise prescriptions accordingly.

Setting up for an exercise session on COLBERT should be fairly simple. The first runner of the day will turn it on by flipping the rack power switch. After waiting a couple minutes for all systems to activate, they'll position the control interface to a location comfortable for them. They'll connect bungee cords to provide a load that will generate the foot force necessary to give the astronaut's bones and muscles a workout in the absence of gravity. They'll put on the harness that connects them to the bungees, set the desired load and verify that they agree with their prescription. Then, they'll log into the system, pick a profile, hit start and go. In the future, a new load system being developed by the European Space Agency will provide highly accurate, continuous force that's closer to a full one-gravity body weight.

The two treadmills provide side benefits for the entire crew, because as humans exercise they respire (breathe) and perspire (sweat) and that moisture is reclaimed by the station's systems that recycle moisture from the station's atmosphere.

NASA chose the acronym COLBERT after the television comedian's campaign for write-in votes to name the next module after himself. NASA chose to name the module Tranquility instead, in honor of the 40th anniversary of the first Apollo landing on the moon. Expedition 14 and 15 astronaut Suni Williams made the announcement on "The Colbert Report" two years after running the Boston Marathon in space.

The COLBERT rack, treadmill and support hardware will launch in the Leonardo Multi-purpose Logistics Module and be transferred to the station on flight day 5. The new workout machine will be set up and used after the shuttle Discovery departs.

MPLM BACKGROUND INFORMATION

Leonardo

The Italian-built, U.S.-owned logistics modules are capable of ferrying more than 7.5 tons (15,000 pounds) of cargo, spares and supplies. This is the equivalent of a semi-truck trailer full of station gear bringing equipment to and from the space station. Return equipment includes container racks with science equipment, science experiments from NASA and its international partners, assembly and spare parts; other return hardware items include completed experiments, system racks, station hardware that needs repair and refuse from the approximately 220-mile-high outpost. Some of these items are for disposal on Earth while others are for analysis and data collection by hardware providers and scientists.

Including STS-128, the MPLMs in total have flown nine times since 2001. This will be the sixth flight for Leonardo. Of the three MPLM modules, only two remain in active service to NASA for future flights. The space shuttle flies logistics modules in its cargo bay when a large quantity of hardware has to be ferried to the orbiting habitat at one time. The modules are attached to the inside of the bay for launch and landing. When in the cargo bay, the module is independent of the shuttle cabin, and there is no passageway for shuttle crew members to travel from the shuttle cabin to the module. After the shuttle has docked to the outpost, typically on the fourth flight day after shuttle launch, Leonardo is mated to the station using

the station's robotic arm to the Node 2 nadir port. In the event of a failure or issue which may prevent the successful latching of the MPLM to the nadir port, the Zenith port can be used to mate the MPLM to the station. Nodes are modules that connect the elements to the station, and Unity was the first element to the station to connect the U.S. and Russian segments of the outpost. For its return trip to Earth, Leonardo will be detached from the station and positioned back into the shuttle's cargo bay.

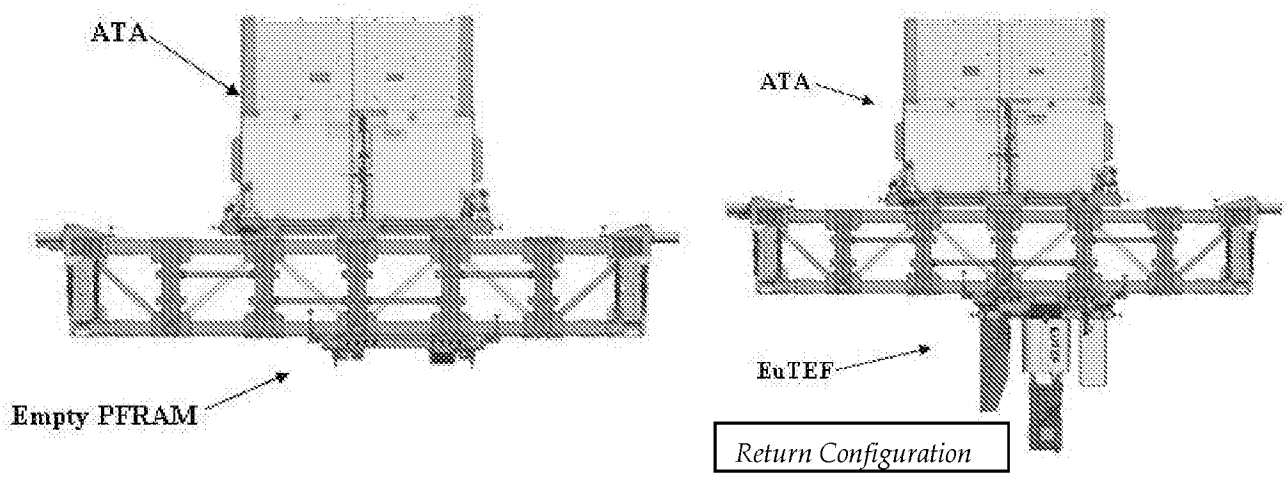
LEONARDO SPECIFICATIONS	
Dimensions:	Length: 21 feet Diameter: 15 feet
Payload Mass (launch):	27,510 lbs
Payload Mass (return):	16,268 lbs
Empty Weight:	9,810 lbs

NASA solely owns the modules which were acquired in a bartered agreement between NASA and the Italian Space Agency for using the modules in exchange for allowing the Italians to have crew time on board station.

Leonardo is named after the Italian inventor and scientist Leonardo da Vinci. It was the first MPLM to deliver supplies to the station. The two other modules are named Raffaello, after master painter and architect Raffaello Sanzio, and Donatello, for one of the founders of modern sculpture, Donato di Niccolo Di Betto Bardi. Raffaello has flown three times. Leonardo has flown the most because it is equipped with programmable heater thermostats on the outside of the module that allow for more mission flexibility. Donatello is not currently on the shuttle manifest to fly because of the cost associated with getting the module up to flight status code. There is only one more MPLM flight scheduled on STS-131/19A before the station is complete and space shuttle retires in 2010.

Under its Checkout, Assembly and Payload Processing Services (CAPPS) contract with NASA, Boeing processes every major payload that flies on all space shuttle flights, and the team performs all aspects of payload support, including the planning and receiving of payloads, payload processing, maintenance of associated payload ground systems, logistics support, integration of payloads with the space shuttle, launch support and space shuttle post-landing payload activities. On this particular mission, Leonardo's micrometeoroid panel bolts were inspected by Boeing technicians at the recommendation of the Marshall Space Flight Center MPLM project office and the chief engineer's office. All 290 bolts were inspected and 16 were replaced on 68 debris shields.

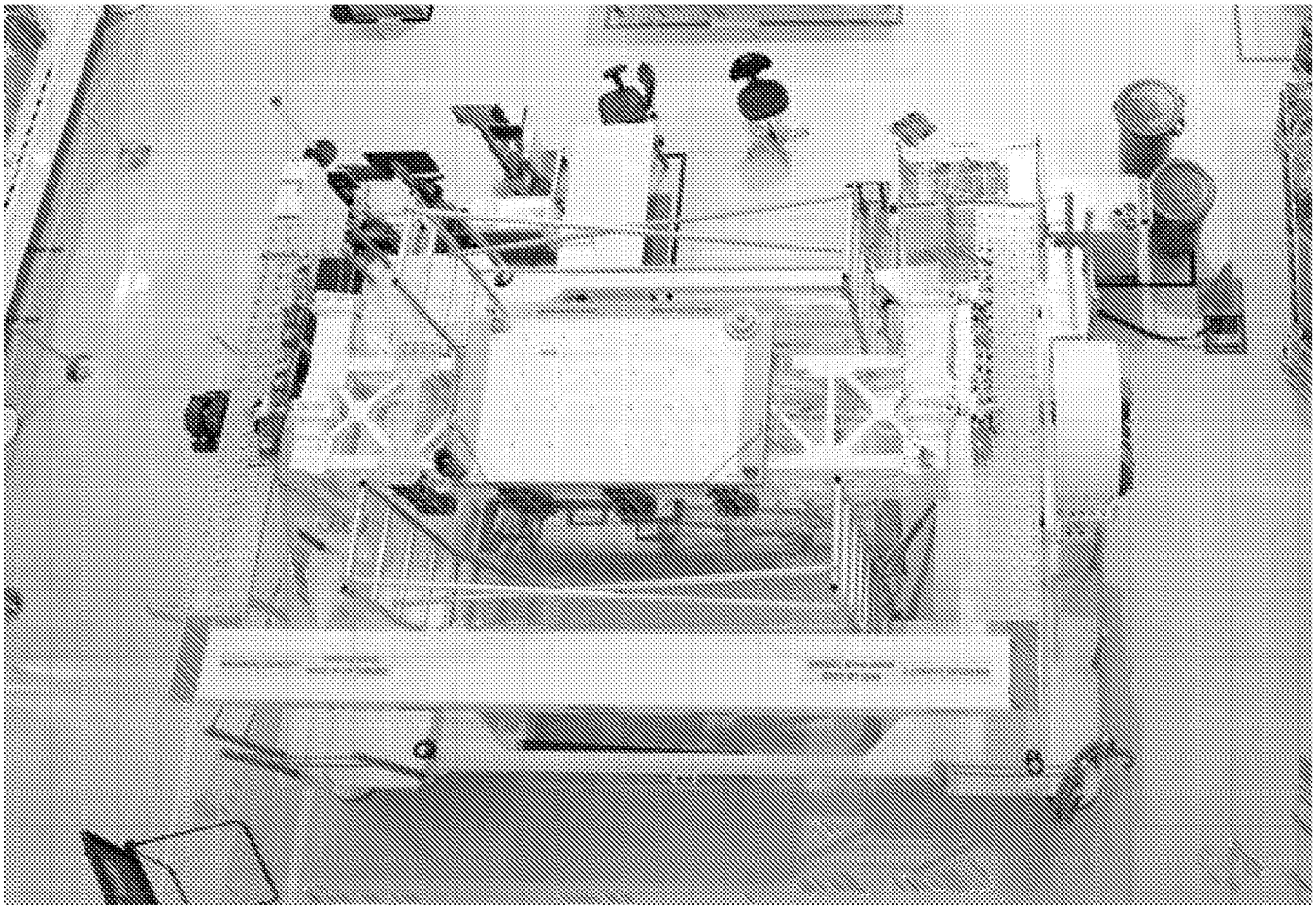
THE LIGHTWEIGHT MULTI-PURPOSE EXPERIMENT SUPPORT STRUCTURE CARRIER (LMC)



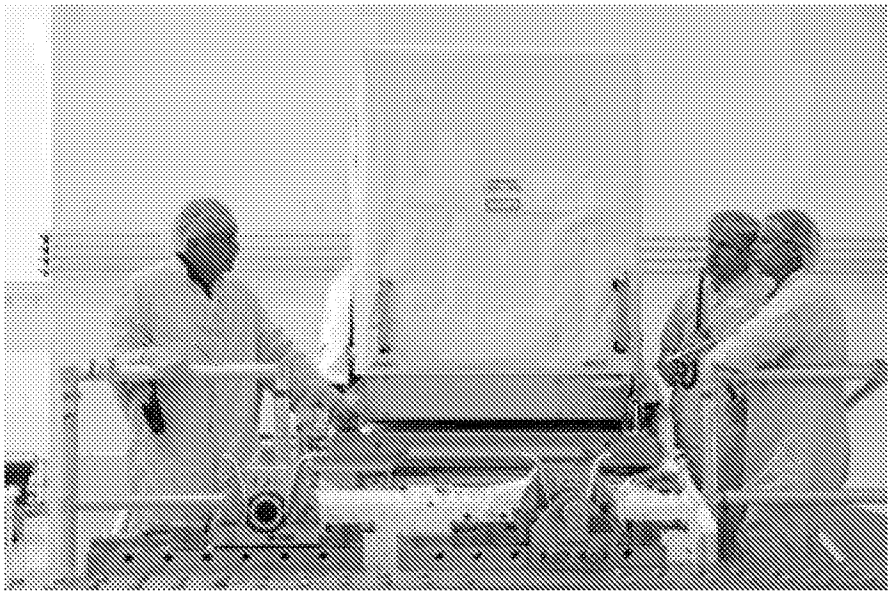
Located behind Leonardo in the space shuttle payload is the Lightweight Multi-Purpose Experiment Support Structure Carrier (LMC), a non-deployable cross-bay carrier providing launch and landing transportation. The LMC is a light-weight shuttle stowage platform that is maintained by the Goddard Space Flight Center and ATK Space for NASA and has flown on four previous missions (STS-108/UF-1, STS-114/LF1, STS-121/ULF1.1 and STS-126/ULF2). The LMC weighs 1,108 pounds. The launch weight of the integrated LMC is 3,926 pounds and the return weight will be 4,146 pounds.

The LMC is the platform which carries the Ammonia Tank Assembly (ATA), a critical spare Orbital Replacement Unit (ORU), in the space shuttle payload bay to the International Space Station and returns with a spent ATA, as well as the European Technology Exposure Facility (EuTEF).

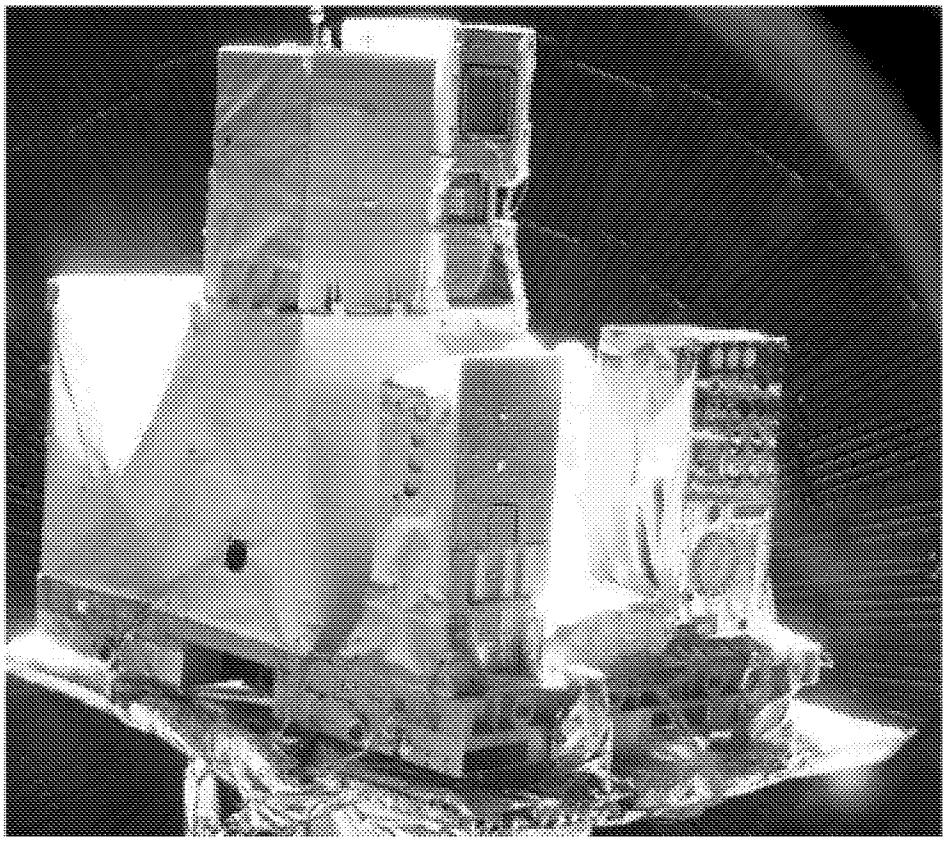
The LMC will be carrying a replacement ATA. The tank, installed on the port one truss, is part of the station's cooling system for the electronic components. The ATA that the space shuttle returns with will have about 30 percent of its ammonia remaining in its tank.



EuTEF will be removed from its orbital mounting platform outside of the Columbus module. There will be a special Contingency Pin Kit (CPK) carried on the LMC. The CPK provides the EVA crew with frontside access to the backside release mechanism of the Passive Flight Releasable Attach Mechanism (PFRAM) to Orbital Replacement Unit (ORU) restraint system if required for safe return of an ORU on the LMC.



In the Space Station Processing Facility at NASA's Kennedy Space Center in Florida, STS-128 Mission Specialists John "Danny" Olivas (left) and Christer Fuglesang (far right) inspect the ATA.

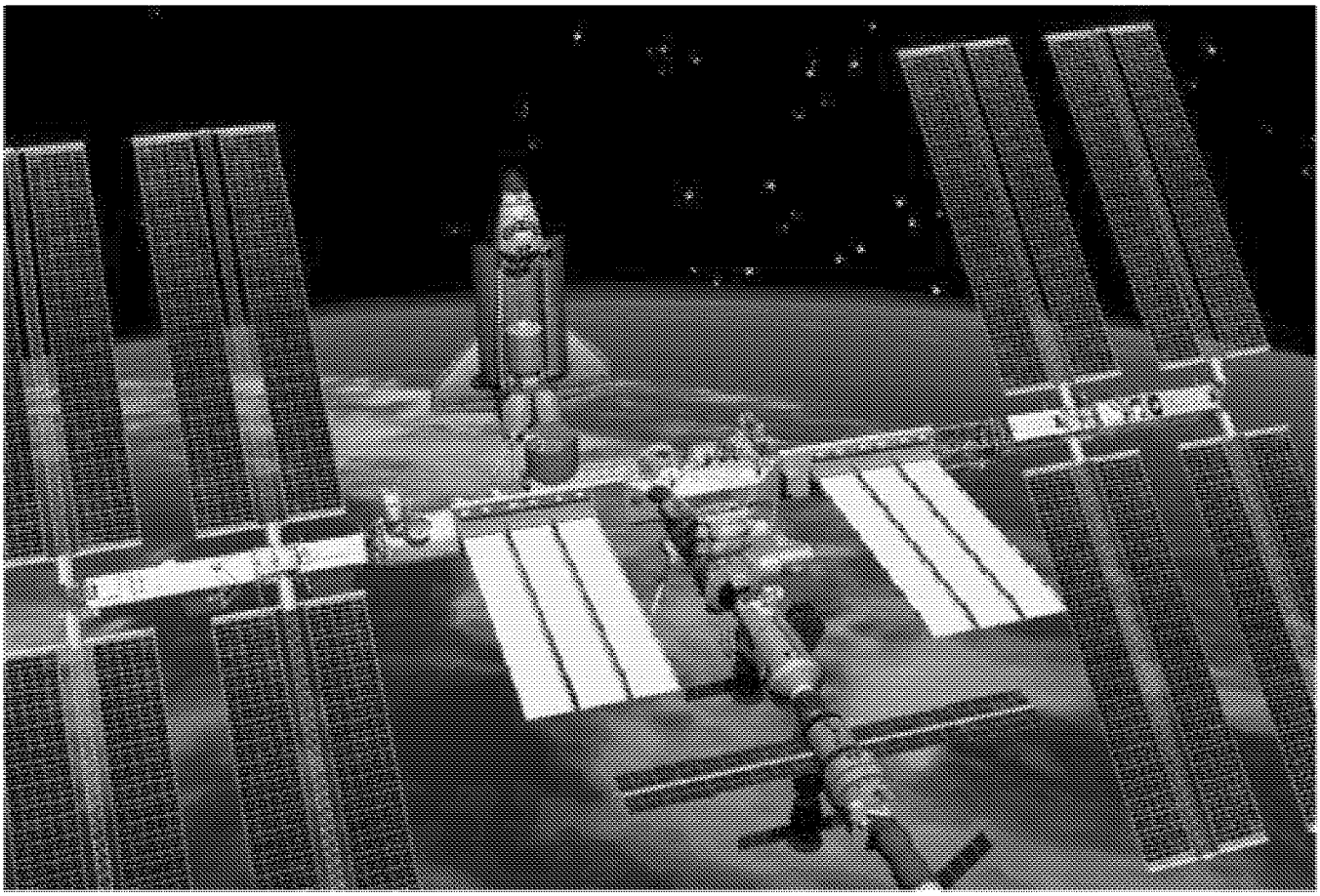


EuTEF carries a suite of 13 different experiments in the fields of exobiology, fundamental physics, and technology requiring exposure to the space environment. The experiments and facility infrastructure are accommodated on the Columbus External Payload Adaptor (CEPA), consisting of an adapter plate, the Active Flight Releasable Attachment Mechanism and the connectors and harness. The experiments are mounted either directly on the adapter plate or an intermediate support structure that elevates them for optimum exposure to the direction of flight or pointing away from the Earth.

The suite of experiments on EuTEF consists of:

- Exposure Experiment (Expose): Exobiological organic samples exposure facility
- Dosimetric Telescope (DOSTEL): cosmic radiation environment measurement
- EuTEF Thermometer (EuTEMP): EuTEF's thermal environment measurement
- Earth Viewing Camera (EVC): Earth observing camera
- DEBris In-orbit Evaluator (DEBIE-2): Micrometeoroid and orbital debris detector
- Flux (Phi) Probe EXperiment (FIPEX): Atomic oxygen detector
- Material Exposure and Degradation Experiment (MEDET): Materials degradation examination
- Plasma Electron Gun Payload (PLEGPAY): Plasma discharge in orbit
- Experiments on Space Tribology (Tribolab): Testbed for tribology (study of friction on moving parts) and properties of materials

RENDEZVOUS & DOCKING



The above image depicts space shuttle Discovery's final docking approach with the International Space Station.

When Discovery launches on the STS-128 mission, it will fly on a trajectory to chase the International Space Station. A series of engine firings during the first two days of the mission will bring the shuttle to a point about 50,000 feet behind the station. Once there, Discovery will start its final approach. About 2.5 hours before docking, the shuttle's jets will be fired during what is called the terminal initiation burn. The shuttle will cover the final miles to the station during the next orbit.

As Discovery moves closer to the station, its rendezvous radar system and trajectory control sensor will provide the crew with range and closing-rate data. Several small correction burns will place the shuttle about 1,000 feet below the station.

Commander Rick Sturckow, with help from Pilot Kevin Ford and other crew members, will manually fly the shuttle for the remainder of the approach and docking.

Sturckow will stop Discovery about 600 feet below the station. Once he determines there is proper lighting, he will maneuver the shuttle through a 9-minute backflip called the Rendezvous Pitch Maneuver. During this maneuver, station crew members Mike Barratt and Gennady Padalka will use digital cameras with 400 mm and 800 mm lenses to photograph Discovery's upper and bottom surfaces through windows of the Zvezda Service Module. The 400 mm lens provides up to 3-inch resolution and the 800 mm lens up to 1-inch resolution. Padalka will use the 400 mm and Barratt will use the 800 mm.

The photography is one of several techniques used to inspect the shuttle's thermal protection system for possible damage. Areas of special interest include the thermal protection tiles, the reinforced carbon-carbon of the nose and leading edges of the wings, landing gear doors and the elevon cove. The photos will be downlinked through the station's Ku-band communications system for analysis by systems engineers and mission managers.

When Discovery completes its backflip, it will be back where it started, with its payload bay facing the station. Sturckow then will fly the shuttle through a quarter circle to a position about 400 feet directly in front of the station. From that point, he will begin the final approach to docking to the Pressurized Mating Adapter 2 at the forward end of the Harmony node.

The shuttle crew members will operate laptop computers that process the navigational data, the laser range systems and Discovery's docking mechanism.

Using a video camera mounted in the center of the Orbiter Docking System, Sturckow will line up the docking ports of the two spacecraft. If necessary, he will pause the shuttle 30 feet from the station to ensure proper alignment of the docking mechanisms. He will maintain the shuttle's speed relative to the station at about one-tenth of a foot per second, while both Discovery and the station are moving at about 17,500 mph. Sturckow will keep the docking mechanisms aligned to a tolerance of 3 inches.

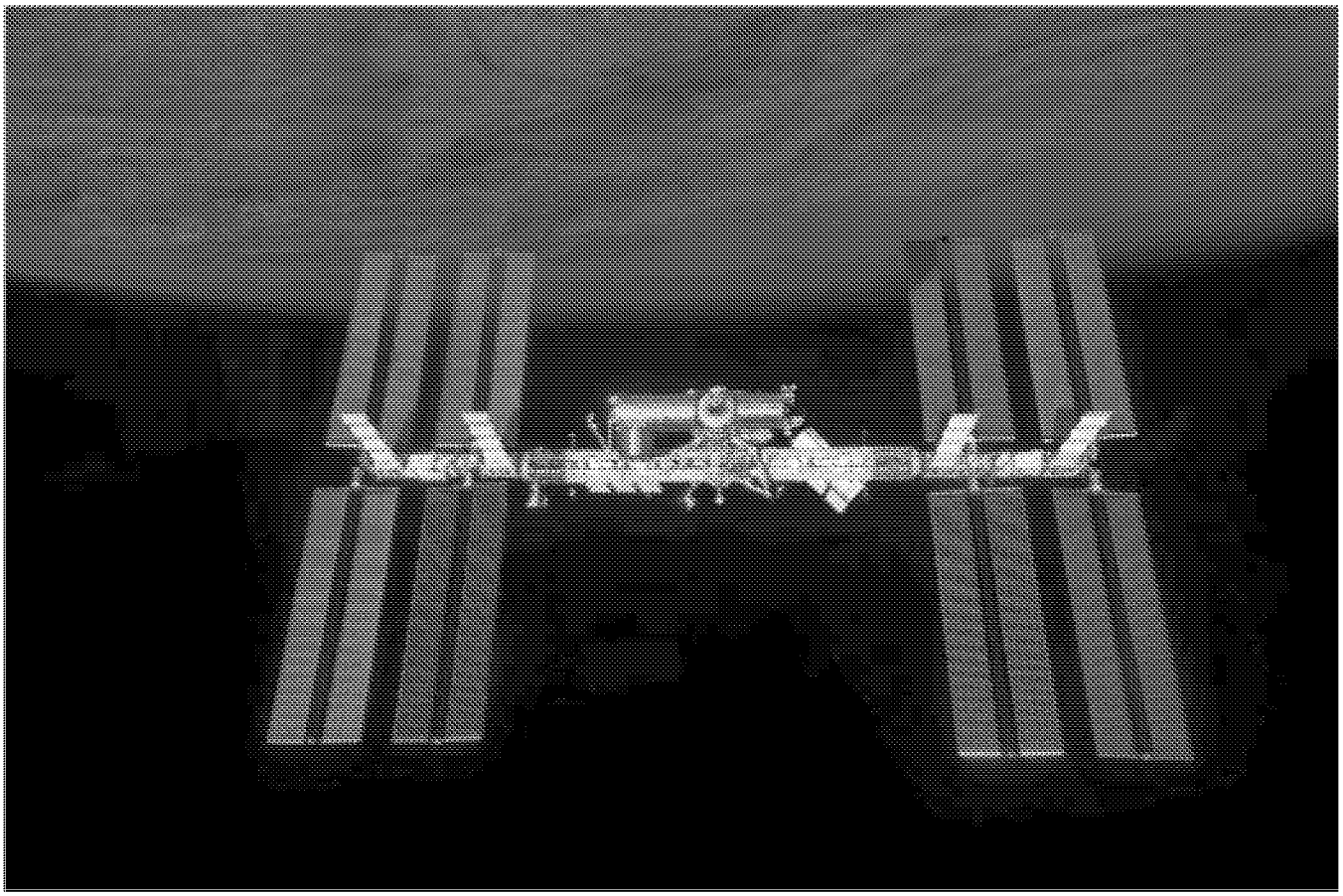
When Discovery makes contact with the station, preliminary latches will automatically attach the two spacecraft. The shuttle's steering jets will be deactivated to reduce the forces acting at the docking interface. Shock absorber springs in the docking mechanism will dampen any relative motion between the shuttle and station.

Once motion between the shuttle and the station has been stopped, the docking ring will be retracted to close a final set of latches between the two vehicles.

UNDOCKING, SEPARATION AND DEPARTURE

At undocking time, the hooks and latches will be opened and springs will push the shuttle away from the station. Discovery's steering jets will be shut off to avoid any inadvertent firings during the initial separation.

Once the shuttle is about 2 feet from the station and the docking devices are clear of one another, Ford will turn the steering jets back on and will manually control Discovery within a tight corridor as the shuttle separates from the station.



Backdropped by the blackness of space and Earth's horizon, the International Space Station is seen from space shuttle Discovery as the two spacecraft begin their relative separation.

Discovery will move to a distance of about 450 feet, where Ford will begin to fly around the station. Ford will circle the shuttle around the station at a distance of 600-700 feet. This will only be done if propellant margins and mission timeline activities permit.

Once the shuttle completes 1.5 revolutions of the complex, Ford will fire Discovery's jets to leave the area. The shuttle will begin to increase its distance from the station with each trip around the Earth, while ground teams analyze data from the late inspection of the shuttle's heat shield. However, the distance will be close enough to allow the shuttle to return to the station in the unlikely event that the heat shield is damaged, preventing the shuttle's safe re-entry.

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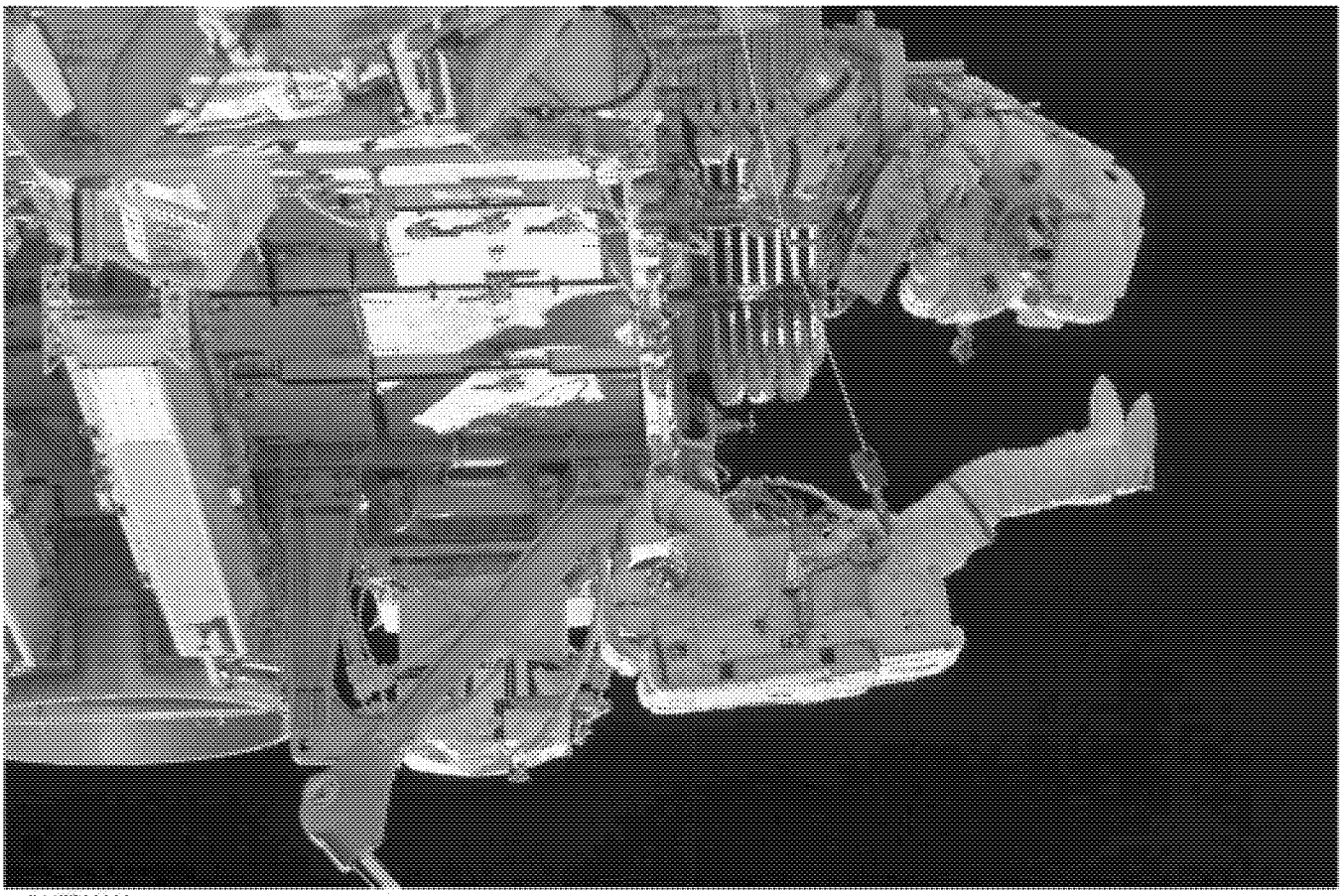
SPACEWALKS



S117E06896

Astronauts Jim Reilly (bottom) and John "Danny" Olivas (top right), both STS-117 mission specialists, participate in the mission's first planned session of extravehicular activity (EVA), as construction resumes on the International Space Station.

There are three spacewalks scheduled for the STS-128 mission.

Mission Specialists John "Danny" Olivas, Christer Fuglesang and Nicole Stott will spend a combined total of 19.5 hours outside the station on flight days 5, 7 and 9. Olivas, the lead spacewalker for the mission, will suit up for all three spacewalks in a spacesuit marked with solid red stripes. He is a veteran spacewalker with two extravehicular activities, or EVAs, performed during the STS-117 mission in 2007.

European Space Agency astronaut Fuglesang will be participating in the second and third spacewalks, adding to the more than 18 hours of spacewalking time that he built up over three EVAs during the STS-116 mission in 2006. He will wear an all white spacesuit.

Stott, who will be staying behind as a station crew member, whose first spacewalk will also be the first of the mission, will wear a spacesuit with broken red stripes.

On each EVA day, a spacewalker inside the station will act as the intravehicular officer, or spacewalk choreographer. The first and second spacewalks will require at least two crew members inside the station or shuttle to be at the controls of the station's 58-foot-long robotic arm to carry and maneuver equipment and spacewalkers.

Preparations will start the night before each spacewalk, when the astronauts spend time in the station's Quest Airlock. This practice is called the campout prebreathe protocol and is used to purge nitrogen from the spacewalkers' systems and prevent decompression sickness, also known as "the bends."

During the campout, the two astronauts performing the spacewalk will isolate themselves inside the airlock while the air pressure is lowered to 10.2 pounds per square inch, or psi. The station is kept at the near-sea-level pressure of 14.7 psi. The morning of the spacewalk, the astronauts will wear oxygen masks while the airlock's pressure is raised back to 14.7 psi for an hour and the hatch between the airlock and the rest of the station is opened. That allows the spacewalkers to perform their morning routines before returning to the airlock, where the air pressure is lowered again. Approximately 50 minutes after the spacewalkers don their spacesuits, the prebreathe protocol will be complete.

The procedure enables spacewalks to begin earlier in the crew's day than was possible before the protocol was adopted.

EVA-1

Duration: 6 hours, 30 minutes
Crew: Olivas and Stott
IV Crew: Forrester
Robotic Arm Operators: Ford and Thirsk

EVA Operations

- Old ammonia tank assembly removal
- EuTEF removal
- MISSE 6 removal

The work to replace the ammonia tank assembly on the first port segment of the station's truss – P1 – will begin on the first spacewalk of the mission. Olivas and Stott will be removing the depleted tank from the truss, so that it may be picked up by the station's robotic arm for storage until after the second spacewalk.

To remove it from the station's truss, Olivas and Stott will disconnect two lines used to transfer its ammonia, two lines which provide nitrogen for pressurization, and two electrical connections and release four bolts. They'll then work together to lift the tank away from the truss and maneuver it into position for the robotic arm to latch onto.

While the arm is still holding the tank assembly, Stott will install a foot restraint on it as well, which she'll then climb into for the removal of the European Technology Exposure Facility, or EuTEF. While Stott gets into place, Olivas will document the experiment's condition by taking some photographs. Olivas will then detach the experiment by releasing one bolt, and Stott will lift it away from its place on the Columbus laboratory. From there, Ford and Thirsk will drive her via the robotic arm to the shuttle's cargo bay, where she'll work with Olivas to store it on a cargo carrier for transport back to Earth. One bolt will be used to attach it to the carrier.

The spacewalkers' final task will be the removal of the sixth Materials International Space Station Experiment – or MISSE. Stott will climb out of the robotic arm's foot restraint and meet Olivas back at Columbus. (Although MISSE is a NASA experiment, it is located on the exterior of the Columbus laboratory.) While he waits for Stott to arrive, Olivas will close the passive experiment containers in which the two parts of the MISSE experiment are housed, and disconnect two cables. Olivas will then remove the first of the containers and pass it on to Stott for installation in a storage location. The second will be removed and stowed by Olvias.

EVA-2

Duration: 6 hours, 30 minutes
Crew: Olivas and Fuglesang
IV Crew: Forrester
Robotic Arm Operators: Ford and Stott

EVA Operations

- New ammonia tank assembly installation
- Old ammonia tank assembly storage

The entire second spacewalk of the mission will focus on completing the ammonia tank assembly swap. Olivas will begin by removing insulation on the new ammonia tank while Fuglesang gets into position in the robotic arm's foot restraint. He and Olivas will then work together to release the four bolts securing the assembly to the cargo carrier inside the shuttle's cargo bay. Ford and Stott will then drive the robotic arm – carrying Fuglesang and both ammonia tanks – to the installation site on the P1 truss segment.

Olivas will meet Fuglesang there, and together they'll drive the four bolts that will hold it in place. Olivas will then connect two electrical cables and four fluid lines.

With the new tank assembly installed, Olivas and Fuglesang will prepare for the storage of the old tank assembly, still latched to the robotic arm. Olivas will tether the old tank assembly to himself and then give Ford and Stott the OK to command the robotic arm to release it. Then Fuglesang will attach his tether to the assembly and Olivas will remove his tether, allowing Fuglesang and the old tank to make their way back to the shuttle's cargo bay via robotic arm.

Once there, Olivas and Fuglesang will install it on the cargo carrier with four bolts.

EVA-3

Duration: 6 hours, 30 minutes
Crew: Olivas and Fuglesang
IV Crew: Forrester
Robotic Arm Operators: None

EVA Operations:

- S3 upper, outboard payload attachment system deploy
- S0 rate gyro assembly replacement
- S0 remote power control module replacement
- Pressurized mating adapter 3 heater cable connection
- Tranquility node avionics cable routing
- Unity node slidewire removal
- Robotic arm camera and light assembly insulation installation

The first tasks of the final spacewalk of the mission will finish work left by the previous space shuttle mission. The STS-127 spacewalkers completed the deployment of the one cargo attachment system on the P1 truss segment, but had to leave the set up of similar systems on S3 for future missions. On STS-119 a jammed detent pin on the first of the systems prevented them from deploying the P1 system. A special tool was built to assist with the deployment. The STS-127 spacewalkers were successful in clearing the jam. Olivas and Fuglesang will have the same tool on hand for use if needed.

If the detent pin does not jam, however, the cargo attachment system will be set up by removing brackets and pins holding it in place, moving it into its correct position and then reinstalling the brackets and pins.

Once that's complete, Olivas and Fuglesang will work together to remove and replace a failed rate gyro assembly in the center of the station's truss. To remove the failed assembly, Olivas will disconnect two cables and remove two bolts. Fuglesang will remove the final two holding the assembly in place, and then Olivas will remove it and temporarily store it nearby. To install the new one, Olivas and Fuglesang will each drive four bolts, and Olivas will then connect its two cables before moving on to the next task.

At this point in the spacewalk, Olivas and Fuglesang will split up. Olivas will set up heater cables that will be used to keep the PMA 3 berthing port between the Unity and the coming Tranquility node warm so it can be pressurized. This will allow the station crew to prepare the vestibule for Tranquility node's arrival. That will involve disconnecting four

cables and wire-tying them into place along a handrails on the Unity node. One of them will be connected to an outlet on Unity, the rest will have caps installed on them.

Meanwhile, Fuglesang will replace a failed remote power control module on the center segment of the station's truss. To remove the failed module, he'll simply release one bolt. To install the new unit, he'll slide it into place on a guide rail and then secure it using one bolt. He'll follow that up by installing an insulation sleeve on a cable inside the truss.

With those tasks done, Fuglesang and Olivas will come together again in the center of the truss to route avionics systems cables. They'll be using wire ties to secure two cable bundles to handrails along the truss system and the Unity node, and then a panel on the truss.

Olivas will wrap up the spacewalk by removing a damaged slidewire from a stanchion on Unity, while Fuglesang installs a lens cover on a camera and light assembly on the space station's robotic arm.

EXPERIMENTS

The space shuttle and International Space Station have an integrated research program that optimizes the use of shuttle crew members and long-duration space station crew members to address research questions in a variety of disciplines.

For information on science on the station, visit:

http://www.nasa.gov/mission_pages/station/science/index.html

or

http://iss-science.jsc.nasa.gov/index.cfm

Detailed information is located at:

http://www.nasa.gov/mission_pages/station/science/experiments/Expedition.html

DETAILED TEST OBJECTIVES AND DETAILED SUPPLEMENTARY OBJECTIVES

Detailed Test Objectives (DTOs) are aimed at testing, evaluating, documenting systems or hardware, and proposing improvements to hardware, systems, and operations. Many of the DTOs on this mission are to provide additional information for engineers working for the Constellation Program as they develop requirements for the rocket and crew module that will return humans to the moon.

DTO 695 Thrust Oscillation Seat Accelerometer/SBDI-1904 Effects of Vibration on Visual Performance during Launch

For this test, accelerometers are being placed on crew seats in the orbiter to gather information on the seat vibration environment during launch. This DTO is being done in conjunction with another test that will measure crew visual performance during launch to help determine how the design of the Orion crew displays might be improved.

Three crew seats -- the same seats that were instrumented for the test on STS-119 in March 2009 and STS-125 in May 2009 -- will be instrumented for this flight.

During ascent, this DTO will measure the vibration of shuttle flight deck seat three and middeck seats five and six. Each seat will have a total of three triaxial accelerometers, each placed on the seat pan, the backrest, and the headrest.

Although the Seat DTO data alone are important in terms of providing a measure of vibration, human performance data are required to fully interpret the operational impact of the vibration values collected.

These human factors data will be provided by the Visual Performance test that has been designed for participation of the shuttle middeck crew members in seats five, six and seven over the course of two flights (STS-119 and STS-128).

Participating crew members will be requested to view a placard attached with Velcro to the middeck lockers directly in front of them. The placard will depict a representative Orion display format in each of four quadrants (i.e., four numbered display formats per placard). Each display format will depict a different effective font size, for a total of four

tested font sizes. There will also be displays containing different color schemes.

Crew members will indicate using a response card included in their kneeboard or flight notebook, by which quadrant had the minimum readable font size, and to rate the readability of the various display schemes, during the launch phase of the flight. Once vibration has subsided, after solid rocket booster separation and before main engine cut-off, the crew members will respond to a brief questionnaire. A post-flight debrief will be held with crew members to elaborate on their experience. When practical within mission constraints, a video camera will record the motion of the middeck crew for correlation with seat vibration.

For additional information, follow this link:

http://www.nasa.gov/mission_pages/station/science/experiments/Visual_Performance.html

DTO 696 Grab Sample Container (GSC) Redesign for Shuttle

Successfully sustaining life in space requires closely monitoring the environment to ensure the health and performance of the crew. Astronauts can be more sensitive to air pollutants because of the closed environment, and the health effects of pollutants are magnified in space exploration because the astronauts' exposure is continuous. One hazard is the off-gassing of vapors from plastics and other inorganic materials aboard the vehicle.

To monitor air contaminant levels, crew members use devices called grab sample canisters. The containers to be flown on this mission have been redesigned so that they minimize overall size and volume. Three of the new GSCs will fit into the packing volume previously needed for one GSC. The smaller GSCs will also be used on the space station and evaluated during this mission.

DTO 701A TriDAR Sensor (Triangulation and LIDAR Automated Rendezvous and Docking)

The TriDAR Sensor is a 3D autonomous rendezvous and docking system that will be integrated into the space shuttle orbiter to demonstrate that technology in low Earth orbit. The complete vision system will incorporate scanning laser ranging and imaging capability, along with software to perform real-time tracking and six degrees of freedom pose calculation, to allow spacecraft rendezvous and docking without typical target markers. Future applications include using TriDAR for multifunction sensor robotic operations, potentially assisting with lander guidance, rover navigation, vehicle inspection, and exploration science.

Such flexible capability in a single sensor will be critical in future exploration missions where size, weight, and power limits are small.

Developed by Canada's Neptec Design Company, TriDAR is a dual sensing, multi-purpose scanner capable of full pose – six degrees of freedom – and sensors for long range rendezvous, vehicle inspection and hazard avoidance. It is a hybrid scanner combining features of the Orbiter Boom Sensor System Laser Camera System with a long-range Time of Flight or LIDAR system. Unlike pure LIDAR system, the TriDAR operates at distances ranging from 0.5 meters to more than 2,000 meters.

TriDAR uses its random access capability to rapidly acquire 3D data. Model-based tracking algorithms then calculate the six degrees of freedom relative pose of the target spacecraft from the acquired data in real-time. The system relies only on the vehicle's geometry and does not require cooperative target. The sensor can also perform high-resolution inspection scans or low-resolution range and bearing determination.

Triangulation is typically used for high-resolution virtualization of objects for a variety of purposes including video games, movies, reverse engineering, inspection, archiving of historic artifacts. LIDARs are most often used for airborne or ground-based imaging such as geological surveys, forestry, urban planning, and automatic target recognition.

DTO 854 Boundary Layer Transition (BLT) Flight Experiment

Tested successfully in arc jet facilities, the Boundary Layer Transition (BLT) flight experiment will gather information on the effect of high Mach number boundary layer transition caused by a protuberance on the space shuttle during the re-entry trajectory.

The experiment is designed to demonstrate that a protuberance on an orbiter BRI-18 tile is safe to fly. BRI-18 is a tile originally developed as a potential heat shield upgrade on the orbiters and is now being considered for use on the Orion crew exploration vehicles. Due to Orion's geometry, the tiles could experience re-entry heating temperatures up to 3,400 degrees Fahrenheit, about 500 degrees higher than the 2,900 degrees experienced by an orbiter during re-entry.

STS-128 will be the second phase of the flight experiment. The BLT flight experiment on STS-119, which flew in March 2009, provided temperature data on a 0.25-inch protuberance near Mach 16. That information is still being assessed. The goal for STS-128 is to gather data on a 0.35-inch protuberance at Mach 18 speed.

Boundary layer transition is a disruption of the smooth, laminar flow of supersonic air across the shuttle's belly and occurs normally when the shuttle's velocity has dropped to around 8 to 10 times the speed of sound, starting toward the back of the heat shield and moving forward. Known as "tripping the boundary layer," this phenomenon can create eddies of turbulence that, in turn, result in higher downstream heating.

For the experiment, a heat shield tile with a "speed bump" on it was installed under Discovery's left wing to intentionally disturb the airflow in a controlled manner and make the airflow turbulent. The bump is four inches long and 0.3-inch wide. Ten thermocouples will be installed on the tile with the protuberance and on tiles downstream to capture test data.

The experiment will receive additional support from a U.S. Navy aircraft that will check the orbiter's exterior temperatures. A Navy NP-3D Orion will fly below Discovery during re-entry and use a long-range infrared camera to remotely monitor heating to the shuttle's lower surface. The imagery captured and recorded will complement the information collected by the onboard instruments. Both will be used to verify and improve design efforts for future spacecraft.

Hypersonic Thermodynamic Infrared Measurements (HYTHIRM)

(Not a DTO but associated with the BLT flight experiment)

Hypersonic Thermodynamic Infrared Measurements (HYTHIRM) will take advantage of the shuttle BLT flight experiment on STS-128 to continue a study of heating patterns of the space shuttle on re-entry. Temperature increases from a protuberance purposely placed on the orbiter's lower left (port) wing will be imaged by the HYTHIRM team with the help of a U.S. Navy NP-3D Orion aircraft. Equipped with a long-range infrared optical system called "Cast Glance," the aircraft will fly 25 to 35 miles under Discovery as it returns to Earth at speeds 18 times the speed of a bullet. The Cast Glance system, as used during STS-119 and STS-125, will remotely monitor and record heating to the shuttle's lower surface using a long-range infrared camera. HYTHIRM imagery will provide ancillary flight data to the BLT Detailed Test Objective by complementing its onboard instruments. Both sets of data will be used to verify and improve design efforts for future spacecraft. HYTHIRM is managed by NASA's Langley Research Center, Hampton, Va.

DTO 900 Solid Rocket Booster Thrust Oscillation

The Space Shuttle Program is gathering data on five shuttle flights, beginning with STS-126, to gain a greater understanding of the pressure oscillation, or periodic variation, phenomena that regularly occurs within solid rocket motors. The pressure oscillation that is observed in solid rocket motors is similar to the hum made when blowing into a bottle. At 1.5 psi, or pounds per square inch, a pressure wave will move up and down the motor from the front to the rear, generating acoustic noise as well as physical loads in the structure. These data are necessary to help propulsion engineers confirm modeling techniques of pressure oscillations and the loads they create. As NASA engineers develop alternate propulsion designs for use in NASA, they will take advantage of current designs from which they can learn and measure. In an effort to obtain data to correlate pressure oscillation with the loads it can generate, the shuttle program is using two data systems to gather detailed information. Both systems are located on the top of the solid rocket motors inside the forward skirt.

The Intelligent Pressure Transducer, or IPT, is a standalone pressure transducer with an internal data acquisition system that will record pressure data to an internal memory chip. The data will be downloaded to a computer after the booster has been recovered and returned to the Solid Rocket Booster Assembly and Refurbishment Facility at NASA's Kennedy Space Center, Fla. This system has been used on numerous full-scale static test motors in Utah and will provide engineers with a common base to compare flight data to ground test data.

The Enhanced Data Acquisition System, or EDAS, is a data acquisition system that will record pressure data from one of the Reusable Solid Rocket Booster Operational Pressure Transducers, or OPT, and from accelerometers and strain gages placed on the forward skirt walls. These data will provide engineers with time synchronized data that will allow them to determine the accelerations and loads that are transferred through the structure due to the pressure oscillation forces.

Intelligent Pressure Transducer

Detailed Supplementary Objectives (DSOs) are space and life science investigations. Their purpose is to determine the extent of physiological deconditioning resulting from spaceflight, to test countermeasures to those changes and to characterize the space environment relative to crew health.

DSO 640 Physiological Factors

Astronauts experience alterations in multiple physiological systems due to exposure to the microgravity conditions of spaceflight. These physiological changes include sensorimotor disturbances, cardiovascular deconditioning, and loss of muscle mass and strength. These changes may lead to a disruption in the ability to walk and perform functional tasks during the initial reintroduction to gravity following prolonged spaceflight, and may cause significant impairments in performance of operational tasks immediately following landing.

The objective of this study is to identify the key underlying physiological factors that contribute to changes in performance of a set of functional tasks that are representative of critical mission tasks for lunar and Mars operations. Astronauts will be tested on an integrated suite of functional and interdisciplinary physiological tests before and after short- and long-duration spaceflight. Using this strategy, the investigators will be

able to: 1) identify critical mission tasks that may be impacted by alterations in physiological responses; 2) map physiological changes to alterations in functional performance; and 3) design and implement countermeasures that specifically target the physiological systems responsible for impaired functional performance.

For more information, follow these links:

https://rlsda.jsc.nasa.gov/scripts/experiment/exper.cfm?exp_index=1448

https://rlsda.jsc.nasa.gov/docs/research/research_detail.cfm?experiment_type_code=35&researchtype

SHORT-DURATION RESEARCH AND STATION EXPERIMENTS

The STS-128 space shuttle mission marks the start of the transition from assembling the International Space Station to using it for continuous scientific research. Assembly and maintenance activities have dominated the available time for crew work. But as completion of the orbiting laboratory nears, additional facilities and the crew members to operate them will enable a measured increase in time devoted to research as a national and multinational laboratory.

Two major additions to the research facilities aboard the station – the Materials Science Research Rack-1 and the Fluids Integrated Rack – will be delivered by Discovery's crew inside the Leonardo Multi-Purpose Logistics Module.

A host of short-duration experiments investigating the causes of and potential solutions to the harmful effects of long-duration spaceflight on the human body, technology development work for future human space exploration and the physical and biological sciences are planned.

In addition, a second treadmill, the Combined Operational Load Bearing External Resistance Treadmill (COLBERT), will provide medical researchers with new insight into the effectiveness of exercise as a countermeasure for bone and muscle density loss due to spaceflight.

New Facilities Delivered by STS-128/17A

Materials Science Research Rack-1 (MSRR-1) is used for basic materials research in the microgravity environment of the station. MSRR-1 can accommodate and support diverse Experiment Modules (EMs). In this way many material types, such as metals, alloys, polymers, semiconductors, ceramics, crystals, and glasses, can be studied to discover new applications for existing materials and new or improved materials

The Fluids Integrated Rack (FIR) is a complementary fluid physics research facility designed to host investigations in areas such as colloids, gels, bubbles, wetting and capillary action, and phase changes, including boiling and cooling.

Short-Duration Research to Be Completed During STS-128/17A

The space shuttle and International Space Station have an integrated research program that optimizes use of shuttle crew members and long-duration space station crew members in addressing research questions in a variety of disciplines.

Human Research and Countermeasure Development for Exploration

Sleep-Wake Actigraphy and Light Exposure during Spaceflight – Short (Sleep-Short) examines the effects of spaceflight on the sleep-wake cycles of the astronauts during shuttle missions. Advancing state-of-the-art technology for monitoring, diagnosing and assessing treatment of sleep patterns is vital to treating insomnia on Earth and in space. (NASA)

Validation of Procedures for Monitoring Crew Member Immune Function – Short Duration Biological Investigation (Integrated Immune-SDBI) assesses the clinical risks resulting from the adverse effects of space flight on the human immune system and will validate a flight-compatible immune monitoring strategy. Immune system changes will be monitored by collecting and analyzing blood, urine and saliva samples from crew members before, during and after spaceflight. (NASA)

Spinal Elongation and Its Effects on Seated Height in a Microgravity Environment (Spinal Elongation) study provides quantitative data as to the amount of change that occurs in the seated height due to spinal elongation in microgravity. (NASA)

Human Factors Assessment of Vibration Effects on Visual Performance During Launch (Visual Performance) determines the visual performance limits during operational vibration and g-loads on the space shuttle, specifically through the determination of minimum readable font size during ascent using planned Orion display formats. (NASA)

National Lab Pathfinder-Vaccine-5 (NLP-Vaccine-5) is a commercial payload serving as a pathfinder for the use of the International Space Station as a National Laboratory after station assembly is complete. It contains several different pathogenic (disease causing) organisms. This research is investigating the use of spaceflight to develop potential vaccines for the prevention of different infections caused by these pathogens on Earth and in microgravity. (NASA)

Studies on Microbiota On Board the International Space Station and Their Relationship to Health Problem (Microbe-I) examines the microbial (bacteria and fungi) environment on board the International Space Station. This investigation uses samples from surfaces and air to determine the variety of microbes through culture analysis. (JAXA)

The Study of Lower Back Pain in Crew Members During Space Flight (Mus) will study the details on development of Low Back Pain (LBP) during flight in astronauts/ cosmonauts. According to biomechanical model, strain on the ilio-lumbar ligaments increases with backward tilt of the pelvis in conjunction with forward flexion of the spine. This is what astronauts may experience due to loss of curvature. The objective is to assess astronaut deep muscle corset atrophy in response to microgravity exposure. (ESA)

Technology Development

Maui Analysis of Upper Atmospheric Injections (MAUI) observes the space shuttle engine exhaust plumes from the Maui Space Surveillance Site in Hawaii. As the shuttle flies over the Maui site, a telescope and all-sky imagers capture images and data when the shuttle engines fire at night or twilight. The

data collected is analyzed to determine the interaction between the spacecraft exhaust plume and the upper atmosphere. (NASA)

Shuttle Exhaust Ion Turbulence Experiments (SEITE) uses space-based sensors to detect the ionospheric turbulence inferred from the radar observation from a previous space shuttle Orbital Maneuvering System (OMS) burn experiment using ground-based radar. (NASA)

The Shuttle Ionospheric Modification with Pulsed Localized Exhaust Experiments (SIMPLEX) investigates plasma turbulence driven by rocket exhaust in the ionosphere using ground-based radars. (NASA)

New Facilities and Experiments Delivered by STS-128/17A

Facilities

Materials Science Research Rack-1 (MSRR-1) is used for basic materials research in the microgravity environment of the station. MSRR-1 can accommodate and support diverse Experiment Modules (EMs). In this way, many material types, such as metals, alloys, polymers, semiconductors, ceramics, crystals, and glasses, can be studied to discover new applications for existing materials and new or improved materials.

The Fluids Integrated Rack (FIR) is a complementary fluid physics research facility designed to host investigations in areas such as colloids, gels, bubbles, wetting and capillary action, and phase changes including, boiling and cooling.

Human Research and Countermeasure Development for Exploration

Neutron Field Study (RaDI-N) will characterize the neutron environment of the station to develop risk countermeasures for crew members living and working in space. (CSA)

Physical and Biological Sciences in Microgravity

The Materials Science Laboratory – Columnar-to-Equiaxed Transition in Solidification Processing and Microstructure Formation in Casting of Technical Alloys under Diffusive and Magnetically Controlled Convective Conditions (MSL-CETSOL and MICAST) are two investigations that support research into metallurgical solidification, semiconductor crystal growth (Bridgman and zone melting) and measurement of thermo-physical properties of materials. This is a cooperative investigation with the European Space Agency (ESA) and NASA for accommodation and operation aboard the International Space Station.

Mice Drawer System (MDS) is an Italian Space Agency investigation that will use a validated mouse model to investigate the genetic mechanisms underlying bone mass loss in microgravity. Research conducted with the MDS is an analog to the Human Research Program, which has the objective to extend the human presence safely beyond low Earth orbit.

Constrained Vapor Bubble (CVB) consists of a remotely controlled microscope and a small, wickless heat pipe, or heat exchanger, operating on an evaporation/condensation cycle. The objective is to better understand the physics of evaporation and condensation as they affect

heat transfer processes in a heat exchanger designed for cooling critical, high heat output components in microgravity. (NASA)

DEvice for the Study of Critical LIquids and Crystallization (DECLIC) is a multi-user facility consisting of three investigations, DECLIC – Alice Like Insert (DECLIC-ALI), DECLIC – High Temperature Insert (DECLIC-HTI) and DECLIC – Directional Solidification Insert (DECLIC-DSI) to study transparent media and their phase transitions in microgravity on board the station. (NASA/CNES)

Selectable Optical Diagnostics Instrument – Influence of Vibration on Diffusion of Liquids (SODI-IVIDIL) will study the influence of controlled vibration stimulus (slow shaking) on diffusion between different liquids in absence of convection induced by the gravity field. Such investigation will help scientists to model numerically this physical phenomenon. (ESA)

Life Cycle of Higher Plants under Microgravity Conditions (Space Seed) uses *Arabidopsis thaliana* to determine if the life cycle of this plant can be achieved in microgravity. Additionally, this study will examine the specific genes in the cell wall of the plant that do not activate in microgravity that normally activate in 1-g conditions. (JAXA)

Integrated Assessment of Long-term Cosmic Radiation Through Biological Responses of the Silkworm, *Bombyx mori*, in Space (RadSilk) examines the effects of radiation exposure in microgravity on silkworms. (JAXA)

Observing the Earth and Educational Activities

Space Education Project of Leave a nest C. Ltd (Leaveanest Seed Project) is a commercial venture between the JAXA and the Leave a nest C. Ltd. For this educational activity, Bonsai Tomato and MicroTom seeds are brought to the station and then returned for distribution. (JAXA)

Technology Development for Exploration

Autonomous Robotic Operations Performed from the ISS (Avatar Explore) is a technology demonstration used to develop remote communications for robot autonomy software. This experiment uses the amateur HAM radio on board the station to interact with a rover on Earth in a Mars exploration scenario.

Space Dynamically Responding Ultrasonic Matrix System (SpaceDRUMS) is a suite of hardware that enables containerless processing of experimental materials without ever touching a container wall. Using a collection of 20 acoustic beam emitters, SpaceDRUMS can completely suspend a baseball-sized solid or liquid sample during combustion or heat-based synthesis. Because the samples never contact the container walls, materials can be produced in microgravity with an unparalleled quality of shape and composition. The goal of the SpaceDRUMS hardware is to assist with the development of advanced materials of a commercial quantity and quality, using the space-based experiments to guide development of manufacturing processes on Earth. (NASA)

ISS Research Samples Returned on STS-128/17A

Human Research and Countermeasure Development for Exploration

Nutritional Status Assessment (Nutrition) is the most comprehensive inflight study done by NASA to date of human physiologic changes during long-duration spaceflight; this includes measures of bone metabolism, oxidative damage, nutritional assessments, and hormonal changes. This study will impact both the definition of nutritional requirements and development of food systems for future space exploration missions to the moon and Mars. This experiment will also help to understand the impact of countermeasures (exercise and pharmaceuticals) on nutritional status and nutrient requirements for astronauts. (NASA)

The National Aeronautics and Space Administration Biological Specimen Repository (Repository) is a storage bank that is used to maintain biological specimens over extended periods of time and under well-controlled conditions. Biological samples from the International Space Station, including blood and urine, will be collected, processed and archived during the preflight, inflight and postflight phases of station missions. This investigation has been developed to archive biosamples for use as a resource for future spaceflight-related research. (NASA)

Validation of Procedures for Monitoring Crew Member Immune Function (Integrated Immune) assesses the clinical risks resulting from the adverse effects of spaceflight on the human immune system and will validate a flight-compatible immune monitoring strategy. Researchers collect and analyze blood, urine and saliva samples from crew members before, during and after spaceflight to monitor changes in the immune system. Changes in the immune system are monitored by collecting and analyzing blood and saliva samples from crew members during flight and blood, urine, and saliva samples before and after spaceflight. (NASA)

Bisphosphonates as a Countermeasure to Space Flight Induced Bone Loss (Bisphosphonates) determines whether antiresorptive agents (help reduce bone loss), in conjunction with the routine inflight exercise program, will protect station crew members from the regional decreases in bone mineral density documented on previous station missions. (NASA)

A Comprehensive Characterization of Microorganisms and Allergens in Spacecraft (SWAB) will use advanced molecular techniques to comprehensively evaluate microbes on board the space station, including pathogens (organisms that may cause disease). It also will track changes in the microbial community as spacecraft visit the station and new station modules are added. This study will allow an assessment of the risk of microbes to the crew and the spacecraft. (NASA)

Cardiovascular and Cerebrovascular Control on Return from ISS (CCISS) will study the effects of long-duration spaceflight on crew members' heart functions and their blood vessels that supply the brain. Learning more about the cardiovascular and cerebrovascular systems could lead to specific countermeasures that might better protect future space travelers. This experiment is collaborative effort with the Canadian Space Agency. (NASA/CSA)

Passive Dosimeter for Life Science Experiment in Space (PADLES) measures radiation exposure levels on board the International Space Station. PADLES uses passive and integrating dosimeters to detect radiation levels. These dosimeters are located near the biological experiment facilities and on the end of the Japanese Experiment Module, Kibo. The proposed research seeks to survey the radiation environment inside the Kibo by using Area dosimeter. Area dosimeter and the analysis system have been developed in JAXA as a system for space radiation dosimetry. The dosimeters measure absorbed doses, equivalent doses and Liner Energy Transfer (LET) distributions. (JAXA)

Mental Representation of Spatial Cues During Space Flight (3D-Space) experiment investigates the effects of exposure to microgravity on the mental representation of spatial cues by astronauts during and after spaceflight. The absence of the gravitational frame of reference during spaceflight could be responsible for disturbances in the mental representation of spatial cues, such as the perception of horizontal and vertical lines, the perception of objects' depth and the perception of targets' distance. (ESA)

Physical and Biological Science in Microgravity

Integrated Assessment of Long-term Cosmic Radiation Through Biological Responses of the Silkworm, *Bombyx mori*, in Space (RadSilk) examines the effects of radiation exposure in microgravity on silkworms. (JAXA)

Validating Vegetable Production Unit (VPU) Plants, Protocols, Procedures and Requirements (P3R) Using Currently Existing Flight Resources (Lada-VPU-P3R) is a study to advance the technology required for plant growth in microgravity and to research related food safety issues. Lada-VPU-P3R also investigates the non-nutritional value to the flight crew of developing plants in orbit. The Lada-VPU-P3R uses the Lada hardware on the station and falls under a cooperative agreement between the National Aeronautics and Space Administration (NASA) and the Russian Federal Space Agency (FSA). (NASA/FSA)

Technology Development

Materials International Space Station Experiment – 6A and 6B (MISSE-6A and 6B) is a sample box attached to the outside of the International Space Station; it is used for testing the effects of exposure to the space environment on small samples of new materials. These samples will be evaluated for their reaction to atomic oxygen erosion, direct sunlight, radiation, and extremes of heat and cold. Results will provide a better understanding of the durability of various materials, with important applications in the design of future spacecraft. (NASA)

European Technology Exposure Facility (EuTEF) is a platform that provides power, data, thermal control and structural support to payloads mounted on the Columbus External Payload Facility. During its time in orbit, EuTEF supported the following nine experiments:

- **DEBris In-orbit Evaluator (DEBIE-2):** Micrometeoroid and orbital debris detector

- **Dosimetric Telescope (DOSTEL):** Measuring the radiation environment
- **EuTEF Thermometer (EuTEMP):** Measure EuTEF's thermal environment
- **Earth Viewing Camera (EVC):** Earth observing camera
- **Exposure Experiment (Expose):** An exobiological exposure facility
- **Flux(Phi) Probe EXperiment (FIPEX):** Atomic oxygen detector
- **Material Exposure and Degradation Experiment (MEDET):** Examine material degradation
- **Plasma Electron Gun Payload (PLEGPAY):** Plasma discharge in orbit
- **An Experiment on Space Tribology Experiment (Tribolab):** Testbed for the tribology (study of friction on moving parts) properties of materials

Additional Station Research from Now Until the End of Expedition 20

Human Research and Countermeasure Development for Exploration

Cardiovascular and Cerebrovascular Control on Return from ISS (CCISS) will study the effects of long-duration spaceflight on crew members' heart functions and their blood vessels that supply the brain. Learning more about the cardiovascular and cerebrovascular systems could lead to specific countermeasures that might better protect future space travelers. This experiment is collaborative effort with the Canadian Space Agency. (NASA/CSA)

Sleep-Wake Actigraphy and Light Exposure During Spaceflight-Long (Sleep-Long) examines the effects of spaceflight and ambient light exposure on the sleep-wake cycles of the crew members during long-duration stays on the space station. (NASA)

Nutritional Status Assessment (Nutrition) is the most comprehensive inflight study done by NASA to date of human physiologic changes during long-duration spaceflight; this includes measures of bone metabolism, oxidative damage, nutritional assessments, and hormonal changes. This study will impact both the definition of nutritional requirements and development of food systems for future space exploration missions to the moon and Mars. This experiment will also help to understand the impact of countermeasures (exercise and pharmaceuticals) on nutritional status and nutrient requirements for astronauts. (NASA)

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Cardiac Atrophy and Diastolic Dysfunction During and After Long-Duration Spaceflight: Functional Consequences for Orthostatic Intolerance, Exercise Capability and Risk for Cardiac Arrhythmias (Integrated Cardiovascular) will quantify the extent, time course and clinical significance of cardiac atrophy (decrease in the size of the heart muscle) associated with long-duration spaceflight. This experiment will also identify the mechanisms of this atrophy and the functional consequences for crew members who will spend extended periods of time in space. (NASA)

Bisphosphonates as a Countermeasure to Space Flight Induced Bone Loss (Bisphosphonates) determines whether antiresorptive agents (help reduce bone loss), in conjunction with the routine inflight exercise program, will protect station crew members from the regional decreases in bone mineral density documented on previous station missions. (NASA)

The Effect of Long-Term Microgravity Exposure on Cardiac Autonomic Function by Analyzing 24-hours Electrocardiogram (Biological Rhythms) examines the effect of long-term microgravity exposure on cardiac autonomic function by analyzing 24-hour electrocardiogram. (JAXA)

SOdium LOading in Microgravity (SOLO) is a continuation of extensive research into the mechanisms of fluid and salt retention in the body during bed rest and spaceflights. It is a metabolically-controlled study. During long-term space missions, astronauts will participate in two study phases, five days each. Subjects follow a diet of constant either low or normal sodium intake, fairly high fluid consumption and isocaloric nutrition.

Observing the Earth and Educational Activities

Crew Earth Observations (CEO) takes advantage of the crew in space to observe and photograph natural and human-made changes on Earth. The photographs record the Earth's surface changes over time, along with dynamic events such as storms, floods, fires and volcanic eruptions. These images provide researchers on Earth with key data to better understand the planet.

Education Payload Operation – Demonstrations (EPO-Demos) are recorded video education demonstrations performed on the International Space Station by crew members using hardware already on board the station. EPO-Demos are videotaped, edited, and used to enhance existing NASA education resources and programs for educators and students in grades K-12. EPO-Demos are designed to support the NASA mission to inspire the next generation of explorers

Technology Development

Synchronized Position Hold, Engage, Reorient, Experimental Satellites (SPHERES) are bowling-ball sized spherical satellites. They are used inside the space station to test a set of well-defined instructions for spacecraft

performing autonomous rendezvous and docking maneuvers. Three free-flying spheres fly within the cabin of the station, performing flight formations. Each satellite is self-contained with power, propulsion, computers and navigation equipment. The results are important for satellite servicing, vehicle assembly and formation flying spacecraft configurations. (NASA)

Space Dynamically Responding Ultrasonic Matrix System (SpaceDRUMS) comprises a suite of hardware that enables containerless processing (samples of experimental materials can be processed without ever touching a container wall). Using a collection of 20 acoustic beam emitters, SpaceDRUMS can completely suspend a baseball-sized solid or liquid sample during combustion or heat-based synthesis. Because the samples never contact the container walls, materials can be produced in microgravity with an unparalleled quality of shape and composition. The ultimate goal of the SpaceDRUMS hardware is to assist with the development of advanced materials of a commercial quantity and quality, using the space-based experiments to guide development of manufacturing processes on Earth.

Microgravity Acceleration Measurement System (MAMS) and Space Acceleration Measurement System (SAMS-II) measure vibration and quasi-steady accelerations that result from vehicle control burns, docking and undocking activities. The two different equipment packages measure vibrations at different frequencies.

SHUTTLE REFERENCE DATA

SHUTTLE ABORT MODES

Redundant Sequence Launch Sequencer (RSLS) Aborts

These occur when the on-board shuttle computers detect a problem and command a halt in the launch sequence after taking over from the ground launch sequencer and before solid rocket booster ignition.

Ascent Aborts

Selection of an ascent abort mode may become necessary if there is a failure that affects vehicle performance, such as the failure of a space shuttle main engine or an orbital maneuvering system engine. Other failures requiring early termination of a flight, such as a cabin leak, might also require the selection of an abort mode. There are two basic types of ascent abort modes for space shuttle missions: intact aborts and contingency aborts. Intact aborts are designed to provide a safe return of the orbiter to a planned landing site. Contingency aborts are designed to permit flight crew survival following more severe failures when an intact abort is not possible. A contingency abort would generally result in a ditch operation.

Intact Aborts

There are four types of intact aborts: abort to orbit (ATO), abort once around (AOA), transoceanic abort landing (TAL) and return to launch site (RTLS).

Return to Launch Site

The RTLS abort mode is designed to allow the return of the orbiter, crew, and payload to the launch site, KSC, approximately 25 minutes after liftoff.

The RTLS profile is designed to accommodate the loss of thrust from one space shuttle main engine between liftoff and approximately four minutes 20 seconds, after which not enough main propulsion system propellant remains to return to the launch site. An RTLS can be considered to consist of three stages – a powered stage, during which the space shuttle main engines are still thrusting; an external tank separation phase; and the glide phase, during which the orbiter glides to a landing at the KSC. The powered RTLS phase begins with the crew selection of the RTLS abort, after solid rocket booster separation. The crew selects the abort mode by positioning the abort rotary switch to RTLS and depressing the abort push button. The time at which the RTLS is selected depends on the reason for the abort. For example, a three-engine RTLS is selected at the last moment, about 3 minutes, 34 seconds into the mission; whereas an RTLS chosen due to an engine out at liftoff is selected at the earliest time, about 2 minutes, 20 seconds into the mission (after solid rocket booster separation).

After RTLS is selected, the vehicle continues downrange to dissipate excess main propulsion system propellant. The goal is to leave only enough main propulsion system propellant to be able to turn the vehicle around, fly back toward the KSC and achieve the proper main engine cutoff conditions so the vehicle can glide to the KSC after external tank separation. During the downrange phase, a pitch-around maneuver is initiated (the time depends in part on the time of a space shuttle main engine

failure) to orient the orbiter/external tank configuration to a heads-up attitude, pointing toward the launch site. At this time, the vehicle is still moving away from the launch site, but the space shuttle main engines are now thrusting to null the downrange velocity. In addition, excess orbital maneuvering system and reaction control system propellants are dumped by continuous orbital maneuvering system and reaction control system engine thrustings to improve the orbiter weight and center of gravity for the glide phase and landing.

The vehicle will reach the desired main engine cutoff point with less than 2 percent excess propellant remaining in the external tank. At main engine cutoff minus 20 seconds, a pitch down maneuver (called powered pitch-down) takes the mated vehicle to the required external tank separation attitude and pitch rate. After main engine cutoff has been commanded, the external tank separation sequence begins, including a reaction control system maneuver that ensures that the orbiter does not recontact the external tank and that the orbiter has achieved the necessary pitch attitude to begin the glide phase of the RTLS.

After the reaction control system maneuver has been completed, the glide phase of the RTLS begins. From then on, the RTLS is handled similarly to a normal entry.

Transoceanic Abort Landing

The TAL abort mode was developed to improve the options available when a space shuttle main engine fails after the last RTLS opportunity but before the first time that an AOA can be accomplished with only two space shuttle main engines or when a major orbiter system failure, for example, a large cabin pressure leak or cooling system failure, occurs after the last RTLS opportunity, making it imperative to land as quickly as possible.

In a TAL abort, the vehicle continues on a ballistic trajectory across the Atlantic Ocean to land at a predetermined runway. Landing occurs about 45 minutes after launch. The landing site is selected near the normal ascent ground track of the orbiter to make the most efficient use of space shuttle main engine propellant. The landing site also must have the necessary runway length, weather conditions and U.S. State Department approval. The three landing sites that have been identified for a launch are Zaragoza, Spain; Moron, Spain; and Istres, France.

To select the TAL abort mode, the crew must place the abort rotary switch in the TAL/AOA position and depress the abort push button before main engine cutoff (depressing it after main engine cutoff selects the AOA abort mode). The TAL abort mode begins sending commands to steer the vehicle toward the plane of the landing site. It also rolls the vehicle heads up before main engine cutoff and sends commands to begin an orbital maneuvering system propellant dump (by burning the propellants through the orbital maneuvering system engines and the reaction control system engines). This dump is necessary to increase vehicle performance (by decreasing weight) to place the center of gravity in the proper place for vehicle control and to decrease the vehicle's landing weight. TAL is handled like a normal entry.

Abort to Orbit

An ATO is an abort mode used to boost the orbiter to a safe orbital altitude when performance has been lost and it is impossible

to reach the planned orbital altitude. If a space shuttle main engine fails in a region that results in a main engine cutoff under speed, the MCC will determine that an abort mode is necessary and will inform the crew. The orbital maneuvering system engines would be used to place the orbiter in a circular orbit.

Abort Once Around

The AOA abort mode is used in cases in which vehicle performance has been lost to such an extent that either it is impossible to achieve a viable orbit or not enough orbital maneuvering system propellant is available to accomplish the orbital maneuvering system thrusting maneuver to place the orbiter on orbit and the deorbit thrusting maneuver. In addition, an AOA is used in cases in which a major systems problem (cabin leak, loss of cooling) makes it necessary to land quickly. In the AOA abort mode, one orbital maneuvering system thrusting sequence is made to adjust the post-main engine cutoff orbit so a second orbital maneuvering system thrusting sequence will result in the vehicle deorbiting and landing at the AOA landing site (White Sands, N.M.; Edwards Air Force Base, Calif.; or the Kennedy Space Center, Fla). Thus, an AOA results in the orbiter circling the Earth once and landing about 90 minutes after liftoff.

After the deorbit thrusting sequence has been executed, the flight crew flies to a landing at the planned site much as it would for a nominal entry.

Contingency Aborts

Contingency aborts are caused by loss of more than one main engine or failures in other systems. Loss of one main engine while another is stuck at a low thrust setting also may necessitate a contingency abort. Such an abort would maintain orbiter integrity for in-flight crew escape if a landing cannot be achieved at a suitable landing field.

Contingency aborts due to system failures other than those involving the main engines would normally result in an intact recovery of vehicle and crew. Loss of more than one main engine may, depending on engine failure times, result in a safe runway landing. However, in most three-engine-out cases during ascent, the orbiter would have to be ditched. The inflight crew escape system would be used before ditching the orbiter.

Abort Decisions

There is a definite order of preference for the various abort modes. The type of failure and the time of the failure determine which type of abort is selected. In cases where performance loss is the only factor, the preferred modes are ATO, AOA, TAL and RTLS, in that order. The mode chosen is the highest one that can be completed with the remaining vehicle performance.

In the case of some support system failures, such as cabin leaks or vehicle cooling problems, the preferred mode might be the one that will end the mission most quickly. In these cases, TAL or RTLS might be preferable to AOA or ATO. A contingency abort is never chosen if another abort option exists.

Mission Control Houston is prime for calling these aborts because it has a more precise knowledge of the orbiter's position than the crew can obtain from on-board systems. Before main engine cutoff, Mission Control makes periodic calls to the crew to identify which abort mode is (or is not) available. If ground communications are lost, the flight crew has

onboard methods, such as cue cards, dedicated displays and display information, to determine the abort region. Which abort mode is selected depends on the cause and timing of the failure causing the abort and which mode is safest or improves mission success. If the problem is a space shuttle main engine failure, the flight crew and Mission Control Center select the best option available at the time a main engine fails.

If the problem is a system failure that jeopardizes the vehicle, the fastest abort mode that results in the earliest vehicle landing is chosen. RTLS and TAL are the quickest options (35 minutes), whereas an AOA requires about 90 minutes. Which of these is selected depends on the time of the failure with three good space shuttle main engines.

The flight crew selects the abort mode by positioning an abort mode switch and depressing an abort push button.

SHUTTLE ABORT HISTORY

RSLS Abort History

(STS-41 D) June 26, 1984

The countdown for the second launch attempt for Discovery's maiden flight ended at T-4 seconds when the orbiter's computers detected a sluggish valve in main engine No. 3. The main engine was replaced and Discovery was finally launched on Aug. 30, 1984.

(STS-51 F) July 12, 1985

The countdown for Challenger's launch was halted at T-3 seconds when onboard computers detected a problem with a coolant valve on main engine No. 2. The valve was replaced and Challenger was launched on July 29, 1985.

(STS-55) March 22, 1993

The countdown for Columbia's launch was halted by onboard computers at T-3 seconds following a problem with purge pressure readings in the oxidizer preburner on main engine No. 2. Columbia's three main engines were replaced on the launch pad, and the flight was rescheduled behind Discovery's launch on STS-56. Columbia finally launched on April 26, 1993.

(STS-51) Aug. 12, 1993

The countdown for Discovery's third launch attempt ended at the T-3 second mark when onboard computers detected the failure of one of four sensors in main engine No. 2 which monitor the flow of hydrogen fuel to the engine. All of Discovery's main engines were ordered replaced on the launch pad, delaying the shuttle's fourth launch attempt until Sept. 12, 1993.

(STS-68) Aug. 18, 1994

The countdown for Endeavour's first launch attempt ended 1.9 seconds before liftoff when onboard computers detected higher than acceptable readings in one channel of a sensor monitoring the discharge temperature of the high pressure oxidizer turbopump in main engine No. 3. A test firing of the engine at the Stennis Space Center in Mississippi on September 2nd confirmed that a slight drift in a fuel flow meter in the engine caused a slight increase in the turbopump's temperature. The test firing also confirmed a slightly slower start for main engine No. 3 during the pad abort, which could have contributed to the higher temperatures. After Endeavour was brought back to the Vehicle Assembly Building to be outfitted with three replacement engines,

NASA managers set Oct. 2 as the date for Endeavour's second launch attempt.

Abort to Orbit History

(STS-51 F) July 29, 1985

After an RSLS abort on July 12, 1985, Challenger was launched on July 29, 1985. Five minutes and 45 seconds after launch, a sensor problem resulted in the shutdown of center engine No. 1, resulting in a safe "abort to orbit" and successful completion of the mission.

SPACE SHUTTLE MAIN ENGINES

Developed in the 1970s by NASA's Marshall Space Flight Center, MSFC in Huntsville, Ala., the space shuttle main engine is the most advanced liquid-fueled rocket engine ever built. Every space shuttle main engine is tested and proven flight worthy at NASA's Stennis Space Center in south Mississippi, before installation on an orbiter. Its main features include variable thrust, high performance reusability, high redundancy and a fully integrated engine controller.

The shuttle's three main engines are mounted on the orbiter aft fuselage in a triangular pattern. Spaced so that they are movable during launch, the engines are used, in conjunction with the solid rocket boosters, to steer the shuttle vehicle.

Each of these powerful main engines is 14 feet long, weighs about 7,000 pounds and is 7.5 feet in diameter at the end of its nozzle.

The engines operate for about 8.5 minutes during liftoff and ascent, burning more than 500,000 gallons of super-cold liquid hydrogen and liquid oxygen propellants stored in the external tank attached to the underside of the shuttle. The engines shut down just before the shuttle, traveling at about 17,000 miles per hour, reaches orbit.

The main engine operates at greater temperature extremes than any mechanical system in common use today. The fuel, liquefied hydrogen at -423 degrees Fahrenheit, is the second coldest liquid on Earth. When it and the liquid oxygen are combusted, the temperature in the main combustion chamber is 6,000 degrees Fahrenheit, hotter than the boiling point of iron.

The main engines use a staged combustion cycle so that all propellants entering the engines are used to produce thrust, or power, more efficiently than any previous rocket engine. In a staged combustion cycle, propellants are first burned partially at high pressure and relatively low temperature, and then burned completely at high temperature and pressure in the main combustion chamber. The rapid mixing of the propellants under these conditions is so complete that 99 percent of the fuel is burned.

At normal operating level, each engine generates 490,847 pounds of thrust, measured in a vacuum. Full power is 512,900 pounds of thrust; minimum power is 316,100 pounds of thrust.

The engine can be throttled by varying the output of the preburners, thus varying the speed of the high-pressure turbopumps and, therefore, the flow of the propellant.

At about 26 seconds into ascent, the main engines are throttled down to 316,000 pounds of thrust to keep the dynamic pressure on the vehicle below a specified level, about 580 pounds per square foot, known as max q. Then, the engines are throttled back up to

normal operating level at about 60 seconds. This reduces stress on the vehicle. The main engines are throttled down again at about seven minutes, 40 seconds into the mission to maintain three g's, three times the Earth's gravitational pull, reducing stress on the crew and the vehicle. This acceleration level is about one-third the acceleration experienced on previous crewed space vehicles.

About 10 seconds before main engine cutoff, or MECO, the cutoff sequence begins. About three seconds later the main engines are commanded to begin throttling at 10 percent thrust per second until they achieve 65 percent thrust. This is held for about 6.7 seconds, and the engines are shut down.

The engine performance has the highest thrust for its weight of any engine yet developed. In fact, one space shuttle main engine generates sufficient thrust to maintain the flight of two and one-half Boeing 747 airplanes.

The space shuttle main engine also is the first rocket engine to use a built-in electronic digital controller, or computer. The controller accepts commands from the orbiter for engine start, change in throttle, shutdown and monitoring of engine operation.

NASA continues to increase the reliability and safety of shuttle flights through a series of enhancements to the space shuttle main engines. The engines were modified in 1988, 1995, 1998, 2001 and 2007. Modifications include new high-pressure fuel and oxidizer turbopumps that reduce maintenance and operating costs of the engine, a two-duct powerhead that reduces pressure and turbulence in the engine, and a single-coil heat exchanger that lowers the number of post flight inspections required. Another modification incorporates a large-throat main combustion chamber that improves the engine's reliability by reducing pressure and temperature in the chamber.

The most recent engine enhancement is the Advanced Health Management System, or AHMS, which made its first flight in 2007. AHMS is a controller upgrade that provides new monitoring and insight into the health of the two most complex components of the space shuttle main engine – the high pressure fuel turbopump and the high pressure oxidizer turbopump. New advanced digital signal processors monitor engine vibration and have the ability to shut down an engine if vibration exceeds safe limits. AHMS was developed by engineers at Marshall.

After the orbiter lands, the engines are removed and returned to a processing facility at Kennedy Space Center, Fla., where they are rechecked and readied for the next flight. Some components are returned to the main engine's prime contractor, Pratt & Whitney Rocketdyne, West Palm Beach, Fla., for regular maintenance. The main engines are designed to operate for 7.5 accumulated hours.

SPACE SHUTTLE SOLID ROCKET BOOSTERS (SRB)

The two solid rocket boosters required for a space shuttle launch and first two minutes of powered flight boast the largest solid-propellant motors ever flown. They are the first large rockets designed for reuse and are the only solid rocket motors rated for human flight. The SRBs have the capacity to carry the entire weight of the external tank, or ET, and orbiter, and to transmit the weight load

through their structure to the mobile launch platform, or MLP.

The SRBs provide 71.4 percent of the thrust required to lift the space shuttle off the launch pad and during first-stage ascent to an altitude of about 150,000 feet, or 28 miles. At launch, each booster has a sea level thrust of approximately 3.3 million pounds and is ignited after the ignition and verification of the three space shuttle main engines, or SSMEs.

SRB apogee occurs at an altitude of about 230,000 feet, or 43 miles, 75 seconds after separation from the main vehicle. At booster separation, the space shuttle orbiter has reached an altitude of 24 miles and is traveling at a speed in excess of 3,000 miles per hour.

The primary elements of each booster are nose cap, housing the pilot and drogue parachute; frustum, housing the three main parachutes in a cluster; forward skirt, housing the booster flight avionics, altitude sensing, recovery avionics, parachute cameras and range safety destruct system; four motor segments, containing the solid propellant; motor nozzle; and aft skirt, housing the nozzle and thrust vector control systems required for guidance. Each SRB possesses its own redundant auxiliary power units and hydraulic pumps.

SRB impact occurs in the ocean approximately 140 miles downrange. SRB retrieval is provided after each flight by specifically designed and built ships. The frustums, drogue and main parachutes are loaded onto the ships along with the boosters and towed back to the Kennedy Space Center, where they are disassembled and refurbished for reuse. Before retirement, each booster can be used as many as 20 times.

Each booster is just over 149 feet long and 12.17 feet in diameter. Both boosters have a combined weight of 1,303,314 pounds at lift-off. They are attached to the ET at the SRB aft attach ring by an upper and lower attach strut and a diagonal attach strut. The forward end of each SRB is affixed to the ET by one attach bolt and ET ball fitting on the forward skirt. While positioned on the launch pad, the space shuttle is attached to the MLP by four bolts and explosive nuts equally spaced around each SRB. After ignition of the solid rocket motors, the nuts are severed by small explosives that allow the space shuttle vehicle to perform lift off.

United Space Alliance (USA)

USA, at KSC facilities, is responsible for all SRB operations except the motor and nozzle portions. In conjunction with maintaining sole responsibility for manufacturing and processing of the non-motor hardware and vehicle integration, USA provides the service of retrieval, post flight inspection and analysis, disassembly and refurbishment of the hardware. USA also exclusively retains comprehensive responsibility for the orbiter.

The reusable solid rocket motor segments are shipped from ATK Launch Systems in Utah to KSC, where they are mated by USA personnel to the other structural components – the forward assembly, aft skirt, frustum and nose cap – in the Vehicle Assembly Building. Work involves the complete disassembly and refurbishment of the major SRB structures – the aft skirts, frustums, forward skirts and all ancillary hardware – required to complete an SRB stack and mate to the ET. Work then proceeds to ET/SRB mate, mate with the orbiter and finally, space shuttle close out operations. After hardware restoration concerning flight

configuration is complete, automated checkout and hot fire are performed early in hardware flow to ensure that the refurbished components satisfy all flight performance requirements.

ATK Launch Systems (ATK)

ATK Launch Systems of Brigham City, Utah, manufactures space shuttle reusable solid rocket motors, or RSRMs, at their Utah facility. Each RSRM – just over 126 feet long and 12 feet in diameter – consists of four rocket motor segments and an aft exit cone assembly is. From ignition to end of burn, each RSRM generates an average thrust of 2.6 million pounds and burns for approximately 123 seconds. Of the motor's total weight of 1.25 million pounds, propellant accounts for 1.1 million pounds. The four motor segments are matched by loading each from the same batches of propellant ingredients to minimize any thrust imbalance. The segmented casing design assures maximum flexibility in fabrication and ease of transportation and handling. Each segment is shipped to KSC on a heavy-duty rail car with a specialty built cover.

SRB Hardware Design Summary

Hold-Down Posts

Each SRB has four hold-down posts that fit into corresponding support posts on the MLP. Hold-down bolts secure the SRB and MLP posts together. Each bolt has a nut at each end, but the top nut is frangible, or breakable. The top nut contains two NASA Standard detonators, or NSDs, that, when ignited at solid rocket motor ignition command, split the upper nut in half.

Splitting the upper nuts allow the hold-down bolts to be released and travel downward because of NSD gas pressure, gravity and the release of tension in the bolt, which is pretensioned before launch. The bolt is stopped by the stud deceleration stand which contains sand to absorb the shock of the bolt dropping down several feet. The SRB bolt is 28 inches long, 3.5 inches in diameter and weighs approximately 90 pounds. The frangible nut is captured in a blast container on the aft skirt specifically designed to absorb the impact and prevent pieces of the nut from liberating and becoming debris that could damage the space shuttle.

Integrated Electronic Assembly (IEA)

The aft IEA, mounted in the ET/SRB attach ring, provides the electrical interface between the SRB systems and the obiter. The aft IEA receives data, commands, and electrical power from the orbiter and distributes these inputs throughout each SRB. Components located in the forward assemblies of each SRB are powered by the aft IEA through the forward IEA, except for those utilizing the recovery and range safety batteries located in the forward assemblies. The forward IEA communicates with and receives power from the orbiter through the aft IEA, but has no direct electrical connection to the orbiter.

Electrical Power Distribution

Electrical power distribution in each SRB consists of orbiter-supplied main dc bus power to each SRB via SRB buses A, B and C. Orbiter main dc buses A, B and C supply main dc bus power to corresponding SRB buses A, B and C. In addition, orbiter main dc, bus C supplies backup power to SRB buses A and B, and orbiter bus B supplies backup power to SRB bus C. This electrical power distribution

arrangement allows all SRB buses to remain powered in the event one orbiter main bus fails.

The nominal dc voltage is 28 V dc, with an upper limit of 32 V dc and a lower limit of 24 V dc.

Hydraulic Power Units (HPUs)

There are two self-contained, independent HPUs on each SRB. Each HPU consists of an auxiliary power unit, or APU; Fuel Supply Module, or FSM; hydraulic pump; hydraulic reservoir; and hydraulic fluid manifold assembly. The APUs are fueled by hydrazine and generate mechanical shaft power to a hydraulic pump that produces hydraulic pressure for the SRB hydraulic system. The APU controller electronics are located in the SRB aft integrated electronic assemblies on the aft ET attach rings. The two separate HPUs and two hydraulic systems are located inside the aft skirt of each SRB between the SRB nozzle and skirt. The HPU components are mounted on the aft skirt between the rock and tilt actuators. The two systems operate from T minus 28 seconds until SRB separation from the orbiter and ET. The two independent hydraulic systems are connected to the rock and tilt servoactuators.

The HPUs and their fuel systems are isolated from each other. Each fuel supply module, or tank, contains 22 pounds of hydrazine. The fuel tank is pressurized with gaseous nitrogen at 400 psi to provide the force to expel via positive expulsion the fuel from the tank to the fuel distribution line. A positive fuel supply to the APU throughout its operation is maintained.

The fuel isolation valve is opened at APU startup to allow fuel to flow to the APU fuel pump and control valves and then to the gas generator. The gas generator's catalytic action decomposes the fuel and creates a hot gas. It feeds the hot gas exhaust product to the APU two-stage gas turbine. Fuel flows primarily through the startup bypass line until the APU speed is such that the fuel pump outlet pressure is greater than the bypass line's, at which point all the fuel is supplied to the fuel pump.

The APU turbine assembly provides mechanical power to the APU gearbox, which drives the APU fuel pump, hydraulic pump and lube oil pump. The APU lube oil pump lubricates the gearbox. The turbine exhaust of each APU flows over the exterior of the gas generator, cooling it and directing it overboard through an exhaust duct.

When the APU speed reaches 100 percent, the APU primary control valve closes and the APU speed is controlled by the APU controller electronics. If the primary control valve logic fails to the open state, the secondary control valve assumes control of the APU at 112 percent speed. Each HPU on an SRB is connected to both servoactuators. One HPU serves as the primary hydraulic source for the servoactuator and the other HPU serves as the secondary hydraulics for the servoactuator. Each servoactuator has a switching valve that allows the secondary hydraulics to power the actuator if the primary hydraulic pressure drops below 2,050 psi. A switch contact on the switching valve will close when the valve is in the secondary position. When the valve is closed, a signal is sent to the APU controller that inhibits the 100 percent APU speed control logic and enables the 112 percent APU speed control logic. The 100 percent APU speed enables one APU/HPU to supply sufficient

operating hydraulic pressure to both servoactuators of that SRB.

The APU 100 percent speed corresponds to 72,000 rpm, 110 percent to 79,200 rpm and 112 percent to 80,640 rpm.

The hydraulic pump speed is 3,600 rpm and supplies hydraulic pressure of 3,050, plus or minus 50 psi. A high-pressure relief valve provides overpressure protection to the hydraulic system and relieves at 3,750 psi.

The APUs/HPUs and hydraulic systems are reusable for 20 missions.

Thrust Vector Control (TVC)

Each SRB has two hydraulic gimbal servoactuators: one for rock and one for tilt. The servoactuators provide the force and control to gimbal the nozzle for TVC. The all-axis gimbaling capability is 8 degrees. Each nozzle has a carbon cloth liner that erodes and chars during firing. The nozzle is a convergent-divergent, movable design in which an aft pivot-point flexible bearing is the gimbal mechanism.

The space shuttle ascent TVC portion of the flight control system directs the thrust of the three SSMEs and the two SRB nozzles to control shuttle attitude and trajectory during liftoff and ascent. Commands from the guidance system are transmitted to the ascent TVC, or ATVC, drivers, which transmit signals proportional to the commands to each servoactuator of the main engines and SRBs. Four independent flight control system channels and four ATVC channels control six main engine and four SRB ATVC drivers, with each driver controlling one hydraulic port on each main and SRB servoactuator.

Each SRB servoactuator consists of four independent, two-stage servovalves that receive signals from the drivers. Each servovalve controls one power spool in each actuator, which positions an actuator ram and the nozzle to control the direction of thrust.

The four servovalves in each actuator provide a force-summed majority voting arrangement to position the power spool. With four identical commands to the four servovalves, the actuator force-sum action prevents a single erroneous command from affecting power ram motion. If the erroneous command persists for more than a predetermined time, differential pressure sensing activates a selector valve to isolate and remove the defective servovalve hydraulic pressure. This permits the remaining channels and servovalves to control the actuator ram spool.

Failure monitors are provided for each channel to indicate which channel has been bypassed. An isolation valve on each channel provides the capability of resetting a failed or bypassed channel.

Each actuator ram is equipped with transducers for position feedback to the thrust vector control system. Within each servoactuator ram is a splashdown load relief assembly to cushion the nozzle at water splashdown and prevent damage to the nozzle flexible bearing.

SRB Rate Gyro Assemblies (RGAs)

Each SRB contains two RGAs mounted in the forward skirt watertight compartment. Each RGA contains two orthogonally mounted gyroscopes – pitch and yaw axes. In conjunction with the orbiter roll rate gyros, they provide angular rate information that describes the inertial motion of the vehicle cluster to the

orbiter computers and the guidance, navigation and control system during first stage ascent to SRB separation. At SRB separation, all guidance control data is handed off from the SRB RGAs to the orbiter RGAs. The RGAs are designed and qualified for 20 missions.

Propellant

The propellant mixture in each SRB motor consists of ammonium perchlorate, an oxidizer, 69.6 percent by weight; aluminum, a fuel, 16 percent by weight; iron oxide, a catalyst, 0.4 percent by weight; polymer, a binder that holds the mixture together, 12.04 percent by weight; and epoxy curing agent, 1.96 percent by weight. The propellant is an 11-point star-shaped perforation in the forward motor segment and a double truncated cone perforation in each of the aft segments and aft closure. This configuration provides high thrust at ignition and then reduces the thrust by about one-third 50 seconds after liftoff to prevent overstressing the vehicle during maximum dynamic pressure.

SRB Ignition

SRB ignition can occur only when a manual lock pin from each SRB safe and arm device has been removed by the ground crew during prelaunch activities. At T minus 5 minutes, the SRB safe and arm device is rotated to the arm position. The solid rocket motor ignition commands are issued when the three SSMEs are at or above 90 percent rated thrust; no SSME fail and/or SRB ignition pyrotechnic initiator controller, or PIC low voltage is indicated; and there are no holds from the launch processing system, or LPS.

The solid rocket motor ignition commands are sent by the orbiter computers through the master events controllers, or MECs, to the NSDs installed in the safe and arm device in each SRB. A pyrotechnic initiation controller, or PIC, is a single-channel capacitor discharge device that controls the firing of each pyrotechnic device. Three signals must be present simultaneously for the PIC to generate the pyro firing output. These signals – arm, fire 1 and fire 2 – originate in the orbiter general-purpose computers and are transmitted to the MECs. The MECs reformat them to 28 V dc signals for the PICs. The arm signal charges the PIC capacitor to 40 V dc, minimum 20 V dc.

The fire 2 commands cause the redundant NSDs to fire through a thin barrier seal down a flame tunnel. This ignites a pyro booster charge, which is retained in the safe and arm device behind a perforated plate. The booster charge ignites the propellant in the igniter initiator; and combustion products of this propellant ignite the solid rocket motor igniter, which fires down the length of the solid rocket motor igniting the solid rocket motor propellant.

The general purpose computer, or GPC, launch sequence also controls certain critical main propulsion system valves and monitors the engine-ready indications from the SSMEs. The main propulsion system, or MPS, start commands are issued by the on-board computers at T minus 6.6 seconds. There is a staggered start – engine three, engine two, engine one – within 0.25 of a second, and the sequence monitors the thrust buildup of each engine. All three SSMEs must reach the required 90 percent thrust within three seconds; otherwise, an orderly shutdown is commanded and safing functions are initiated.

Normal thrust buildup to the required 90 percent thrust level will result in the SSMEs being commanded to the liftoff position at T minus 3 seconds as well as the fire 1 command being issued to arm the SRBs. At T minus three seconds, the vehicle base bending load modes are allowed to initialize.

At T minus 0, the two SRBs are ignited by the four orbiter on-board computers; commands are sent to release the SRBs; the two T-0 umbilicals, one on each side of the spacecraft, are retracted; the on-board master timing unit, event timer and mission event timers are started; the three SSMEs are at 100 percent; and the ground launch sequence is terminated.

SRB Separation

The SRB/ET separation subsystem provides for separation of the SRBs from the orbiter/ET without damage to or recontact of the elements – SRBs, orbiter/ET – during or after separation for nominal modes. SRB separation is initiated when the three solid rocket motor chamber pressure transducers are processed in the redundancy management middle value select and the head end chamber pressure of both SRBs is less than or equal to 50 psi. A backup cue is the time elapsed from booster ignition.

The separation sequence is initiated, commanding the thrust vector control actuators to the null position and putting the main propulsion system into a second-stage configuration 0.8 second from sequence initialization, which ensures the thrust of each SRB is less than 100,000 pounds. Orbiter yaw attitude is held for four seconds and SRB thrust drops to less than 60,000 pounds. The SRBs separate from the ET within 30 milliseconds of the ordnance firing command.

The forward attachment point consists of a ball on the SRB and socket on the ET, held together by one bolt. The bolt contains one NSD pressure cartridge at each end. The forward attachment point also carries the range safety system cross-strap wiring connecting each SRB range safety system, or RSS, and the ET RSS with each other.

The aft attachment points consist of three separate struts: upper, diagonal, and lower. Each strut contains one bolt with an NSD pressure cartridge at each end. The upper strut also carries the umbilical interface between its SRB and the external tank and on to the orbiter.

Redesigned Booster Separation Motors (RBSM)

Eight Booster Separation Motors, or BSMs, are located on each booster – four on the forward section and four on the aft skirt. BSMs provide the force required to push the SRBs away from the orbiter/ET at separation. Each BSM weighs approximately 165 pounds and is 31.1 inches long and 12.8 inches in diameter. Once the SRBs have completed their flight, the BSMs are fired to jettison the SRBs away from the orbiter and external tank, allowing the boosters to parachute to Earth and be reused. The BSMs in each cluster of four are ignited by firing redundant NSD pressure cartridges into redundant confined detonating fuse manifolds. The separation commands issued from the orbiter by the SRB separation sequence initiate the redundant NSD pressure cartridge in each bolt and ignite the BSMs to effect a clean separation.

Redesigned BSMs flew for the first time in both forward and aft locations on STS-125. As a result of vendor viability and manifest support issues, space shuttle BSMs are now being manufactured by ATK. The igniter has been

redesigned and other changes include material upgrades driven by obsolescence issues and improvements to process and inspection techniques.

SRB Cameras

Each SRB flies with a complement of four cameras, three mounted for exterior views during launch, separation and descent; and one mounted internal to the forward dome for main parachute performance assessment during descent.

The ET observation camera is mounted on the SRB forward skirt and provides a wide-angle view of the ET intertank area. The camera is activated at lift off by a G-switch and records for 350 seconds, after which the recorder is switched to a similar camera in the forward skirt dome to view the deployment and performance of the main parachutes to splash down. These cameras share a digital tape recorder located within the data acquisition system.

The ET ring camera is mounted on the ET attach ring and provides a view up the stacked vehicle on the orbiter underside and the bipod strut attach point.

The forward skirt camera is mounted on the external surface of the SRB forward skirt and provides a view aft down the stacked vehicle of the orbiter underside and the wing leading edge reinforced carbon-carbon, or RCC, panels.

The ET attach ring camera and forward skirt camera are activated by a global positioning system command at approximately T minus 1 minute 56 seconds to begin recording at approximately T minus 50 seconds. The camera images are recorded through splash down. These cameras each have a dedicated recorder and are recorded in a digital format. The cameras were designed, qualified, and implemented by USA after Columbia to provide enhanced imagery capabilities to capture potential debris liberation beginning with main engine start and continuing through SRB separation.

The camera videos are available for engineering review approximately 24 hours following the arrival of the boosters at KSC.

Range Safety Systems (RSS)

The RSS consists of two antenna couplers; command receivers/decoders; a dual distributor; a safe and arm device with two NSDs; two confined detonating fuse manifolds; seven confined detonator fuse, or CDF assemblies; and one linear-shaped charge.

The RSS provides for destruction of a rocket or part of it with on-board explosives by remote command if the rocket is out of control, to limit danger to people on the ground from crashing pieces, explosions, fire, and poisonous substances.

The space shuttle has two RSSs, one in each SRB. Both are capable of receiving two command messages – arm and fire – which are transmitted from the ground station. The RSS is only used when the space shuttle violates a launch trajectory red line.

The antenna couplers provide the proper impedance for radio frequency and ground support equipment commands. The command receivers are tuned to RSS command frequencies and provide the input signal to the distributors when an RSS command is sent. The command decoders use a code plug to

prevent any command signal other than the proper command signal from getting into the distributors. The distributors contain the logic to supply valid destruct commands to the RSS pyrotechnics.

The NSDs provide the spark to ignite the CDF that in turn ignites the linear shaped charge for space shuttle destruction. The safe and arm device provides mechanical isolation between the NSDs and the CDF before launch and during the SRB separation sequence.

The first message, called arm, allows the onboard logic to enable a destruct and illuminates a light on the flight deck display and control panel at the commander and pilot station. The second message transmitted is the fire command. The SRB distributors in the SRBs are cross-strapped together. Thus, if one SRB received an arm or destruct signal, the signal would also be sent to the other SRB.

Electrical power from the RSS battery in each SRB is routed to RSS system A. The recovery battery in each SRB is used to power RSS system B as well as the recovery system in the SRB. The SRB RSS is powered down during the separation sequence, and the SRB recovery system is powered up.

Descent and Recovery

After separation and at specified altitudes, the SRB forward avionics system initiates the release of the nose cap, which houses a pilot parachute and drogue parachute; and the frustum, which houses the three main parachutes. Jettison of the nose cap at 15,700 feet deploys a small pilot parachute and begins to slow the SRB decent. At an altitude of 15,200 feet the pilot parachute pulls the drogue parachute from the frustum. The drogue parachute fully inflates in stages, and at 5,500 feet pulls the frustum away from the SRB, which initiates the deployment of the three main parachutes. The parachutes also inflate in stages and further slow the decent of the SRBs to their final velocity at splashdown. The parachutes slow each SRB from 368 mph at first deployment to 52 mph at splashdown, allowing for the recovery and reuse of the boosters.

Two 176-foot recovery ships, Freedom Star and Liberty Star, are on station at the splashdown zone to retrieve the frustums with drogue parachutes attached, the main parachutes and the SRBs. The SRB nose caps and solid rocket motor nozzle extensions are not recovered. The SRBs are dewatered using an enhanced diver operating plug to facilitate tow back. These plugs are inserted into the motor nozzle and air is pumped into the booster, causing it to lay flat in the water to allow it to be easily towed. The boosters are then towed back to the refurbishment facilities. Each booster is removed from the water and components are disassembled and washed with fresh and deionized water to limit saltwater corrosion. The motor segments, igniter and nozzle are shipped back to ATK in Utah for refurbishment. The nonmotor components and structures are disassembled by USA and are refurbished to like-new condition at both KSC and equipment manufacturers across the country.

SPACE SHUTTLE SUPER LIGHT WEIGHT TANK (SLWT)

The super lightweight external tank (SLWT) made its first shuttle flight June 2, 1998, on mission STS-91. The SLWT is 7,500 pounds lighter than the standard external tank. The lighter weight tank allows the shuttle to deliver

International Space Station elements (such as the service module) into the proper orbit.

The SLWT is the same size as the previous design. But the liquid hydrogen tank and the liquid oxygen tank are made of aluminum lithium, a lighter, stronger material than the metal alloy used for the shuttle's current tank. The tank's structural design has also been improved, making it 30 percent stronger and 5 percent less dense.

The SLWT, like the standard tank, is manufactured at Michoud Assembly, near New Orleans, by Lockheed Martin.

The 154-foot-long external tank is the largest single component of the space shuttle. It stands taller than a 15-story building and has a diameter of about 27 feet. The external tank holds over 530,000 gallons of liquid hydrogen and liquid oxygen in two separate tanks. The hydrogen (fuel) and liquid oxygen (oxidizer) are used as propellants for the shuttle's three main engines.

EXTERNAL TANK

The 154-foot-long external tank is the largest single component of the space shuttle. It stands taller than a 15-story building and has a diameter of about 27 feet. The external tank holds more than 530,000 gallons of liquid hydrogen and liquid oxygen in two separate tanks, the forward liquid oxygen tank and the aft liquid hydrogen tank. An unpressurized intertank unites the two propellant tanks.

Liquid hydrogen (fuel) and liquid oxygen (oxidizer) are used as propellants for the shuttle's three main engines. The external tank weighs 58,500 pounds empty and 1,668,500 pounds when filled with propellants.

The external tank is the "backbone" of the shuttle during launch, providing structural support for attachment with the solid rocket boosters and orbiter. It is the only component of the shuttle that is not reused. Approximately 8.5 minutes after reaching orbit, with its propellant used, the tank is jettisoned and falls in a preplanned trajectory. Most of the tank disintegrates in the atmosphere, and the remainder falls into the ocean.

The external tank is manufactured at NASA's Michoud Assembly Facility in New Orleans by Lockheed Martin Space Systems.

Foam Facts

The external tank is covered with spray-on foam insulation that insulates the tank before and during launch. More than 90 percent of the tank's foam is applied using an automated system, leaving less than 10 percent to be applied manually.

There are two types of foam on the external tank, known as the Thermal Protection System, or TPS. One is low-density, closed-cell foam on the tank acreage and is known as Spray-On-Foam-Insulation, often referred to by its acronym, SOFI. Most of the tank is covered by either an automated or manually applied SOFI. Most areas around protuberances, such as brackets and structural elements, are applied by pouring foam ingredients into part-specific molds. The other is a denser composite material made of silicone resins and cork and called ablator. An ablator is a material that dissipates heat by eroding. It is used on areas of the external tank subjected to extreme heat, such as the aft dome near the engine exhaust, and remaining protuberances, such as the cable trays. These areas are exposed to extreme aerodynamic heating.

Closed-cell foam used on the tank was developed to keep the propellants that fuel the shuttle's three main engines at optimum temperature. It keeps the shuttle's liquid hydrogen fuel at -423 degrees Fahrenheit and the liquid oxygen tank at near -297 degrees Fahrenheit, even as the tank sits under the hot Florida sun. At the same time, the foam prevents a buildup of ice on the outside of the tank.

The foam insulation must be durable enough to endure a 180-day stay at the launch pad, withstand temperatures up to 115 degrees Fahrenheit, humidity as high as 100 percent, and resist sand, salt, fog, rain, solar radiation and even fungus. Then, during launch, the foam must tolerate temperatures as high as 2,200 degrees Fahrenheit generated by aerodynamic friction and radiant heating from the 3,000 degrees Fahrenheit main engine plumes. Finally, when the external tank begins reentry into the Earth's atmosphere about 30 minutes after launch, the foam maintains the tank's structural temperatures and allows it to safely disintegrate over a remote ocean location.

Though the foam insulation on the majority of the tank is only 1-inch thick, it adds 4,823 pounds to the tank's weight. In the areas of the tank subjected to the highest heating, insulation is somewhat thicker, between 1.5 to 3 inches thick. Though the foam's density varies with the type, an average density is about 2.4 pounds per cubic foot.

Application of the foam, whether automated by computer or hand-sprayed, is designed to meet NASA's requirements for finish, thickness, roughness, density, strength and adhesion. As in most assembly production situations, the foam is applied in specially designed, environmentally controlled spray cells and applied in several phases, often over a period of several weeks. Before spraying, the foam's raw material and mechanical properties are tested to ensure they meet NASA specifications. Multiple visual inspections of all foam surfaces are performed after the spraying is complete.

Most of the foam is applied at NASA's Michoud Assembly Facility in New Orleans when the tank is manufactured, including most of the "closeout" areas, or final areas applied. These closeouts are done either by hand pouring or manual spraying. Additional closeouts are completed once the tank reaches Kennedy Space Center, Fla.

The super lightweight external tank, or SLWT, made its first shuttle flight in June 1998 on mission STS-91. The SLWT is 7,500 pounds lighter than previously flown tanks. The SLWT is the same size as the previous design, but the liquid hydrogen tank and the liquid oxygen tank are made of aluminum lithium, a lighter, stronger material than the metal alloy used previously.

Beginning with the first Return to Flight mission, STS-114 in June 2005, several improvements were made to improve safety and flight reliability.

Forward Bipod

The external tank's forward shuttle attach fitting, called the bipod, was redesigned to eliminate the large insulating foam ramps as a source of debris. Each external tank has two bipod fittings that connect the tank to the orbiter through the shuttle's two forward attachment struts. Four rod heaters were placed below each forward bipod, replacing the

large insulated foam Protuberance Airload, or PAL, ramps.

Liquid Hydrogen Tank & Liquid Oxygen Intertank Flange Closeouts

The liquid hydrogen tank flange located at the bottom of the intertank and the liquid oxygen tank flange located at the top of the intertank provide joining mechanisms with the intertank. After each of these three component tanks, liquid oxygen, intertank and liquid hydrogen, are joined mechanically, the flanges at both ends are insulated with foam. An enhanced closeout, or finishing, procedure was added to improve foam application to the stringer, or intertank ribbing, and to the upper and lower area of both the liquid hydrogen and liquid oxygen intertank flanges.

Liquid Oxygen Feedline Bellows

The liquid oxygen feedline bellows were reshaped to include a "drip lip" that allows condensate moisture to run off and prevent freezing. A strip heater was added to the forward bellow to further reduce the potential of high density ice or frost formation. Joints on the liquid oxygen feedline assembly allow the feedline to move during installation and during liquid hydrogen tank fill. Because it must flex, it cannot be insulated with foam like the remainder of the tank.

Other tank improvements include:

Liquid Oxygen & Liquid Hydrogen Protuberance Airload (PAL) Ramps

External tank ET-119, which flew on the second Return to Flight mission, STS-121, in July 2006, was the first tank to fly without PAL ramps along portions of the liquid oxygen and liquid hydrogen tanks. These PAL ramps were extensively studied and determined to not be necessary for their original purpose, which was to protect cable trays from aeroelastic instability during ascent. Extensive tests were conducted to verify the shuttle could fly safely without these particular PAL ramps. Extensions were added to the ice frost ramps for the pressline and cable tray brackets, where these PAL ramps were removed to make the geometry of the ramps consistent with other locations on the tank and thereby provide consistent aerodynamic flow. Nine extensions were added, six on the liquid hydrogen tank and three on the liquid oxygen tank.

Engine Cutoff (ECO) Sensor Modification

Beginning with STS-122, ET-125, which launched on Feb. 7, 2008, the ECO sensor system feed through connector on the liquid hydrogen tank was modified by soldering the connector's pins and sockets to address false readings in the system. All subsequent tanks after ET-125 have the same modification.

Liquid Hydrogen Tank Ice Frost Ramps

ET-128, which flew on the STS-124 shuttle mission, May 31, 2008, was the first tank to fly with redesigned liquid hydrogen tank ice frost ramps. Design changes were incorporated at all 17 ice frost ramp locations on the liquid hydrogen tank, stations 1151 through 2057, to reduce foam loss. Although the redesigned ramps appear identical to the previous design, several changes were made. PDL* and NCFI foam have been replaced with BX* manual spray foam in the ramp's base cutout to reduce debonding and cracking; Pressline and cable tray bracket feet corners have been rounded to reduce stresses; shear pin holes have been sealed to reduce leak paths; isolators were primed to promote adhesion; isolator corners

were rounded to help reduce thermal protection system foam stresses; BX manual spray was applied in bracket pockets to reduce geometric voids.

*BX is a type of foam used on the tank's "loseout," or final finished areas; it is applied manually or hand-sprayed. PDL is an acronym for Product Development Laboratory, the first supplier of the foam during the early days of the external tank's development. PDL is applied by pouring foam ingredients into a mold. NCFI foam is used on the aft dome, or bottom, of the liquid hydrogen tank.

Liquid Oxygen Feedline Brackets

ET-128 also was the first tank to fly with redesigned liquid oxygen feedline brackets. Titanium brackets, much less thermally conductive than aluminum, replaced aluminum brackets at four locations, XT 1129, XT 1377, Xt 1624 and Xt 1871. This change minimizes ice formation in under-insulated areas, and reduces the amount of foam required to cover the brackets and the propensity for ice development. Zero-gap/slip plane Teflon material was added to the upper outboard monoball attachment to eliminate ice adhesion. Additional foam has been added to the liquid oxygen feedline to further minimize ice formation along the length of the feedline.

LAUNCH AND LANDING

LAUNCH

As with all previous space shuttle launches, Discovery has several options to abort its ascent if needed after engine failures or other systems problems. Shuttle launch abort philosophy is intended to facilitate safe recovery of the flight crew and intact recovery of the orbiter and its payload.

Abort modes include:

ABORT-TO-ORBIT (ATO)

This mode is used if there is a partial loss of main engine thrust late enough to permit reaching a minimal 105 by 85 nautical mile orbit with the orbital maneuvering system engines. The engines boost the shuttle to a safe orbital altitude when it is impossible to reach the planned orbital altitude.

TRANSATLANTIC ABORT LANDING (TAL)

The loss of one or more main engines midway through powered flight would force a landing at either Zaragoza, Spain; Moron, Spain; or Istres, France. For launch to proceed, weather conditions must be acceptable at one of these TAL sites.

RETURN-TO-LAUNCH-SITE (RTLS)

If one or more engines shut down early and there is not enough energy to reach Zaragoza, the shuttle would pitch around toward Kennedy until within gliding distance of the Shuttle Landing Facility. For launch to proceed, weather conditions must be forecast to be acceptable for a possible RTLS landing at KSC about 20 minutes after liftoff.

ABORT ONCE AROUND (AOA)

An AOA is selected if the vehicle cannot achieve a viable orbit or will not have enough propellant to perform a deorbit burn, but has enough energy to circle the Earth once and land about 90 minutes after liftoff.

LANDING

The primary landing site for Discovery on STS-128 is the Kennedy Space Center's Shuttle Landing Facility. Alternate landing sites that could be used if needed because of weather conditions or systems failures are at Edwards Air Force Base, Calif., and White Sands Space Harbor, N.M.

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ACRONYMS AND ABBREVIATIONS

A/G	Alignment Guides
A/L	Airlock
AAA	Avionics Air Assembly
ABC	Audio Bus Controller
ACBM	Active Common Berthing Mechanism
ACDU	Airlock Control and Display Unit
ACO	Assembly Checkout Officer
ACS	Atmosphere Control and Supply
ACU	Arm Control Unit
ADS	Audio Distribution System
AE	Approach Ellipsoid
AEP	Airlock Electronics Package
AI	Approach Initiation
AJIS	Alpha Joint Interface Structure
AM	Atmosphere Monitoring
AMOS	Air Force Maui Optical and Supercomputing Site
AOH	Assembly Operations Handbook
APAS	Androgynous Peripheral Attachment
APCU	Assembly Power Converter Unit
APE	Antenna Pointing Electronics
	Audio Pointing Equipment
APFR	Articulating Portable Foot Restraint
APM	Antenna Pointing Mechanism
APS	Automated Payload Switch
APV	Automated Procedure Viewer
AR	Atmosphere Revitalization
ARCU	American-to-Russian Converter Unit
ARS	Air Revitalization System
	Atmosphere Revitalization System
ASW	Application Software
ATA	Ammonia Tank Assembly
ATCS	Active Thermal Control System
ATU	Audio Terminal Unit
BAD	Broadcast Ancillary Data
BC	Bus Controller
BCDU	Battery Charge/Discharge Unit
	Berthing Mechanism Control and Display Unit
BEP	Berthing Mechanism Electronics Package

BGA	Beta Gimbal Assembly
BIC	Bus Interface Controller
BIT	Built-In Test
BM	Berthing Mechanism
BOS	BIC Operations Software
BSS	Basic Software
BSTS	Basic Standard Support Software
C&C	Command and Control
C&DH	Command and Data Handling
C&T	Communication and Tracking
C&W	Caution and Warning
C/L	Crew Lock
C/O	Checkout
CAM	Collision Avoidance Maneuver
CAPE	Canister for All Payload Ejections
CAS	Common Attach System
CB	Control Bus
CBCS	Centerline Berthing Camera System
CBM	Common Berthing Mechanism
CCA	Circuit Card Assembly
CCAA	Common Cabin Air Assembly
CCHA	Crew Communication Headset Assembly
CCP	Camera Control Panel
CCT	Communication Configuration Table
CCTV	Closed-Circuit Television
CDR	Space Shuttle Commander
CDRA	Carbon Dioxide Removal Assembly
CETA	Crew Equipment Translation Aid
CHeCS	Crew Health Care System
CHX	Cabin Heat Exchanger
CISC	Complicated Instruction Set Computer
CLA	Camera Light Assembly
CLPA	Camera Light Pan Tilt Assembly
CMG	Control Moment Gyro
COLBERT	Combined Operational Load Bearing External Resistance Treadmill
COTS	Commercial Off the Shelf
CPA	Control Panel Assembly
CPB	Camera Power Box
CR	Change Request
CRT	Cathode-Ray Tube
CSA	Canadian Space Agency

CSA-CP	Compound Specific Analyzer
CVIU	Common Video Interface Unit
CVT	Current Value Table
CZ	Communication Zone
DB	Data Book
DC	Docking Compartment
DCSU	Direct Current Switching Unit
DDCU	DC-to-DC Converter Unit
DEM	Demodulator
DFL	Decommutation Format Load
DIU	Data Interface Unit
DMS	Data Management System
DMS-R	Data Management System-Russian
DPG	Differential Pressure Gauge
DPU	Baseband Data Processing Unit
DRTS	Japanese Data Relay Satellite
DYF	Display Frame
E/L	Equipment Lock
EATCS	External Active Thermal Control System
EBCS	External Berthing Camera System
ECC	Error Correction Code
ECLSS	Environmental Control and Life Support System
ECS	Environmental Control System
ECU	Electronic Control Unit
EDSU	External Data Storage Unit
EDU	EEU Driver Unit
EE	End Effector
EETCS	Early External Thermal Control System
EEU	Experiment Exchange Unit
EF	Exposed Facility
EFBM	Exposed Facility Berthing Mechanism
EFHX	Exposed Facility Heat Exchanger
EFU	Exposed Facility Unit
EGIL	Electrical, General Instrumentation, and Lighting
EIU	Ethernet Interface Unit
ELM-ES	Japanese Experiment Logistics Module – Exposed Section
ELM-PS	Japanese Experiment Logistics Module – Pressurized Section
ELPS	Emergency Lighting Power Supply
EMGF	Electric Mechanical Grapple Fixture
EMI	Electro-Magnetic Imaging

EMU	Extravehicular Mobility Unit
E-ORU	EVA Essential ORU
EP	Exposed Pallet
EPS	Electrical Power System
ES	Exposed Section
ESA	European Space Agency
ESC	JEF System Controller
ESW	Extended Support Software
ET	External Tank
ETCS	External Thermal Control System
ETI	Elapsed Time Indicator
ETRS	EVA Temporary Rail Stop
ETVCG	External Television Camera Group
EuTEF	European Technology Exposure Facility
EV	Extravehicular
EVA	Extravehicular Activity
EXP-D	Experiment-D
EXT	External
FA	Fluid Accumulator
FAS	Flight Application Software
FCT	Flight Control Team
FD	Flight Day
FDDI	Fiber Distributed Data Interface
FDIR	Fault Detection, Isolation, and Recovery
FDS	Fire Detection System
FE	Flight Engineer
FET-SW	Field Effect Transistor Switch
FGB	Functional Cargo Block
FIR	Fluids Integration Rack
FOR	Frame of Reference
FPP	Fluid Pump Package
FR	Flight Rule
FRD	Flight Requirements Document
FRGF	Flight Releasable Grapple Fixture
FRM	Functional Redundancy Mode
FSE	Flight Support Equipment
FSEGF	Flight Support Equipment Grapple Fixture
FSW	Flight Software

GAS	Get-Away Special
GCA	Ground Control Assist
GLA	General Lighting Assemblies
	General Luminaire Assembly
GLONASS	Global Navigational Satellite System
GNC	Guidance, Navigation, and Control
GPC	General Purpose Computer
GPS	Global Positioning System
GPSR	Global Positioning System Receiver
GUI	Graphical User Interface
H&S	Health and Status
HCE	Heater Control Equipment
HCTL	Heater Controller
HEPA	High Efficiency Particulate Acquisition
HPA	High Power Amplifier
HPP	Hard Point Plates
HRDR	High Rate Data Recorder
HREL	Hold/Release Electronics
HRFM	High Rate Frame Multiplexer
HRM	Hold Release Mechanism
HRMS	High Rate Multiplexer and Switcher
HTV	H-II Transfer Vehicle
HTVCC	HTV Control Center
HTV Prox	HTV Proximity
HX	Heat Exchanger
I/F	Interface
IAA	Intravehicular Antenna Assembly
IAC	Internal Audio Controller
IBM	International Business Machines
ICB	Inner Capture Box
ICC	Integrated Cargo Carrier
ICS	Interorbit Communication System
ICS-EF	Interorbit Communication System – Exposed Facility
IDRD	Increment Definition and Requirements Document
IELK	Individual Equipment Liner Kit
IFHX	Interface Heat Exchanger
IMCS	Integrated Mission Control System
IMCU	Image Compressor Unit
IMV	Intermodule Ventilation
INCO	Instrumentation and Communication Officer

IP	International Partner
IP-PCDU	ICS-PM Power Control and Distribution Unit
IP-PDB	Payload Power Distribution Box
ISP	International Standard Payload
ISPR	International Standard Payload Rack
ISS	International Space Station
ISSSH	International Space Station Systems Handbook
ITCS	Internal Thermal Control System
ITS	Integrated Truss Segment
IVA	Intravehicular Activity
IVSU	Internal Video Switch Unit
JAXA	Japan Aerospace Exploration Agency
JCP	JEM Control Processor
JEF	JEM Exposed Facility
JEM	Japanese Experiment Module
JEMAL	JEM Airlock
JEM-EF	Japanese Experiment Module Exposed Facility
JEM-PM	Japanese Experiment Module – Pressurized Module
JEMRMS	Japanese Experiment Module Remote Manipulator System
JEUS	Joint Expedited Undocking and Separation
JFCT	Japanese Flight Control Team
JLE	Japanese Experiment Logistics Module – Exposed Section
JLP	Japanese Experiment Logistics Module – Pressurized Section
JLP-EDU	JLP-EFU Driver Unit
JLP-EFU	JLP Exposed Facility Unit
JPM	Japanese Pressurized Module
JPM WS	JEM Pressurized Module Workstation
JSC	Johnson Space Center
JTVE	JEM Television Equipment
Kbps	Kilobit per second
KOS	Keep Out Sphere
LB	Local Bus
LCA	LAB Cradle Assembly
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LEE	Latching End Effector
LMC	Lightweight MPESS Carrier Lightweight Multipurpose Carrier
LSW	Light Switch

LTA	Launch-to-Activation
LTAB	Launch-to-Activation Box
LTL	Low Temperature Loop
MA	Main Arm
MAUI	Main Analysis of Upper-Atmospheric Injections
Mb	Megabit
Mbps	Megabit per second
MBS	Mobile Base System
MBSU	Main Bus Switching Unit
MCA	Major Constituent Analyzer
MCC	Mission Control Center
MCC-H	Mission Control Center – Houston
MCC-M	Mission Control Center – Moscow
MCDS	Multifunction Cathode-Ray Tube Display System
MCS	Mission Control System
MDA	MacDonald, Dettwiler and Associates Ltd.
MDM	Multiplexer/Demultiplexer
MDP	Management Data Processor
MELFI	Minus Eighty-Degree Laboratory Freezer for ISS
MGB	Middle Grapple Box
MIP	Mission Integration Plan
MISSE	Materials International Space Station Experiment
MKAM	Minimum Keep Alive Monitor
MLE	Middeck Locker Equivalent
MLI	Multi-layer Insulation
MLM	Multipurpose Laboratory Module
MMOD	Micrometeoroid/Orbital Debris
MOD	Modulator
MON	Television Monitor
MPC	Main Processing Controller
MPESS	Multipurpose Experiment Support Structure
MPEV	Manual Pressure Equalization Valve
MPL	Manipulator Retention Latch
MPLM	Multi-Purpose Logistics Module
MPM	Manipulator Positioning Mechanism
MPV	Manual Procedure Viewer
MSD	Mass Storage Device
MSFC	Marshall Space Flight Center
MSP	Maintenance Switch Panel
MSRR	Materials Science Research Rack
MSS	Mobile Servicing System

MT	Mobile Tracker
MTL	Moderate Temperature Loop
MUX	Data Multiplexer
n.mi.	nautical mile
NASA	National Aeronautics and Space Administration
NBL	Neutral Buoyancy Laboratory
NCS	Node Control Software
NET	No Earlier Than
NLT	No Less Than
NPRV	Negative Pressure Relief Valve
NSV	Network Service
NTA	Nitrogen Tank Assembly
NTSC	National Television Standard Committee
OBSS	Orbiter Boom Sensor System
OCA	Orbital Communications Adapter
OCAD	Operational Control Agreement Document
OCAS	Operator Commanded Automatic Sequence
ODF	Operations Data File
ODS	Orbiter Docking System
OI	Orbiter Interface
OIU	Orbiter Interface Unit
OMS	Orbital Maneuvering System
OODT	Onboard Operation Data Table
ORCA	Oxygen Recharge Compressor Assembly
ORU	Orbital Replacement Unit
OS	Operating System
OSA	Orbiter-based Station Avionics
OSE	Orbital Support Equipment
OTCM	ORU and Tool Changeout Mechanism
OTP	ORU and Tool Platform
P/L	Payload
PAL	Planning and Authorization Letter
PAM	Payload Attach Mechanism
PAO	Public Affairs Office
PBA	Portable Breathing Apparatus
PCA	Pressure Control Assembly
PCBM	Passive Common Berthing Mechanism
PCN	Page Change Notice
PCS	Portable Computer System

PCU	Power Control Unit
PDA	Payload Disconnect Assembly
PDB	Power Distribution Box
PDGF	Power and Data Grapple Fixture
PDH	Payload Data Handling unit
PDRS	Payload Deployment Retrieval System
PDU	Power Distribution Unit
PEC	Passive Experiment Container
PEHG	Payload Ethernet Hub Gateway
PFE	Portable Fire Extinguisher
PGSC	Payload General Support Computer
PIB	Power Interface Box
PIU	Payload Interface Unit
PLB	Payload Bay
PLBD	Payload Bay Door
PLC	Pressurized Logistics Carrier
PLT	Payload Laptop Terminal
	Space Shuttle Pilot
PM	Pressurized Module
PMA	Pressurized Mating Adapter
PMCU	Power Management Control Unit
POA	Payload ORU Accommodation
POR	Point of Resolution
PPRV	Positive Pressure Relief Valve
PRCS	Primary Reaction Control System
PREX	Procedure Executor
PRLA	Payload Retention Latch Assembly
PROX	Proximity Communications Center
psia	Pounds per Square Inch Absolute
PSP	Payload Signal Processor
PSRR	Pressurized Section Resupply Rack
PTCS	Passive Thermal Control System
PTR	Port Thermal Radiator
PTU	Pan/Tilt Unit
PVCU	Photovoltaic Controller Unit
PVM	Photovoltaic Module
PVR	Photovoltaic Radiator
PVTCS	Photovoltaic Thermal Control System
QD	Quick Disconnect

R&MA	Restraint and Mobility Aid
RACU	Russian-to-American Converter Unit
RAM	Read Access Memory
RBVM	Radiator Beam Valve Module
RCC	Range Control Center
RCT	Rack Configuration Table
RF	Radio Frequency
RGA	Rate Gyro Assemblies
RHC	Rotational Hand Controller
RIGEX	Rigidizable Inflatable Get-Away Special Experiment
RIP	Remote Interface Panel
RLF	Robotic Language File
RLT	Robotic Laptop Terminal
RMS	Remote Manipulator System
ROEU	Remotely Operated Electrical Umbilical
ROM	Read Only Memory
R-ORU	Robotics Compatible Orbital Replacement Unit
ROS	Russian Orbital Segment
RPC	Remote Power Controller
RPCM	Remote Power Controller Module
RPDA	Remote Power Distribution Assembly
RPM	Roll Pitch Maneuver
RS	Russian Segment
RSP	Return Stowage Platform
RSR	Resupply Stowage Rack
RT	Remote Terminal
RTAS	Rocketdyne Truss Attachment System
RVFS	Rendezvous Flight Software
RWS	Robotics Workstation
SAFER	Simplified Aid for EVA Rescue
SAM	SFA Airlock Attachment Mechanism
SARJ	Solar Alpha Rotary Joint
SCU	Sync and Control Unit
SD	Smoke Detector
SDS	Sample Distribution System
SEDA	Space Environment Data Acquisition equipment
SEDA-AP	Space Environment Data Acquisition equipment - Attached Payload
SELS	SpaceOps Electronic Library System
SEU	Single Event Upset
SFA	Small Fine Arm
SFAE	SFA Electronics

SI	Smoke Indicator
SLM	Structural Latch Mechanism
SLP-D	Spacelab Pallet – D
SLP-D1	Spacelab Pallet – Deployable
SLP-D2	Spacelab Pallet – D2
SLT	Station Laptop Terminal
	System Laptop Terminal
SM	Service Module
SMDP	Service Module Debris Panel
SOC	System Operation Control
SODF	Space Operations Data File
SPA	Small Payload Attachment
SPB	Survival Power Distribution Box
SPDA	Secondary Power Distribution Assembly
SPDM	Special Purpose Dexterous Manipulator
SPEC	Specialist
SRAM	Static RAM
SRB	Solid Rocket Booster
SRMS	Shuttle Remote Manipulator System
SSAS	Segment-to-Segment Attach System
SSC	Station Support Computer
SSCB	Space Station Control Board
SSE	Small Fine Arm Storage Equipment
SSIPC	Space Station Integration and Promotion Center
SSME	Space Shuttle Main Engine
SSOR	Space-to-Space Orbiter Radio
SSP	Standard Switch Panel
SSPTS	Station-to-Shuttle Power Transfer System
SSRMS	Space Station Remote Manipulator System
STC	Small Fire Arm Transportation Container
STR	Starboard Thermal Radiator
STS	Space Transfer System
STVC	SFA Television Camera
SVS	Space Vision System
TA	Thruster Assist
TAC	TCS Assembly Controller
TAC-M	TCS Assembly Controller – M
TCA	Thermal Control System Assembly
TCB	Total Capture Box
TCCS	Trace Contaminant Control System
TCCV	Temperature Control and Check Valve

TCS	Thermal Control System
TCV	Temperature Control Valve
TDK	Transportation Device Kit
TDRS	Tracking and Data Relay Satellite
THA	Tool Holder Assembly
THC	Temperature and Humidity Control Translational Hand Controller
THCU	Temperature and Humidity Control Unit
TIU	Thermal Interface Unit
TKSC	Tsukuba Space Center (Japan)
TLM	Telemetry
TMA	Russian vehicle designation
TMR	Triple Modular Redundancy
TPL	Transfer Priority List
TRRJ	Thermal Radiator Rotary Joint
TUS	Trailing Umbilical System
TVC	Television Camera
UCCAS	Unpressurized Cargo Carrier Attach System
UCM	Umbilical Connect Mechanism
UCM-E	UCM – Exposed Section Half
UCM-P	UCM – Payload Half
UHF	Ultrahigh Frequency
UIL	User Interface Language
ULC	Unpressurized Logistics Carrier
UMA	Umbilical Mating Adapter
UOP	Utility Outlet Panel
UPC	Up Converter
USA	United Space Alliance
US LAB	United States Laboratory
USOS	United States On-Orbit Segment
VAJ	Vacuum Access Jumper
VBSP	Video Baseband Signal Processor
VCU	Video Control Unit
VDS	Video Distribution System
VLU	Video Light Unit
VRA	Vent Relief Assembly
VRCS	Vernier Reaction Control System
VRCV	Vent Relief Control Valve
VRIV	Vent Relief Isolation Valve

VSU	Video Switcher Unit
VSW	Video Switcher
WAICO	Waiving and Coiling
WCL	Water Cooling Loop
WETA	Wireless Video System External Transceiver Assembly
WIF	Work Interface
WRM	Water Recovery and Management
WRS	Water Recovery System
WS	Water Separator
	Work Site
	Work Station
WVA	Water Vent Assembly
ZSR	Zero-g Stowage Rack

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MEDIA ASSISTANCE

NASA TELEVISION TRANSMISSION

NASA Television is carried on an MPEG-2 digital signal accessed via satellite AMC-6, at 72 degrees west longitude, transponder 17C, 4040 MHz, vertical polarization. For those in Alaska or Hawaii, NASA Television will be seen on AMC-7, at 137 degrees west longitude, transponder 18C, at 4060 MHz, horizontal polarization. In both instances, a Digital Video Broadcast, or DVB-compliant Integrated Receiver Decoder, or IRD, with modulation of QPSK/DBV, data rate of 36.86 and FEC 3/4 will be needed for reception. The NASA Television schedule and links to streaming video are available at:

http://www.nasa.gov/ntv

NASA TV's digital conversion will require members of the broadcast media to upgrade with an "addressable" Integrated Receiver De-coder, or IRD, to participate in live news events and interviews, media briefings and receive NASA's Video File news feeds on a dedicated Media Services channel. NASA mission coverage will air on a digital NASA Public Services "Free to Air" channel, for which only a basic IRD will be needed.

Television Schedule

A schedule of key in-orbit events and media briefings during the mission will be detailed in a NASA TV schedule posted at the link above. The schedule will be updated as necessary and will also be available at:

http://www.nasa.gov/multimedia/nasatv/mission_schedule.html

Status Reports

Status reports on launch countdown and mission progress, in-orbit activities and landing operations will be posted at:

http://www.nasa.gov/shuttle

This site also contains information on the crew and will be updated regularly with photos and video clips throughout the flight.

More Internet Information

Information on the ISS is available at:

http://www.nasa.gov/station

Information on safety enhancements made since the Columbia accident is available at:

http://www.nasa.gov/returntoflight/system/index.html

Information on other current NASA activities is available at:

http://www.nasa.gov

Resources for educators can be found at the following address:

http://education.nasa.gov

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AIMTech Project Brief

Project/ Product Name: Force-Induced Treadmill

Date: October 20, 2015

Product Description: Horizontal treadmill with resistive forces and harness to perform exercise testing and prescription on a level surface at a speed that is self-selected by the patient. Equipment and algorithms allow determination of VO2Max similar to standard protocols.

Technical Readiness Level: TLR 5 (Component and/or breadboard validation in relevant environment) Dr. David Brown has tested healthy volunteers on KineAssist equipment with modified algorithms.

Intellectual Property Status: UAB PCT patent application filed August 2015.

Market Analysis: Team has conducted 13 interviews to date to obtain feedback from potential prescribers and users. Target patient populations are those who have gait and balances problems where walking/running exercise would be beneficial, such as stroke victims or people with Parkinson's disease. Frail people (e.g. osteoporosis) who fear falls would also be a target. At UAB, there are about 1100 acute stroke patients each year and a similar number of spinal cord injuries. Stroke patients in rehab use equipment 2-3 times/ week. Woodway has offered to provide a treadmill base to incorporate the FIT components and to place in their exhibit booth at ACSM in May, 2016.

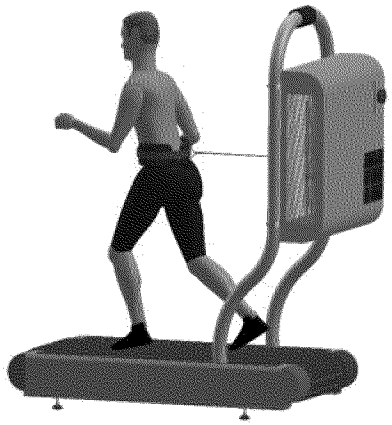
Competitive Advantages and Differentiation:

- Security- Patient is in a harness which eliminates the chance of a slip or fall during the procedure.
- Self-selected speed- Patients can perform test at their own walking pace, with resistive forces applied to the treadmill to change the work load. May be advantageous for peripheral artery disease and other patients with limited gait speed.
- Better patient compliance- The security of a flat surface at a constant speed minimizes the desire of patients to grab the handrail and may allow patients to push further since the chance of a slip or fall is eliminated. May be especially advantageous for osteoporosis, diabetics with peripheral neuropathy and stroke/ brain injury patients.
- Better data than use of bicycle or pharmaceutical acceleration of heart rate.
- Shorter test duration-Evidence so far suggests faster ramp up to maximum heart rate.

Key Decisions and Next Deliverables:

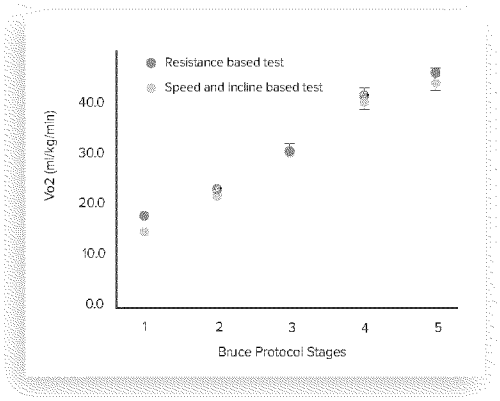
- Build a manual prototype with elastic bands to create the resistive forces. Complete.
- Design a harness, constant force apparatus and software that can be integrated with a traditional treadmill.
- Build prototype unit for use in Drs. Hurt and Brown's lab and for exhibiting at ACSM

Additional Pictures, Drawings or Data:



Resist^X Force-Induced Treadmill

ALLIANCE FOR INNOVATIVE MEDICAL TECHNOLOGY – AIMTECH / REHAB ENGINEERING



Treadmill and harness provide a safe environment to perform exercise testing and prescription on a level surface, at a speed that is self-selected by the individual. Specialized equipment and customized algorithms allow determination of cardiorespiratory fitness by matching workrates to standardized exercises protocols.

Technical Readiness Level

TRL 6 (Prototype demonstration in a relevant environment) Fully functional prototype has been built and evaluated with healthy volunteers. Prototype contains automated resistive force control and safety features. Demonstrated testing protocols that match a person's workrate and VO2 to that of standard treadmill protocols, such as Bruce Protocol.

Competitive Advantages

Individuals can perform exercise testing and training at their own pace while experiencing resistive forces applied at the waist. This may be advantageous for patient populations with limited gait speed or balance impairments. Several features of the treadmill create a safe environment to perform aerobic testing and training: The safety harness, the flat surface, and the ability to walk at a constant speed minimize the risk of falling and desire to grab the handrails for support, which will enable patients to challenge themselves to a greater extent. This may be especially advantageous for individuals with common musculoskeletal and neurological impairments.

Market Overview

Target patient populations are those who have gait and balance impairments that limit functional mobility. These populations include but are not limited to older individuals or those aging with neurological or musculoskeltal impairments such as individuals poststroke, those who have Parkinson's disease, or osteoporosis. Our team has conducted interviews to obtain feedback from clinicians, rehabilitation specialists and end target users.

Inventors

- David Brown Ph.D., UAB Department of Physical Therapy
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Electronic Patent Application Fee Transmittal

Application Number:	15958339
Filing Date:	20-Apr-2018
Title of Invention:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
First Named Inventor/Applicant Name:	Douglas G. Bayerlein
Filer:	Alexander J. Neuworth/Laura Buhs
Attorney Docket Number:	097208-0226

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
		Total in USD ($)		**120**

Electronic Acknowledgement Receipt

EFS ID:	33852383
Application Number:	15958339
International Application Number:	
Confirmation Number:	4765
Title of Invention:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
First Named Inventor/Applicant Name:	Douglas G. Bayerlein
Customer Number:	26371
Filer:	Alexander J. Neuworth/Laura Buhs
Filer Authorized By:	Alexander J. Neuworth
Attorney Docket Number:	097208-0226
Receipt Date:	27-SEP-2018
Filing Date:	20-APR-2018
Time Stamp:	16:30:32
Application Type:	Utility under 35 USC 111(a)

Payment information:

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Payment Type	CARD
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RAM confirmation Number	092818INTEFSW16305900
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	097208-0226_IDS.pdf	101503 0fe7c38cf30aabe7b0a874ae31c05e1cb1a8afb1	no	2
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	097208-0226_SB08.pdf	103243 7366c7dca0b48036563d9cfec445f4e5d64231c5	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	C23--WO_2009_014330A1.pdf	2259548 b7b046d6446a4f5d2b48fe664a4ad4fff6dba9db	no	49
Warnings:					
Information:					
4	Non Patent Literature	C24--BIODEX_MEDICAL_SYSTEMS__INC____THE_BIODE.pdf	3721575 b78bcace99544fe1daf383b4c3ba575227b5a477	no	48
Warnings:					
Information:					
5	Non Patent Literature	C25--BUCHHEIT_ET_AL____Assessing_Stride_Varia.pdf	479407 cd5690f9501688c0c67157d39bb60a739352d548	no	5
Warnings:					
Information:					
6	Non Patent Literature	C26--COOLTHINGS___Woodway_EcoMill__A_Non_Moto.pdf	828715 e30c72c4bbcff48e198d696912c95233b4271c8a	no	6
Warnings:					

Information:					
7	Non Patent Literature	C27--HDT_EXPEDITIONARY_SYSTEMS__INC____KineAs.pdf	5358040 52b1f62535535c9fb3335bcb3121c167d8dc73ef	no	73
Warnings:					
Information:					
8	Non Patent Literature	C28--LISZEWSKI__ANDREW___EcoMill_Treadmill_Ge.pdf	571108 d6336bf22e6eaffe316cad7cc7d1cc2c00a0ab65	no	1
Warnings:					
Information:					
9	Non Patent Literature	C29--NASA___Combined_Operational_Load_Bearing.pdf	288735 e2db7df59463f04c50342f81bd192336da9fe885	no	3
Warnings:					
Information:					
10	Non Patent Literature	C30--NASA___International_Space_Station__Comb.pdf	157641 a56caffd2ea654658dbcfbfc219cd42fc86c52f6	no	4
Warnings:					
Information:					
11	Non Patent Literature	C31--NASA___International_Space_Station__Do_T.pdf	138258 d2c062d4c0efadea86f96ea31e0c5e85b35026b9	no	2
Warnings:					
Information:					
12	Non Patent Literature	C32--NASA___International_Space_Station__Trea.pdf	242689 1c6b05aa6ba345e16ced684bcb356be99fd653bf	no	5
Warnings:					
Information:					
13	Non Patent Literature	C34--Ruling_Re__Plaintiffs__Motion_for_Summar.pdf	1103440 efd2a256fedf825d3bcf89b3ed6a105a37ea8ad1	no	26
Warnings:					
Information:					

14	Non Patent Literature	C37--TECMACHINE___Sprint_Club__User_s_Guide__.pdf	2069122 8e5c5e802a700221d0f8cae894a33cbc60bd05fd	no	33
Warnings:					
Information:					
15	Non Patent Literature	--NASA___Space_Shuttle_Mission.pdf	4873561 70771784dfbdbbd43b4b1663f039bf3c7e411c93	no	116
Warnings:					
Information:					
16	Non Patent Literature	--SOUTHERN_RESEARCH_ET_AL_____AIMTech_Proje_Processed.pdf	145576 1418912955eebbb412a99268620377536 6fd68ea	no	2
Warnings:					
Information:					
17	Non Patent Literature	--SOUTHERN_RESEARCH_ET_AL_____Resist_Force__Processed.pdf	473767 5568ba25ac1550ed66be5fab4ea56bc7fd1523dc	no	2
Warnings:					
Information:					
18	Fee Worksheet (SB06)	fee-info.pdf	30614 d47643dce1105fd970583da5cad277309bcd2af1	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	22946542	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Douglas G. Bayerlein
Title:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
Application No.:	15/958,339
Filing Date:	4/20/2018
Examiner:	Deichl, Jennifer M.
Art Unit:	3764
Confirmation No.:	4765

INFORMATION DISCLOSURE STATEMENT UNDER 37 CFR §1.56

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

Applicant submits herewith documents for the Examiner's consideration in accordance with 37 CFR §§1.56, 1.97 and 1.98.

Applicants respectfully request that each listed document be considered by the Examiner and be made of record in the present application and that an initialed copy of Form PTO/SB/08 be returned in accordance with MPEP §609.

Applicant requests that, in accordance with 37 CFR §1.98(d), the Examiner review all applications relied on for an earlier effective filing date under 35 U.S.C. 120, including application no. PCT/US10/27543, filed 3/16/2010; application no. 13/235,065, filed 9/16/2011; application no. 14/076912, filed 11/11/2013; application no. 14/832,708, filed 8/21/2015, for copies of references of record therein that are not being provided here; although Applicant would be pleased to provide copies of any such documents at the Examiner's request.

The submission of any document herewith is not an admission that such document constitutes prior art against the claims of the present application or that such document is considered material to patentability as defined in 37 CFR §1.56(b). Applicants do not waive any rights to take any action which would be appropriate to antedate or otherwise remove as a competent reference any document submitted herewith.

TIMING OF THE DISCLOSURE

The listed documents are being submitted in compliance with 37 CFR §1.97(c), before the mailing date of any of a final action under 37 CFR §1.113, a notice of allowance under 37 CFR §1.311, or an action that otherwise closes prosecution in the application.

FEE

Fees in the amount of $120.00 to cover the fee associated with an information disclosure statement are being paid by credit card via EFS-Web.

The Commissioner is hereby authorized to charge any additional fees which may be required for this application to Deposit Account Number 19-0741.

Respectfully submitted,

Date /9-27-2018/ By /Alexander J. Neuworth/

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Attorneys for Applicant

Richard J. McKenna
Registration No. 35,610

Alexander J. Neuworth
Registration No. 72,021

Please forward to Group Art Unit 3784

Amended Compact Discs

EXAMINER NOTE: THIS PAPER IS AN INTERNAL WORKSHEET ONLY. DO NOT ENCLOSE WITH ANY COMMUNICATION TO THE APPLICANT. ITS PURPOSE IS ONLY THAT OF AN AID IN HIGHLIGHTING A PARTICULAR PROBLEM IN A COMPACT DISC.

THE ATTACHED CD (COPY 1) HAS BEEN REVIEWED BY OIPE FOR COMPLIANCE WITH 37 CFR 1.52(E). ***Please match this CD with the application listed below.***

Date: 10-3-2018
Serial Number: 15958339
Reviewed By: K. Smith Phone: 703-756-1146

☐ The compact discs are readable and acceptable.

☐ Copy 1 and Copy 2 of the compact discs are not the same.

☐ The compact discs are unreadable.

☐ The files on the compact discs are not in ASCII –

☐ The compact discs contain at least one virus.

☒ Other – Not Proper Subject Matter

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Inventor Name:	Douglas G. Bayerlein
Title:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
Appl. No.:	15/958,339
Filing Date:	4/20/2018
Examiner:	Deichl, Jennifer M.
Art Unit:	3784
Confirmation Number:	4765

AMENDMENT AND REPLY UNDER 37 C.F.R. § 1.111

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Commissioner:

This communication is responsive to the Non-Final Office Action mailed July 19, 2018, concerning the above-referenced patent application.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this document.

Remarks begin on page 14 of this document.

Please amend the application as follows:

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) A manually powered treadmill, comprising:

a frame having a front end and a rear end positioned opposite the front end;

a front shaft coupled to the frame proximate the front end;

a rear shaft coupled to the frame proximate the rear end;

a plurality of bearings coupled to the frame;

a running belt at least partially supported by the plurality of bearings, wherein the running belt includes a curved running surface; and

a safety device coupled to the running belt and to at least one of the front shaft and the rear shaft, so that a portion of the safety device, the running belt and the at least one of the front shaft and the rear shaft freely rotate when the portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety device, the running belt and the at least one of the front shaft and the rear shaft ~~wherein the safety device is structured to restrict movement of at least one of the running belt, the front shaft, and the rear shaft in a first rotational direction while permitting movement of the at least one of the running belt, the front shaft, and the rear shaft in a second rotational direction opposite the first rotational direction~~.

2. (Original) The manually powered treadmill of claim 1, wherein the frame includes a left side member, a right side member, and at least one cross-member extending between the left side member and the right side member, wherein the plurality of bearings includes a first plurality of bearings coupled to a left-side of the frame and a second plurality of bearings coupled to a right-side of the frame.

3. (Original) The manually powered treadmill of claim 2, wherein the first plurality of bearings and the second plurality of bearings each at least partially define a curved top profile, wherein the curved top profile substantially corresponds to at least a portion of the curved running surface.

4. (Original) The manually powered treadmill of claim 1, wherein the safety device is a one-way bearing.

5. (Original) The manually powered treadmill of claim 1, further comprising at least one support foot coupled to the frame, wherein the at least one support foot is adjustable to enable an adjustment of the relative vertical incline of at least a portion of the manually powered treadmill in relation to a surface supporting the manually powered treadmill.

6. (Original) The manually powered treadmill of claim 1, further comprising a braking system coupled to the frame and configured to selectively resist the rotational movement of the running belt.

7. (Original) The manually powered treadmill of claim 6, wherein the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt.

8. (Currently Amended) A manually powered treadmill, comprising:

a frame;

a first plurality of bearings coupled to the frame;

a second plurality of bearings coupled to the frame and spaced a distance from the first plurality of bearings;

a front shaft assembly coupled to the frame;

a rear shaft assembly coupled to the frame;

a running belt at least partially supported by the first plurality of bearings and the second plurality of bearings, the running belt being at least partially disposed about the front and rear

shaft assemblies, and comprising ~~including~~ a running surface, at least a portion of which is curved; and

a safety device coupled to the frame and the running belt, so that a portion of the safety device and the running belt freely rotate when the portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety device and the running belt ~~for resisting rotation of at least one of the running belt, the front shaft assembly, and the rear shaft assembly in a first rotational direction while permitting rotation of at least one of the running belt, the front shaft assembly, and the rear shaft assembly in a second rotational direction opposite the first rotational direction~~.

9. (Original) The manually powered treadmill of claim 8, wherein the safety device is a one-way bearing.

10. (Original) The manually powered treadmill of claim 8, wherein the front shaft assembly comprises a front shaft coupled to frame.

11. (Currently Amended) The manually powered treadmill of claim 10, wherein the front shaft assembly comprises [[and]] at least one front running belt pulley coupled to the front shaft.

12. (Original) The manually powered treadmill of claim 8, wherein the rear shaft assembly comprises a rear shaft coupled to the frame.

13. (Original) The manually powered treadmill of claim 12, wherein the rear shaft assembly comprises at least one rear running belt pulley coupled to the rear shaft.

14. (Original) The manually powered treadmill of claim 8, wherein the rear shaft assembly comprises at least one rear running belt pulley and the front shaft assembly comprises at least one front running belt pulley.

15. (Original) The manually powered treadmill of claim 14 wherein at least one of the at least one rear running belt pulley and the at least one front running belt pulley are formed from an electrically insulating material.

16. (Currently Amended) The manually powered treadmill of claim 8, further comprising at least one support foot coupled to the frame, wherein the at least one support foot is adjustable to enable an adjustment of the relative vertical incline of at least a portion of the manually powered treadmill in relation to a surface supporting the manually powered treadmill.

17. (Original) The manually powered treadmill of claim 8, wherein the running belt is at least partially supported by the first plurality of bearings and the second plurality of bearings.

18. (Original) The manually powered treadmill of claim 17, wherein each of the first and second pluralities of bearings define a curved top profile and wherein the curved top profile substantially corresponds to at least a portion of the curved portion of the running surface.

19. (Currently Amended) The manually powered treadmill of claim 8, wherein the frame includes a left side member, a right side member [[a]] spaced a distance from the left side member, and at least one cross-member extending between the left side member and the right side member.

20. (Original) The manually powered treadmill of claim 19 wherein the first plurality of bearings are coupled the left side member and the second plurality of bearings are coupled to the right side member.

21. (Currently Amended) A manually powered treadmill, comprising:

a frame;

at least one front running belt pulley coupled to the frame;

at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;

a plurality of bearings coupled to the frame;

a running belt at least partially supported by the plurality of bearings and at least partially supported by at least one of the at least one front running belt pulley and the at least one rear running belt pulley, wherein the running belt includes a running surface, at least a portion of which is curved; and

a safety device coupled to ~~at least one of~~ the running belt~~, the front running belt pulley, and the rear running belt pulley~~, so that a portion of the safety device and the running belt freely rotate when the portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety device and the running belt ~~wherein the safety device is structured to resist rotation of the at least one running belt, the front running belt pulley, and the rear running belt pulley in a first direction while permitting rotation of the at least one running belt, the front running belt pulley, and the rear running belt pulley in a second direction opposite the first direction~~.

22. (Original) The manually powered treadmill of claim 21 wherein at least one of the at least one rear running belt pulley and the at least one front running belt pulley are formed from an electrically insulating material.

23. (Original) The manually powered treadmill of claim 21 further comprising a front shaft coupled to frame, the front shaft being adapted to support the at least one front running belt pulley.

24. (Original) The manually powered treadmill of claim 21 further comprising a rear shaft coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley.

25. (Original) The manually powered treadmill of claim 21, wherein the safety device is a one-way bearing.

26. (Original) The manually powered treadmill of claim 21, further comprising a braking system coupled to the frame and configured to selectively resist the rotational movement of the running belt.

27. (Original) The manually powered treadmill of claim 26, wherein the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt.

28. (Currently Amended) A method, comprising:

providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and a rear end;

providing a plurality of bearings coupled to the frame, wherein the plurality of bearings define at least a portion of a curved top profile;

disposing a running belt on the plurality of bearings such that the curved top profile of plurality of bearings define at least a portion of a curved running surface of the running belt;

providing a safety device coupled to the frame and the running belt, the safety device having a first element;

permitting rotation ~~movement~~ of the running belt in a first direction by freewheeling of the first element of the safety device; and

~~providing a safety device coupled to the frame wherein the safety device resists~~ resisting rotation ~~movement~~ of the running belt in a second direction opposite the first direction by restricting rotation of the first element of the safety device.

29. (Original) A method according to claim 28 further comprising providing for selective application of a braking force to resist the rotational movement of the running belt in the first direction.

30. (Original) A method according to claim 28 further comprising providing for the adjustment of the vertical incline of at least a portion of the running surface.

31. (New) A manually powered treadmill, comprising:

a frame having a front end and a rear end positioned opposite the front end;

a front shaft coupled to the frame proximate the front end;

a rear shaft coupled to the frame proximate the rear end;

a plurality of bearings coupled to the frame;

a running belt at least partially supported by the plurality of bearings, wherein the running belt comprises a curved running surface; and

a safety device coupled to the frame and the running belt, the safety device having a first element and a second element;

wherein the first element of the safety device and the running belt freely rotate relative to the second element of the safety device when the first element of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, interference between the first element and the second element of the safety device substantially prevents rotation of the first element of the safety device and the running belt relative to the frame.

32. (New) The manually powered treadmill of claim 31, wherein the frame includes a left side member, a right side member, and at least one cross-member extending between the left side member and the right side member, wherein the plurality of bearings includes a first plurality of bearings coupled to a left-side of the frame and a second plurality of bearings coupled to a right-side of the frame.

33. (New) The manually powered treadmill of claim 32, wherein the first plurality of bearings and the second plurality of bearings each at least partially define a curved top profile, wherein the curved top profile substantially corresponds to at least a portion of the curved running surface.

34. (New) The manually powered treadmill of claim 31, wherein the safety device is a one-way bearing.

35. (New) The manually powered treadmill of claim 31, further comprising at least one support foot coupled to the frame, wherein the at least one support foot is adjustable to enable an adjustment of the relative vertical incline of at least a portion of the manually powered treadmill in relation to a surface supporting the manually powered treadmill.

36. (New) The manually powered treadmill of claim 31, further comprising a braking system coupled to the frame and configured to selectively resist the rotational movement of the running belt.

37. (New) The manually powered treadmill of claim 36, wherein the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt.

38. (New) A manually powered treadmill, comprising:

a frame;

a first plurality of bearings coupled to the frame;

a second plurality of bearings coupled to the frame and spaced a distance from the first plurality of bearings;

a front shaft assembly coupled to the frame;

a rear shaft assembly coupled to the frame;

a running belt at least partially supported by the first plurality of bearings and the second plurality of bearings, the running belt being at least partially disposed about the front and rear shaft assemblies, and comprising a running surface, at least a portion of which is curved; and

a safety device coupled to the frame and the running belt, the safety device having a first element and a second element;

wherein the first element of the safety device and the running belt freely rotate relative to the second element of the safety device when the first element of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, interference between the first element and the second element of the safety device substantially prevents rotation of the first element of the safety device and the running belt relative to the frame.

39. (New) The manually powered treadmill of claim 38, wherein the safety device is a one-way bearing.

40. (New) The manually powered treadmill of claim 38, wherein the front shaft assembly comprises a front shaft coupled to frame.

41. (New) The manually powered treadmill of claim 40, wherein the front shaft assembly comprises at least one front running belt pulley coupled to the front shaft.

42. (New) The manually powered treadmill of claim 38, wherein the rear shaft assembly comprises a rear shaft coupled to the frame.

43. (New) The manually powered treadmill of claim 42, wherein the rear shaft assembly comprises at least one rear running belt pulley coupled to the rear shaft.

44. (New) The manually powered treadmill of claim 38, wherein the rear shaft assembly comprises at least one rear running belt pulley and the front shaft assembly comprises at least one front running belt pulley.

45. (New) The manually powered treadmill of claim 44, wherein at least one of the at least one rear running belt pulley and the at least one front running belt pulley are formed from an electrically insulating material.

46. (New) The manually powered treadmill of claim 38, further comprising at least one support foot coupled to the frame, wherein the at least one support foot is adjustable to enable an adjustment of the relative vertical incline of at least a portion of the manually powered treadmill in relation to a surface supporting the manually powered treadmill.

47. (New) The manually powered treadmill of claim 38, wherein the running belt is at least partially supported by the first plurality of bearings and the second plurality of bearings.

48. (New) The manually powered treadmill of claim 47, wherein each of the first and second pluralities of bearings define a curved top profile and wherein the curved top profile substantially corresponds to at least a portion of the curved portion of the running surface.

49. (New) The manually powered treadmill of claim 38, wherein the frame includes a left side member, a right side member spaced a distance from the left side member, and at least one cross-member extending between the left side member and the right side member.

50. (New) The manually powered treadmill of claim 49, wherein the first plurality of bearings are coupled the left side member and the second plurality of bearings are coupled to the right side member.

51. (New) A manually powered treadmill, comprising:

a frame;

at least one front running belt pulley coupled to the frame;

at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;

a plurality of bearings coupled to the frame;

a running belt at least partially supported by the plurality of bearings and at least partially supported by at least one of the at least one front running belt pulley and the at least one rear running belt pulley, wherein the running belt includes a running surface, at least a portion of which is curved;

a safety device coupled to the frame and the running belt, the safety device having a first element and a second element;

wherein the first element of the safety device and the running belt freely rotate relative to the second element of the safety device when the first element of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, interference between the first element and the second element of the safety device substantially prevents rotation of the first element of the safety device and the running belt relative to the frame.

52. (New) The manually powered treadmill of claim 51, wherein at least one of the at least one rear running belt pulley and the at least one front running belt pulley are formed from an electrically insulating material.

53. (New) The manually powered treadmill of claim 51 further comprising a front shaft coupled to frame, the front shaft being adapted to support the at least one front running belt pulley.

54. (New) The manually powered treadmill of claim 51 further comprising a rear shaft coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley.

55. (New) The manually powered treadmill of claim 51, wherein the safety device is a one-way bearing.

56. (New) The manually powered treadmill of claim 51, further comprising a braking system coupled to the frame and configured to selectively resist the rotational movement of the running belt.

57. (New) The manually powered treadmill of claim 56, wherein the braking system utilizes friction to apply a variable amount of force to resist the rotational movement of the running belt.

58. (New) A method, comprising:

providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and a rear end;

providing a plurality of bearings coupled to the frame, wherein the plurality of bearings define at least a portion of a curved top profile;

disposing a running belt on the plurality of bearings such that the curved top profile of plurality of bearings define at least a portion of a curved running surface of the running belt;

providing a safety device coupled to the frame and to the running belt, the safety device having a first element and a second element;

permitting rotation of the first element of the safety device and the running belt in a first direction of rotation; and

substantially preventing rotation in a second direction, opposite the first direction, of the running belt and the first element of the safety device by interference between the first element and the second element of the safety device.

59. (New) A method according to claim 58 further comprising providing for selective application of a braking force to resist the rotational movement of the running belt in the first direction.

60. (New) A method according to claim 58 further comprising providing for the adjustment of the vertical incline of at least a portion of the running surface.

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and the reasons that follow.

Status of Claims

Claims 1, 8, 11, 16, 19, 21, and 28 are currently amended. Support for the amendments may be found at least at paragraphs [0147]-[0156] and at Figures 36 and 38 of the present application. These amendments are made without prejudice or disclaimer. No new matter has been added.

No claims are cancelled.

Claims 31-60 are new. Support for new claims 31-60 can be found at least at originally-filed claims 1-30, paragraphs [0147]-[0156], and at Figures 36 and 38 of the present application. No new matter has been added.

After amending the claims as set forth above, claims 1-60 are pending in this application for examination. Applicant respectfully requests favorable consideration of these claims.

New Claims 31-60

Claims 31-60 are new, and are variations of the originally-filed and currently amended claims 1-30. New independent claims 31, 38, 51, and 58 are similar to currently amended independent claims 1, 8, 21, and 28. However and in particular, new independent claims 31, 51, and 58 recite "a safety device having a first element and a second element" (emphasis added). The claims depending from the new independent claims 31, 38, 51, and 58 substantially track the claims depending from the currently amended independent claims 1, 8, 21, and 28.

Applicant respectfully submits that new independent claims 31, 38, 51, and 58 are patentable over the cited references for similar reasons as mentioned below. The lone cited reference for the claimed "safety device" is U.S. Patent No. 5,492,517 ("Bostic"). As mentioned in detail below, Bostic does not disclose, teach, or suggest the features of amended independent claims 1, 8, 21, and 28. New independent claims 31, 38, 51, and 58 substantially recite these features and, as mentioned above, further define the safety device.

For at least this reason, new independent claims 31, 38, 51, and 58 are patentable over the cited references. The claims depending therefrom are also patentable for similar reasons. *See* pre-AIA 35 U.S.C. § 112 ¶ 4 or post-AIA 35 U.S.C. § 112(d).

Statement of Substance of Interview

On September 19, 2018, a telephone interview was conducted in the present application between Examiner Jennifer Deichl and Attorneys Alexander J. Neuworth and Richard J. McKenna for the Applicant. Applicant thanks the Examiner for her time. During the interview, the parties discussed the disclosure of U.S. Pat. No. 5,492,517 ("Bostic"). Attorneys for the Applicant explained the believed method of operation of the one-way clutch of Bostic, which is also presented below under the Claim Rejections under 35 U.S.C. § 103 section. Simply, the one-way clutch of Bostic does not provide for rotation in only one direction. The Bostic one-way clutch freewheels in one direction and transmits torque in the other direction. As a result, the treadmill belt of Bostic is free to move in both directions. The Examiner appeared to agree with counsel, but indicated more consideration would be required. A proposed claim amendment was then discussed to highlight this distinction between the claims of the present application and Bostic. The Examiner indicated that there appears to be support for the claim term "freewheel" based on paragraph [0149] of the present application. The Examiner also indicated that focusing on this freewheeling feature may differentiate the claims from Bostic and the other cited references. However, as relating to the support and differentiation issues, the Examiner again indicated that more search and consideration would be required. Applicant thanks the Examiner for her time and thoughtful consideration.

Claim Rejections Under 35 U.S.C. § 103

On page 2 of the Office Action, the Examiner rejected claims 1-4, 6-14, 17-21, and 23-29 under 35 U.S.C. § 103 as being unpatentable over Bostic in view of U.S. Patent No. 3,642,279 ("Cutter") and U.S. Patent No. 4,334,676 ("Schonenberger"). On page 7 of the Office Action, the Examiner rejected claims 5, 16, and 30 under 35 U.S.C. § 103 as being unpatentable over Bostic in view of Cutter and Schonenberger and further in view of U.S. Patent No. 4,406,451 ("Gaetano"). On page 7 of the Office Action, the Examiner rejected claims 15 and 22 under 35 U.S.C. § 103 as being unpatentable over Bostic in view of Cutter and Schonenberger and further in view of U.S. Patent No. 6,923,746 ("Skowronski"). These rejections are respectfully traversed.

Without acquiescing to the rejections, Applicant has amended independent claim 1 to recite, in part:

> 1. A manually powered treadmill, comprising:
> ....
> a safety device coupled to the running belt and to at least one of the front shaft and the rear shaft, so that a portion of the safety device, the running belt and the at least one of the front shaft and the rear shaft freely rotate when the portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety device, the running belt and the at least one of the front shaft and the rear shaft.

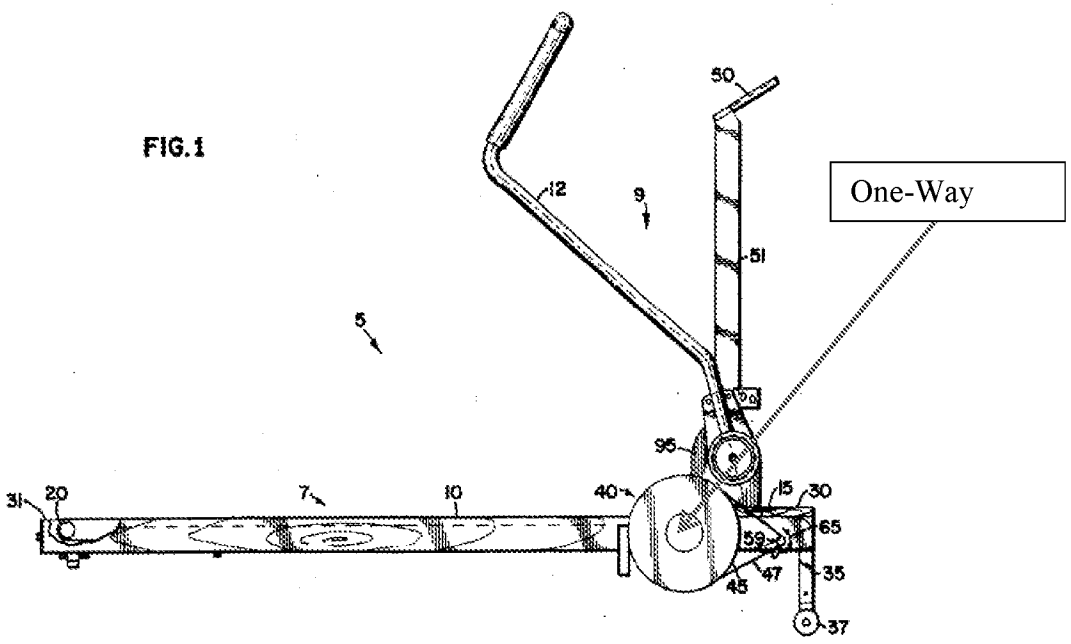
In combination with the other limitations, none of the cited references disclose, teach, or suggest a "safety device coupled to the running belt and to at least one of the front shaft and the rear shaft, so that a portion of the safety device, the running belt and the at least one of the front shaft and the rear shaft freely rotate when the portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety

device, the running belt and the at least one of the front shaft and the rear shaft," as in amended independent claim 1.

In the Office Action and with respect to the "safety device" limitations, the Examiner cited Bostic and stated that "Bostic teaches a manually powered treadmill, comprising ... a safety device ... structured to restrict movement of at least one of the running belt, the front shaft, and the rear shaft in a first rotational direction while permitting movement of the at least one of the running belt, the front shaft, and the rear shaft in a second rotational direction opposite the first rotational direction (one-way clutch; column 2 lines 54-56)." Office Action, p. 2. Applicant respectfully disagrees.

Bostic relates to an "an exercise apparatus including [a] structure for exercising the legs as well as [a] structure for exercising the arms." Col. 1, lines 11-13. The apparatus includes a "flywheel 45 [that] incorporates a one-way clutch which allows free movement of the flywheel in one direction but precludes movement in the opposite direction." *Id.* at Col. 2, lines 54-56.

The one-way clutch does not affect movement of the treadmill surface 10. With reference to annotated to Figure 1 of Bostic below, the one-way clutch is disposed inside the flywheel 45.



4826-6677-4898.6

A rigid or fixed structure does not engage with the one-way clutch. As a result, the one-way clutch is capable of rotating in both directions. However, torque is only transmitted in one direction, which is one characteristic of a "freewheeling" type device. In the opposite rotational direction, torque is not transmitted (i.e., the device freewheels). In this regard and in operation, as a user moves the treadmill belt 10 rearward (away from the display panel 50), the drive roller 25 (not shown above) engages with the one-way clutch to rotate the flywheel 45 counterclockwise: in other words, torque is transmitted from the drive roller 25 to the one-way clutch and to the flywheel to cause the flywheel to rotate. However, as a user moves the treadmill belt 10 frontward (toward the display panel), the one-way-clutch freewheels which enables the drive roller 25 to simply rotate within the one-way clutch. Torque resulting from the rotation of the treadmill surface 10 is not transmitted to the flywheel 45. Therefore, the flywheel 45 continues to rotate in the counterclockwise direction (based on the view above). The one-way clutch does not affect or otherwise control directional movement or rotation of the treadmill belt 10. As a result, the treadmill belt 10 is free to move in both directions.

This structure which transmits torque in one direction but allows rotation of the treadmill in both directions comports with U.S. Pat. No. 4,023,795 ("Pauls"), which is incorporated by reference in Bostic with respect to the one-way clutch. Pauls discloses a "one-way drive means so that they will free wheel in one direction and will drive an energy storage device when moved in the opposite direction." Pauls at col. 1, lines 36-39. Hence, in one rotational direction, a drive capability is provided (when the treadmill belt moves rearward, the drive roller 25 *drives* rotation of the flywheel via the one-way clutch) and in an opposite rotational direction, the clutch freewheels (the one-way clutch freewheels to allow the drive roller 25 to rotate, but not transmit torque to the flywheel).

Thus, both Bostic and in Pauls, (which Bostic relies upon and incorporates by reference for Pauls' teachings of a one-way drive means) show use of a one-way clutch to act as a one-way drive means for transmitting *torque* in only one direction of rotation but *allowing rotation* in both directions. In the first direction of rotation, the torque from the rotation is transmitted from

one element to another. In the second direction of rotation, no torque is transmitted, but also no means are provided to limit the rotation of the various interconnected elements.

Therefore, Bostic in combination with Pauls fails to disclose, teach, or suggest a "safety device coupled to the running belt and to at least one of the front shaft and the rear shaft, so that a portion of the safety device, the running belt and the at least one of the front shaft and the rear shaft freely rotate when the portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety device, the running belt and the at least one of the front shaft and the rear shaft," as in amended independent claim 1.

Accordingly, amended independent claim 1 is patentable over Bostic. None of the other references are cited as disclosing the "safety device" of claim 1 and, indeed, do not appear to disclose this feature. Therefore, amended independent claim 1 is patentable over the cited references. Claims 2-7 depend from claim 1 and are patentable for similar reasons. *See* pre-AIA 35 U.S.C. § 112 ¶ 4 or post-AIA 35 U.S.C. § 112(d).

Though different in scope, independent claims 8, 21, and 28 have been amended to recite similar subject matter as amended independent claim 1. In particular, claims 8, 21, and 28 have been amended to recite, in part:

> 8. A manually powered, comprising: ...
> a safety device coupled to the frame and the running belt, so that a portion of the safety device and the running belt freely rotate when the portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety device and the running belt.
>
> 21. A manually powered treadmill, comprising:
> ...
> a safety device coupled to the running belt, so that a portion of the safety device and the running belt freely rotate when the

> portion of the safety device rotates in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the safety device substantially prevents rotation of the portion of the safety device and the running belt.
>
> 28. A method, comprising:
> ...
> providing a safety device coupled to the frame and the running belt, the safety device having a first element;
> permitting rotation-of the running belt in a first direction by freewheeling of the first element of the safety device; and
> resisting rotation of the running belt in a second direction opposite the first direction by restricting rotation of the first element of the safety device.

Therefore, amended independent claims 8, 21, and 28 are also patentable over the cited references. Claims 9-20 depend from claim 8, claims 22-27 depend from claim 22, and claims 29-30 depend from claim 28. All of these claims are patentable for similar reasons. *See* pre-AIA 35 U.S.C. § 112 ¶ 4 or post-AIA 35 U.S.C. § 112(d).

Based on the foregoing, Applicant respectfully submits that the claim rejections under Section 103 are overcome. Withdrawal of same is respectfully requested.

Double Patenting

On page 8 of the Office Action, the Examiner stated that "Claims 1-30 [are] provisionally rejected on the ground of nonstatutory double patenting as being unpatentable over claims 1-30 of copending Application No. 15/957,721." This provisional rejection is respectfully traversed.

The present application includes three apparatus independent claims (claims 1, 8, and 21) and one independent method claim (claim 28). The '721 application includes three apparatus independent claims (claims 1, 12, and 24) and one independent method claim (claim 29). In varying formats, each of the pending independent claims 1, 12, and 24 of the '721 application recite a "braking system." None of pending independent claims 1, 8, and 21 recite a "braking system." Independent claim 28 of the present application recites a "plurality of bearings [that]

define at least a portion of a curved top profile," which is not recited in independent claim 29 of the '721 application. For at least these reasons, Applicant respectfully submits that the claims of the present application are not obvious in view of the claims of the '721 application or vice versa. Therefore, Applicant respectfully requests withdrawal of the double patenting rejections.

Conclusion

It is submitted that each outstanding objection and rejection to the present application has been overcome, and that the present application is in condition for allowance. Applicant requests consideration and allowance of all pending claims.

It should also be noted that although Applicant has only addressed certain claims or claimed features herein, other claims, features, or combinations of features may also be patentable for additional reasons. Further, the failure to address any statement by the Examiner should not be interpreted as acquiescence or agreement with such statement. Applicant expressly reserves the right to rebut any statement presented by the Examiner and to set forth additional and/or alternative reasons for patentability during prosecution of the present application or in any other future proceeding.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance prosecution.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application, or credit any overpayment, to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date /10-18-2018/ By /Alexander J. Neuworth/

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Electronic Patent Application Fee Transmittal

Application Number:	15958339
Filing Date:	20-Apr-2018
Title of Invention:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
First Named Inventor/Applicant Name:	Douglas G. Bayerlein
Filer:	Alexander J. Neuworth/Laura Buhs
Attorney Docket Number:	097208-0226

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	30	50	1500
INDEPENDENT CLAIMS IN EXCESS OF 3	2201	4	230	920
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
SUBMISSION- INFORMATION DISCLOSURE STMT	2806	1	120	120
		Total in USD ($)		**2540**

Electronic Acknowledgement Receipt

EFS ID:	34052641
Application Number:	15958339
International Application Number:	
Confirmation Number:	4765
Title of Invention:	MANUAL TREADMILL AND METHODS OF OPERATING THE SAME
First Named Inventor/Applicant Name:	Douglas G. Bayerlein
Customer Number:	26371
Filer:	Alexander J. Neuworth/Laura Buhs
Filer Authorized By:	Alexander J. Neuworth
Attorney Docket Number:	097208-0226
Receipt Date:	18-OCT-2018
Filing Date:	20-APR-2018
Time Stamp:	18:08:58
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	CARD
Payment was successfully received in RAM	$2540
RAM confirmation Number	101918INTEFSW18094700
Deposit Account	
Authorized User	
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54	Transmittal Letter	097208-0226_IDS.pdf	101963 4e95378a7db02d0f2cfb280c5eabbafbcfbd7b8f	no	2
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Multipart Description/PDF files in .zip description		
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Claims	2	13
Applicant Arguments/Remarks Made in an Amendment	14	22

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

From:	ecf_bounces@nyed.uscourts.gov
To:	nobody@nyed.uscourts.gov
Subject:	Activity in Case 2:17-cv-00768-KAM-AKT Speedfit LLC v. Woodway USA, Inc. Markman Hearing
Date:	Wednesday, June 13, 2018 10:44:18 AM

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U.S. District Court

Eastern District of New York

Notice of Electronic Filing

The following transaction was entered on 6/13/2018 at 11:43 AM EDT and filed on 6/13/2018

Case Name: Speedfit LLC v. Woodway USA, Inc.
Case Number: 2:17-cv-00768-KAM-AKT
Filer:
Document Number: No document attached

Docket Text:
Minute Entry and Order for proceedings held before Judge Kiyo A. Matsumoto:*Markman* Hearing held on 6/13/2018. Appearances: for plaintiff, John F. Vodopia, Esq.; for defendant, Kadie M. Jelenchick, Esq. The parties presented argument as to the meaning of the term "coupled" in U.S. Patent No. 9,114,276 (the "276 Patent"). Plaintiff conceded on the record that defendant's proposed construction is proper. The court ORDERED as follows: for the reasons stated on the record at the hearing, the term "coupled," as recited in the '276 Patent, shall be construed as "the joining of two members directly or indirectly to one another." The parties are respectfully directed to proceed with discovery pursuant to the scheduling order entered by the Honorable A. Kathleen Tomlinson, United States Magistrate Judge, and under Judge Tomlinson's supervision. Following the close of discovery, the court will hold a hearing regarding inventorship of the patents-in-suit. Ordered by Judge Kiyo A. Matsumoto on 6/13/2018. (Court Reporter Anthony Mancuso.) (Flores, Diego)

2:17-cv-00768-KAM-AKT Notice has been electronically mailed to:

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2:17-cv-00768-KAM-AKT Notice will not be electronically mailed to:

UNITED STATES DISTRICT COURT
DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC Plaintiffs,	:	CIVIL CASE NO. 3:15-CV-1665 (JCH)
v.	:	
WOODWAY USA, INC. Defendant.	:	JUNE 20, 2018

RULING RE: MOTION FOR RECONSIDERATION (DOC. NO. 248)

I. INTRODUCTION

Pending before the court is the plaintiffs' Motion for Reconsideration of the court's decision on summary judgment to exclude Dr. Giachetti's expert testimony on invalidity theories involving U.S. Patent No. 1,211,765 ("Schmidt"). See Motion for Reconsideration ("Mot. for Recons.") (Doc. No. 248).

For the reasons stated below, the Motion for Reconsideration is **DENIED**.

II. BACKGROUND

On June 22, 2016, the court modified its Scheduling Order to require the plaintiffs, Chapco, Inc. ("Chapco") and Samsara Fitness, LLC ("Samsara"), to file their supplemental preliminary invalidity disclosures by August 8, 2016. See Minute Entry, June 22, 2016 (Doc. No. 51). Fact discovery was to close on December 30, 2016, and expert disclosures were due by March 2, 2017. See id. In their supplemental preliminary invalidity disclosures, the plaintiffs did not disclose invalidity theories involving Schmidt, either alone or in combination with U.S. Patent No. 641,424 ("Ziebell"), as to Woodway's U.S. Patent No. 9,039,580 ("'580 Patent"). See Ruling Granting in Part and Denying in Part Motion for Summary Judgment ("Ruling on MFSJ")

(Doc. No. 144) at 24. Those theories were disclosed for the first time in the plaintiffs' expert disclosures in March 2017, specifically in Dr. Giachetti's expert report.[1] See id.

Along with its Motion for Summary Judgment, Woodway filed a Motion to Strike the portions of Dr. Giachetti's opening expert report that pertained to invalidity theories involving Schmidt. See Motion to Strike Portions of the Opening Report of Dr. Giachetti ("Mot. to Strike") (Doc. No. 89). Woodway argued that the invalidity theories were untimely and should therefore be excluded pursuant to Federal Rule of Civil Procedure 37. See Mot. to Strike Mem. in Supp. at 4. The court denied the Motion to Strike as procedurally improper, but considered the arguments in the Motion in determining the admissibility of Dr. Giachetti's testimony for the purpose of Woodway's Motion for Summary Judgment. See Ruling on MFSJ at 23.

The court agreed with Woodway that the plaintiffs' disclosure of their invalidity theories involving Schmidt was untimely and violated the court's Scheduling Order. See id. The court then considered whether Dr. Giachetti's expert testimony should be excluded based on the following factors laid out in Outley v. City of New York, 837 F.2d 587, 590 (2d Cir. 1988): (1) the party's explanation for its failure to comply with the discovery order; (2) the importance of the testimony of the witness to be excluded; (3) the prejudice suffered by the opposing party as a result of having to prepare to meet the new testimony; and (4) the possibility of a continuance. See Ruling on MFSJ at 24–29. The court held that, while the importance of the testimony weighed against excluding

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[1] The March expert disclosures also included combinations of Schmidt with Ziebell, U.S. Patent No. 3,637,206 ("Chickering"), and U.S. Patent No. 5,538,489 ("Magid") as to Woodway's U.S. Patent No. 8,989,169 (the "'169 Patent"). See Ruling on MFSJ at 24. However, Woodway dismissed with prejudice its counterclaims pertaining to the '169 Patent, so that patent and the related issues are no longer before this court. See Woodway's Partial Motion to Dismiss (Doc. No. 244) at 1.

the testimony, on balance the factors warranted exclusion. See id. at 29. Because the court declined to consider Dr. Giachetti's testimony on the late-disclosed theories of invalidity, it granted Woodway's Motion for Summary Judgment on the plaintiffs' invalidity claims to the extent the claims advance a theory of anticipation by Schmidt or obviousness based on combinations involving Schmidt. See id. at 38, 40.

On March 16, 2018, Woodway filed a Motion for Leave to Supplement the Expert Reports of Dr. Blair and Mr. Green. See Motion for Leave to Supplement Expert Reports ("Mot. to Supplement") (Doc. No. 184). After the opening expert reports were due on March 2, 2017, Woodway became aware of two new curved manual treadmills on the U.S. market: the Assault AirRunner ("AirRunner") and the Speedfit Speedboard ("Speedboard"). See Memorandum in Support of Mot. to Supplement ("Mot. to Supplement Mem.") (Doc. No. 184-1) at 4. Woodway procured the AirRunner in September 2017, and had not yet acquired the Speedboard by the time it filed the Motion to Supplement in March 2018. See id. at 4–5.

The court indicated at the Pretrial Conference that it was not inclined to allow Woodway to supplement because Woodway had the AirRunner in September, but waited five months to file the Motion to Supplement. See Transcript, April 30, 2018 ("4/30/18 Transcript") (Doc. No. 247) at 409. However, the trial was continued from May 2018, to October 2018, for unrelated scheduling reasons. See id. at 410. Because of the continuance, the court granted Woodway's Motion to Supplement, with the understanding that Chapco and Samsara would have the right to file rebuttal expert reports on the AirRunner and Speedboard. See id. at 407, 410.

Chapco and Samsara then made an oral motion for leave to file the current Motion for Reconsideration, which the court granted. See id. at 420. Woodway argues that the Motion for Reconsideration is untimely because the District of Connecticut Local Rules require motions for reconsideration to be filed within 7 days[2] of the decision to be reconsidered, making the plaintiffs' Motion 216 days past the deadline. See Memorandum in Opposition to Mot. for Recons. ("Mem. in Opp.") (Doc. No. 250) at 1 n.2; L. Civ. R. 7(c)(1). However, the court granted the plaintiffs leave to file the current Motion and now exercises its discretion to consider it. See 4/30/18 Transcript at 420.

III. LEGAL STANDARD

"A motion for reconsideration is committed to the sound discretion of the court." Appel v. Spiridon, No. 3:06-CV-1177 (SRU), 2008 WL 11377645, at *1 (D. Conn. Dec. 16, 2008) (quoting Rebaudo v. AT&T Services, Inc., No. 3:07-CV-396 (DJS), 2007 WL 4539533, at *2 (D. Conn. Dec. 20, 2007)). The Second Circuit has held that "[t]he standard for granting [a motion for reconsideration] is strict, and reconsideration will generally be denied unless the moving party can point to controlling decisions or data that the court overlooked—matters, in other words, that might reasonably be expected to alter the conclusion reached by the court." Shrader v. CSX Transp., Inc., 70 F.3d 255, 257 (2d Cir.1995) (citations omitted); see also D. Conn. Civ. R. 7(c)(1) ("Motions for reconsideration shall not be routinely filed and shall satisfy the strict standard applicable to such motions.").

[2] Local Civil Rule 7 was amended on January 18, 2017. Prior to the amendment, Local Civil Rule 7 required motions for reconsideration to be filed within 14 days of the decision to be reconsidered. See L. Civ. R. 7(c) (2016). The change does not affect the court's analysis here.

"There are three grounds that justify granting a motion for reconsideration: (1) an intervening change in controlling law; (2) the availability of newly discovered evidence; and (3) the need to correct clear error or prevent manifest injustice." Peck v. Aetna Life Ins. Co., No. 3:04-CV-1139 (JCH), 2007 WL 1598089, at *1 (D. Conn. June 1, 2007) (citing Virgin Atl. Airways, Ltd. v. Nat'l Mediation Bd., 956 F.2d 1245, 1255 (2d Cir.1992)). "A motion for reconsideration is not a means to reargue those issues already considered when a party does not like the way the original motion was resolved." Doe v. Winchester Bd. of Educ., No. 10-CV-1179 (VAB), 2017 WL 662898, at *2 (D. Conn. Feb. 17, 2017).

IV. DISCUSSION

Chapco and Samsara have not identified any intervening change in controlling law or any newly discovered evidence. Rather, they base their Motion for Reconsideration solely on the need to prevent manifest injustice, precipitated by the court's granting of Woodway's Motion to Supplement. See Memorandum in Support of Mot. for Recons. ("Mem. in Supp.") (Doc. No. 249) at 3. They argue that the same Outley factors apply to the exclusion or admission of Dr. Giachetti's testimony on Schmidt as to Woodway's supplementing of Dr. Blair's and Mr. Green's expert reports. See id. at 5. Therefore, they argue, it would be manifestly unjust to permit one but not the other. See id.

Woodway makes a number of arguments in opposition to the Motion for Reconsideration. First, it argues that reconsideration would be unfairly prejudicial to Woodway because it relied on the court's summary judgment decision in preparing for trial and streamlining the case. See Mem. in Opp. at 4–8. Second, it argues that reconsideration would require revisiting other issues previously addressed at summary

judgment, including Woodway's Daubert motion challenging the sufficiency of Dr. Giachetti's opinions and the court's exclusion of Woodway's indirect infringement claim. See id. at 8–9. Third, Woodway argues that Chapco and Samsara are attempting to use the Motion for Reconsideration to introduce new theories of obviousness based on the combinations of Schmidt and Chickering and Schmidt and Magid that were not disclosed as to the '580 patent either in the invalidity contentions or in Dr. Giachetti's March 2, 2017 report. See id. at 9–10. Finally, Woodway argues that there is no parity between the court's decision regarding Dr. Giachetti's testimony on Schmidt and the supplemental expert reports on the AirRunner and Speedboard. See id. at 10–15. The court focuses primarily on the first and last arguments because they respond directly to Chapco and Samsara's argument for reconsideration.

In excluding Dr. Giachetti's testimony on Schmidt, the court relied on Federal Rule of Civil Procedure 37(c), which states that, if a party fails to disclose or supplement information, "the party is not allowed to use that information or witness to supply evidence on a motion, at a hearing, or at a trial, unless the failure was substantially justified or is harmless." Fed. R. Civ. P. 37(c)(1). The court analyzed the four Outley factors and found that only the second factor, the importance of the testimony, favored the plaintiffs. See Ruling on MFSJ at 27. The court noted, however, that even though Dr. Giachetti's testimony was the primary basis for plaintiffs' theories of invalidity based on these references, it was important not to overstate the importance of the testimony because combinations based on Schmidt were not the only references that the plaintiffs had to support their invalidity arguments. See id. While no change has since altered

the first or second Outley factor,[3] Chapco and Samsara here argue that the third and fourth factors of prejudice and possibility for continuance now weigh in their favor because they mirror the considerations facing the court when it granted Woodway's Motion to Supplement.

The court acknowledges some degree of apparent similarity between the scenario faced by Chapco and Samsara at summary judgment and the one faced by Woodway on its Motion to Supplement. In both instances, the party seeking to introduce the expert testimony was untimely, and the four-month continuance of the trial until October 2018, now permits the other party time to respond and rebut the untimely disclosed expert testimony. However, despite this apparent similarity, the situations faced by the plaintiffs and by Woodway are not identical.

The court excluded Dr. Giachetti's testimony on the undisclosed invalidity theories and permitted Woodway to supplement its expert reports at different stages in the case. The plaintiffs' failure to comply with the court's Scheduling Order served as the basis for the court's decision to grant summary judgment for Woodway on those undisclosed invalidity theories. The court issued its Ruling on Summary Judgment, and the deadline for dispositive motions was closed. Nothing since then has changed the

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[3] The court notes that the first Outley factor, which remains unaffected by the arguments raised in the Motion for Reconsideration, played a substantial role in the court's decision at summary judgment. See Ruling on MFSJ at 29 ("On the whole, the court is persuaded that the new Schmidt theories should not be considered in connection with the summary judgment motions, largely because of the lack of reasonable excuse for their late addition to plaintiffs' case."). The court noted in its Ruling that Chapco and Samsara offered no explanation for why they failed to move to amend their invalidity contentions. See id. at 25. The court also rejected the plaintiffs' argument that they were permitted to file their expert report later than the invalidity contentions and therefore did nothing wrong in failing to timely disclose the invalidity theories based on Schmidt because they were included in the expert report. See id. at 26. This factor remains unchanged and still cuts against the plaintiffs, as they have not since offered an explanation for their failure to timely disclose their invalidity theories.

underlying facts regarding the plaintiffs' undisclosed invalidity theories. The court emphasizes that, when summary judgment is granted on a claim, that judgment is dispositive, and the claim is resolved. Thus, the plaintiffs' requested reconsideration is distinguishable from the court's grant of Woodway's Motion to Supplement because the plaintiffs' request requires the court to reopen claims that were disposed of months ago. Woodway's Motion to Supplement, in contrast, did not disturb the court's prior dispositive rulings.

Additionally, although Woodway did untimely delay, the court granted its Motion to Supplement because of extenuating circumstances that required the trial to be continued. See 4/30/18 Transcript at 410. In addition to independent scheduling concerns, a significant part of those circumstances was the plaintiffs' decision to introduce the Generation III TrueForm Runner ("Gen. III") in May 2018. See id. at 367 (noting that the court stated, in relation to the continuance of the trial date, "I keep reminding myself of a new product and going through this twice would be crazy. I have to say that entered greatly into my decision . . . ."). The court permitted the parties to amend their trial exhibits and introduce supplemental expert reports to address claims concerning the Gen. III treadmill in this case. See 4/30/18 Transcript at 372–73. Chapco and Samsara cannot reasonably complain about the inclusion of Gen. III in this case because they decided to introduce the product in May 2018, in the midst of litigation, and further argued that they should be permitted to present evidence of Gen. III to dispute Woodway's allegations of willfulness. See Motion to Amend Exhibit List (Doc. No. 214); Transcript, April 12, 2018 ("4/12/18 Transcript") (Doc. No. 238) at 279, 283–90.

The court presumes that the supplemental expert reports will address the existence of noninfringing alternatives, including the AirRunner and Speedboard, as they pertain to the Gen. III treadmill. Such reports would not be untimely, as the parties could not have addressed issues relating to Gen. III prior to the plaintiffs' decision to introduce the new treadmill onto the market or the court's decision to permit Gen. III into the case. Given the overlap in issues concerning the noninfringing alternatives to Gen. II and Gen. III, it would confuse the jury to permit the expert reports to address the AirRunner and Speedboard in the context of Gen. III, but not Gen. II. Thus, the plaintiffs' introduction of Gen. III weighed heavily in the court's decision to grant Woodway's Motion to Supplement. No such extenuating circumstances existed at the time of the court's Ruling on Summary Judgment, excluding Dr. Giachetti's expert testimony. That they exist now—at least partially as a result of the plaintiffs' own actions—should not be sufficient reason to unwind the court's prior decisions.

Additionally, the court notes that perfect parity in litigation is never possible because the circumstances of the case are always changing as the parties move toward trial. Chapco and Samsara have not demonstrated that manifest injustice would result if the court declined to reconsider its previous Ruling on Summary Judgment. They have cited no cases in which a court has held that permitting a party to supplement under one circumstance while excluding testimony under another circumstance is manifest injustice. Litigation cannot and should not operate as a "tit-for-tat" where a decision favorable to one party must be matched by another decision favorable to the other party. Indeed, the efficient administration of justice would be substantially hindered if

courts were required to repeatedly review past evidentiary decisions whenever it exercised its discretion in favor of one party.[4]

Not only have the plaintiffs failed to persuade the court that manifest injustice would result if the court does not reconsider its previous Ruling, the court also notes that granting the Motion for Reconsideration would result in substantial unfair prejudice to Woodway. This unfair prejudice goes beyond merely the time and expense of taking additional discovery regarding Schmidt and supplementing Dr. Blair's rebuttal report.[5]

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[4] As an example of the effect of the requested reconsideration on the efficient administration of justice, the parties here cannot agree on the degree to which the reconsideration would reopen Rulings previously decided by the court or open the door to additional dispositive motions. For example, Woodway claims that the court's exclusion of its indirect infringement allegations against Chapco was decided in parallel to the court's exclusion of the plaintiffs' untimely disclosed invalidity theories. See Mem. in Opp. at 8–9; Ruling on MFSJ at 8–9 ("Just as Woodway argued that the plaintiffs failed to include all of their theories of invalidity in their invalidity contentions, the plaintiffs argue that Woodway's infringement contentions do not disclose any indirect infringement theory. . . . Woodway cannot claim to be prejudiced by an undisclosed theory of invalidity and, at the same time argue that it should not be held to the same standard with regards to its infringement theories."). Therefore, Woodway argues that, if the court reconsiders its exclusion of the plaintiffs' invalidity theories, it should also reconsider its exclusion of Woodway's indirect infringement allegation. See Mem. in Opp. at 8–9. The plaintiffs oppose Woodway's argument. See Reply in Support of Mot. for Recons. ("Reply in Supp.") (Doc. No. 251) at 2.

The parties also disagree as to whether granting the Motion for Reconsideration would require the court to reconsider Woodway's Motion to Strike Dr. Giachetti's opinions on the grounds that they are insufficiently supported, not just untimely. Compare Mem. in Opp. at 8; with Reply in Supp. at 2. Finally, it is not clear from the plaintiffs' Memorandum whether they intend to file additional motions for summary judgment based on invalidity theories involving Schmidt. See Mem. in Supp. at 6 ("Invalidity will be a key focus of the upcoming summary judgment filings and trial . . . .").

Without resolving which of these prior decisions will need to be revisited if the Motion for Reconsideration were granted, the court notes that the parties' disagreement is illustrative of the degree of confusion and disruption that such reconsideration would have on the case.

[5] The plaintiffs cite three cases in which the court found that there was no unfair prejudice caused by late disclosure when the opposing party was sufficiently on notice about the late-disclosed theory. See Mem. in Supp. at 6; Eli Lilly & Co. v. Teva Pharmaceuticals USA, Inc., 619 F.3d 1329, 1345 (Fed. Cir. 2010); Hikansut LLC v. United States, 127 Fed. Cl. 101, 109 (Ct. Fed. Cl. 2016); Inventio AG v. ThyssenKrupp Elevator Corp., No. 08-08874-RGA, 2014 WL 468897, at *4–*5 (D. Del. Feb. 3, 2014). However, none of these cases considered the prejudice caused after the late-disclosed theory had been excluded and the parties had proceeded to prepare for trial in reliance on that exclusion. Hikansut and Inventio were not decided on a motion for reconsideration and, therefore, had no occasion to consider the prejudice caused by reconsideration of a ruling made seven months prior. See Hikansut, 127 Fed. Cl. At 109; Inventio, 2014 WL 468897, at *4–*5.

The court's exclusion of Dr. Giachetti's testimony on the undisclosed invalidity theories has shaped the landscape of the case, on which both parties have relied in their preparations for trial. Since the court's Ruling on Summary Judgment on September 26, 2017, the parties have now spent seven months preparing for trial in reliance on the court's Ruling, including its exclusion of Schmidt for purposes of invalidity. During that time, the parties have prepared witnesses and exhibits, submitted pretrial disclosures, and filed Motions in Limine and evidentiary objections, on many of which the court has already ruled.

Additionally, attorneys make deliberate decisions about trial strategy based on the court's prior Rulings and the posture of the case at the time. Thus, in addition to preparing a response to Chapco and Samsara's invalidity theories based on Schmidt, Woodway may also have to reconsider various strategy choices it has already made in reliance on the exclusion of Schmidt. For example, Woodway argues that it made the strategic decision to dismiss certain infringement claims with prejudice to streamline the case in reliance on the court's Ruling on Summary Judgment, including as regards to the Schmidt invalidity theories. See Partial Motion to Dismiss (Doc. No. 244). Although the plaintiffs argue that Woodway's claim that it streamlined the case in reliance on the court's ruling "strains credulity," see Reply in Support of Mot. for Recons. (Doc. No. 251) at 3, the court is not in Woodway's shoes and cannot say whether Woodway would have made these or other decisions in the absence of the court's Ruling excluding the evidence on Schmidt. Thus, to unwind the court's prior Ruling at this stage in the case without also unwinding a number of decisions made since then would unfairly prejudice Woodway.

Chapco and Samsara recognize that, "[u]ltimately, this comes down to an exercise of the Court's discretion." Mem. in Supp. at 7. Here, because of the plaintiffs' inability to show manifest injustice and the unfair prejudice to Woodway, the court declines to reconsider its prior Ruling at summary judgment to exclude the portions of Dr. Giachetti's expert report addressing invalidity theories based on Schmidt.

V. CONCLUSION

For the reasons stated above, the Motion for Reconsideration is **DENIED**.

SO ORDERED.

Dated at New Haven, Connecticut this 20th day of June, 2017.

/s/ Janet C. Hall
Janet C. Hall
United States District Judge

EXHIBIT AA

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC, Plaintiffs, vs. WOODWAY USA, INC., Defendant.	Civil Action No. 3:15-cv-1665 (JCH) March 15, 2018

SUPPLEMENTAL EXPERT REPORT OF KIM B. BLAIR, Ph.D.

I, Kim B. Blair, Ph.D., hereby make the following supplemental disclosure pursuant to Fed. R. Civ. P. 26(a)(2) and 26(e).

1. I am the same Kim Blair who submitted expert reports in this matter on March 2, 2017, and March 30, 2017. For brevity, I will not repeat my background, experience, or qualifications here.

2. Since March 30, 2017, I have authored one additional publication: Crouch, T. N., Burton, D., LaBry, Z. A., and Blair, K. B., 2017, "Riding Against the Wind: A Review of Competition Cycling Aerodynamics," Invited Paper, *Sports Engineering*, Vol. 20, No. 2, pp. 81-110.

3. Since March 30, 2017, I have continued to provide services to Woodway USA, Inc. ("Woodway") in this matter through STI&E Consulting, my independent consulting company. In addition to my work as a consultant through STI&E, I joined Exponent, Inc. as a Senior Manager in September, 2017.

4. Since March 30, 2017, I have been deposed in connection with this matter (April 5, 2017). I also provided testimony during an August 15, 2017 Markman proceeding in *Speedfit LLC v. Woodway USA, Inc.*, Case No. 2013 Civ. 01276 (E.D.N.Y.). I have not otherwise provided any other testimony as an expert at trial or by deposition since my last report.

5. The compensation for my time spent in working on issues in this case continues to be $450 per hour. I continue to be compensated for my expenses in connection with this matter. Just as with my previous reports, my compensation is not dependent on or related in any matter to the outcome of the current litigation. I have no financial interest whatsoever in the outcome of this litigation.

6. For this supplemental report, I have been asked by Woodway to physically inspect and analyze the Assault AirRunner, which according to its online promotional is a "premiere elite fitness running machine," and to provide an assessment as to whether this product infringes any claims of United States Patent No. 9,039,580 ("the '580 patent"). It is my understanding that the Assault AirRunner only became available in the United States since I issued my last expert report.

7. The Assault AirRunner product is depicted below:

8. For the purposes of my investigation, I studied the content contained within Assault's website (https://www.assaultfitness.com/products/treadmill), walked and ran on an Assault AirRunner (Serial No. M1701BK0024) as well as reviewed photographs and considered this same Assault AirRunner in various stages of assembly/disassembly. Based on my review of the information made available to me, the Assault AirRunner infringes at least independent claim 1 of the '580 patent, reproduced below.

Claim 1
A manually powered treadmill comprising: a frame having a front end and a rear end positioned opposite the front end; a front shaft rotatably coupled to the frame at the front end; a rear shaft rotatably coupled to the frame at the rear end; a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame; a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame; a running belt supported by the first bearing rail and the second bearing rail and disposed about the front shaft and the rear shaft, wherein the running belt follows a curved running surface; and a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.

9. As is apparent from a review of the claim language, this independent claim requires a safety device as well as various other components of a curved, manual treadmill. While each and every element recited in the claim language must be present for the Assault AirRunner to infringe, the infringement analysis appears to primarily hinge on the "safety device" element. The annotated photographs in Exhibit A illustrate how the Assault AirRunner product meets each and every claim limitation in at least claim 1 of the '580 patent.

10. Just as I stated in my first two reports, I understand that the parties in the litigation are under a continuing obligation to supplement any discovery that has been provided during this litigation. Therefore, because new materials or information may become available which could further support or modify the conclusions that I have reached to date, I expressly reserve the right to amend, expand, add, supplement, change, alter, or otherwise modify my opinions disclosed herein. Any changes or necessary amplification of my opinions and conclusions will be addressed in supplemental reports or testimony, which I reserve the right to provide.

11. Also as provided in my first two reports, if I am called to testify, I expect and intend to use exhibits and demonstratives relating to the subject matter of my testimony. These exhibits and demonstratives may include portions of the materials included in this report as well as diagrams, models, photographs, or physical samples of the structures described in those items. Portions of these documents may be enlarged, colored, or otherwise adapted to illustrate my opinions. I may also rely on demonstrative exhibits, and summaries that have not yet been prepared.

I hereby certify under the penalty of perjury that the foregoing is true and correct to the best of my knowledge.

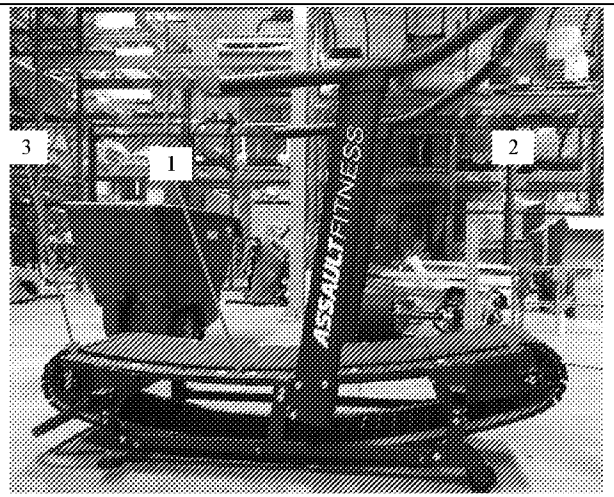
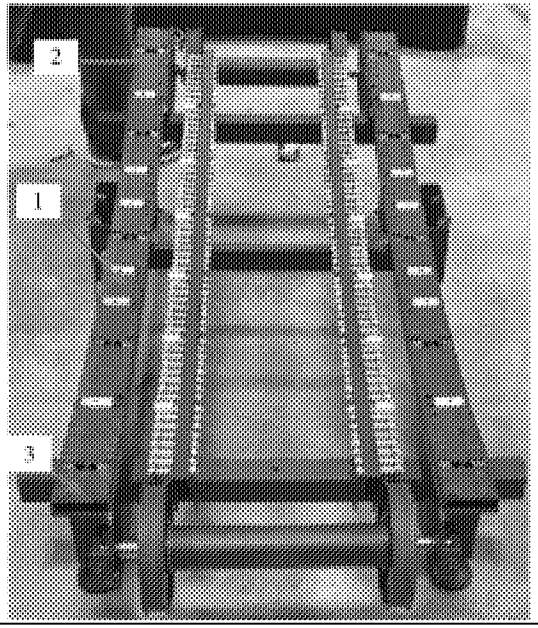
Date: March 15, 2018

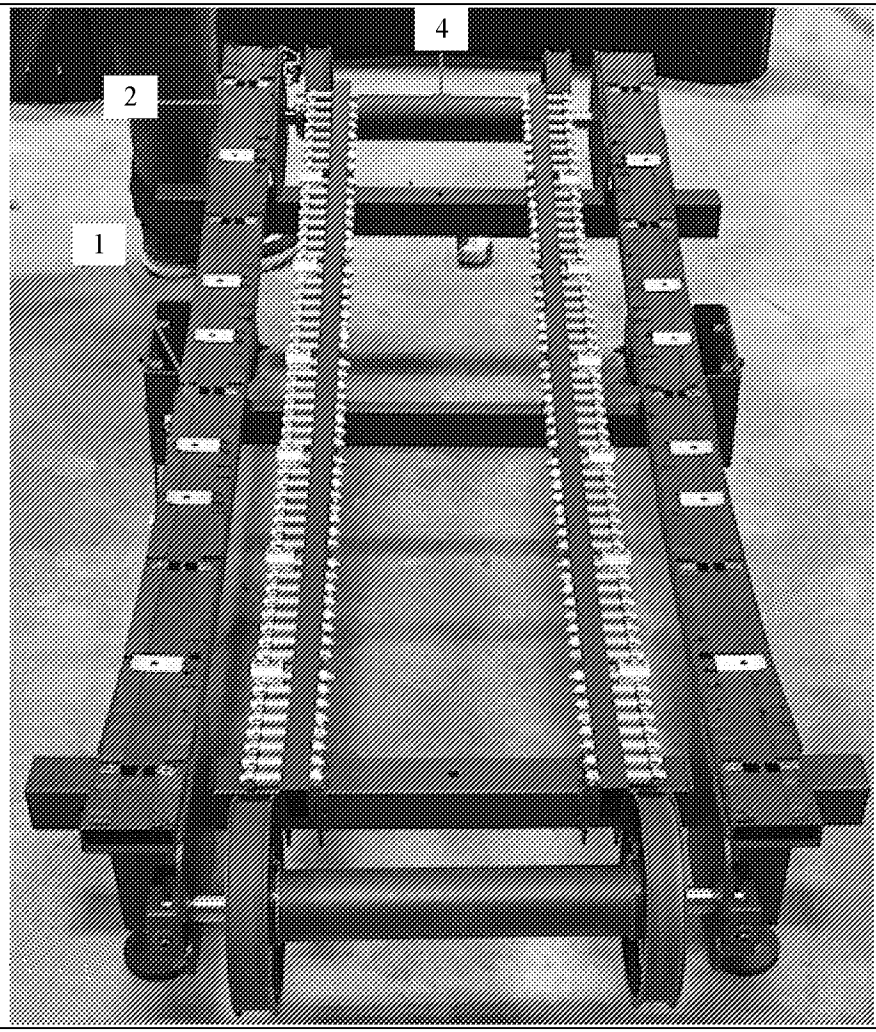
Kim B. Blair

Kim B. Blair, Ph.D.

SUPPLEMENTAL EXPERT REPORT OF KIM B. BLAIR, Ph.D. – EXHIBIT A

the '580 patent	Assault AirRunner	
1. A manually powered treadmill comprising:	A "manually powered treadmill" is literally the Infringing Product. The Assault Fitness AirRunner Product is pictured. As described on the product website, "the AirRunner runs on your energy, with zero electrical consumption" and "[b]urn[s] up to 30% more calories than a motorized treadmill." (*See* https://shop.assaultfitness.com/products/treadmill) (emphasis added).	

the '580 patent	Assault AirRunner	
a frame having a front end and a rear end positioned opposite the front end;	A "frame having a front end and a rear end positioned opposite the front end" is literally present in the Infringing Product. As shown, the frame [1] has a front end [2] and a rear end [3], where the front end [2] is positioned opposite the rear end [3].	 

the '580 patent	Assault AirRunner	
a front shaft rotatably coupled to the frame at the front end;	A "front shaft rotatably coupled to the frame at the front end" is literally present in the Infringing Product. As shown, a front shaft [4] is rotatably coupled to the frame [1] at the front end [2].	

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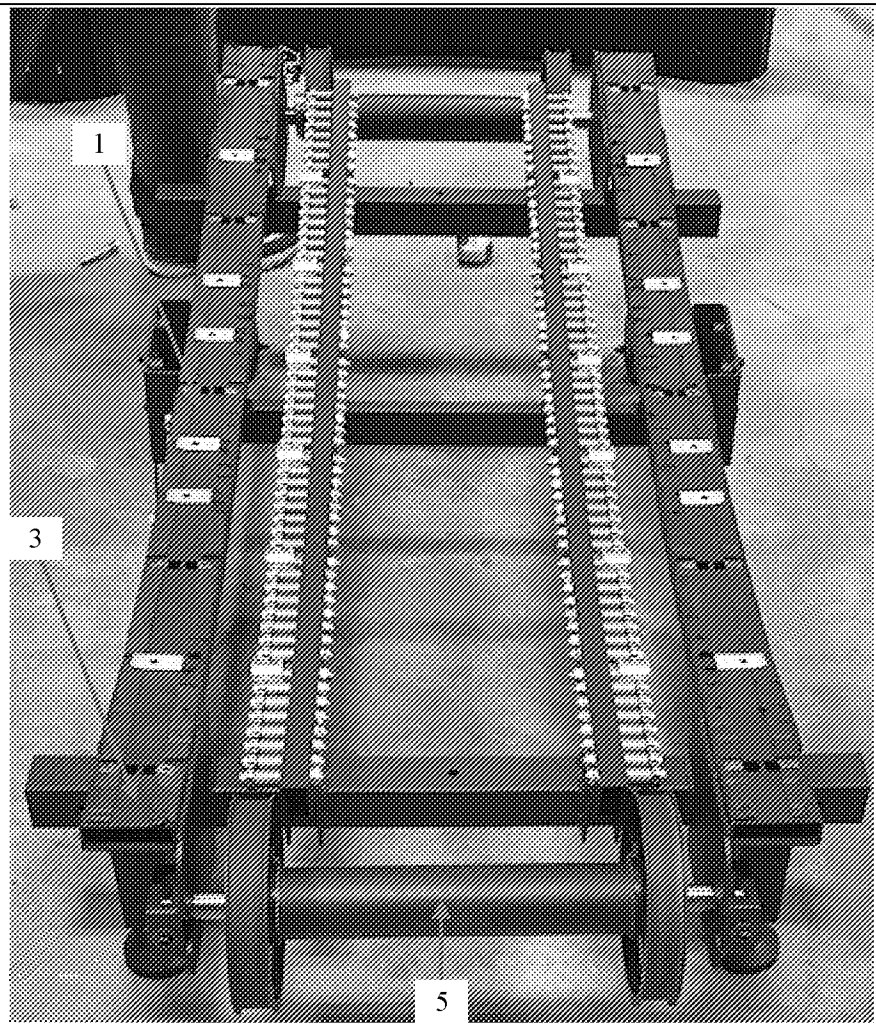
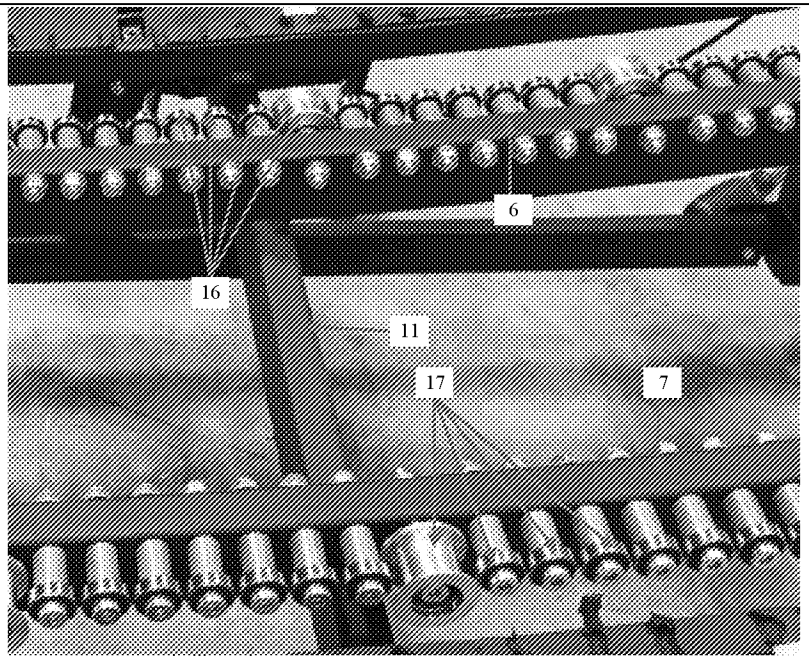
the '580 patent	Assault AirRunner	
a rear shaft rotatably coupled to the frame at the rear end;	A "rear shaft rotatably coupled to the frame at the rear end" is literally present in the Infringing Product. As shown, a rear shaft [5] is rotatably coupled to the frame [1] at the rear end [3].	

LIFECORE Ex. 1002

the '580 patent	Assault AirRunner	
a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame;	A "first bearing rail having a plurality of bearings" and "attached to a left side of the frame" are literally present in the Infringing Product. As shown, a first bearing rail [6] includes a plurality of bearings [16]. As also shown, the first bearing rail [6] is coupled to at least one cross-member [11]. The at least one cross-member [11] is included with the frame [1]. (*See, e.g.,* claim 3 and col. 5, lines 56-61 stating that "The frame 40 comprises ... one or more lateral or cross-members 56 ... ."). Therefore and as shown, the first bearing rail [6] is attached to one side of the frame [1] (i.e., the left side), while the second bearing rail [7] is attached to the other side of the frame [1] (i.e., the right side).	

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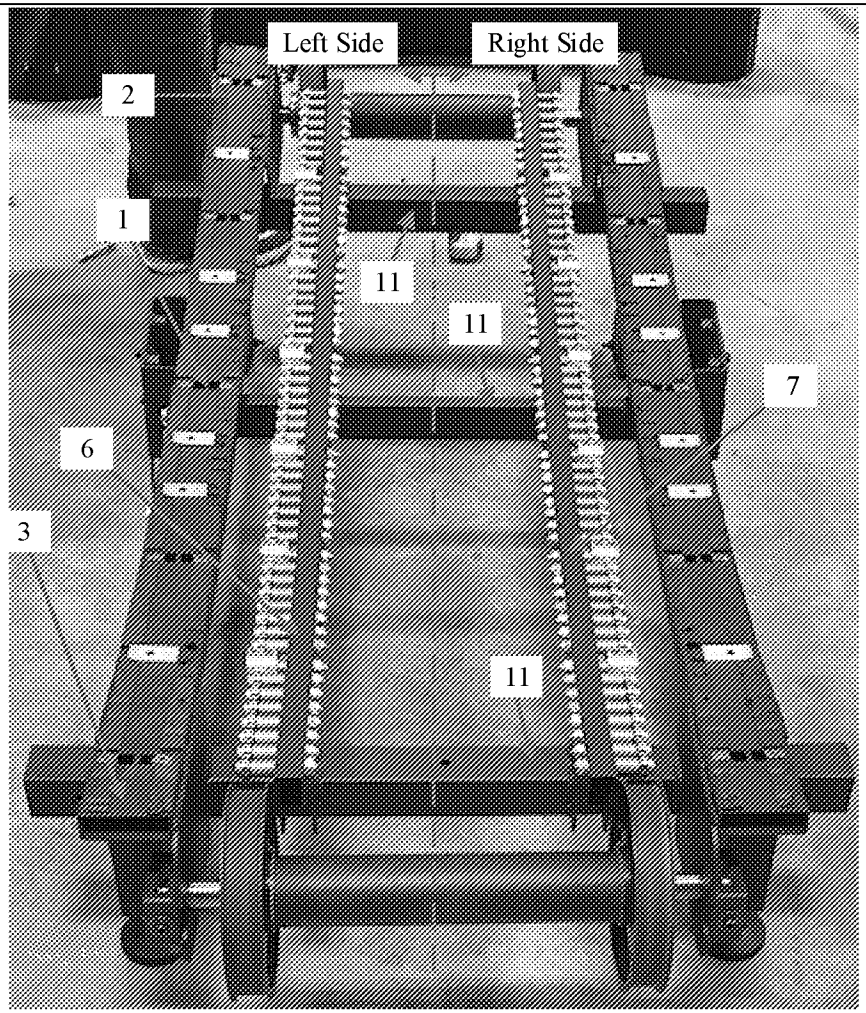
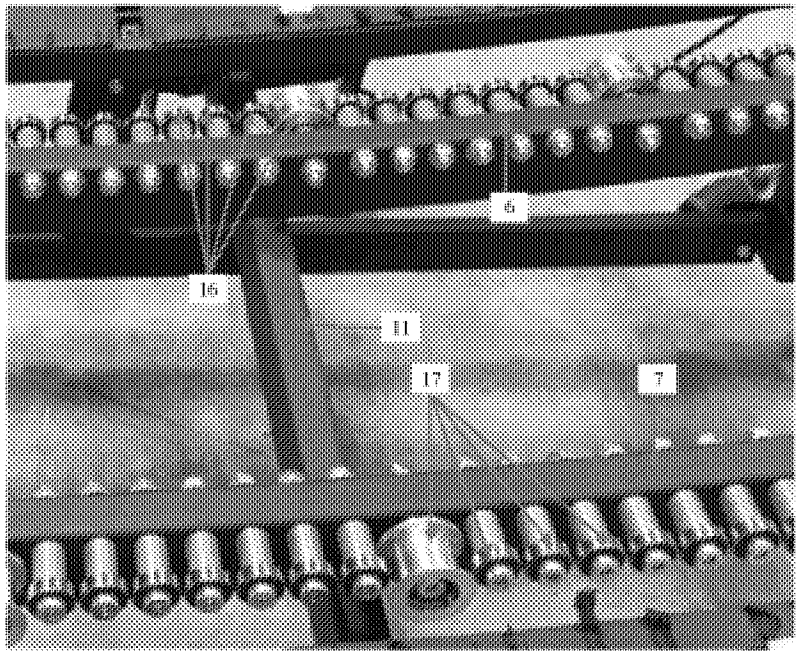
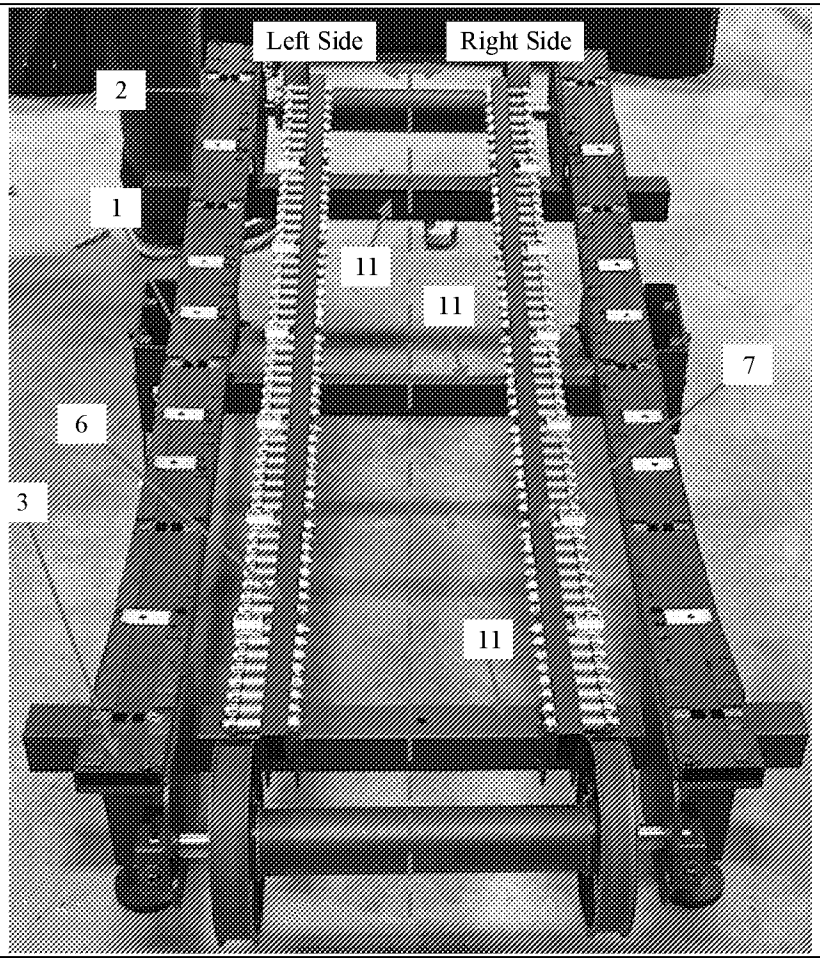
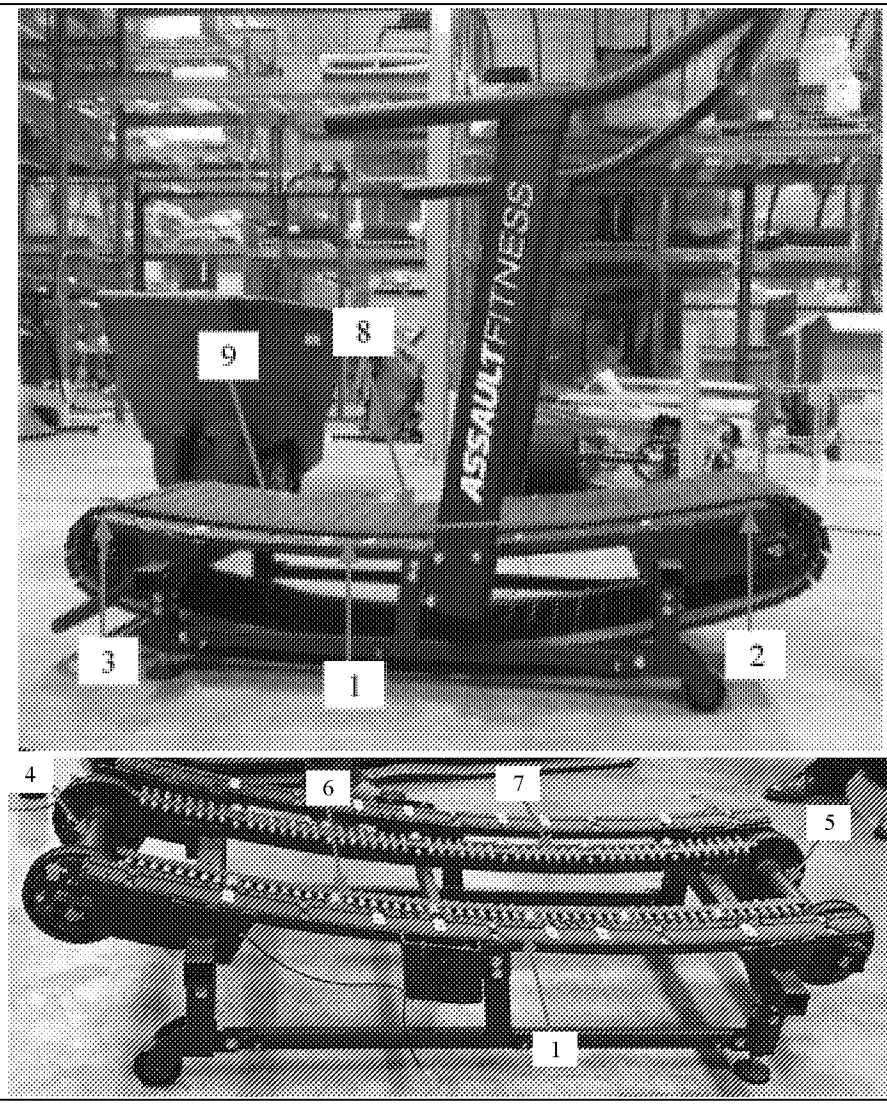
LIFECORE Ex. 1002

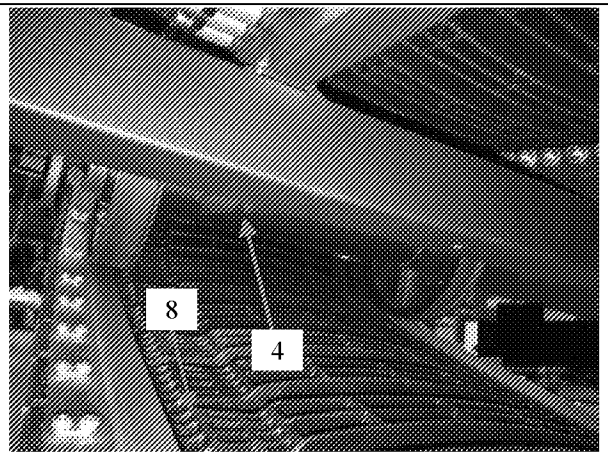
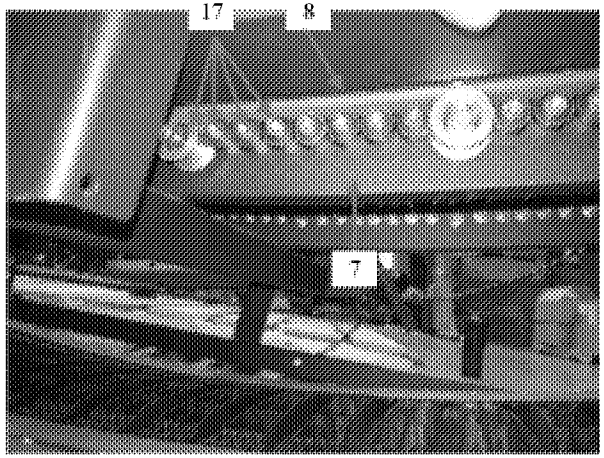
the '580 patent	Assault AirRunner	
		

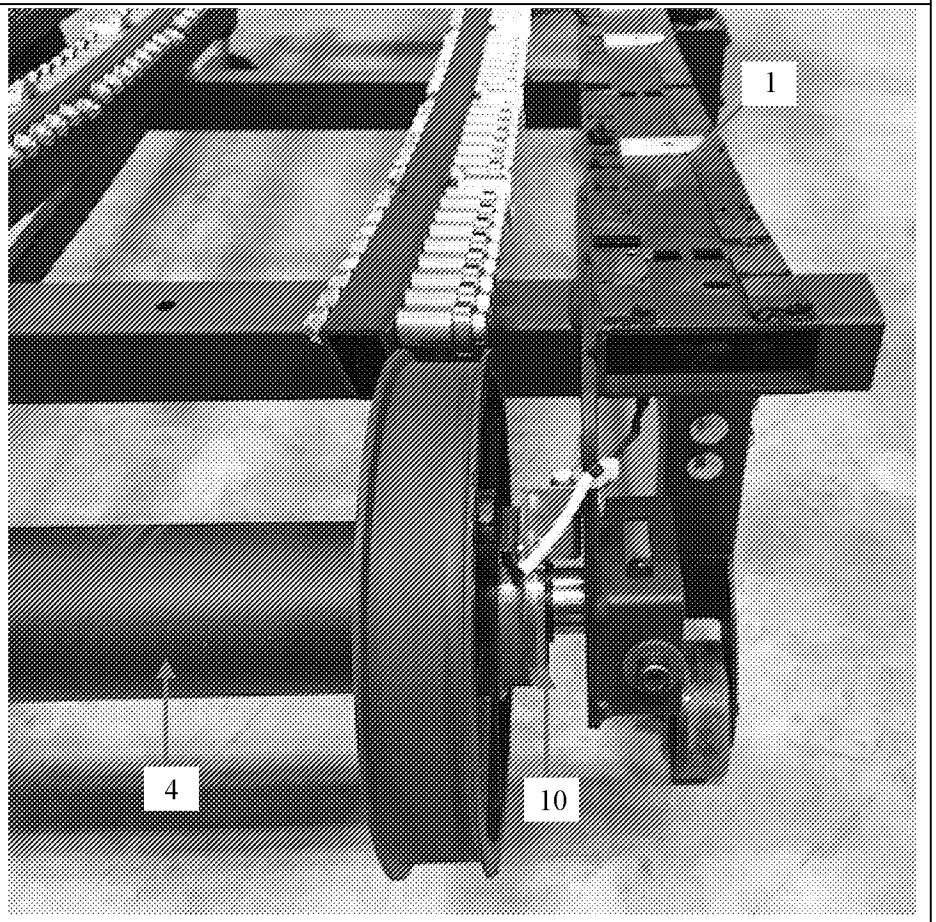
the '580 patent	Assault AirRunner	
a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame;	A "second bearing rail having a plurality of bearings" and "attached to a right side of the frame" are literally present in the Infringing Product. As shown, a second bearing rail [7] includes a plurality of bearings [17]. As also shown, the second bearing rail [7] is coupled to at least one cross-member [11]. The at least one cross-member [11] is included with the frame [1]. (*See, e.g.,* claim 3 and col. 5, lines 56-61 stating that "The frame 40 comprises ... one or more lateral or cross-members 56 ... ."). Therefore and as shown, the first bearing rail [6] is attached to one side of the frame [1] (i.e., the left side), while the second bearing rail [7] is attached to the other side of the frame [1] (i.e., the right side).	

the '580 patent	Assault AirRunner	
		

SUPPLEMENTAL EXPERT REPORT OF KIM B. BLAIR, Ph.D. – EXHIBIT A

the '580 patent	Assault AirRunner	
a running belt supported by the first bearing rail and the second bearing rail and disposed about the front shaft and the rear shaft, wherein the running belt follows a curved running surface; and	A "running belt" supported by the "first bearing rail" and the "second bearing rail," "disposed about the front shaft and the rear shaft," and following a "curved running surface" is literally present in the Infringing Product. As shown, a running belt [8] follows a curved running surface [9]. The running belt [8] is supported by the first bearing rail [6] and the second bearing rail [7] as well as disposed about the front shaft [4] and the rear shaft [5]. While the lower two pictures only show the running belt [8] being disposed about the front shaft [4] and supported by the second bearing rail [7], a similar configuration is provided with the rear shaft [6] and the first bearing rail [6] in that the running belt [8] is disposed about the rear shaft [6] and supported by the first bearing [6].	

the ’580 patent	Assault AirRunner	
		 

the '580 patent	Assault AirRunner	
a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.	A "safety device coupled to at least one of the front shaft and the rear shaft" and "structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" is literally present in the Infringing Product. "At least one of the front shaft and the rear shaft" can mean that the "safety device" is coupled to the "front shaft" alone; the "safety device" is coupled to the "rear shaft" alone; or, the "safety device" is coupled to each of the "front shaft" and the "rear shaft." As shown, the safety device [10] is coupled to the front shaft [4]. As also shown, the safety device [10] is an Altra Industrial Motion brand type CSK 25 PP "sprag type freewheel[]." (*See* Altra Industrial Motion, *Overrunning Clutches and Backstops* at p. 16 (2017), http://www.stieberclutch.com/products/combined-bearing-	

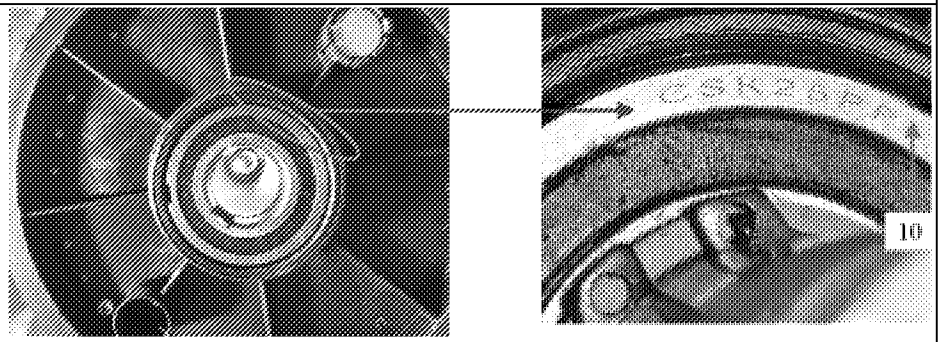
the '580 patent	Assault AirRunner	
	freewheels/cskp). The CSK 25 PP "freewheel allows rotation in one direction only. ... The freewheel prevents reverse rotation ... ." (*Id.* at p. 3). Because the safety device [10] is coupled to the front shaft [4] and because the safety device [10] "allows rotation in one direction only" (*id.*), the safety device [10] is "structured to substantially prevent rotation ... of the front shaft ... in a first rotational direction while permitting rotation ... of the front shaft ... in a second rotational direction opposite the first rotational direction."	

EXHIBIT 3

CONTAINS CONFIDENTIAL – ATTORNEYS' EYES ONLY INFORMATION

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC, Plaintiffs, vs. WOODWAY USA, INC., Defendant.	Civil Action No. 3:15-cv-1665 (JCH) April 13, 2018

SECOND SUPPLEMENTAL EXPERT REPORT OF KIM B. BLAIR, Ph.D.

CONTAINS CONFIDENTIAL – ATTORNEYS' EYES ONLY INFORMATION

I, Kim B. Blair, Ph.D., hereby make the following second supplemental disclosure pursuant to Fed. R. Civ. P. 26(a)(2) and 26(e).

1. I am the same Kim Blair who submitted expert reports in this matter on March 2, 2017, March 30, 2017, and March 15, 2018. For brevity, I will not repeat my background, experience, or qualifications here. I attach my current curriculum vitae as Exhibit B.

2. Since March 15, 2018, I have not authored any new publications.

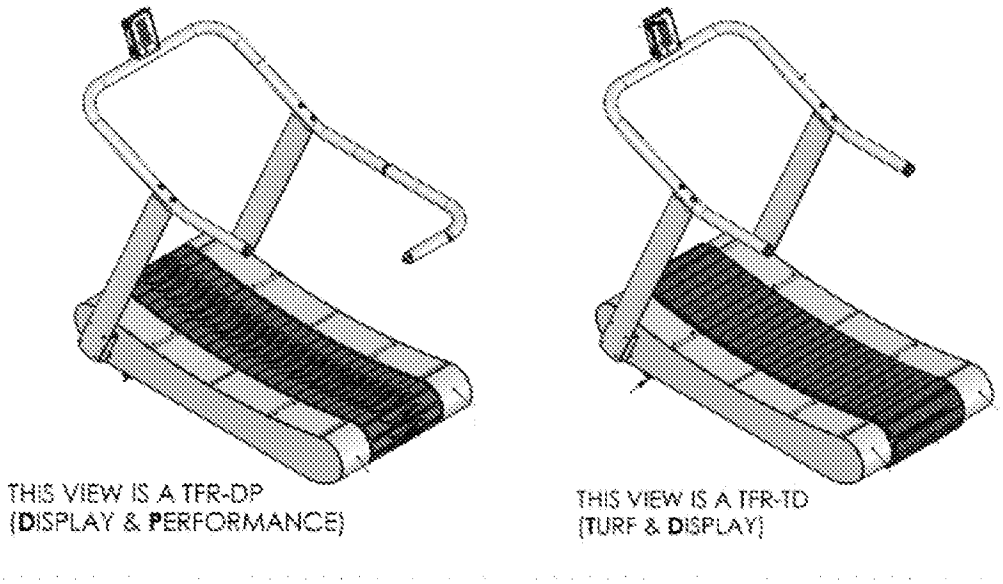
3. Since March 15, 2018, I have continued to provide services to Woodway USA, Inc. ("Woodway") in this matter through STI&E Consulting, my independent consulting company.

4. Since March 15, 2018, I have not otherwise provided any other testimony as an expert at trial or by deposition since my last report.

5. The compensation for my time spent in working on issues in this case continues to be $450 per hour. I continue to be compensated for my expenses in connection with this matter. Just as with my previous reports, my compensation is not dependent on or related in any matter to the outcome of the current litigation. I have no financial interest whatsoever in the outcome of this litigation.

6. For this Report, I have been asked by Woodway to physically inspect and analyze the Generation III TrueForm Runner Treadmill ("Gen III"), evaluate the documentation Plaintiffs have provided relating to the same, and to provide an assessment and opinion as to whether the Gen III infringes claim 25 of U.S. Patent No. 9,039,580 ("the '580 patent").

7. The Gen III is depicted below:



Excerpted from SAM0014143.

8. It is my understanding that the Gen III is ready for production, but has not yet been sold. Also, it is my understanding that the Gen III is in large part identical to the "Redesigned TrueForm Runner Treadmill" that I evaluated and opined infringed claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent. I have been informed that on summary judgment, the Court agreed with my assessment regarding infringement of at least claims 1, 6, 19, and 20. I have reviewed the Court's summary judgment decision, which states in pertinent part, "there is no genuine issue of material fact as to whether the [Redesigned TrueForm Runner Treadmill] contain[s] every element in claim 1, 6, 19, and 20."

9. It is my understanding that Plaintiffs contend that the Gen III is different from the Redesigned TrueForm Runner Treadmill in two ways. According to Plaintiffs' Opposition to Woodway's Motions in Limine, first, Plaintiffs identified that the Gen III has "wheels [that] are no longer out of contact with the ground during operation (required by claim 1)."[1] Second, Plaintiffs identified that "there is no rear shaft rotatably coupled to the frame (required by claim

[1] I note that claim 1 of the '580 patent does not contain this particular claim limitation.

19)."[2] Plaintiffs have not identified any other differences. For the purposes of my analysis, I did not compare the Redesigned TrueForm Runner Treadmill with the Gen III that was made available.

10. In forming my opinions, just as I did in my March 2, 2017 Expert Report, I have been asked to assume that certain legal principles apply to Woodway's claim of infringement against Plaintiffs. Again, I reviewed the current version of the Model Patent Jury Instructions published by the Federal Circuit Bar Association (last edited July 2016), and I have taken guidance from those form instructions on matters that relate to my opinions expressed herein. If there is some change in the applicable law to which I am alerted, or if the Court adopts some substantially different instructions for the jury to follow, I will reconsider my opinions accordingly. Also, if there is some change in the applicable substantive law between the time of this Report and any future expert testimony, my opinions may change as well.

11. As I set forth in my March 2, 2017 Expert Report, I understand that claim 25 is a method claim that is made up of multiple steps. In order for the Gen III to infringe claim 25, I understand that each step of that patent claim must be performed.

12. Just as I did in my March 2, 2017 Expert Report, in reading and applying the claim language in claim 25 of the '580 patent to the Gen III, I understand that I am to apply the Court's definitions. These definitions are the same definitions I used in my prior infringement analysis of the Redesigned TrueForm Runner Treadmill as detailed in my March 2, 2017 Expert Report. For those claim terms and phrases that were not construed, just as I did previously, I understand that I am to apply the ordinary and customary meaning to those claim terms and

[2] I note that claim 19 of the '580 patent does not contain this particular claim limitation.

phrases as understood by a person of ordinary skill in the art at the time of the invention in the context of the '580 patent.

13. The Court provided the below constructions for the terms disputed between the parties. Certain of the construed claim terms are found in claim 25, which are highlighted in green.

Disputed Term/Phrase	**Chapco's and Samsara's Construction**	**Woodway's Construction**	**Court's Construction**
Frame	A structure distinct from the bearing rails.	Plain and ordinary meaning.	No further construction necessary.
Bearing Rail	A running belt retention system that is a structure distinct from the frame and configured to help achieve the desired shape of the running surface.	Plain and ordinary meaning.	A rail with bearings whose top profile corresponds to the shape of the running surface.
A safety device cooperating with the rear shaft	A safety device mechanically connected to the rear shaft.	Plain and ordinary meaning.	A safety device adjoined to the rear shaft.
Coupled	The joining of two members directly or indirectly.	The joining of two members directly or indirectly.	The joining of two members directly or indirectly.
Rotatably coupled	Each part is connected in such a way to permit rotation of one entire element relative to the other element.	Plain and ordinary meaning.	No further construction necessary.

Disputed Term/Phrase	Chapco's and Samsara's Construction	Woodway's Construction	Court's Construction
A bearing rail having a plurality of bearings rotatably coupled to the at least one bearing rail	At least one bearing rail having more than one bearing connected to the bearing rail in such a way that each bearing can rotate relative to the bearing rail.	Plain and ordinary meaning.	No further construction necessary.
Running belt	A structure different from the endless belts that follows the profile of the bearing rails.	Plain and ordinary meaning.	No further construction necessary.
Running Surface	Section of the running belt in between the front and rear shafts intended for contact with the user's foot.	Plain and ordinary meaning.	The portion of the running belt upon which a user could place their foot during normal operation. or The portion of the running belt upon which a user could place part of their foot.
Left side member and right side member	The left side of the frame and the right side of the frame.	Should not be construed.	The court declines to construe this term.

14. My analysis is based on the specific constructions adopted by the Court on December 8, 2016 in its Claim Construction Ruling. My analysis is also based on the plain and ordinary meaning of those terms that were not construed as understood by a person of ordinary skill in the art of designing manual treadmills, who I opined as someone with a bachelor of science degree in mechanical engineering or at least two years of experience in the treadmill

industry, including experience and knowledge of the design, construction, testing, and operation of manual treadmills.

15. For the purposes of my investigation, I studied the content contained within documents produced by Plaintiffs relating to the Gen III, SAM0014078-SAM0014085, SAM0014252-SAM0014290, and the other materials cited herein. I also considered the Gen III in various stages of assembly/disassembly on April 11, 2018, at 8 Inspiration Lane, Chester, Connecticut. The unit that I inspected had the sidecovers and handrails removed at the time of my arrival. I was otherwise responsible for the disassembly.

16. Based on my review of the information made available to me, the assembly of the Gen III meets each and every claimed step in claim 25 of the '580 patent.

17. Claim 25 of the '580 patent reads:

Claim 25
A method, comprising: providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and rear end; providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile; disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails; permitting movement of the running belt in a first direction; and substantially preventing movement of the running belt in a second direction opposite the first direction.

18. Based on my analysis discussed herein and as set forth in Exhibit A, I believe the assembly of the Gen III literally infringes claim 25 of the '580 patent.

19. Just as I stated in my first three reports, I understand that the parties in the litigation are under a continuing obligation to supplement any discovery that has been provided during this litigation. Therefore, because new materials or information may become available which could further support or modify the conclusions that I have reached to date, I expressly reserve the right to amend, expand, add, supplement, change, alter, or otherwise modify my opinions disclosed herein. Any changes or necessary amplification of my opinions and conclusions will be addressed in supplemental reports or testimony, which I reserve the right to provide.

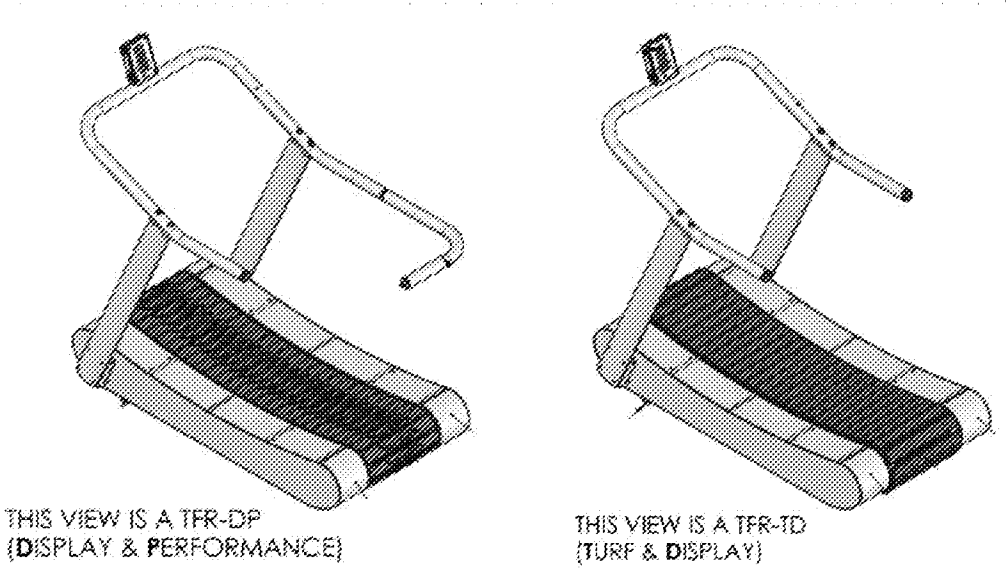
20. Also as provided in my first three reports, if I am called to testify, I expect and intend to use exhibits and demonstratives relating to the subject matter of my testimony. These exhibits and demonstratives may include portions of the materials included in this report as well as diagrams, models, photographs, or physical samples of the structures described in those items. Portions of these documents may be enlarged, colored, or otherwise adapted to illustrate my opinions. I may also rely on demonstrative exhibits, and summaries that have not yet been prepared.

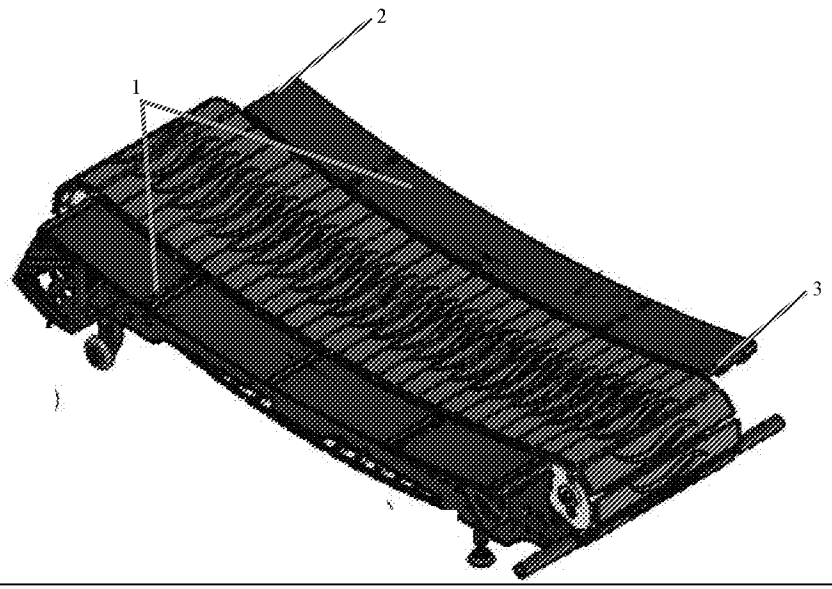
I hereby certify under the penalty of perjury that the foregoing is true and correct to the best of my knowledge.

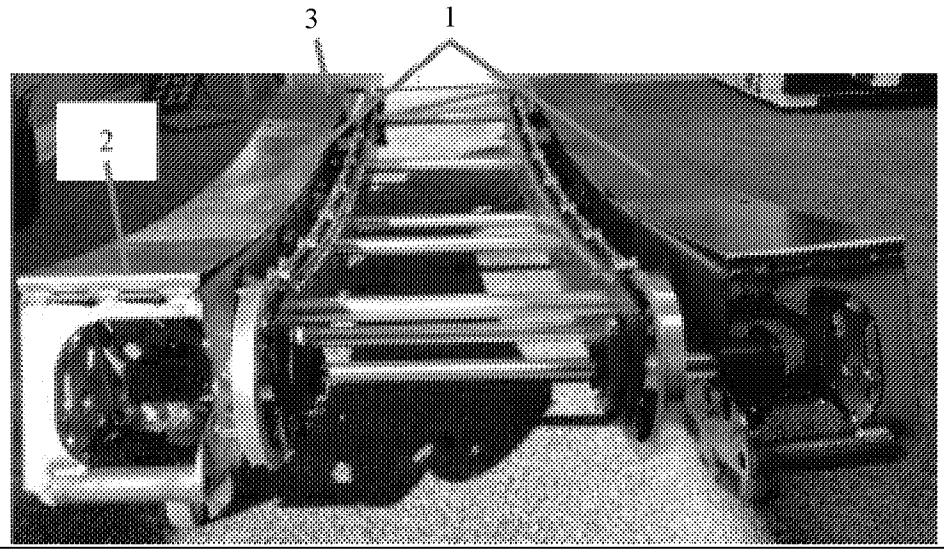
Date: April 13, 2018

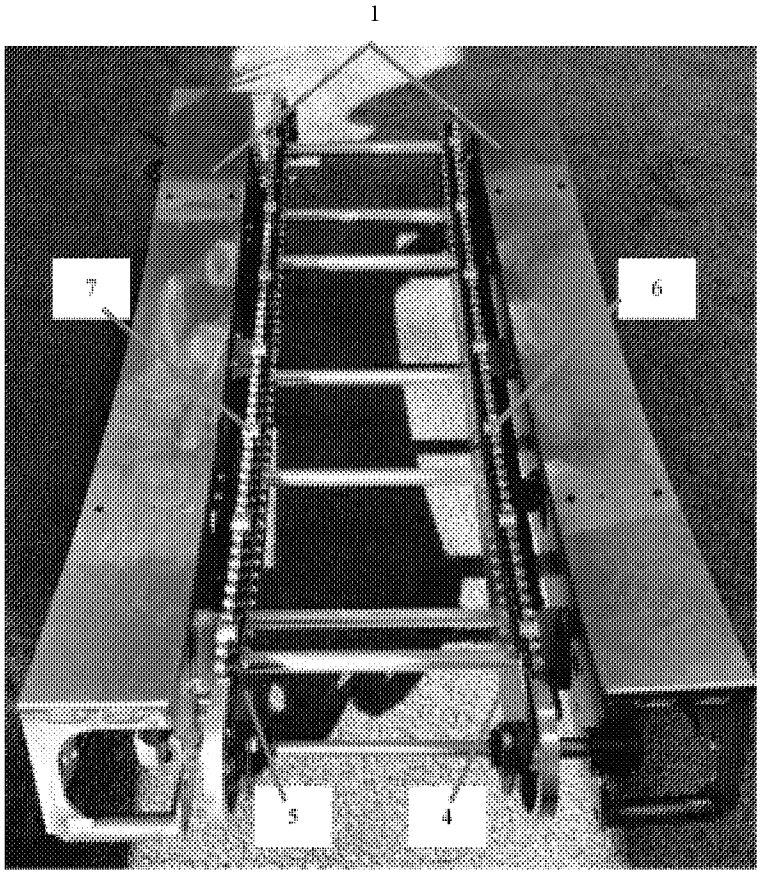
Kim B. Blair, Ph.D.

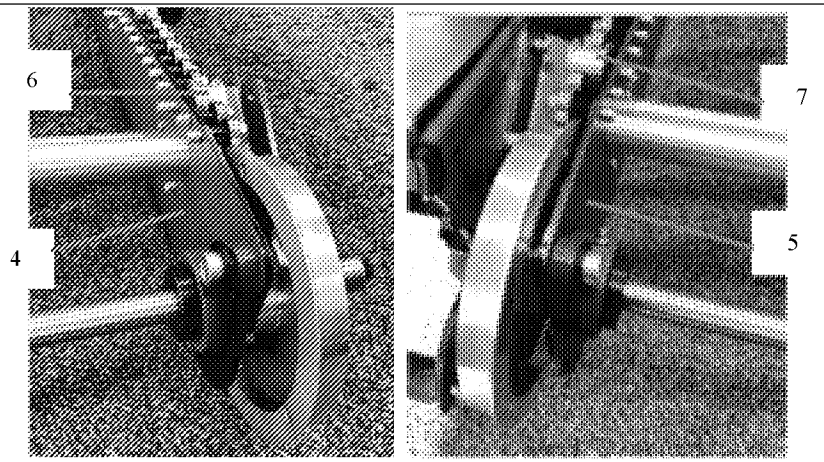
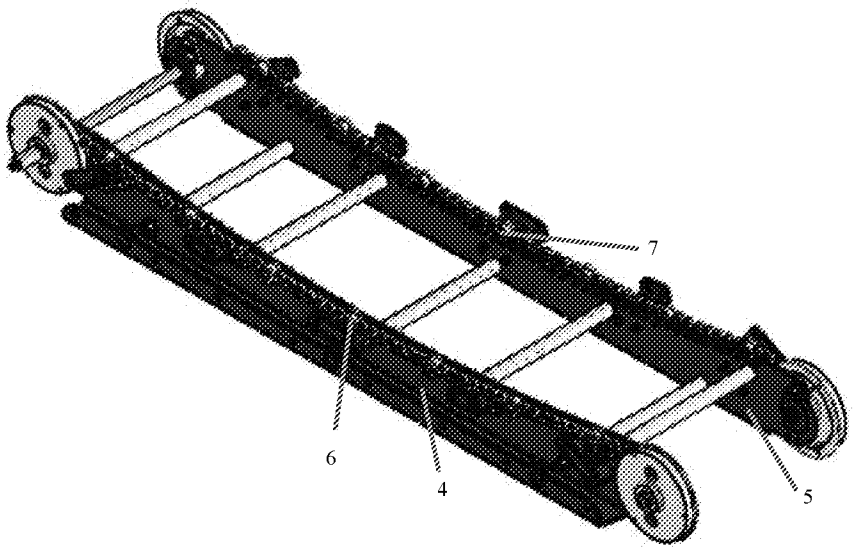
SECOND SUPPLEMENTAL EXPERT REPORT OF KIM B. BLAIR, Ph.D. – EXHIBIT A

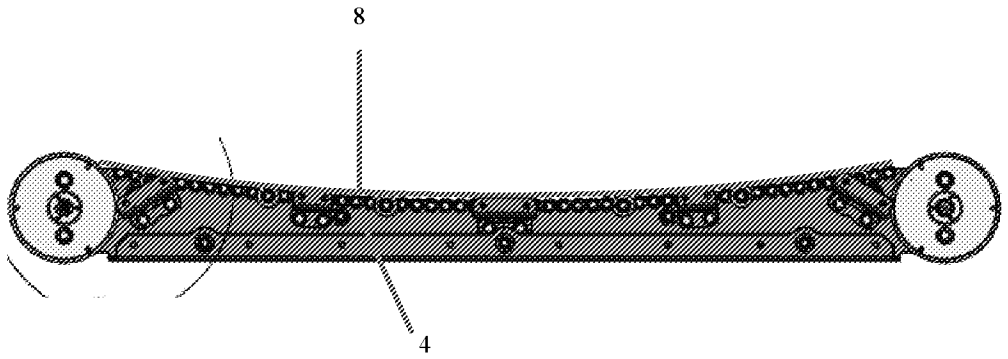
the '580 patent	**Gen III Treadmill**	
25. A method, comprising: providing a manually powered treadmill,	"[P]roviding a manually powered treadmill" is the assembly of the Gen III treadmill. The Gen III is a "manually powered treadmill". None of the Chapco design documentation identifies any motor, which was confirmed during the April 11, 2018 inspection and disassembly. Hence, the treadmill is manually powered. *Excerpted from SAM0014290.*	

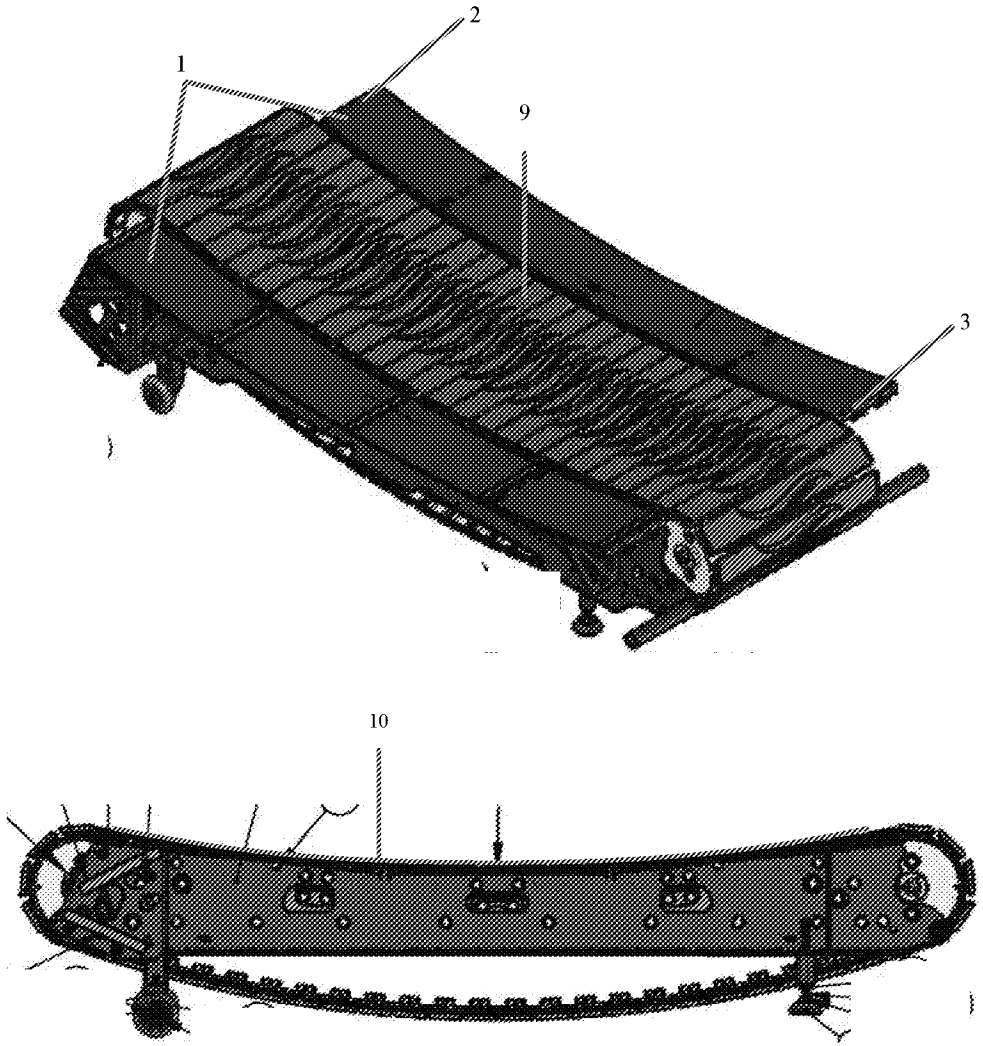
the '580 patent	Gen III Treadmill	
the manually powered treadmill having a frame with a front end and rear end;	A "frame having a front end and a rear end" is literally provided in the Gen III treadmill. As shown, a frame [1] has a front end [2] and a rear end [3]. *Engineering drawing excerpted from SAM0014284.*	

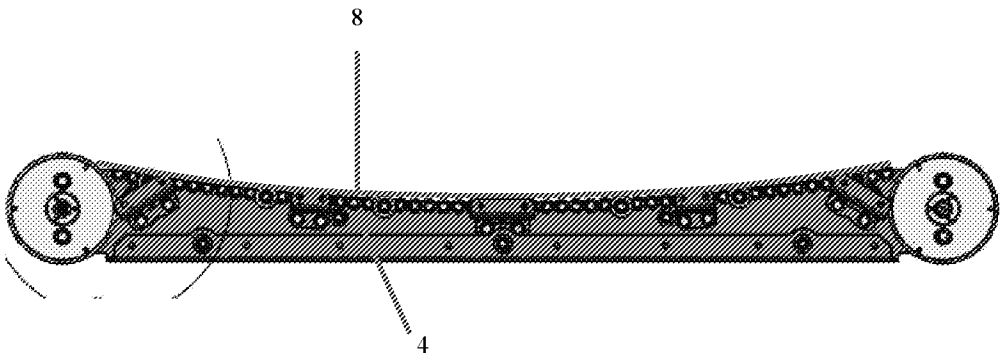
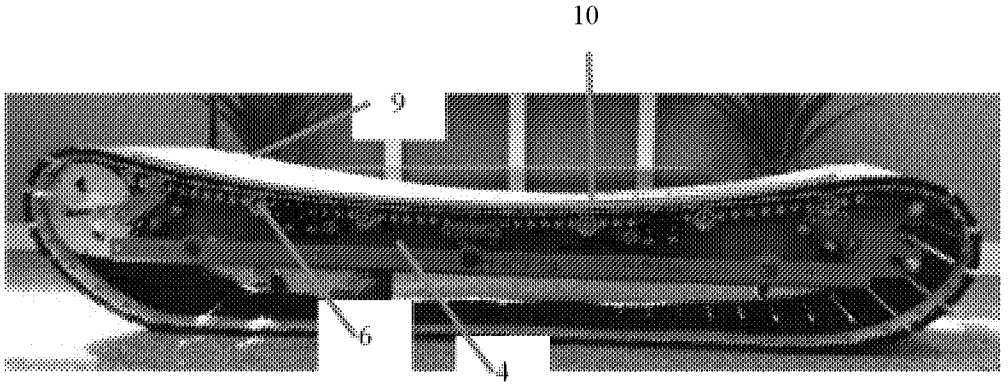
the '580 patent	Gen III Treadmill	
		

the '580 patent	Gen III Treadmill	
providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile;	The assembly of the Gen III treadmill, which includes providing two bearing rails, meets this limitation. "[P]roviding a "first bearing rail" having "a plurality of bearings" and a "second bearing rail" having a "plurality of bearings" where "the first and second bearing rails define a curved top profile" and "extend[] longitudinally on the frame" is literally provided in the assembly of the Gen III treadmill. As shown, a first bearing rail [4] extends longitudinally on one side of the frame [1] (i.e., the left side), while a second bearing rail [5] extends longitudinally on the other side of the frame [1] (i.e., the right side). The first bearing rail [4] includes a plurality of bearings [6]. The second bearing rail [5] includes a	 ("Front" is in the foreground – the direction of "left" or "right" is from the perspective of the user.)

the '580 patent	Gen III Treadmill	
	plurality of bearings [7]. The first and second bearing rails [4] and [5] define a curved top profile [8]. *Top engineering drawing excerpted from SAM0014260. Bottom engineering drawing excerpted from SAM0014261.*	 

the '580 patent	Gen III Treadmill	
		
disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails;	The assembly of the Gen III treadmill, which includes providing a running belt and locating it above the bearing rails, meets this limitation. A "running belt" that is disposed "on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails" is literally present in the Gen III treadmill.	

the '580 patent	Gen III Treadmill	
	As shown, a running belt [9] follows a curved running surface [10]. The running belt [9] is disposed on the pluralities of bearings [6] and [7] of first bearing rail [4] and the second bearing rail [5], respectively. Because the curved top profile [8] is proximate the curved running surface [10], the curved running surface [10] corresponds to the curved top profile [8]. *Top two engineering drawings excerpted from SAM0014284. Bottom engineering drawing excerpted from SAM0014261.*	

the ’580 patent	Gen III Treadmill	
		 

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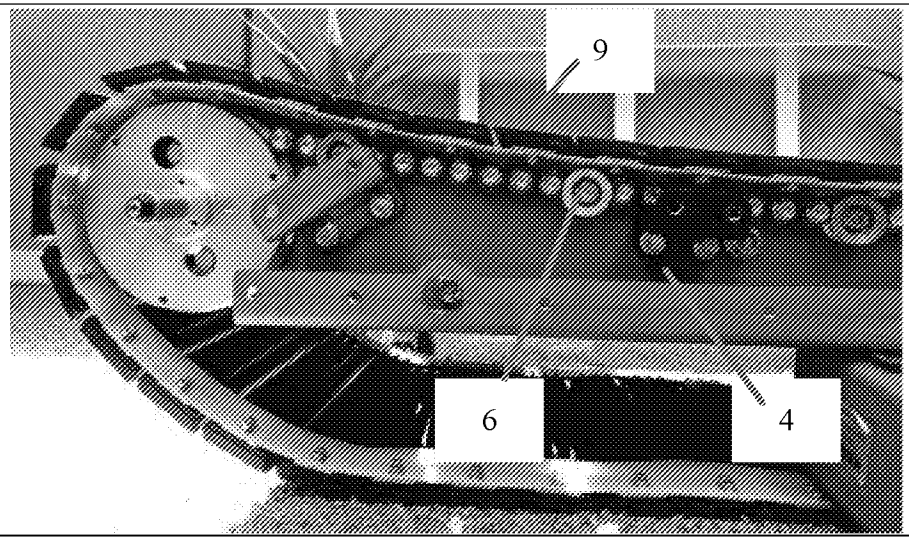
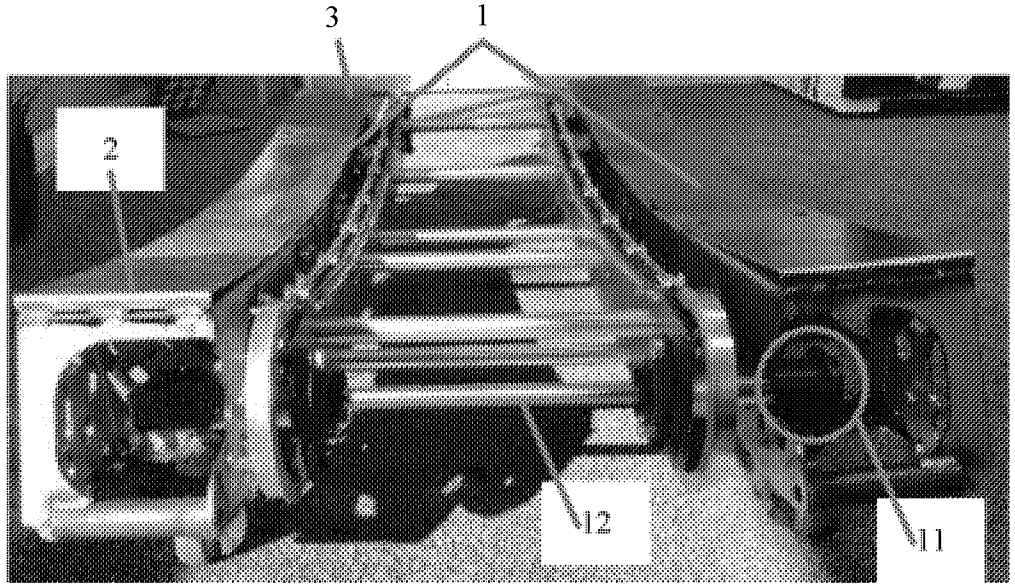
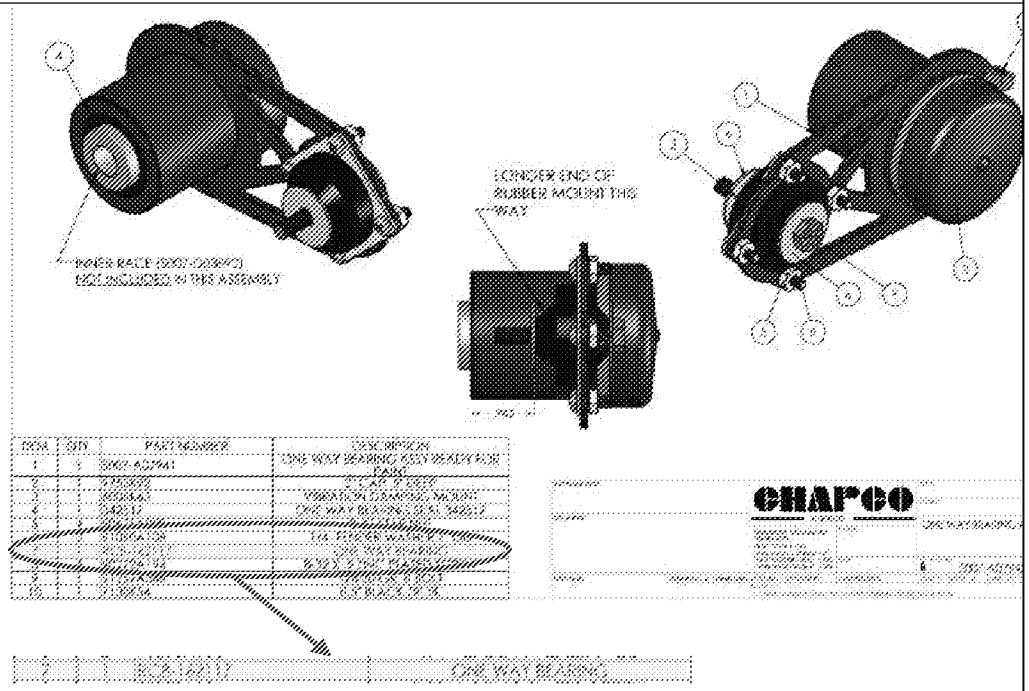
LIFECORE Ex. 1002

the '580 patent	Gen III Treadmill	
		

the '580 patent	Gen III Treadmill	
permitting movement of the running belt in a first direction; and substantially preventing movement of the running belt in a second direction opposite the first direction.	The assembly of the Gen III treadmill, which includes the coupling of a safety device, meets this limitation. The "running belt" being permitted to move in a first direction and "substantially prevent[ed]" from moving "in a second direction opposite the first direction" is literally present in the Gen III treadmill. As shown, a safety device [11] is coupled to a shaft [12]. As also shown, the safety device [11] has a model number of RCB-162117, which corresponds with a Koyo brand. This model number corresponds with a "regular clutch and bearing assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction."	

the '580 patent	Gen III Treadmill	
	(*See* JTEKT Corp., *Koyo Needle Roller Bearings* at p. B-3-4 (2014), http://www.jtekt-na.com/assets/ce/Documents/(B2018E-1)%20Needle%20Roller%20Bearing%20Catalog.pdf). Because the safety device [11] is coupled to the shaft [12] and because the safety device [11] "allows free overrun," (*id.*), in one rotational direction, the safety device [11] is structured to substantially prevent rotation of the shaft [12] in a first rotational direction while permitting rotation of the shaft [12] in a second rotational direction opposite the first rotational direction. Because the running belt [9] is disposed about the shaft [12], rotational movement of the running belt [9] is affected/constrained by movement of the shaft	

the '580 patent	Gen III Treadmill	
	[12]. Thus, the safety device [11] is structured to substantially prevent movement of the running belt [9] in a first direction and permit movement of the running belt [9] in a second direction that is opposite the first direction. *Engineering drawing excerpted from SAM0014264.*	

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PROFILE

Extensive experience in the development of innovative solutions to challenging technical problems in academic, start-up, small-medium enterprise, and large corporate cultures. Proven skills in strategic planning, innovation management, business development, consulting firm operations, project management, product development, team building, and engineering design and analysis. Over ten years experience developing and delivering innovative, hands-on educational programs in engineering, product development process, and innovation process.

EXPERIENCE

EXPONENT, INC. **Natick, MA**

A multi-disciplinary engineering and scientific consulting firm

Senior Manager **2017 – Present**

Growing the client base in the sports industry. Providing research and development, technology development and product development, and intellectual property consulting to sports industry clients.

STI&E CONSULTING **Arlington, MA**

A Sports Technology Innovation & Engineering consultancy

Founder **2017 – Present**

Provide business and strategic planning, technology scouting, open innovation, technology development and assessment, and development of strategic alliances to the sports industry. Provide expert witness services in patent infringement cases.

COOPER PERKINS, INC. **Lexington, MA**

A technology development and product engineering consultancy

Vice President Business Development & Manager Sports Engineering Practice **2010 – 2017**

Member of five-person senior management team. Led business development and client facing operations resulting in a period of significant company growth. Managed client relationships in a number of industry sectors. Managed and supported projects in sports engineering including research and development, new product innovation, product development, development of product testing capabilities, technology assessment, and patent litigation support.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY **Cambridge, MA**

Department of Aeronautics and Astronautics and Department of Mechanical Engineering

External Advisor, STE@M / 3-Sigma Sports **2012 – Present (Pro-Bono)**

Advisor for the new sports innovation program based in the department of mechanical engineering.

Founding Director, Sports Innovation @ MIT **1999 – 2003, 2003 – 2012 (Pro-Bono)**

Founded a unique sports product development research and educational center. Lead multiple one to six member product development teams in numerous projects focused on sports products, sports product design tools, and sports performance monitoring systems. Develop business and operational plans using market research results. Negotiated intellectual property policies and contractual agreements for program sponsors. Over 100 students have been involved in the program, resulting in over 30 BS theses, two MS theses, and two MEng theses.

Lecturer, MIT Department of Aeronautics and Astronautics **1999 – 2003**

Lead Instructor, Experimental Projects I/II. Led a team of three faculty, four technical instructors, and 40 project teams consisting of a faculty advisor and two students through a two-semester senior thesis course requiring conception through implementation of an experimental project. Course content included project management, experiment design, and technical communications. *Lecturer*, Structural Dynamics (graduate course). *Co-developer and co-instructor*, Advanced Dynamics (undergraduate course).

LOUGHBOROUGH UNIVERSITY **Leicestershire, UK**

Wolfson School of Mechanical, Electrical and Manufacturing Engineering

Visiting Professor **2008 – Present**

Advise on research and teaching initiatives. Developing student exchange program between MIT STE@M and the Loughborough Sports Technology Institute. Serve as an external examiner for Loughborough Ph.D. student theses.

SPORTS INNOVATION GROUP LLC **Arlington, MA**

A consultancy bringing strategy, innovation and technology expertise to the sports industry.

Founder/President **2000 – 2009**

Provided business and strategic planning, technology scouting, open innovation, technology development and assessment, and development of strategic alliances to the sports industry. Serve as advisory board member for emerging companies developing innovative sports products using advanced technology. Provide expert witness services in patent infringement cases.

MOLDYN, INC. **Cambridge, MA**

Launched as a division of Photon Research Associates to develop biomechanics, molecular modeling, and bioinformatics software products. Purchased by Structural Bioinformatics, Inc. in 2000.

Senior Staff Scientist **1992 – 1999**

Senior Management: Member of 3-person management team responsible for all company operations. Individually responsible for IT infrastructure and support team.

Principal Investigator**:** Directed four NASA-sponsored projects with total revenue of $1.4 million in two product development areas. (1) Coupling of multi-body dynamics analysis techniques modeling human motion with general systems performance theory. (2) Development of a software infrastructure coupling structures, dynamics and controls analyses for complex satellite systems.

Task Leader**:** Key contributions in the development of MBO(N)D a molecular dynamics analysis tool.

NASA, JOHNSON SPACE CENTER **Houston, TX**

Aerospace Engineer (Summer Intern/Graduate Co-op – 15 months total) **1987 – 1990**

Investigated dynamic interaction between payloads and their attachment points in the Space Shuttle. Adapted lunar-landing simulation software for Mars Lander program. Studied Space Shuttle nose-gear landing loads to define the conditions limiting shuttle landings at Kennedy Space Flight Center.

PURDUE UNIVERSITY **West Lafayette, IN**

Graduate Student Schools of Mechanical Engineering and Aeronautics and Astronautics **1985 – 1992**

Doctoral Research: Thesis topic: Nonlinear Dynamic Response of Shallow Arches to Harmonic Forcing.

Master's Research: Developed analytical model to estimate error in measurement of crack length in fatigue test specimens. Performed fatigue testing on advanced aluminum alloys.

Teaching Assistant: Developed the lab section of a junior-level mechanical design course and supervised other lab instructors. Guest lectured in graduate fatigue course. Managed logistics of graduate distance learning courses. Assisted in undergraduate and graduate courses in structures and dynamics.

ALPO PETFOODS, INC. **Crete, NE**

Associate Project Engineer **1983 – 1985**

Directed high-speed, pet food manufacturing line upgrades from conception through start up. Directly responsible for $500K, and assisted with $400K, of capital projects.

EDUCATION

PURDUE UNIVERSITY West Lafayette, IN
Ph.D., Aeronautics and Astronautics 1992
M.S., Mechanical Engineering 1987

UNIVERSITY OF NEBRASKA Lincoln, NE
B.S., Mechanical Engineering 1983
B.A., Psychology 1981

PUBLICATIONS, PRESENTATIONS, MEDIA

Lead Author: 4 journal articles, 11 conference proceedings, 1 book chapter.

Contributing Author: 3 journal articles, 7 conference proceedings.

Patent: US9642415, Systems and methods for monitoring athletic performance.

Invited Presentations: Smithsonian Institute Lemelson Foundation, IDEAS Boston 2004, University of London, Loughborough University, École Polytechnique Fédérale de Lausanne, University of Nebraska, Boston University, The International Congress on Technological and Social Innovation in Sport (Spain), the Sporting Goods Manufacturers Association International Business Intelligence Series, MIT Center for Innovation and Product Development, The 2005 Growth and Innovation Conference, New York.

Media: Featured in regional, national, and international print, radio, or television programs.

PROFESSIONAL ACTIVITIES

Societies, Journals and Conferences: Secretary, President and Past President - International Sports Engineering Association, Member - American Society of Mechanical Engineers, Editorial Board - Journal of Sports Engineering and Technology, Reviewer - Journal of Sports Engineering, Scientific Committee Member - Engineering of Sport Conferences 5-11, and Asia Pacific Congress on Sports Technology 4.

Educational Outreach: Boston Museum of Science, ISEA Summer School in Prato, Italy, Sport Science, Engineering and Technology Summer Camp for Young Women in Cambridge, MA.

AWARDS

University of Nebraska Alumni Achievement Award, 2005.

Eagle Scout, Overland Trails Council, Grand Island, Nebraska, 1973.

OTHER INTERESTS

MIT Triathlon Club: Faculty advisor. Guided club officers from conception through recognition as an MIT Club Sport. Delivered talks and guidance on getting involved in the sport and training programs.

Team Psycho Ltd. (a New England elite triathlon team)**:** Former President and current member of the Board of Directors. Led team through 50% membership growth and incorporation as a nonprofit enterprise. Triathlete: Competitions include Regional and US Championships, Ironman Austria, and Ironman World Championships.

PROFESSIONAL AFFILIATIONS

ISEA, International Sports Engineering Association, Past President 2014 – 2016, President 2010 – 2014, Secretary 2008 – 2010.

Journal of Sports Engineering and Technology, Editorial Board, 2007 – 2010.

Reviewer, Journal of Applied Biomechanics, 2009.

National Science Foundation Design Science Workshop Series, 2008 – 2009.

Golf Digest Technical Advisory Group Member, Technical Review of 2006 Golf Product Offerings, Naples, FL. October 2005.

Golf Digest Technical Advisory Group Member, Technical Review of 2005 Golf Product Offerings, Las Vegas, NV. October 2004 and the PGA Show, Orlando, 2005.

IMCRC International Expert Review Committee Member, Loughborough University, UK, 2004 – 2008.

JOURNAL ARTICLES AND BOOK CHAPTERS

Crouch, T. N., Burton, D., LaBry, Z. A., and Blair, K. B., 2017, "Riding Against the Wind: A Review of Competition Cycling Aerodynamics," Invited Paper, *Sports Engineering*, Vol. 20, No. 2, pp. 81-110.

Caine, M. P., Blair, K. B., and Vasquez, M., "Materials and Technology in Sport", Invited Commentary, *Nature Materials*, Vol. 11, August 2012.

Blair, K. B., Chew, G-L, and Cote, M., 2007, "The Effect of Static Leg Position and Cadence on the Drag of a Cyclist," *Human Power eJournal,* Article 14, Issue 4.

Blair, K. B., 2007, "Materials and design for sports apparel," *Materials in Sports Equipment (Volume 2),* Woodhead Publishing Limited, Cambridge, UK, pp 60-86.

Blair, K. B., Custer, D., Graham, J., Okal, M., 2005, "Analysis of Fatigue Failure in D-Shaped Carabiners," *Sports Engineering*, Vol. 8, No. 2, pp. 107-113.

Chun, H. M., Padilla, C. E., Alper, H. E., Chin, D. N., Watanabe, M. Karlov, V. I., Soosaar, K., Blair, K. B., Becker, O., Caves, L, Nagle, R., and Farmer, B. L., 2000, "MBO(N)D: A Multi-body Method For Long-Time Molecular Dynamics Simulations," Journal of Computational Chemistry, Vol. 21, No. 3, pp. 159-184.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1997, "Harmonic Balance and Continuation Techniques in Nonlinear Dynamics with an Application to Duffing's Equation," Journal of Sound and Vibration, Vol. 202, No. 5, pp. 717–731.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1996, "Nonlinear Dynamic Response of Shallow Arches to Harmonic Forcing," Journal of Sound and Vibration, Vol. 194, No. 3, pp. 353–367.

CONFERENCE PAPERS

Berry, M., Las Fargeas, J., and Blair, K. B., 2010, "Wind Tunnel Testing of a Novel Wingsuit Design," *The Engineering of Sport 8*, Proceedings of the 8th Conference of the International Sports Engineering Association, Vienna, Austria, Procedia Engineering, Vol. 2, No. 2, pp 2735-2740.

Blair, K. B., Turner, J. M., and Vasquez, M., 2009, "High Speed Sensor and Testing System for Baseball Chest Protectors," *The Impact of Technology on Sport III*, Proceedings of the 4th Asia Pacific Congress on Sports Technology, Honolulu, HI, USA, eds F. Alam, L. V. Smith, A. Subic, F. K. Fuss and S. Ujihashi, Publishing Solutions Pty Ltd, pp 435-439.

CONFERENCE PAPERS (Continued)

Holschuh, B. T., Gray, T. L., Blair, K. B., 2009, "Golf Driver/Ball Impact Acoustic Measurement System," *The Impact of Technology on Sport III*, Proceedings of the 4th Asia Pacific Congress on Sports Technology, Honolulu, HI, USA, eds F. Alam, L. V. Smith, A. Subic, F. K. Fuss and S. Ujihashi, Publishing Solutions Pty Ltd, pp 287-291.

Blair, K. B., Vasquez, M., and Groudas, P., 2008, "Testing Procedures for Baseball Chest Protection Equipment," *The Engineering of Sport 7*, Proceedings of the 7th International Conference on the Engineering of Sport, Biarritz, France, Springer-Verlag, Vol. 2, pp. 215-222.

Blair, K. B., and Sidelko, S., 2008, "Aerodynamic Performance of Cycling Time Trial Helmets," *The Engineering of Sport 7*, Proceedings of the 7th International Conference on the Engineering of Sport, Biarritz, France, Springer-Verlag, Paris, France, Vol. 1, pp 371-377.

Blair, K. B., Williams, G., and Vasquez G., 2007, "The Effect of Wood Properties on the Performance of Baseball Bats," in: Fuss F.K., Subic A. and Ujihashi S. (Eds.) *The Impact of Technology on Sport II*. Proceedings of the Asia-Pacific Congress on Sports Technology, Singapore, Taylor & Francis Group, London, pp. 345-349.

Blair, K. B., 2006, "Synopsis of Current Developments: Modeling Equipment," *The Engineering of Sport 6*, Proceedings of the 6th International Conference on the Engineering of Sport, TUM - Munich University of Technology, Germany, Vol. 2, pp. 107-108.

Blair, K. B., Culligan, K. F., and Walfisch, D., 2006, "Analysis of Fulcrum Skate Performance," *The Engineering of Sport 6*, Proceedings of the 6th International Conference on the Engineering of Sport, TUM - Munich University of Technology, Germany, Vol. 3, pp. 301-306.

Blair, K. B., Custer, D., Alziati, S., and Bennett, W., 2004, "The Effect of Load Rate, Placement Angle, and Ice Type on Ice Screw Failure," *The Engineering of Sport 5*, Proceedings of the 5th International Conference on the Engineering of Sport, University of California, Davis, Vol. 2, pp. 283-289.

Hastings, A. Z. Blair, K. B., Culligan, K. F., and Pober, D. M., 2004, "Measuring the effect of transmitted road vibration on cycling performance," *The Engineering of Sport 5*, Proceedings of the 5th International Conference on the Engineering of Sport, University of California, Davis, Vol. 2, pp. 619-625.

Young, L. R., Bush, D. J., Blair, K. B., 2003, "Rear-Releasable Ski Boots for ACL Protection: An Engineering Evaluation," International Society for Skiing Safety, 15th Congress, St. Moritz, Switzerland.

Brodeur, D. R., Young, P. W., and Blair, K. B., 2002, "Problem-Based Learning in Aerospace Engineering Education," Proceedings of the American Society for Engineering Education Annual Conference and Exposition, Montreal, Canada.

Blair, K. B., Custer, D., Graham, J., Okal, M., 2002, "Analysis of Fatigue Failure in D-Shaped Carabiners," 2nd International Conference on Science and Technology in Climbing and Mountaineering, Leeds, United Kingdom.

Chun, H., Karlov, V., Blair, K., Alper, H., Chin, D., Watanabe, M. and Padilla, C., 1997, "A Substructured Dynamics Method for Macromolecules - MBO(N)D. 1. Formulation and Methodology," Abstracts of Papers of the American Chemical Society, Vol. 214, pp. 57.

Chun, H. M., Padilla, C. E., Blair, K. B., Li, J. H., Haney, D. N., and Alper, H. E., 1994, "A Reduced Variable Approach for Long–Time Dynamics of Large Macromolecular Systems," Air Force Materials Directorate Workshop on Large Scale Simulations in Chemistry/Materials Science.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1994, "Dynamic Response of a Shallow Arch to Antisymmetric, Harmonic Loading," Proceedings of the 5th International Conference on Recent Advances in Structural Dynamics, Southampton, England, Vol. I, pp. 326–339.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1992, "Nonlinear Dynamic Response of Shallow Arches," Proceedings of the 33rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Dallas, TX, pp. 2376–2384.

CONFERENCE PAPERS (Continued)

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1992, "Harmonic Balance and Continuation Techniques in Nonlinear Dynamics with an Application to Duffing's Equation," ASME Applied Mechanics, Materials and Aerospace Summer Meeting, Scottsdale, AZ, 1992.

CONFERENCE COMMITTEES

Session Chair, 11th International Conference on Engineering of Sport, Delft University of Technology, Delft, NL, July 2016.

Session Chair, 10th International Conference on Engineering of Sport, Sheffield Hallam University, Sheffield, UK, July 2014.

Scientific Committee Member, 10th International Conference on Engineering of Sport, Sheffield Hallam University, Sheffield, UK, July 2014.

Session Chair, 9th International Conference on Engineering of Sport, University of Massachusetts - Lowell, Lowell, MA, July 2012.

Scientific Committee Member, 9th International Conference on Engineering of Sport, University of Massachusetts - Lowell, Lowell, MA, July 2012.

Session Chair, 8th International Conference on Engineering of Sport, Fachhochschule Technikum Wein, Vienna, Austria, July 2010.

Scientific Committee Member, 8th International Conference on Engineering of Sport, Fachhochschule Technikum Wein, Vienna Austria, July 2010.

Scientific Committee Member, 4th Asia Pacific Congress on Sports Technology, Honolulu, HI, September 2009.

Session Chair, 7th International Conference on Engineering of Sport, Ecole Supérieure des Technologies Industrielles Avancées, Biarritz, France, June 2008.

Scientific Committee Member, 7th International Conference on Engineering of Sport, Ecole Supérieure des Technologies Industrielles Avancées, Biarritz, France, July 2008.

Member, Board of Advisors, Sporting Goods Manufacturers Association Sport + Technology Summit, San Diego, CA, October 2007.

Conference Chair, Better Golf Through Technology Conference, Massachusetts Institute of Technology, March 2007.

Session Chair, 6th International Conference on Engineering of Sport, Technischen Universität München, Munich, Germany, July 2006.

Scientific Committee Member, 6th International Conference on Engineering of Sport, Technischen Universität München, Munich, Germany, July 2006.

Conference Chair, Better Golf Through Technology Conference, Massachusetts Institute of Technology, February 2006.

Session Chair, "What Industry Wants – A Panel Discussion," 5th International Conference on Engineering of Sport, University of California – Davis, September 2005.

Scientific Committee Member, 5th International Conference on Engineering of Sport, University of California – Davis, September 2005.

INVITED PRESENTATIONS

"Smart Devices in Sports", Harrington STEM Lecture Series, State University of New York – New Paltz, November 2017.

"Smart Devices in Sports Products", Guest lecture for EM 153 – Management of Innovation, Gordon Institute, Tufts University, February 2017.

"Smart Devices in Sports Products", Guest lecture for ME 597 – Sports Technology and Entrepreneurship, School of Materials Engineering, Purdue University, February 2017.

"Hardware Development for Smart Products in Sports", Invited seminar, Sports Technology Institute, Wolfson School of Mechanical, Electrical and Manufacturing Engineering, Loughborough University, November 2016.

"Hardware Development for Smart Products in Sports", Invited entrepreneurship seminar, Loughborough University London, November 2016.

"Pressure Sensitive Adhesives - An Application Engineer's Point of View", Keynote presentation, 3M 2015 PSA Symposium, 3M Headquarters, St. Paul, MN, May 2015.

"Hardware Innovation and Product Development Process", 3M Automotive Applications Group Lunch and Learn, 3M Headquarters, St. Paul, MN, May 2015.

Panelist – "Innovations Fueling the Sports and Entertainment Industries", Licensing Executives Silicon Valley Chapter Fifteenth Annual Conference, Palo Alto, CA, April 2015.

"Wearable Technology – The Hardware Challenge", Evolve – The CSE Innovation Summit, Atlanta, GA, January 2015.

"Multi-Disciplinary Engineering for the Development of Advanced Applications in Sport Textiles", The AISTS & CSEM Conference on Smart Textile Opportunities for Sport, Rolex Centre, École Polytechnique Fédérale de Lausanne, Switzerland, November 2013.

"The Disciplines of Technology Development and Product Design", Sports Tech and Innovation Summit, The Emirates Stadium, London, UK, November 2013.

"The Disciplines of Technology Development and Product Design", Executive MBA at the School of Management in Fribourg Workshop, Swissnex, Cambridge, MA, October 2013.

"The Disciplines of Technology Development and Product Design", Sports Analytics Innovation Meet Up, Boston, MA, July 2013.

"The Disciplines of Technology Development and Product Design", Centre for Sport and Exercise Sciences, Sheffield Hallam University, Sheffield, UK, September 2012.

Panelist – "How Can Sport Drive Engineering Innovation?", Royal Academy of Engineering, London, UK, September, 2012.

"The Disciplines of Technology Development and Product Design", Swissnex Venture Leaders Conference, Cambridge, MA, October 2011.

"The Disciplines of Technology Development and Product Design", Department of Mechanical and Aerospace Engineering, Rutgers University, Piscataway, NJ, October 2011.

"The Disciplines of Technology Development and Product Design", Department of Industrial and Systems Engineering at Rensselaer Polytechnic Institute, Rochester, NY, October 2011.

"The Disciplines of Technology Development and Product Design", Department of Mechanical & Materials Engineering Pierson Lecture Series, University of Nebraska, Lincoln, NE, September 2011.

"The Disciplines of Technology Development and Product Design", Nebraska Society of Professional Engineers, Eagle, NE, September 2011.

INVITED PRESENTATIONS (Continued)

Panelist – "Golf Analytics", MIT Sloan Sports Analytics Conference, Cambridge, MA, March 2011.

"The Disciplines of Technology Development and Product Design", Applied Ocean Physics & Engineering Seminar Series, Woods Hole Oceanographic Institute, Woods Hole, MA, February 2011.

"Innovation Workshop," University of Jyväskylä, Jyväskylä, Finland, November 2010.

Panelist – "Performance Enhancement: Will Future Athletes be Formula One or NASCAR?", MIT Sloan Sports Analytics Conference, Cambridge, MA, March 2010.

"Aerodynamics of Sports Balls," adidas International, Pre-Release of 2010 World Cup Soccer Ball, Scheinfeld, Germany, November 2009.

"Innovation in Sports Technology – Developing Marketable Products," University of Bridgeport, November, 2009.

"Applications of High Speed Imaging in Sports Product Design," Massachusetts Institute of Technology Professional Education Short Program in High-Speed Imaging for Motion Analysis: Systems and Techniques, June 2009.

"Engineering Sporting Excellence," Sports Engineering and Technology, Institute of Mechanical Engineers, London, March 2009.

"Innovation in Sports Technology – Developing Marketable Products," Purdue University Mechanical Engineering Design Seminar, April, 2009.

Panel Moderator – Sport 2.0: The Evolution of Technology and Sports, MIT Sloan Sports Analytics Conference, Cambridge, MA, March 2009.

"Innovation in Sports Technology – Developing Marketable Products," New England American College of Sports Medicine Conference, November, 2008.

"Location Switzerland – Sports Business Tour," Switzerland, April 2008.

Panel Moderator – Technology, MIT Sloan Sports Analytics Conference, Cambridge, MA, February 2008.

"Innovative Technologies in Sport," Netherlands Office for Science & Technology, Netherlands Ministry of Economic Affairs, The Hague, The Netherlands, November 2007.

"Building Collaborative Relationships Between Industry, Government and Academia – An International Discussion Panel," SGMA's Sports and Technology Convergence, La Jolla, CA, October 2007.

"Creating Sports Performance Innovations," Jyväskylä Regional Development Company, Jyväskylä, Finland, July 2007.

"Creating Sports Performance Innovations," Oulu Wellness Institute, Oulu, Finland, July 2007.

Panel Moderator – "Sponsorship", MIT Sloan Sports Analytics Conference, Cambridge, MA, February 2007.

"Implementing Sports Performance Innovations in Mass Sports Products," SGMA's Sports and Technology Convergence, La Jolla, CA, October 2006.

"Sports Apparel Aerodynamics," Department of Materials and Textiles," University of Massachusetts Dartmouth, May 2006.

"Cycling Aerodynamics," Exercise and Health Science Department, University of Massachusetts Boston, April 2006.

"Teaching and Research at the MIT Center for Sports Innovation," Sports and Rehabilitation Engineering Center, École Polytechnique Fédérale de Lausanne, Switzerland, November 2005.

INVITED PRESENTATIONS (Continued)

"Teaching and Research at the MIT Center for Sports Innovation," NeuroMuscular Research Center Seminar Series, Boston University, October 2005.

"Innovation and Product Development in Sports," Mechanical Engineering Colloquium Series, University of Nebraska, October 2005.

"Predicting the Success of Innovation," The 2005 Growth and Innovation Conference, New York, NY, May 2005.

"New Technology and Sports Equipment," International Business Intelligence Series, Orlando, FL, January 2005.

"New Technologies to Monitor and Enhance Athletic Performance," CIMIT – Center for the Integration of Medicine and Innovative Technology Forum, Boston, MA, January 2005.

"Technology and Sports," International Congress on Technological and Social Innovation in Sport, San Sebastian, Spain, December 2004.

"Applications of Smart Textiles in the Sports Industry," ESPRC Network: Smart Textiles for Intelligent Consumer Products, London, United Kingdom, June 2004.

"Driving Innovation in Product Development," IDEAS 2004, Boston, MA, June 2004.

"Hands-on Experience in Teaching Innovation and Product Development", Center for Innovation and Product Development Seminar Series, Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA, April 2004.

"Sports Product Innovation," Lemelson Center's Symposium, Inventing Ourselves, Lemelson Center for the Study of Invention and Innovation, Smithsonian National Museum of American History, Washington, DC, November 2003.

"Sports Product Development in Engineering Education," Queen Mary University of London, United Kingdom, November 2003.

"Sports Product Development in Engineering Education," Loughborough University, United Kingdom, November 2003.

"Advanced Development of Sports Equipment – Prototype Production," United States Olympic Committee Coach's Conference, Colorado Springs, CO, April 2003.

"Teaching Product Development in a Laboratory Context," The 2002 MIT Engineering/Manufacturing Conference: Innovations in Product Development, Cambridge, MA, October 2002.

EDUCATIONAL OUTREACH

WGBH "Fetch" Scientific Advisory Board, 2007 – 2009.

Lecturer, MIT Science of Baseball Program, Cambridge, MA, July 2008.

Sports Product Development Segment, Teacher's Domain, Multimedia Resources for the Classroom and Professional Development, http://www.teachersdomain.org, Produced by WGBH, July 2006.

Course Faculty, International Sports Engineering Association Summer School, Lectures in aerodynamics, materials, and a seminar in product development process, Prato, Italy, June 2005.

Associate Director Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, MIT, Cambridge, MA, August 2005.

Course Faculty, Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, MIT, "Wind Tunnel Testing of Sports Equipment", and "Understanding User Needs in Sports Equipment Design," Cambridge, MA, August 2005.

EDUCATIONAL OUTREACH (Continued)

Boston Museum of Science Lowell Institute Lecture Series, "Material Science in Sports: High Performance Equipment Design," Boston, MA, December 2004.

Course faculty, Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, MIT, "Wind Tunnel Testing of Sports Equipment", and "Understanding User Needs in Sports Equipment Design," Cambridge, MA, August 2004.

Boston Museum of Science Lowell First Friday Lecture Series, "Aerodynamics and Sports," Boston, MA, February 2004.

Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, "Wind Tunnel Testing of Sports Equipment," MIT, Cambridge, MA, August 2003.

Aerodynamics and wind tunnel testing advisor, POVme, an educational science of sports television program aimed at preteens and teens, primarily targeting young women, minorities, and the disabled who have a strong interest in sports, May 2003.

Member, Board of Advisors, Harvard-Smithsonian SportSmarts, a national education campaign of the designed to increase the understanding and appreciation of science through sports, 2000 – 2004.

AWARDS FOR SUPERVISED ACADEMIC PROJECTS

Aeronautics and Astronautics Department, MIT: Leaders for Manufacturing Award for directly dealing with issues that are related to the interface of engineering and manufacturing, Santiago, N., and Williams, G., "Performance Benefits of Handle Flex in Baseball Bats," June 2006.

ispo - Technical University of Munich: Academic Challenge Award, Munich, Germany. 1st Place Popular and Leisure Sports Category, Okal, M., "Carabiner Damage Detection Device," February 2004.

ispo - Technical University of Munich: Academic Challenge Award, Munich, Germany. 2nd Place Popular and Leisure Sports Category, Wang, C-A, "Triathlon Shoe Design", February 2004.

Aeronautics and Astronautics Department, MIT: United Technologies Corporation Award for outstanding achievement in the design, construction, execution, and reporting of an undergraduate experimental project, Alziati, S. A., and Bennett, W. L. M., "Simulating and Testing Ice Screw Performance in the Laboratory," May 2003.

2nd International Conference on Science and Technology in Climbing and Mountaineering, Leeds, United Kingdom: Best Student Presentation in Technological Fields, Okal, M., "Analysis of Fatigue Failure in D-Shaped Carabiners", April 2002.

Aeronautics and Astronautics Department, MIT: Admiral Luis de Florez Award for original thinking or ingenuity, Okal, M., and Graham, J., "Fatigue Failure of Climbing Carabiners," May 2002.

SUPERVISED THESES

Li, Harriet and Obropta, "Bicycle Fork Aerodynamics," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2012.

Hyatt, D., "Proposed Testing Method for Foam Padding," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2011.

Ryne, B, and Kays, C., "Laptop Computer Shock and Vibration Characterization in Commuter Bike Packs," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, December 2010.

Racz, R., "Development of an Improved Wind Tunnel Test Platform for Bicycles," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2010.

SUPERVISED THESES (Continued)

Berry, M., Fargeas, J. L., "Lift to Drag Increase of Wingsuits," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2010.

Vasquez, M., "Economic and Technological Advantages of Using High Speed Sintering as a Rapid Manufacturing Alternative in Footwear Applications," M Eng, Materials Science and Engineering, Massachusetts Institute of Technology, June 2009.

Pier, T., "Development of a Camber Measurement System for Skis and Snowboards," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2008.

Desrochers, C., "Product Development of a Resistive Athletic Suit," SB Mechanical Engineering, Massachusetts Institute of Technology, January 2008.

Cote, M., "Product Design and Development of an Aerodynamic Hydration Systems for Bicycling and Triathlon," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

LaCrosse, B. A., "Measurement of Baseball Glove and Hand Dynamics," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

Renjifo, J. F., "Developing the Next "Wow" Fitness Product," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

Sidelko, S., "Aerodynamic Performance of Time Trial Helmets," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

Liburd, S., and Naranjo, J. L., "Thermal Performance of Under Armour Sports Apparel," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2007.

Gray, T., and Holschuh, B., "Golf Driver-Ball Impact Acoustic Measurement System," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2006.

Santiago, N., and Williams, G., "Performance Benefits of Handle Flex in Baseball Bats," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2006.

Culligan, K., and Walfisch, D., "Analysis of a New Speed Skating Hinge Mechanism," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2005.

Kendall, B., and Newell, D., "Friction Testing of Luge Runners," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2005.

Yandell, A., "Design of Wind Tunnel Test Device for Spinning Sports Balls," SB Ocean Engineering, Massachusetts Institute of Technology, June 2005.

Raghunathan, S., "Potential Impact of Advanced Sensing and Communication Technologies in Sports Products", SB Mechanical Engineering, Massachusetts Institute of Technology, June 2005.

Hildago, M., "Integration of Computer Based Design Tools in the Athletic Shoe Design Process," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2004.

LaValley, Z, "Teaching Motion to a Group Using Integrated Motion Sensing Systems," MEng Electrical Engineering and Computer Science, Massachusetts Institute of Technology, June 2004.

Hoying, B., "Wind Tunnel Interface for Testing Bicycle Aerodynamics," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2003.

Yang, C., "Materials Selection in Shoe Sole Design," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2003.

Alziati, S. A., and Bennett, W. L. M., "Simulating and Testing Ice Screw Performance in the Laboratory," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2003.

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Blundo, J. "Design of an Ultra-Marathon Shoe," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2002.

Bush, D. "Evaluation of the Lange V-9 Ski Boot Release Mechanism," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2002.

Mauger, A., "Optimizing the Incorporation of Technology into the Custom Golf Club Market," SM Systems Design and Management, Massachusetts Institute of Technology, January 2002.

Graham, J., and Okal, M., "Fatigue Failure of Climbing Carabiners," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, December 2001.

Bonnell, J., Pendexter, M., "Characterization of In-Line Skating Motion," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2001.

Loreto, A., "A Standard Test Method for Football/Hockey Body Padding and Its Application to the DF-4 Product," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2001.

Oloo, J., "Precise Measurement of Bicycle Wheel Aerodynamics," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2001.

Spinak, A., "Characteristics of In-line Skate Vibrations," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2001.

Wang, C., "Design of a Running Shoe for Triathlon," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2001.

Willets, A. C., and Yi, S., "Core Muscle Stabilization Product Development," SB Mechanical Engineering, Massachusetts Institute of Technology, January 2001.

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McKenney, K., "Development of a Weight Fixture for Improved Abdominal Fitness," SB Mechanical Engineering, Massachusetts Institute of Technology, May 2000.

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"A Study of the Relationship Between Surface Features and the In-Flight Performance of Footballs," David Mark Rogers, Ph.D., Loughborough University, United Kingdom, Advisor: Dr. Andy Harland, June 2011.

"The Design and Development of a Novel Training System for Cricket," Laura M. Justham, Ph.D., Loughborough University, United Kingdom, Advisor: Dr. Andy West, May 2007.

"Customisation of Sport Grips Using Rapid Manufacturing Methodologies," David Barrass, Ph.D. Loughborough University, United Kingdom, Advisor: Professor Roy Jones, November 2006.

"Possible Ways to Improve the Comfort, Fit and Visual Performance of Swimming Goggles," Dan Coe, Ph.D., Loughborough University, United Kingdom, Advisor: Dr. Mike Caine, September 2005.

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"Aerodynamics in Cyclocross?," *Cyclocross.com*, November 2010.

"Bicycling Wind Tunnel Testing," *Shining City*, NESN – New England Sports Network, September 2010.

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"What's Next – Advances in Sporting Goods," *SGB – Sporting Goods Business*, Vol. 36, Issue 12, December 2003.

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"Athlete Inventors - MIT Students Hit, Run, Field, and then Tinker," *The Christian Science Monitor*, March 9, 2000.

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"Research Center Focuses on Oar, Wheel, Rod and Bat," *MIT Tech Talk*, Vol. 44, No. 18, January 26, 2000.

"The Future of Sports," *7 News*, WHDH Television Network, December 24, 1999.

"Ride With the Wind," *MIT Tech Talk*, Vol. 44, No. 13, November 17, 1999.

LITIGATION SUPPORT

I have been qualified as an expert in District courts. I have been deposed multiple times and provided inside consulting for litigation matters. My duties have included discovery assistance, literature searches, document review, patent analysis, and writing expert and rebuttal reports. I have provided technical assistance for litigation matters including reverse engineering and analysis as well as designed, developed, and utilized equipment for performance testing of patent claims.

Foley & Lardner, LLP representing FlyDive et. al., Inc. **2017 – Present**

United States District Court for the Central District of California, Case No. 8:16-cv-1607-CJC-JCG

ZapIP LLC and JLIP LLC, v. FlyDive, Inc., Jetpack Enterprises, LLC, Jetpack Enterprises – San Diego, LLC, and Dean O'Malley.

Patent infringement case related to hydroflight devices. Prepared expert report on non-infringement and invalidity.

Foley & Lardner, LLP representing Woodway USA, Inc. **2016 – Present**

United States District Court for the Eastern District of Wisconsin, Case No. 3:15-cv-016665-JCH, Woodway USA Inc. v. Samsara Fitness LLC, and Chapco, Inc.

Patent infringement case related to treadmills. Prepared expert report on infringement and rebuttal report on invalidity. Deposed.

Foley & Lardner, LLP representing Woodway USA, Inc. **2015 – Present**

United States District Court Eastern District of New York, 2013 Civ. 01276, Speedfit LLC and Aurel Astilean v. Woodway USA Inc. and Douglas G. Bayerlein.

Patent infringement case related to treadmills. Prepared and submitted expert report and rebuttal reports on invalidity. Deposed.

Maschoff Brennan, representing Icon Health & Fitness, Inc. **2012 – 2013**

JAMS, Inc. Reference No. 1200047858. Icon Health & Fitness, Inc., Claimant, v. Dayco International, Inc. and Spirit Manufacturing, Inc. d/b/a Spirit Fitness Products, Respondents.

Patent infringement case related to fitness equipment. Prepared and submitted expert report on infringement and rebuttal reports on claim construction and engineering analyses. Present during JAMS hearing.

United States District Court for the District of Utah (Northern Division). Civil Action No. 1:10-cv-00195-RJS-DBP, Icon Health & Fitness, Inc., Plaintiff and Counterclaim Defendant, v. Park City Entertainment, Inc., Defendant and Counterclaim Plaintiff.

Patent infringement case related to fitness equipment. Prepared and submitted expert report on claim construction. Deposed.

Workman | Nydegger, representing Icon Health & Fitness, Inc. **2012**

United States District Court for the District of Utah (Northern Division). Civil Action No. 2:10-cv-01264-PMW, Icon Health & Fitness, Inc., Plaintiff, v. Fitness Equipment Services LLC, d/b/a/ Sole Fitness, Spirit Manufacturing, Inc, d/b/a Spirit Fitness Products, Defendants.

United States District Court for the District of Utah (Northern Division). Civil Action No. 1:10-cv-00195-DAK, Icon Health & Fitness, Inc., Plaintiff, v. Park City Entertainment, Inc., Defendant.

Patent infringement cases related to fitness equipment. Discovery assistance including document review, patent analysis, engineering analysis and technical support.

Cases transferred to Maschoff Gilmore & Israelsen (which became Maschoff Brennan) October 2012.

LITIGATION SUPPORT (Continued)

Miller Canfield, representing Dickinson Wright, P.L.L.C. **2012**

United States District Court, Eastern District of Michigan (Southern Division). Case No. 09-12102
Warrior Sports, Inc., Plaintiff-Appellee, v. Dickinson Wright, P.L.L.C., Defendant, Appellant.

Malpractice case related to an underlying patent infringement case regarding lacrosse equipment. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Prepared and submitted expert report on infringement. Deposed.

Williams Mullen, representing Fitness Anywhere **2011**

United States District Court, Eastern District of Virginia (Norfolk Division). C.A. 2:11CV156 HCM/DEM.
Fitness Anywhere, LLC, Plaintiff, v. Lifeline International, Inc., Defendant.

Patent infringement case related to fitness equipment. Discovery assistance including document review, patent analysis, literature searches, engineering analysis and technical support. Prepared and submitted expert report on infringement and rebuttal report on invalidity. Deposed.

Sunstein, Kann, Murphy & Timbers LLP, representing MacNeill Engineering Company **2009 - 2010**

United States District Court, District of Delaware. C.A. No. 08-469-GMS.
Softspikes, LLC and Pride Manufacturing Company, LLC, Plantiffs, v. MacNeill Engineering Company, Inc., Defendant.

Patent infringement case related to golf cleats. Discovery assistance including document review, patent analysis, technical support, engineering analysis, designed, built and used test mechanism to test performance of accused products against patent claims.

Sterne, Kessler, Goldstein & Fox PLLC, representing adidas International **2009**

United States Patent and Trademark Office. Control No.: 95/001,198.

Re-examination of a patent related to portable training devices. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Prepared and submitted declaration including obviousness analysis.

Fish & Richardson PC, representing Callaway Golf Company **2008**

United States District Court, District of Delaware. C.A. No. 07-367-SLR.
Callaway Golf Company, Plaintiff, v. Acushnet Company, Defendant.

Patent infringement case related to golf clubs. Discovery assistance including document review, patent analysis, and providing technical support and engineering analysis.

Paul, Hastings, Janofsky & Walker LLP, representing Bridgestone Golf **2005 – 2007**

(Case transferred from Sughrue Mion, PLLC, March 2006)
United States District Court, District of Delaware. C.A. No. 05-132-JJF.
Bridgestone Sports Co., LTD., and Bridgestone Golf, Inc., Plaintiffs, v. Acushnet Company, Defendant.

Patent infringement case related to golf balls. Discovery assistance including document review, patent analysis, literature searches, engineering analysis and technical support. Prepared and submitted expert report. Deposed.

LITIGATION SUPPORT (Continued)

Kegler, Brown, Hill & Ritter Co., LPA, representing High Cedar Enterprises **2005 – 2006**

United States District Court, Central District of California, Southern Division. SACV 05-535-AHS.
High Cedar Enterprises, Co., and Karakal Far East, Ltd., a/k/a Karakal Golf Grips, Plaintiffs, v. Winn Inc., Defendant.

Patent infringement case related to golf grips. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Supervised third party testing of products involved in the case. Prepared and submitted expert report on invalidity and rebuttal report on infringenment. Deposed.

Sughrue Mion, PLLC, representing Eaton Corporation **2003**

United States District Court, Central District of California, Southern Division. CV 03-1568-SJO.
Winn Inc., and Ben Huang, an individual, Plaintiff, v. Eaton Corporation, Defendant.

Patent infringement case related to golf grips. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Prepared and submitted expert report on invalidity and rebuttal report on infringement. Deposed.

EXHIBIT 7

CONTAINS CONFIDENTIAL – ATTORNEYS' EYES ONLY INFORMATION

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNETICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC, Plaintiffs, vs. WOODWAY USA, INC., Defendant.	Civil Action No. 3:15-cv-1665 (JCH) March 2, 2017

EXPERT REPORT OF KIM B. BLAIR, Ph.D.

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I, Kim B. Blair, Ph.D., hereby make the following disclosure pursuant to Fed. R. Civ. P. 26(a)(2).

I. SUMMARY OF OPINIONS

1. I have been asked by Woodway USA, Inc. ("Woodway") to express an opinion on whether the TrueForm Runner Treadmills manufactured, offered for sale, sold, and used by Chapco, Inc. ("Chapco") and Samsara Fitness, LLC ("Samsara") infringe U.S. Patent Nos. 8,986,169 ("the '169 patent) and 9,039,580 ("the '580 patent")[1] and to comment on certain other technical issues in the case.

2. As discussed in more detail below and explained in Exhibits E and F, annexed hereto, I have arrived at the following opinions:

(a) The Original TrueForm Runner Treadmills literally infringe claims 11-16 of the '169 patent;

(b) The Original and Redesigned TrueForm Runner Treadmills literally infringe claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent; and

(c) The Technogym SkillMill product likely infringes at least independent claims 1, 11, and 19 of the '580 patent.

II. QUALIFICATIONS

3. Enabling innovation at the intersection of technology and sports, I have extensive experience utilizing advanced technologies to enhance all aspects of the sporting experience. As the Founder of STI&E Consulting and previously as the Vice President of Business Development and Operations and the Manager of the Sports Engineering Practice at Cooper Perkins, Inc. and the Founding Director of the Sports Innovation Program at MIT (now

[1] Copies of the '169 and '580 patents are annexed to this Report as Exhibits A and B, respectively.

STE@M), I lead the development of new products as well as technologies for sport performance analyses from early formulation of product concepts to final prototype design and testing.

4. Many of my projects have won awards, including MIT departmental awards, conference best paper awards, and international ispo Academic Challenge design awards.

5. My work enjoys extensive media coverage, including features in Forbes, The Boston Globe, Outside Magazine, and GQ, and programs by CNN, The NewsHour, The Discovery Channel, NPR, and local network affiliates.

6. I provide a wide variety of consulting services to the sports industry, including leading product development projects, conducting performance testing of existing and prototype products, and creating innovative concepts aimed at enhancing the experience for sports spectators.

7. In addition, as a member of the board of advisors for emerging companies, I provide expertise on business and strategic planning, technology assessment and development, strategic alliances, and raising capital.

8. A recognized expert in innovation and sport technology, I have spoken at the Lemelson Foundation, the Boston Museum of Science, IDEAS Boston 2004, The International Congress on Technological and Social Innovation in Sport (Spain), The University of Nebraska, Purdue University, The University of Illinois, Rutgers University, Rochester Polytechnic Institute, The University of London, Loughborough University (UK), the SGMA International Business Intelligence, Tufts University, and the MIT Center for Innovation and Product Development.

9. I have served as a technical advisor for the United States Olympic Committee, on the advisory board for the SGMA Sport + Technology Convergence Conference, and as a member of the Golf Digest Academic Advisory Panel.

10. Prior to founding STI&E and my work with Cooper Perkins, I was the President and Founder of Sports Innovation Group LLC, a lecturer in the MIT Aeronautics and Astronautics Department, serving as the lead instructor for a capstone experimental projects course, co-developer of a junior level advanced dynamics course, and instructor in a graduate structural dynamics and vibrations course.

11. Previously, I was a senior scientist and management team member at Moldyn, Inc., an organization applying aerospace analysis techniques to the fields of biomechanics and computational chemistry. I also served as an aerospace engineer at the NASA Johnson Space Center.

12. My professional affiliations include serving as Secretary, President, and Past-President of the International Sports Engineering Association as well as serving as member of the editorial board for the Journal of Sports Engineering and Technology and reviewer for the Journal of Sports Engineering.

13. I have served on the scientific committees for several editions of The Engineering of Sport Conference and the Asia Pacific Conference on Sports Technology. In addition, I recently served as a Session Chair for the 11th International Conference on Engineering of Sport.

14. I am also a lead user of sports and fitness products having trained for and competed in more than 100 endurance events, including the US National Triathlon Championships, World Triathlon Championship Qualifier, and the Hawaii Ironman World

Championships. I am the past president and current board member of Team Psycho, a New England-based elite triathlon team.

15. Born and raised in Nebraska, I earned a B.A. in Psychology and a B.S. in Mechanical Engineering at the University of Nebraska. At Purdue University, I earned a M.S. in Mechanical Engineering and a Ph.D. in Aeronautics and Astronautics. In 2005, the University of Nebraska awarded me an Alumni Achievement Award.

16. Of particular relevance to this case, I have contributed to the design and development of fitness equipment such as the KoKo Smartrainer, I am a co-inventor of a wearable device for assessing running form (US 20130041617), and I have served as an expert witness on a number of patent litigation cases related to sports equipment, most recently four cases involving treadmills. Over the years, I have attended a number of trade shows that feature fitness equipment including the SGMA Super Show, Club Industry East, Interbike, and ispo.

17. I am generally familiar with patents and review patent disclosures regularly.

18. My curriculum vitae is attached as Exhibit C. It includes a listing of all publications I have authored or co-authored during my career.

III. TESTIMONY AND FEES

19. I have testified in lawsuits and been accepted as an expert in state and federal courts. More specifically, in the past four years, I have testified as an expert by deposition in the following matters:

- Case No.: 09-12102 – Warrior Sports, Inc. vs. Dickinson Wright, P.L.L.C. (E.D. Mich.);
- Case No.: C.A. No. 1:10-cv-00195-RJS-DBP – Icon Health and Fitness Inc. vs. Park City Entertainment, Inc. (D. Utah); and
- Case No.: 2013 Civ. 01276 – Speedfit LLC v. Woodway USA, Inc. (E.D.N.Y.).

20. The compensation for my time spent in working on issues in this case is $450 per hour. I am also compensated for my expenses in relation to this matter. My compensation is not dependent on or related in any manner to the outcome of the current litigation. I have no financial interest whatsoever in the outcome of the litigation.

IV. MATERIALS REVIEWED

21. In my study of this matter and in forming my opinions disclosed herein, I have relied on my own experience and education as well as information learned through discussions with Woodway personnel, and from examining the '169 and '580 patents, the '169 and '580 patents' file histories, including the referenced priority patent application, the materials identified in Exhibit D, certain deposition testimony from this case, documents produced during discovery, and the materials cited in this Report. I relied on these materials to varying degrees; some very much and some not at all.

22. Although I am not a lawyer, I have been advised about certain aspects of the law, which I have set forth in my Report where pertinent.

V. BACKGROUND AND SUMMARY OF THE PATENTS AND ASSERTED CLAIMS

23. In reaching my opinions about the infringement of the '169 and '580 patents expressed herein, and about the importance of the inventions described in these claims, I studied a number of prior art patents/references to come to an understanding of the background that preceded the inventions in the '169 and '580 patents. In addition, I have met with and spoken with one of the inventors, Nicholas Oblamski, to discuss the inventions in detail.

24. As I understand it, Woodway has been building and selling manual or non-motorized treadmills since at least the mid-1990s, including the TRAMP and FORCE treadmills,[2] which complement its line of motorized treadmills.[3]

25. While the concept of a manual treadmill has been in the public domain for centuries,[4] one of the problems that has never been solved is how to handle the unpredictable movement of the running belt, particularly when the running surface is curved.

26. A critical challenge with a curved, motorless treadmill is to ensure the safety of the user. When a curved, motorless treadmill is being used as intended, it requires free rolling of the running belt. However, when a user is trying to mount or dismount, the running belt can move in the forward and backward direction. Because it is common for a user to enter the treadmill from the rear, when a user steps on the rear of the treadmill, the user's weight may cause the belt to unexpectedly rotate forward (the reverse of the normal operating direction of the running belt). Depending on how quickly and where the user mounts the treadmill, the running belt may move in the forward or backward direction, creating an extreme safety hazard. The unpredictable belt movement may startle the user, create a temporary feeling of loss of control, or even cause a user to fall.

27. The patents-in-suit describe design improvements and novel safety enhancements to a curved, manually operated treadmill.

28. The '169 patent is entitled "Manual Treadmill and Methods of Operating the Same." The '169 patent issued on March 24, 2015, from U.S. Patent Application No. 14/243,716, which was filed on April 2, 2014. The named inventors are Douglas G. Bayerlein,

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[2] Deposition of Douglas Bayerlein, December 14, 2016 , pp. 35, 37, 50-51.
[3] Deposition of Douglas Bayerlein, December 14, 2016, pp. 31-35.
[4] http://www.attendly.com/the-ancient-and-surprising-history-of-the-treadmill (noting that manual treadmills have been in existence since at least the 1st century AD, when Roman engineers fitted the Polyspastos Crane with a human powered tread wheel).

Vance E. Emons, Nicholas A. Oblamski, Scott D. Hoerig, Matthew J. Zank, Robert L. Zimpel, and Joel W. Richards. The '169 patent is assigned to Woodway.

29. The '580 patent is also entitled "Manual Treadmill and Methods of Operating the Same." The '580 patent issued on May 26, 2015, from U.S. Patent Application No. 14/656,942, which was filed on March 13, 2015. The named inventors are Douglas G. Bayerlein, Vance E. Emons, Nicholas A. Oblamski, Scott D. Hoerig, Matthew J. Zank, Robert L. Zimpel, and Joel W. Richards. The '580 patent is assigned to Woodway.

30. Both the '169 and '580 patents claim a curved, manual treadmill that, among other things, requires "a safety device" that prevents the running belt from moving in both the forward and backward directions. In the asserted claims of the '169 patent, the safety device cooperates with the rear shaft of the rear shaft assembly to permit rotation of the rear shaft (and therefore the running belt which is disposed about the front and rear shafts) in only one direction. The asserted claims of the '580 patent are a broader application of the safety mechanism and require that the safety device is coupled to at least one of the front shaft or the rear shaft.

31. Woodway has been manufacturing and selling its non-motorized CURVE treadmills, which embody the inventions of the '169 and '580 patents, since 2009. Since the 2009 launch, Woodway has introduced various models and sizes in this product line.

Woodway's Innovative CURVE Treadmills

CURVE Treadmill	**CURVE Trainer Treadmill**	**CURVE XL Treadmill**

32. It is my understanding that Woodway is asserting claims 11-16 of the '169 patent against Chapco and Samsara. These claims are reproduced below.[5]

Claim	
11	A manually operated treadmill comprising: a frame supported on a substantially horizontal surface; a front shaft assembly supported by the frame and comprising: a front shaft; and at least one front running belt pulley supported by the front shaft; a rear shaft assembly supported by the frame and spaced a distance from the front shaft and comprising: a rear shaft; and at least one rear running belt pulley supported by the rear shaft; a running belt supported at least in part by the front shaft assembly and the rear shaft assembly,

[5] It is my understanding that Woodway filed a Request for Certificate of Correction Pursuant to 37 C.F.R. § 1.323 with the United States Patent and Trademark Office to correct minor typographical and clerical errors. Woodway proposed, and the United States Patent and Trademark Office adopted, certain corrections, which are not subject to reasonable debate based on consideration of the claim language, the specification, and the prosecution history. The Certificate of Correction issued on March 29, 2016. The additions as a result of the Certificate of Correction are shown in underline; the deletion is shown in strikethrough.

Claim	
	the running belt including a front belt portion adjacent the front shaft assembly, a rear belt portion adjacent the rear shaft assembly, and a central belt portion intermediate the front belt portion and the rear belt portion, the front belt portion and the rear belt portion being positioned vertically higher than a lowest point found in the central belt portion to form a curved running surface upon which a user of the treadmill may walk or run, wherein gravitational force acting upon weight of the user's body on the running belt relative to the lowest point of the running belt causes rotation of the running belt, front shaft, and the rear shaft without the aid of a motor; a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction; and at least one bearing rail having a plurality of bearings rotatably coupled to the at least one bearing rail and forming a top profile, the top profile defined by a front profile portion adjacent the front shaft assembly, a rear profile portion adjacent the rear shaft assembly, and a central profile portion intermediate the front profile portion and the rear profile portion, the central profile portion having a concave curve, and the front profile portion and the ~~profile~~ rear profile portion being continuations of the concave curve; wherein the running surface of the running belt is supported by the top profile of the at least one bearing rail such that the running surface substantially corresponds to the shape of the top profile of the at least one bearing rail.
12	The manually operated treadmill of claim **11,** the at least one bearing rail extending along the frame and longitudinally aligned with one of the at least one front running belt pulley and one of the at least one rear running belt pulley.

Claim	
13	The manually operated treadmill of claim **12,** wherein the running belt comprises a plurality of laterally extending slats.
14	The manually operated treadmill of claim **13,** wherein: the front shaft assembly comprises a second front running belt pulley supported by the front shaft and spaced laterally from the at least one front running belt pulley; the rear shaft assembly comprises a second rear running belt pulley supported by the rear shaft and spaced laterally from the at least one rear running belt pulley; the at least one bearing rail further comprises a second bearing rail having a plurality of bearings forming a top profile matching the top profile of the first of the at least one bearing rail, the second bearing rail being longitudinally aligned with the second front running belt pulley and the second rear running belt pulley; the running belt comprises a first endless belt and a second endless belt, wherein the first endless belt is supported by the at least one front running belt pulley, the first of the at least one bearing rail, and the at least one rear running belt pulley, and wherein the second endless belt is supported by the second front running belt pulley, the second bearing rail, and the second rear running belt pulley; and the plurality of laterally extending slats extend between the first endless belt and the second endless belt.
15	The manually operated treadmill of claim **14,** wherein the rear profile portion of the at least one bearing rail is positioned and shaped to provide a smooth transition for the running belt from the at least one bearing rail onto the at least one rear running belt pulley.
16	The manually operated treadmill of claim **11,** wherein the safety device comprises a one-way bearing.

33. It is also my understanding that Woodway is asserting claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent against Chapco and Samsara. These claims are reproduced below.

Claim	
1	A manually powered treadmill comprising:

Claim	
	a frame having a front end and a rear end positioned opposite the front end; a front shaft rotatably coupled to the frame at the front end; a rear shaft rotatably coupled to the frame at the rear end; a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame; a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame; a running belt supported by the first bearing rail and the second bearing rail and disposed about the front shaft and the rear shaft, wherein the running belt follows a curved running surface; and a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.
4	The manually powered treadmill of claim **1**, wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft.
5	The manually powered treadmill of claim **1**, wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface.
6	The manually powered treadmill of claim **1**, wherein the safety device includes a one-way bearing.
10	The manually powered treadmill of claim **1**, further comprising a handrail attached to the frame and structured to provide a support structure for the user of the manually powered treadmill.
11	A manually powered treadmill, comprising: a frame having a front end and a rear end positioned opposite the front end;

Claim	
	a front shaft attached to the frame adjacent the front end; a rear shaft attached to the frame adjacent the rear end; a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame; a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame; a running belt at least partially disposed about the front shaft and the rear shaft and at least partially supported by the first bearing rail and the second bearing rail, wherein the running belt includes a front belt portion proximate the front end, a rear belt portion proximate the rear end, and a central belt portion intermediate the front and rear belt portions, wherein the central belt portion is positioned vertically closer to a ground surface supporting the frame than the front and rear belt portions such that the running belt follows a curved running surface; and a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.
12	The manually powered treadmill of claim **11**, wherein the safety device includes a one-way bearing.
13	The manually powered treadmill of claim **11**, further comprising a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating position.
14	The manually powered treadmill of claim **11**,

Claim	
	further comprising support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface.
18	The manually powered treadmill of claim **11,** wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft.
19	A manually powered treadmill, comprising: a frame having a front end and a rear end; a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame; a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame; a handrail attached to the frame and structured to provide a support structure for a user of the manually powered treadmill; a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position; at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface; a running belt supported by the first and second bearing rails, wherein the running belt follows a curved running surface; and a safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt in a first direction and permit movement of the running belt in a second direction opposite the first direction.
20	The manually powered treadmill of claim **19,**

Claim	
	further comprising a sensor configured to acquire data indicative of a speed of the running belt.
25	A method, comprising: providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and rear end; providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile; disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails; permitting movement of the running belt in a first direction; and substantially preventing movement of the running belt in a second direction opposite the first direction.

VI. LAW OF INFRIGNEMENT

34. In forming my opinions, I have been asked to assume that certain legal principles apply to Woodway's claims of infringement against Chapco and Samsara. Counsel for Woodway has provided me with the current (last edited July 2016) version of the Model Patent Jury Instructions published by the Federal Circuit Bar Association, and I have taken guidance from those form instructions on matters that relate to my opinions expressed herein. If there is some change in the applicable law to which I am alerted, or if the Court adopts some substantially different instructions for the jury to follow, I will reconsider my opinions accordingly. Also, if there is some change in the applicable substantive law between the time of this Report and any future expert testimony, my opinions may change as well.

35. I understand that each of the patent claims asserted by Woodway is made up of multiple limitations or elements. In order for an accused device to infringe a patent claim, I understand that each element of that patent claim must be found in the particular accused device, either literally or when alleged, equivalently. If one or more of a claim's elements are not found in the accused device, then that accused device does not infringe the claim.

36. I understand that some patent claims may "depend from" or "be dependent upon" other claims in the same patent. These dependent claims are understood to include all of the limitations that are found in the claim or claims from which they depend. Therefore, if a dependent claim depends from another claim that is not infringed by an accused device, then the dependent claim also is not infringed by the accused device.

VII. THE COURT'S CLAIM CONSTRUCTION ORDER

37. I understand that the Court has defined certain terms and phrases that appear in the asserted claims of the '169 and '580 patents and that, in reading and applying the patent claims, I am to apply the Court's definitions. Below is a summary of the terms and phrases construed by the Court.

Disputed Term/Phrase	Chapco's and Samsara's Construction	Woodway's Construction	Court's Construction
Frame	A structure distinct from the bearing rails.	Plain and ordinary meaning.	No further construction necessary.
Bearing Rail	A running belt retention system that is a structure distinct from the frame and configured to help achieve the desired shape of the running surface.	Plain and ordinary meaning.	A rail with bearings whose top profile corresponds to the shape of the running surface.

Disputed Term/Phrase	Chapco's and Samsara's Construction	Woodway's Construction	Court's Construction
A safety device cooperating with the rear shaft	A safety device mechanically connected to the rear shaft.	Plain and ordinary meaning.	A safety device adjoined to the rear shaft.
Coupled	The joining of two members directly or indirectly.	The joining of two members directly or indirectly.	The joining of two members directly or indirectly.
Rotatably coupled	Each part is connected in such a way to permit rotation of one entire element relative to the other element.	Plain and ordinary meaning.	No further construction necessary.
A bearing rail having a plurality of bearings rotatably coupled to the at least one bearing rail	At least one bearing rail having more than one bearing connected to the bearing rail in such a way that each bearing can rotate relative to the bearing rail.	Plain and ordinary meaning.	No further construction necessary.
Running belt	A structure different from the endless belts that follows the profile of the bearing rails.	Plain and ordinary meaning.	No further construction necessary.
Running Surface	Section of the running belt in between the front and rear shafts intended for contact with the user's foot.	Plain and ordinary meaning.	The portion of the running belt upon which a user could place their foot during normal operation. or The portion of the running belt upon which a user could place part of their foot.
Left side member and	The left side of the	Should not be	The court declines to

Disputed Term/Phrase	Chapco's and Samsara's Construction	Woodway's Construction	Court's Construction
right side member	frame and the right side of the frame.	construed.	construe this term.

38. My analysis is based on the specific constructions adopted by the Court, and where the Court ruled that no further construction was necessary, I understand that I am to apply the ordinary and customary meaning to those claim terms and phrases as understood by a person of ordinary skill in the art at the time of the invention, in the context of the relevant patent-in-suit.

39. In defining a "person of ordinary skill in the art," I have been advised to consider factors such as the educational level and years of experience not only of the persons who have developed the Woodway CURVE treadmills that practice the claimed inventions of the patents-in-suit, but also of others working in the pertinent art; the types of problems encountered in the art; the teachings of the prior art; patents and publications of other persons or companies; and the sophistication of the technology. I understand that a person of ordinary skill in the art is not a specific, real individual, but rather a hypothetical individual having the qualities reflected by the factors discussed above. I have assessed the level of ordinary skill in the art based upon my nearly 20 years working in the sport technology industry along with my experience, education, and training.

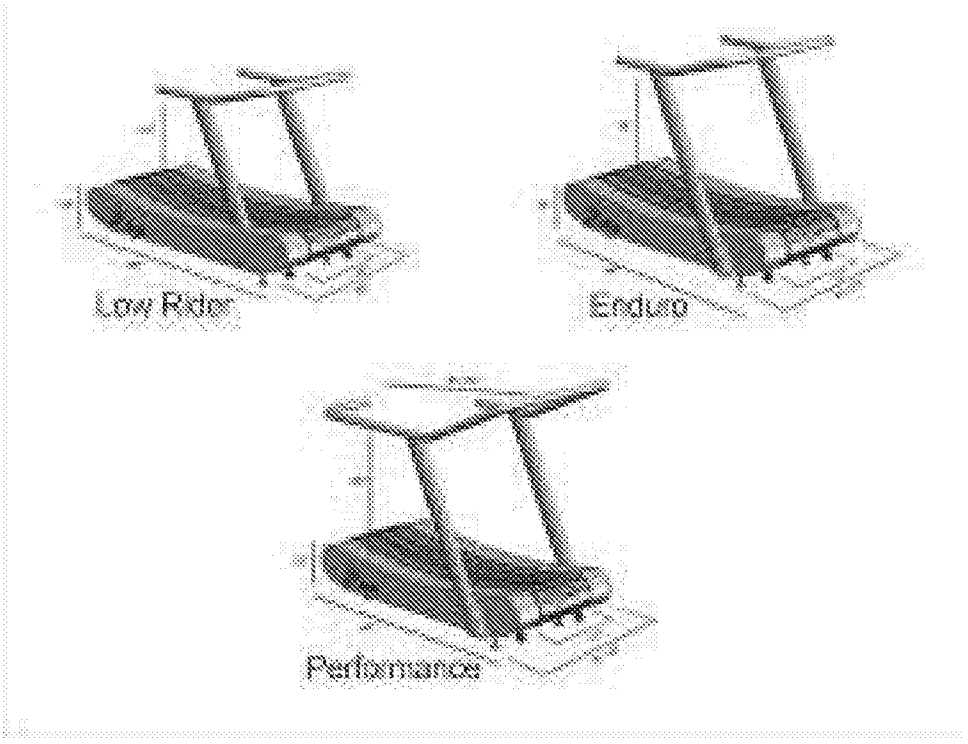
40. In order to determine who one of ordinary skill in the art is, I found it necessary to first define what that "art" is. It is my understanding that the art in question relates to designing manual treadmills. In my opinion, one of ordinary skill in the art of designing manual treadmills would have a bachelor of science degree in mechanical engineering or at least two years of

experience in the treadmill industry, including experience and knowledge of the design, construction, testing, and operation of manual treadmills.

VIII. INFRINGEMENT ANALYSIS

A. Chapco and Samsara Accused Products

41. As I understand the record, there are three models of the TrueForm Runner Treadmill: the Low Rider, Enduro, and Performance, with the only difference between these models being their relative size and shape and arrangement of the handrails; the size and dimensions of the treadmill base is the same for each model.[6] Images of the three models of the TrueForm Runner treadmill are depicted below.



[6] Deposition of Jeremiah Rabe, October 18, 2016, pp. 30-31; 30(b)(6) Deposition of Chapco, October 20, 2016, p. 98, Ex. 84; see also Exhibit G attached hereto.

42. From the TrueForm Runner's introduction until "late March 2015,"[7] the TrueForm Runner Treadmills had what I will call an "Original" configuration. I understand that Chapco/Samsara treadmill with Serial Number 100106, which has been disassembled and photographed for the purposes of this case, is representative of an Original TrueForm Runner Treadmill. I have inspected these photographs for the purposes of my analysis.

43. Sometime after late March 2015, Chapco/Samsara redesigned the Original TrueForm Runner and began manufacturing, offering for sale, selling, and using what I will call a "Redesigned" TrueForm Runner Treadmill. I understand that Chapco/Samsara treadmill with Serial Number 100950, which has also been dissembled and photographed for the purposes of this case, is representative of a Redesigned TrueForm Runner Treadmill.[8] I have also inspected these photographs for the purposes of my analysis. I understand that Chapco and Samsara continue to offer the Redesigned TrueForm Runner Treadmill.

44. During discovery, Chapco provided CAD prints of the TrueForm Runner Treadmills at various stages of assembly/disassembly.[9]

[7] 30(b)(6) Deposition of Chapco, October 20, 2016, pp. 158-159.
[8] The disassembled Original and Redesigned TrueForm Runner Treadmills have not been altered, modified, or otherwise changed relative to the as-sold units.
[9] 30(b)(6) Deposition of Chapco, October 20, 2016, pp. 131-143, Exs. 34-37.

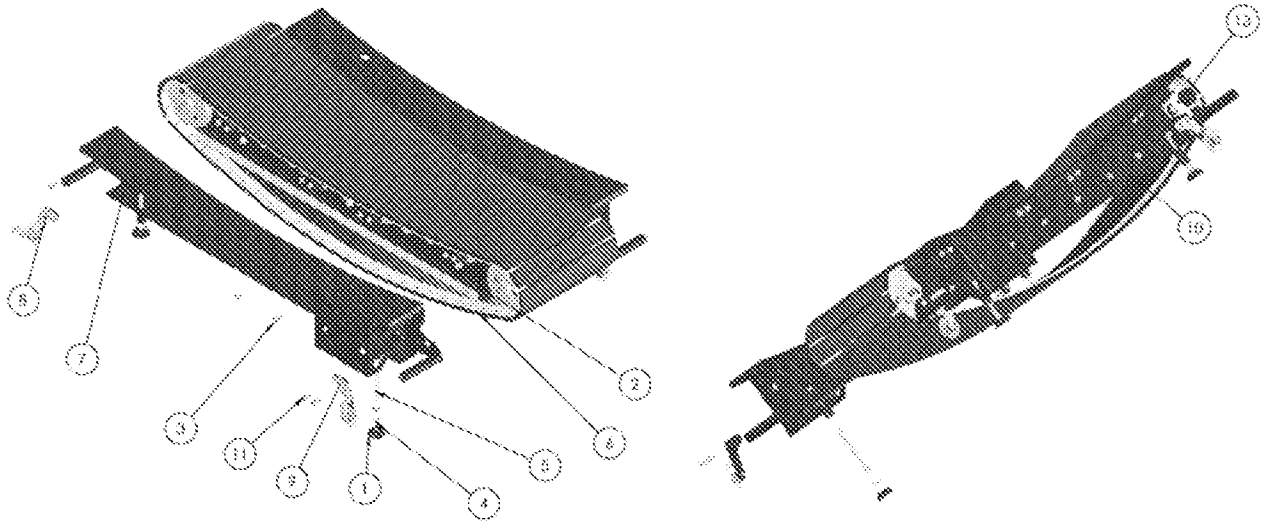
Exhibit 37, SAM0005704[10]

[10] Attached hereto as Exhibit H.

CONTAINS CONFIDENTIAL – ATTORNEYS' EYES ONLY INFORMATION

Exhibit 36, SAM0005701[11]

ITEM	QTY.	PART NUMBER	REV	DESCRIPTION
1	4	S0609		FOOT, MOUNTING, 1/2-13, NEOPRENE, 150-600#
2	1	90096A540		SCREW, HEX, 1/4-20 X .75, TYPE F, ZINC PLATED
3	32	90096A622		SCREW, HEX, 3/8-16 X .75, TYPE F, ZINC PLATED
4	8	91078A222		NUT, HEX, JAM, 1/2-13, GRADE 2, ZINC
5	4	95475A738		STUD, THREADED, 1/2-13 X 6", STEEL, ZINC
6	1	S007-A00958_S2		TREADMILL, ASSEMBLY, STAGE 2
7	1	S007-A01239	H	FRAME, SIDE, WELDMENT RIGHT
8	2	S007-A03086	C	WHEEL, MOUNT, ASSEMBLY
9	2	S007-A03086	C	WHEEL, MOUNT, ASSEMBLY
10	1	S007-A01239	H	FRAME, SIDE, WELDMENT LEFT
11	8	90096A624		SCREW, HEX, 3/8-16 X 1, TYPE F, ZINC PLATED
12	1	S007-003833	-	TENSION TOOL 3/4 ASSY
13	1	S007-A03894	3	ONE WAY BEARING ASSY

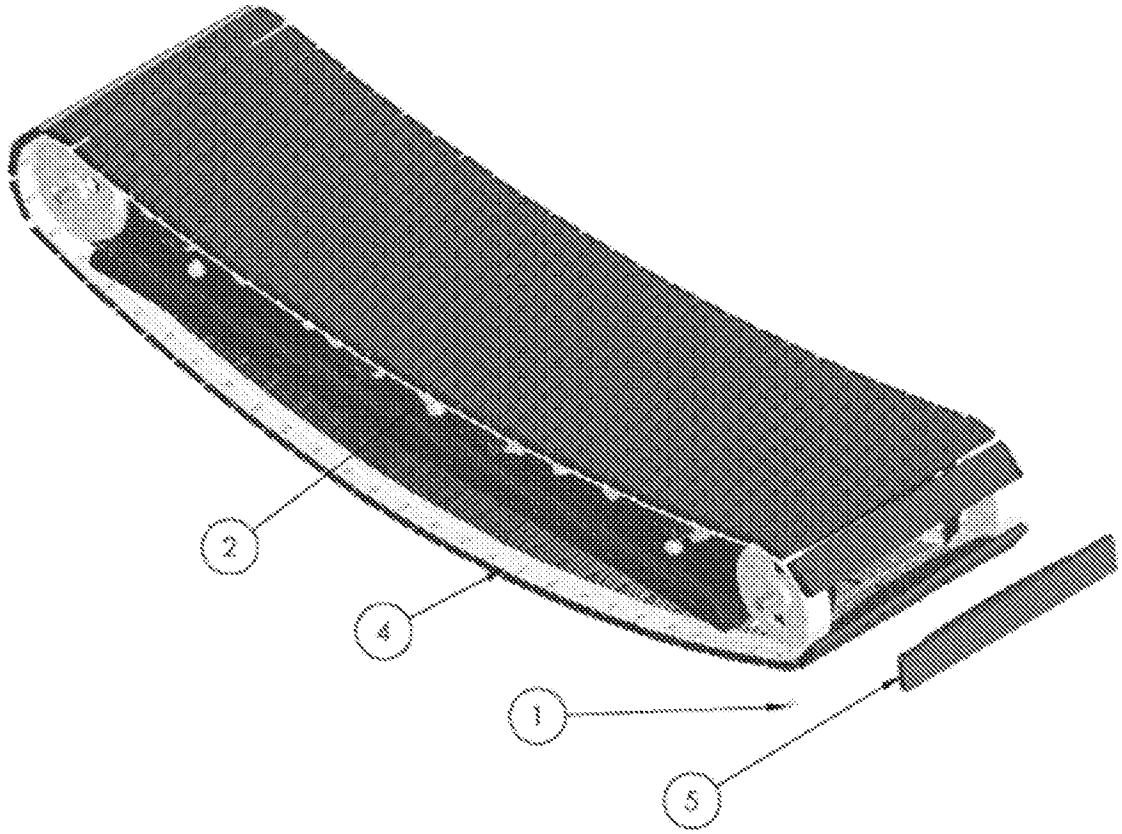


[11] Attached hereto as Exhibit I.

CONTAINS CONFIDENTIAL – ATTORNEYS' EYES ONLY INFORMATION

Exhibit 35, SAM0005698[12]

ITEM	QTY.	PART NUMBER	REV	DESCRIPTION
1	228	96562A240		SCREW, PAN #2, 10-24 X .375, 18-8 SST, PATCH
2	1	5007-A00958_S1		TREADMILL, ASSEMBLY, STAGE 1
3	1	5007-A02491	A	HOUSING, ROLLBACK BEARING, BACK ASSEMBLY
4	2	5007-000943	G	BELT, TREADMILL
5	57	5007-002744	A	TREAD, TREADMILL, W/ OVERMOLD



CHAPCO

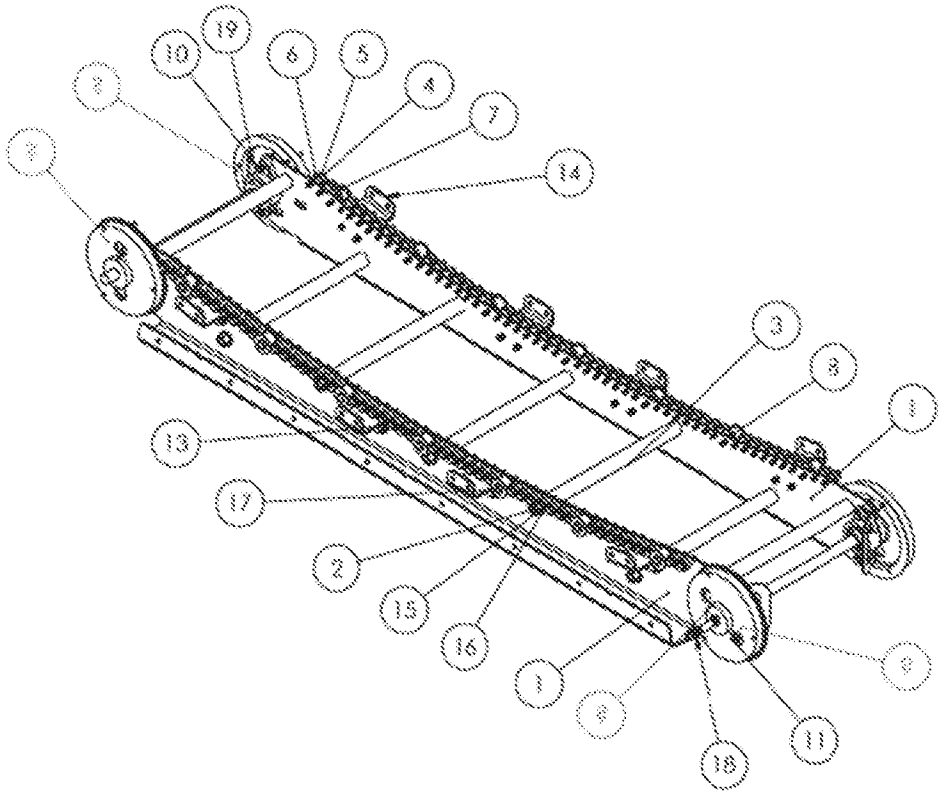
TRUEFORM

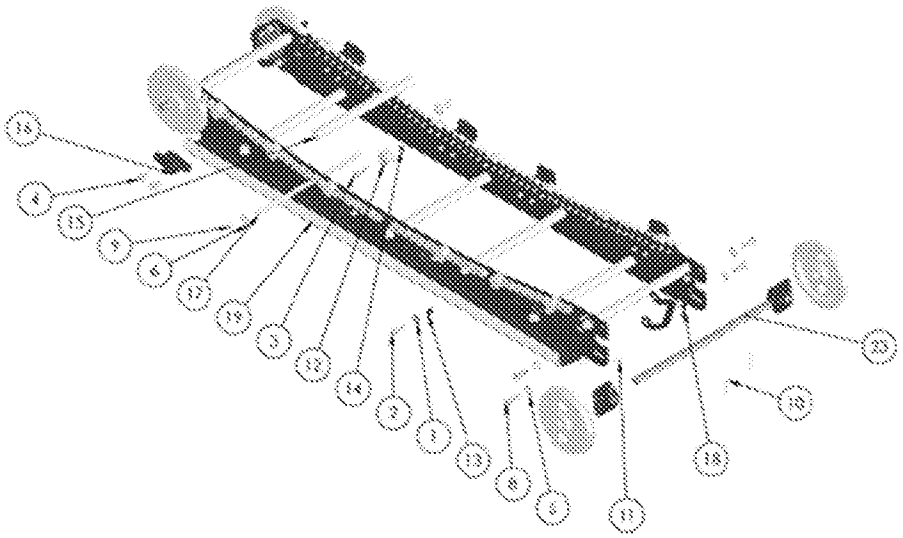
TREADMILL
ASSEMBLY
STAGE 2

5007-A00958_S2

[12] Attached hereto as Exhibit J.

Exhibit 34, SAM0005694[13]





[13] Attached hereto as Exhibit K.

45. As I understand it and from my review of the evidence, the only material difference between the Original and Redesigned TrueForm Runner Treadmills is the location of the "One Way Bearing Assy," which is Item 13 as indicated in the Stage 3 Assembly print above.[14] In the Original TrueForm Runner Treadmill, the "One Way Bearing Assy" was located on the rear shaft of the treadmill.[15] Mr. Rabe, a Chapco engineer, testified that the "One Way Bearing Assy" was moved sometime in 2015 to the front shaft of the treadmill to "avoid a patent issue."[16] To effectuate the change, Chapco swapped the locations of the front and rear shafts.[17]

B. Claim Charts for the '169 and '580 Patents

46. I have analyzed and compared the representative Original and Redesigned TrueForm Runner Treadmills to the construed claims of the '169 and '580 patents. These comparisons are expressed in the form of claim charts, which are attached to this Report. Exhibits E and F detail how each and every claim limitation of the asserted claims of the '169 and '580 patents are literally met.

47. Based on my analysis discussed herein and as set forth in Exhibit E, I believe the Original TrueForm Runner Treadmills literally infringe claims 11-16 of the '169 patent.

48. Based on my analysis discussed herein and as set forth in Exhibit F, I believe the Original and Redesigned TrueForm Runner Treadmills literally infringe claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent.

[14] 30(b)(6) Deposition of Chapco, October 20, 2016, pp. 137-140, 158-159.
[15] Deposition of Jeremiah Rabe, October 18, 2016, pp. 31-34.
[16] Deposition of Jeremiah Rabe, October 18, 2016, p. 34.
[17] 30(b)(6) Deposition of Chapco, October 20, 2016, pp. 158-159, Exs. 34, 44.

C. Technogym SkillMill Product

49. I understand that sometime in 2016, fitness equipment manufacturer, Technogym, introduced the SkillMill product, which is a piece of "functional training equipment" that has a curved, manual treadmill component.[18] Technogym's SkillMill product is depicted below.

50. Based on my review of the information made available to me, the SkillMill product likely infringes at least independent claims 1, 11, and 19 of the '580 patent, reproduced below.

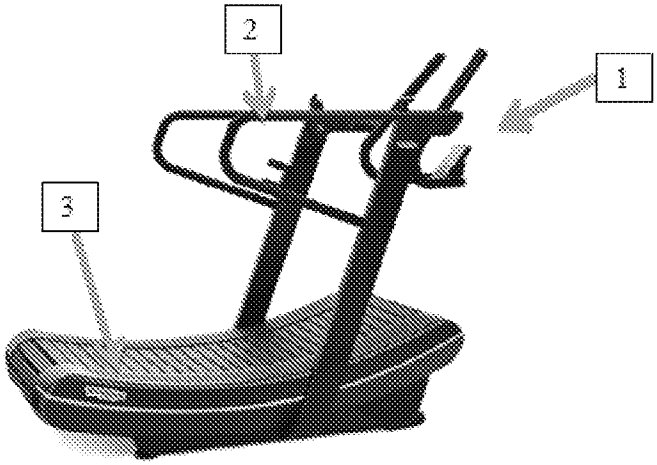
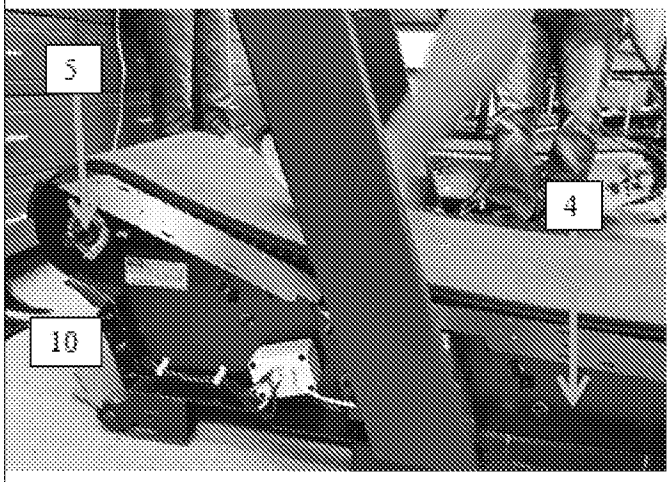
Claim 1	Claim 11	Claim 19
A manually powered treadmill comprising: a frame having a front end	A manually powered treadmill, comprising: a frame having a front end	A manually powered treadmill, comprising: a frame having a front end

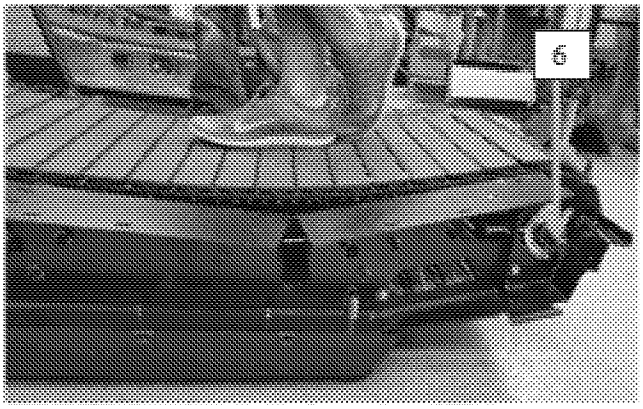
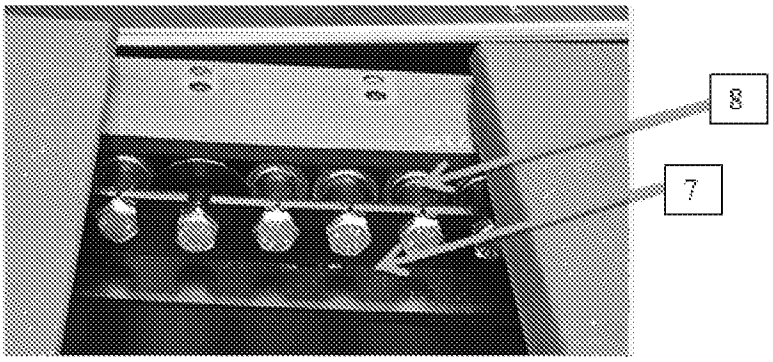
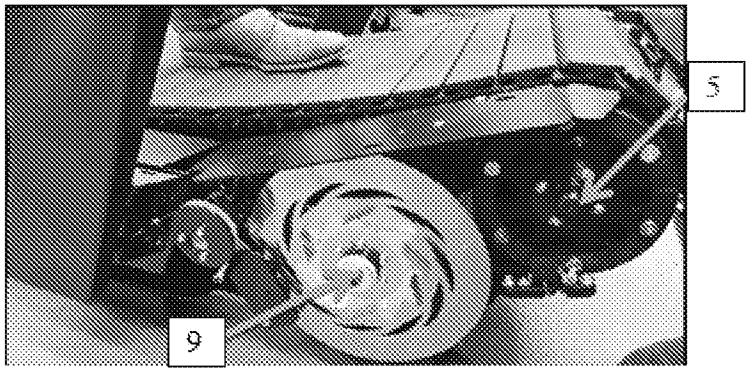
[18] http://www.technogym.com/us/products/functional-flexibility/skillmill.html; Deposition of Douglas Bayerlein, December 14, 2016, pp. 233-234.

Claim 1	Claim 11	Claim 19
and a rear end positioned opposite the front end; a front shaft rotatably coupled to the frame at the front end; a rear shaft rotatably coupled to the frame at the rear end; a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame; a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame; a running belt supported by the first bearing rail and the second bearing rail and disposed about the front shaft and the rear shaft, wherein the running belt follows a curved running surface; and a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.	and a rear end positioned opposite the front end; a front shaft attached to the frame adjacent the front end; a rear shaft attached to the frame adjacent the rear end; a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame; a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame; a running belt at least partially disposed about the front shaft and the rear shaft and at least partially supported by the first bearing rail and the second bearing rail, wherein the running belt includes a front belt portion proximate the front end, a rear belt portion proximate the rear end, and a central belt portion intermediate the front and rear belt portions, wherein the central belt portion is positioned vertically closer to a ground surface supporting the frame than the front and rear belt portions such that the running belt follows a curved running surface;	and a rear end; a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame; a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame; a handrail attached to the frame and structured to provide a support structure for a user of the manually powered treadmill; a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position; at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface; a running belt supported by the first and second bearing rails, wherein the running belt follows a curved running surface;

Claim 1	Claim 11	Claim 19
	and a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.	and a safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt in a first direction and permit movement of the running belt in a second direction opposite the first direction.

51. As is apparent from a review of the claim language, these independent claims require a safety device as well as various other components of a curved, manual treadmill. While each and every element recited in the claim language must be present for the SkillMill to infringe, the infringement analysis appears to primarily hinge on the "safety device" element. The below annotated photographs illustrate how the SkillMill product likely meets each and every claim limitation in claims 1, 11, and 19 of the '580 patent.

Technogym SkillMill Product	Legend
 	1 – Manually powered treadmill 2 – Handrail 3 – Running belt with a curved running surface 4 – Frame 5 – Front shaft 6 – Rear shaft 7 – Bearing rail 8 – Bearings 9 – Safety device 10 – Wheels

Technogym SkillMill Product	Legend
  	1 – Manually powered treadmill 2 – Handrail 3 – Running belt with a curved running surface 4 – Frame 5 – Front shaft 6 – Rear shaft 7 – Bearing rail 8 – Bearings 9 – Safety device 10 – Wheels

IX. RESERVATIONS

52. I have been advised by counsel for Woodway that the parties in the litigation are under a continuing obligation to supplement any discovery that has been provided during this

litigation. Therefore, because new materials or information may become available which could further support or modify the conclusions that I have reached to date, I expressly reserve the right to amend, expand, add, supplement, change, alter, or otherwise modify my opinions. Any changes or necessary amplification of my opinions and conclusions will be addressed in supplemental reports or testimony, which I reserve the right to provide.

53. Further, I reserve the right to consider and comment on any expert reports or statements and testimony of any Chapco and/or Samsara expert(s) in this matter.

54. If I am called to testify, I expect and intend to use exhibits and demonstratives relating to the subject matter of my testimony. These exhibits and demonstratives may include portions of the materials included in this report (and Exhibits hereto) as well as diagrams, models, photographs, or physical samples of the structures described in those items. Portions of these documents may be enlarged, colored, or otherwise adapted to illustrate my opinions. I may also rely on claim charts, demonstrative exhibits, and summaries that have not yet been prepared.

X. SIGNATURE

I hereby certify under the penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Date: March 2, 2017

Kim B. Blair, Ph.D.

Exhibit C

Kim B. Blair, Ph.D.

kbb@stie-consulting.com +1 781.266.6375

PROFILE

Extensive experience in the development of innovative solutions to challenging technical problems in academic, start-up, small-medium enterprise, and large corporate cultures. Proven skills in strategic planning, innovation management, business development, consulting firm operations, project management, product development, team building, and engineering design and analysis. Over ten years experience developing and delivering innovative, hands-on educational programs in engineering, product development process, and innovation process.

EXPERIENCE

STI&E CONSULTING **Arlington, MA**

A Sports Technology Innovation & Engineering consultancy

Founder **2017 – Present**

Provide business and strategic planning, technology scouting, open innovation, technology development and assessment, and development of strategic alliances to the sports industry. Serve as advisory board member for emerging companies developing innovative sports products using advanced technology. Provide expert witness services in patent infringement cases.

COOPER PERKINS, INC. **Lexington, MA and San Francisco, CA**

A technology development and product engineering consultancy

Vice President Business Development & Manager Sports Engineering Practice **2010 – 2017**

Cooper Perkins is a product engineering and technology development consulting firm specializing in the design of highly integrated electro-mechanical systems. Member of five-person senior management team. Led business development and client facing operations resulting in a period of significant company growth. Managed client relationships in a number of industry sectors. Managed and supported projects in sports engineering including research and development, new product innovation, product development, development of product testing capabilities, technology assessment, and patent litigation support.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY **Cambridge, MA**

Department of Aeronautics and Astronautics and Department of Mechanical Engineering

External Advisor, Sports Technology and Education @ MIT **2012 – Present (Pro-Bono)**

Sports Technology and Education @ MIT (STE@M) is the re-birth of the Sports Innovation Program, now based in the department of mechanical engineering, but reaching across the MIT campus. Work with MIT faculty to define the mission of the new entity and develop educational and outreach programs to support that mission. Focused on growing corporate involvement and managing the MIT - Loughborough University student exchange program.

Founding Director, Sports Innovation @ MIT **1999 – 2003, 2003 – 2012 (Pro-Bono)**

Founded a unique sports product development research and educational center. Lead multiple one to six member product development teams in numerous projects focused on sports products, sports product design tools, and sports performance monitoring systems. Develop business and operational plans using market research results. Negotiated intellectual property policies and contractual agreements for program sponsors. Over 100 students have been involved in the program, resulting in over 30 BS theses, two MS theses, and two MEng theses.

Lecturer, MIT Department of Aeronautics and Astronautics **1999 – 2003**

Lead Instructor, Experimental Projects I/II. Led a team of three faculty, four technical instructors, and 40 project teams consisting of a faculty advisor and two students through a two-semester senior thesis course requiring conception through implementation of an experimental project. Course content included project management, experiment design, and technical communications. *Lecturer*, Structural Dynamics (graduate course). *Co-developer and co-instructor*, Advanced Dynamics (undergraduate course).

LOUGHBOROUGH UNIVERSITY **Leicestershire, UK**

Wolfson School of Mechanical, Electrical and Manufacturing Engineering

Visiting Professor **2008 – Present**

Advise on research and teaching initiatives. Developing student exchange program between MIT STE@M and the Loughborough Sports Technology Institute. Serve as an external examiner for Loughborough Ph.D. student theses.

SPORTS INNOVATION GROUP LLC **Arlington, MA**

A consultancy bringing strategy, innovation and technology expertise to the sports industry.

Founder/President **2000 – 2009**

Provided business and strategic planning, technology scouting, open innovation, technology development and assessment, and development of strategic alliances to the sports industry. Serve as advisory board member for emerging companies developing innovative sports products using advanced technology. Provide expert witness services in patent infringement cases.

MOLDYN, INC. **Cambridge, MA**

Launched as a division of Photon Research Associates to develop biomechanics, molecular modeling, and bioinformatics software products. Purchased by Structural Bioinformatics, Inc. in 2000.

Senior Staff Scientist **1992 – 1999**

Senior Management: Member of 3-person management team responsible for all company operations. Individually responsible for IT infrastructure and support team.

Principal Investigator: Directed four NASA-sponsored projects with total revenue of $1.4 million in two product development areas. (1) Coupling of multi-body dynamics analysis techniques modeling human motion with general systems performance theory. (2) Development of a software infrastructure coupling structures, dynamics and controls analyses for complex satellite systems.

Task Leader: Key contributions in the development of MBO(N)D a molecular dynamics analysis tool.

NASA, JOHNSON SPACE CENTER **Houston, TX**

Aerospace Engineer (Summer Intern/Graduate Co-op – 15 months total) **1987 – 1990**

Investigated dynamic interaction between payloads and their attachment points in the Space Shuttle. Adapted lunar-landing simulation software for Mars Lander program. Studied Space Shuttle nose-gear landing loads to define the conditions limiting shuttle landings at Kennedy Space Flight Center.

PURDUE UNIVERSITY **West Lafayette, IN**

Graduate Student Schools of Mechanical Engineering and Aeronautics and Astronautics **1985 – 1992**

Doctoral Research: Thesis topic: Nonlinear Dynamic Response of Shallow Arches to Harmonic Forcing.

Master's Research: Developed analytical model to estimate error in measurement of crack length in fatigue test specimens. Performed fatigue testing on advanced aluminum alloys.

Teaching Assistant: Developed the lab section of a junior-level mechanical design course and supervised other lab instructors. Guest lectured in graduate fatigue course. Managed logistics of graduate distance learning courses. Assisted in undergraduate and graduate courses in structures and dynamics.

ALPO PETFOODS, INC. **Crete, NE**

Associate Project Engineer **1983 – 1985**

Directed high-speed, pet food manufacturing line upgrades from conception through start up. Directly responsible for $500K, and assisted with $400K, of capital projects.

EDUCATION

PURDUE UNIVERSITY West Lafayette, IN
Ph.D., Aeronautics and Astronautics 1992
M.S., Mechanical Engineering 1987

UNIVERSITY OF NEBRASKA Lincoln, NE
B.S., Mechanical Engineering 1983
B.A., Psychology 1981

PUBLICATIONS, PRESENTATIONS, MEDIA

Lead Author: 5 journal articles, 12 conference proceedings, 1 book chapter.

Contributing Author: 2 journal articles, 5 conference proceedings.

Invited Presentations: Smithsonian Institute Lemelson Foundation, IDEAS Boston 2004, University of London, Loughborough University, École Polytechnique Fédérale de Lausanne, University of Nebraska, Boston University, The International Congress on Technological and Social Innovation in Sport (Spain), the Sporting Goods Manufacturers Association International Business Intelligence Series, MIT Center for Innovation and Product Development, The 2005 Growth and Innovation Conference, New York.

Media: Featured in regional, national, and international print, radio, or television programs.

PROFESSIONAL ACTIVITIES

Societies, Journals and Conferences: Secretary, President and Past President - International Sports Engineering Association, Member - American Society of Mechanical Engineers, Editorial Board - Journal of Sports Engineering and Technology, Reviewer - Journal of Sports Engineering, Scientific Committee Member - Engineering of Sport Conferences 5-11, and Asia Pacific Congress on Sports Technology 4.

Educational Outreach: Boston Museum of Science, ISEA Summer School in Prato, Italy, Sport Science, Engineering and Technology Summer Camp for Young Women in Cambridge, MA.

AWARDS

University of Nebraska Alumni Achievement Award, 2005.

Eagle Scout, Overland Trails Council, Grand Island, Nebraska, 1973.

OTHER INTERESTS

MIT Triathlon Club: Faculty advisor. Guided club officers from conception through recognition as an MIT Club Sport. Delivered talks and guidance on getting involved in the sport and training programs.

Team Psycho Ltd. (a New England elite triathlon team): Former President, Board of Directors. Led team through 50% membership growth and incorporation as a nonprofit enterprise. Triathlete: Competitions include Regional and US Championships, Ironman Austria, and Ironman World Championships.

PROFESSIONAL AFFILIATIONS

ISEA, International Sports Engineering Association, Past President 2014 – 2016, President 2010 – 2014, Secretary 2008 – 2010.

Journal of Sports Engineering and Technology, Editorial Board, 2007 – 2010.

Reviewer, Journal of Applied Biomechanics, 2009.

National Science Foundation Design Science Workshop Series, 2008 – 2009.

Golf Digest Technical Advisory Group Member, Technical Review of 2006 Golf Product Offerings, Naples, FL. October 2005.

Golf Digest Technical Advisory Group Member, Technical Review of 2005 Golf Product Offerings, Las Vegas, NV. October 2004 and the PGA Show, Orlando, 2005.

IMCRC International Expert Review Committee Member, Loughborough University, UK, 2004 – 2008.

JOURNAL ARTICLES AND BOOK CHAPTERS

Crouch, T. N., Burton, D., LaBry, Z. A., and Blair, K. B., "Riding Against the Wind – A Review of Competition Cycling Aerodynamics," Invited Paper, Journal of Sports Engineering, In Press.

Caine, M. P., Blair, K. B., and Vasquez, M., "Materials and Technology in Sport", Invited Commentary, *Nature Materials*, Vol. 11, August 2012.

Blair, K. B., Chew, G-L, and Cote, M., 2007, "The Effect of Static Leg Position and Cadence on the Drag of a Cyclist," *Human Power eJournal,* Article 14, Issue 4.

Blair, K. B., 2007, "Materials and design for sports apparel," *Materials in Sports Equipment (Volume 2),* Woodhead Publishing Limited, Cambridge, UK, pp 60-86.

Blair, K. B., Custer, D., Graham, J., Okal, M., 2005, "Analysis of Fatigue Failure in D-Shaped Carabiners," *Sports Engineering*, Vol. 8, No. 2, pp 107-113.

Chun, H. M., Padilla, C. E., Alper, H. E., Chin, D. N., Watanabe, M. Karlov, V. I., Soosaar, K., Blair, K. B., Becker, O., Caves, L, Nagle, R., and Farmer, B. L., 2000, "MBO(N)D: A Multi-body Method For Long-Time Molecular Dynamics Simulations," Journal of Computational Chemistry, Vol. 21, No. 3, pp. 159-184.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1997, "Harmonic Balance and Continuation Techniques in Nonlinear Dynamics with an Application to Duffing's Equation," Journal of Sound and Vibration, Vol. 202, No. 5, pp. 717–731.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1996, "Nonlinear Dynamic Response of Shallow Arches to Harmonic Forcing," Journal of Sound and Vibration, Vol. 194, No. 3, pp. 353–367.

CONFERENCE PAPERS

Berry, M., Las Fargeas, J., and Blair, K. B., 2010, "Wind Tunnel Testing of a Novel Wingsuit Design," *The Engineering of Sport 8*, Proceedings of the 8th Conference of the International Sports Engineering Association, Vienna, Austria, Procedia Engineering, Vol. 2, No. 2, pp 2735-2740.

Blair, K. B., Turner, J. M., and Vasquez, M., "High Speed Sensor and Testing System for Baseball Chest Protectors," *The Impact of Technology on Sport III*, Proceedings of the 4th Asia Pacific Congress on Sports Technology, Honolulu, HI, USA, eds F. Alam, L. V. Smith, A. Subic, F. K. Fuss and S. Ujihashi, Publishing Solutions Pty Ltd, pp 435-439, 2009.

CONFERENCE PAPERS (Continued)

Holschuh, B. T., Gray, T. L., Blair, K. B., 2009, "Golf Driver/Ball Impact Acoustic Measurement System," *The Impact of Technology on Sport III*, Proceedings of the 4th Asia Pacific Congress on Sports Technology, Honolulu, HI, USA, eds F. Alam, L. V. Smith, A. Subic, F. K. Fuss and S. Ujihashi, Publishing Solutions Pty Ltd, pp 287-291.

Blair, K. B., Vasquez, M., and Groudas, P., 2008, "Testing Procedures for Baseball Chest Protection Equipment," *The Engineering of Sport 7*, Proceedings of the 7th International Conference on the Engineering of Sport, Biarritz, France, Springer-Verlag, Vol. 2, pp. 215-222.

Blair, K. B., and Sidelko, S., 2008, "Aerodynamic Performance of Cycling Time Trial Helmets," *The Engineering of Sport 7*, Proceedings of the 7th International Conference on the Engineering of Sport, Biarritz, France, Springer-Verlag, Paris, France, Vol. 1, pp 371-377.

Blair, K. B., Williams, G., and Vasquez G., 2007, "The Effect of Wood Properties on the Performance of Baseball Bats," in: Fuss F.K., Subic A. and Ujihashi S. (Eds.) *The Impact of Technology on Sport II*. Proceedings of the Asia-Pacific Congress on Sports Technology, Singapore, Taylor & Francis Group, London, pp 345-349.

Blair, K. B., 2006, "Synopsis of Current Developments: Modeling Equipment," *The Engineering of Sport 6*, Proceedings of the 6th International Conference on the Engineering of Sport, TUM - Munich University of Technology, Germany, Vol. 2, pp 107-108.

Blair, K. B., Culligan, K. F., and Walfisch, D., 2006, "Analysis of Fulcrum Skate Performance," *The Engineering of Sport 6*, Proceedings of the 6th International Conference on the Engineering of Sport, TUM - Munich University of Technology, Germany, Vol. 3, pp 301-306.

Blair, K. B., Custer, D., Alziati, S., and Bennett, W., 2004, "The Effect of Load Rate, Placement Angle, and Ice Type on Ice Screw Failure," *The Engineering of Sport 5*, Proceedings of the 5th International Conference on the Engineering of Sport, University of California, Davis, Vol. 2, pp 283-289.

Hastings, A. Z. Blair, K. B., Culligan, K. F., and Pober, D. M., 2004, "Measuring the effect of transmitted road vibration on cycling performance," *The Engineering of Sport 5*, Proceedings of the 5th International Conference on the Engineering of Sport, University of California, Davis, Vol. 2, pp 619-625.

Young, L. R., Bush, D. J., Blair, K. B., 2003, "Rear-Releasable Ski Boots for ACL Protection: An Engineering Evaluation," International Society for Skiing Safety, 15th Congress, St. Moritz, Switzerland.

Brodeur, D. R., Young, P. W., and Blair, K. B., 2002, "Problem-Based Learning in Aerospace Engineering Education," Proceedings of the American Society for Engineering Education Annual Conference and Exposition, Montreal, Canada.

Blair, K. B., Custer, D., Graham, J., Okal, M., 2002, "Analysis of Fatigue Failure in D-Shaped Carabiners," 2nd International Conference on Science and Technology in Climbing and Mountaineering, Leeds, United Kingdom.

Chun, H. M., Padilla, C. E., Blair, K. B., Li, J. H., Haney, D. N., and Alper, H. E., 1994, "A Reduced Variable Approach for Long–Time Dynamics of Large Macromolecular Systems," Air Force Materials Directorate Workshop on Large Scale Simulations in Chemistry/Materials Science.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1994, "Dynamic Response of a Shallow Arch to Antisymmetric, Harmonic Loading," Proceedings of the 5th International Conference on Recent Advances in Structural Dynamics, Southampton, England, Vol. I, pp. 326–339.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1992, "Nonlinear Dynamic Response of Shallow Arches," Proceedings of the 33rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Dallas, TX, pp. 2376–2384.

Blair, K. B., Krousgrill, C. M., and Farris, T. N., 1992, "Harmonic Balance and Continuation Techniques in Nonlinear Dynamics with an Application to Duffing's Equation," ASME Applied Mechanics, Materials and Aerospace Summer Meeting, Scottsdale, AZ, 1992.

CONFERENCE COMMITTEES

Session Chair, 11th International Conference on Engineering of Sport, Delft University of Technology, Delft, NL, July 2016.

Session Chair, 10th International Conference on Engineering of Sport, Sheffield Hallam University, Sheffield, UK, July 2014.

Scientific Committee Member, 10th International Conference on Engineering of Sport, Sheffield Hallam University, Sheffield, UK, July 2014.

Session Chair, 9th International Conference on Engineering of Sport, University of Massachusetts - Lowell, Lowell, MA, July 2012.

Scientific Committee Member, 9th International Conference on Engineering of Sport, University of Massachusetts - Lowell, Lowell, MA, July 2012.

Session Chair, 8th International Conference on Engineering of Sport, Fachhochschule Technikum Wein, Vienna, Austria, July 2010.

Scientific Committee Member, 8th International Conference on Engineering of Sport, Fachhochschule Technikum Wein, Vienna Austria, July 2010.

Scientific Committee Member, 4th Asia Pacific Congress on Sports Technology, Honolulu, HI, September 2009.

Session Chair, 7th International Conference on Engineering of Sport, Ecole Supérieure des Technologies Industrielles Avancées, Biarritz, France, June 2008.

Scientific Committee Member, 7th International Conference on Engineering of Sport, Ecole Supérieure des Technologies Industrielles Avancées, Biarritz, France, July 2008.

Member, Board of Advisors, Sporting Goods Manufacturers Association Sport + Technology Summit, San Diego, CA, October 2007.

Conference Chair, Better Golf Through Technology Conference, Massachusetts Institute of Technology, March 2007.

Session Chair, 6th International Conference on Engineering of Sport, Technischen Universität München, Munich, Germany, July 2006.

Scientific Committee Member, 6th International Conference on Engineering of Sport, Technischen Universität München, Munich, Germany, July 2006.

Conference Chair, Better Golf Through Technology Conference, Massachusetts Institute of Technology, February 2006.

Session Chair, "What Industry Wants – A Panel Discussion," 5th International Conference on Engineering of Sport, University of California – Davis, September 2005.

Scientific Committee Member, 5th International Conference on Engineering of Sport, University of California – Davis, September 2005.

INVITED PRESENTATIONS

"Smart Devices in Sports Products", Guest lecture for EM 153 – Management of Innovation, Gordon Institute, Tufts University, February 2017.

"Smart Devices in Sports Products", Guest lecture for ME 597 – Sports Technology and Entrepreneurship, School of Materials Engineering, Purdue University, February 2017.

INVITED PRESENTATIONS (Continued)

"Hardware Development for Smart Products in Sports", Invited seminar, Sports Technology Institute, Wolfson School of Mechanical, Electrical and Manufacturing Engineering, Loughborough University, November 2016.

"Hardware Development for Smart Products in Sports", Invited entrepreneurship seminar, Loughborough University London, November 2016.

"Pressure Sensitive Adhesives - An Application Engineer's Point of View", Keynote presentation, 3M 2015 PSA Symposium, 3M Headquarters, St. Paul, MN, May 2015.

"Hardware Innovation and Product Development Process", 3M Automotive Applications Group Lunch and Learn, 3M Headquarters, St. Paul, MN, May 2015.

Panelist – "Innovations Fueling the Sports and Entertainment Industries", Licensing Executives Silicon Valley Chapter Fifteenth Annual Conference, Palo Alto, CA, April 2015.

"Wearable Technology – The Hardware Challenge", Evolve – The CSE Innovation Summit, Atlanta, GA, January 2015.

"Multi-Disciplinary Engineering for the Development of Advanced Applications in Sport Textiles", The AISTS & CSEM Conference on Smart Textile Opportunities for Sport, Rolex Centre, École Polytechnique Fédérale de Lausanne, Switzerland, November 2013.

"The Disciplines of Technology Development and Product Design", Sports Tech and Innovation Summit, The Emirates Stadium, London, UK, November 2013.

"The Disciplines of Technology Development and Product Design", Executive MBA at the School of Management in Fribourg Workshop, Swissnex, Cambridge, MA, October 2013.

"The Disciplines of Technology Development and Product Design", Sports Analytics Innovation Meet Up, Boston, MA, July 2013.

"The Disciplines of Technology Development and Product Design", Centre for Sport and Exercise Sciences, Sheffield Hallam University, Sheffield, UK, September 2012.

Panelist – "How Can Sport Drive Engineering Innovation?", Royal Academy of Engineering, London, UK, September, 2012.

"The Disciplines of Technology Development and Product Design", Swissnex Venture Leaders Conference, Cambridge, MA, October 2011.

"The Disciplines of Technology Development and Product Design", Department of Mechanical and Aerospace Engineering, Rutgers University, Piscataway, NJ, October 2011.

"The Disciplines of Technology Development and Product Design", Department of Industrial and Systems Engineering at Rensselaer Polytechnic Institute, Rochester, NY, October 2011.

"The Disciplines of Technology Development and Product Design", Department of Mechanical & Materials Engineering Pierson Lecture Series, University of Nebraska, Lincoln, NE, September 2011.

"The Disciplines of Technology Development and Product Design", Nebraska Society of Professional Engineers, Eagle, NE, September 2011.

Panelist – "Golf Analytics", MIT Sloan Sports Analytics Conference, Cambridge, MA, March 2011.

"The Disciplines of Technology Development and Product Design", Applied Ocean Physics & Engineering Seminar Series, Woods Hole Oceanographic Institute, Woods Hole, MA, February 2011.

"Innovation Workshop," University of Jyväskylä, Jyväskylä, Finland, November 2010.

Panelist – "Performance Enhancement: Will Future Athletes be Formula One or NASCAR?", MIT Sloan Sports Analytics Conference, Cambridge, MA, March 2010.

INVITED PRESENTATIONS (Continued)

"Aerodynamics of Sports Balls," adidas International, Pre-Release of 2010 World Cup Soccer Ball, Scheinfeld, Germany, November 2009.

"Innovation in Sports Technology – Developing Marketable Products," University of Bridgeport, November, 2009.

"Applications of High Speed Imaging in Sports Product Design," Massachusetts Institute of Technology Professional Education Short Program in High-Speed Imaging for Motion Analysis: Systems and Techniques, June 2009.

"Engineering Sporting Excellence," Sports Engineering and Technology, Institute of Mechanical Engineers, London, March 2009.

"Innovation in Sports Technology – Developing Marketable Products," Purdue University Mechanical Engineering Design Seminar, April, 2009.

Panel Moderator – Sport 2.0: The Evolution of Technology and Sports, MIT Sloan Sports Analytics Conference, Cambridge, MA, March 2009.

"Innovation in Sports Technology – Developing Marketable Products," New England American College of Sports Medicine Conference, November, 2008.

"Location Switzerland – Sports Business Tour," Switzerland, April 2008.

Panel Moderator – Technology, MIT Sloan Sports Analytics Conference, Cambridge, MA, February 2008.

"Innovative Technologies in Sport," Netherlands Office for Science & Technology, Netherlands Ministry of Economic Affairs, The Hague, The Netherlands, November 2007.

"Building Collaborative Relationships Between Industry, Government and Academia – An International Discussion Panel," SGMA's Sports and Technology Convergence, La Jolla, CA, October 2007.

"Creating Sports Performance Innovations," Jyväskylä Regional Development Company, Jyväskylä, Finland, July 2007.

"Creating Sports Performance Innovations," Oulu Wellness Institute, Oulu, Finland, July 2007.

Panel Moderator – "Sponsorship", MIT Sloan Sports Analytics Conference, Cambridge, MA, February 2007.

"Implementing Sports Performance Innovations in Mass Sports Products," SGMA's Sports and Technology Convergence, La Jolla, CA, October 2006.

"Sports Apparel Aerodynamics," Department of Materials and Textiles," University of Massachusetts Dartmouth, May 2006.

"Cycling Aerodynamics," Exercise and Health Science Department, University of Massachusetts Boston, April 2006.

"Teaching and Research at the MIT Center for Sports Innovation," Sports and Rehabilitation Engineering Center, École Polytechnique Fédérale de Lausanne, Switzerland, November 2005.

"Teaching and Research at the MIT Center for Sports Innovation," NeuroMuscular Research Center Seminar Series, Boston University, October 2005.

"Innovation and Product Development in Sports," Mechanical Engineering Colloquium Series, University of Nebraska, October 2005.

"Predicting the Success of Innovation," The 2005 Growth and Innovation Conference, New York, NY, May 2005.

"New Technology and Sports Equipment," International Business Intelligence Series, Orlando, FL, January 2005.

INVITED PRESENTATIONS (Continued)

"New Technologies to Monitor and Enhance Athletic Performance," CIMIT – Center for the Integration of Medicine and Innovative Technology Forum, Boston, MA, January 2005.

"Technology and Sports," International Congress on Technological and Social Innovation in Sport, San Sebastian, Spain, December 2004.

"Applications of Smart Textiles in the Sports Industry," ESPRC Network: Smart Textiles for Intelligent Consumer Products, London, United Kingdom, June 2004.

"Driving Innovation in Product Development," IDEAS 2004, Boston, MA, June 2004.

"Hands-on Experience in Teaching Innovation and Product Development", Center for Innovation and Product Development Seminar Series, Sloan School of Management, Massachusetts Institute of Technology, Cambridge, MA, April 2004.

"Sports Product Innovation," Lemelson Center's Symposium, Inventing Ourselves, Lemelson Center for the Study of Invention and Innovation, Smithsonian National Museum of American History, Washington, DC, November 2003.

"Sports Product Development in Engineering Education," Queen Mary University of London, United Kingdom, November 2003.

"Sports Product Development in Engineering Education," Loughborough University, United Kingdom, November 2003.

"Advanced Development of Sports Equipment – Prototype Production," United States Olympic Committee Coach's Conference, Colorado Springs, CO, April 2003.

"Teaching Product Development in a Laboratory Context," The 2002 MIT Engineering/Manufacturing Conference: Innovations in Product Development, Cambridge, MA, October 2002.

EDUCATIONAL OUTREACH

WGBH "Fetch" Scientific Advisory Board, 2007 – 2009.

Lecturer, MIT Science of Baseball Program, Cambridge, MA, July 2008.

Sports Product Development Segment, Teacher's Domain, Multimedia Resources for the Classroom and Professional Development, http://www.teachersdomain.org, Produced by WGBH, July 2006.

Course Faculty, International Sports Engineering Association Summer School, Lectures in aerodynamics, materials, and a seminar in product development process, Prato, Italy, June 2005.

Associate Director Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, MIT, Cambridge, MA, August 2005.

Course Faculty, Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, MIT, "Wind Tunnel Testing of Sports Equipment", and "Understanding User Needs in Sports Equipment Design," Cambridge, MA, August 2005.

Boston Museum of Science Lowell Institute Lecture Series, "Material Science in Sports: High Performance Equipment Design," Boston, MA, December 2004.

Course faculty, Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, MIT, "Wind Tunnel Testing of Sports Equipment", and "Understanding User Needs in Sports Equipment Design," Cambridge, MA, August 2004.

EDUCATIONAL OUTREACH (Continued)

Boston Museum of Science Lowell First Friday Lecture Series, "Aerodynamics and Sports," Boston, MA, February 2004.

Get SSET!: Sport Science, Engineering and Technology Summer Camp for Young Women, "Wind Tunnel Testing of Sports Equipment," MIT, Cambridge, MA, August 2003.

Aerodynamics and wind tunnel testing advisor, POVme, an educational science of sports television program aimed at preteens and teens, primarily targeting young women, minorities, and the disabled who have a strong interest in sports, May 2003.

Member, Board of Advisors, Harvard-Smithsonian SportSmarts, a national education campaign of the designed to increase the understanding and appreciation of science through sports, 2000 – 2004.

AWARDS FOR SUPERVISED ACADEMIC PROJECTS

Aeronautics and Astronautics Department, MIT: Leaders for Manufacturing Award for directly dealing with issues that are related to the interface of engineering and manufacturing, Santiago, N., and Williams, G., "Performance Benefits of Handle Flex in Baseball Bats," June 2006.

ispo - Technical University of Munich: Academic Challenge Award, Munich, Germany. 1st Place Popular and Leisure Sports Category, Okal, M., "Carabiner Damage Detection Device," February 2004.

ispo - Technical University of Munich: Academic Challenge Award, Munich, Germany. 2nd Place Popular and Leisure Sports Category, Wang, C-A, "Triathlon Shoe Design", February 2004.

Aeronautics and Astronautics Department, MIT: United Technologies Corporation Award for outstanding achievement in the design, construction, execution, and reporting of an undergraduate experimental project, Alziati, S. A., and Bennett, W. L. M., "Simulating and Testing Ice Screw Performance in the Laboratory," May 2003.

2nd International Conference on Science and Technology in Climbing and Mountaineering, Leeds, United Kingdom: Best Student Presentation in Technological Fields, Okal, M., "Analysis of Fatigue Failure in D-Shaped Carabiners", April 2002.

Aeronautics and Astronautics Department, MIT: Admiral Luis de Florez Award for original thinking or ingenuity, Okal, M., and Graham, J., "Fatigue Failure of Climbing Carabiners," May 2002.

SUPERVISED THESES

Li, Harriet and Obropta, "Bicycle Fork Aerodynamics," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2012.

Hyatt, D., "Proposed Testing Method for Foam Padding," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2011.

Ryne, B, and Kays, C., "Laptop Computer Shock and Vibration Characterization in Commuter Bike Packs," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, December 2010.

Racz, R., "Development of an Improved Wind Tunnel Test Platform for Bicycles," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2010.

Berry, M., Fargeas, J. L., "Lift to Drag Increase of Wingsuits," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2010.

SUPERVISED THESES (Continued)

Vasquez, M., "Economic and Technological Advantages of Using High Speed Sintering as a Rapid Manufacturing Alternative in Footwear Applications," M Eng, Materials Science and Engineering, Massachusetts Institute of Technology, June 2009.

Pier, T., "Development of a Camber Measurement System for Skis and Snowboards," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2008.

Desrochers, C., "Product Development of a Resistive Athletic Suit," SB Mechanical Engineering, Massachusetts Institute of Technology, January 2008.

Cote, M., "Product Design and Development of an Aerodynamic Hydration Systems for Bicycling and Triathlon," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

LaCrosse, B. A., "Measurement of Baseball Glove and Hand Dynamics," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

Renjifo, J. F., "Developing the Next "Wow" Fitness Product," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

Sidelko, S., "Aerodynamic Performance of Time Trial Helmets," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2007.

Liburd, S., and Naranjo, J. L., "Thermal Performance of Under Armour Sports Apparel," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2007.

Gray, T., and Holschuh, B., "Golf Driver-Ball Impact Acoustic Measurement System," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2006.

Santiago, N., and Williams, G., "Performance Benefits of Handle Flex in Baseball Bats," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2006.

Culligan, K., and Walfisch, D., "Analysis of a New Speed Skating Hinge Mechanism," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2005.

Kendall, B., and Newell, D., "Friction Testing of Luge Runners," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2005.

Yandell, A., "Design of Wind Tunnel Test Device for Spinning Sports Balls," SB Ocean Engineering, Massachusetts Institute of Technology, June 2005.

Raghunathan, S., "Potential Impact of Advanced Sensing and Communication Technologies in Sports Products", SB Mechanical Engineering, Massachusetts Institute of Technology, June 2005.

Hildago, M., "Integration of Computer Based Design Tools in the Athletic Shoe Design Process," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2004.

LaValley, Z, "Teaching Motion to a Group Using Integrated Motion Sensing Systems," MEng Electrical Engineering and Computer Science, Massachusetts Institute of Technology, June 2004.

Hoying, B., "Wind Tunnel Interface for Testing Bicycle Aerodynamics," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2003.

Yang, C., "Materials Selection in Shoe Sole Design," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2003.

Alziati, S. A., and Bennett, W. L. M., "Simulating and Testing Ice Screw Performance in the Laboratory," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2003.

SUPERVISED THESES (Continued)

Talon, L., "Development of a Biofeedback System for Optimizing Cycling Performance Assessment During Wind Tunnel Testing," SM Aeronautics and Astronautics, Massachusetts Institute of Technology, August 2002.

Blundo, J. "Design of an Ultra-Marathon Shoe," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2002.

Bush, D. "Evaluation of the Lange V-9 Ski Boot Release Mechanism," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2002.

Mauger, A., "Optimizing the Incorporation of Technology into the Custom Golf Club Market," SM Systems Design and Management, Massachusetts Institute of Technology, January 2002.

Graham, J., and Okal, M., "Fatigue Failure of Climbing Carabiners," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, December 2001.

Bonnell, J., Pendexter, M., "Characterization of In-Line Skating Motion," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2001.

Loreto, A., "A Standard Test Method for Football/Hockey Body Padding and Its Application to the DF-4 Product," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2001.

Oloo, J., "Precise Measurement of Bicycle Wheel Aerodynamics," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2001.

Spinak, A., "Characteristics of In-line Skate Vibrations," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, June 2001.

Wang, C., "Design of a Running Shoe for Triathlon," SB Mechanical Engineering, Massachusetts Institute of Technology, June 2001.

Willets, A. C., and Yi, S., "Core Muscle Stabilization Product Development," SB Mechanical Engineering, Massachusetts Institute of Technology, January 2001.

Lanphier, G., and Pilkington, L., "Energy Dissipation into a Bicycle Rider," SB Aeronautics and Astronautics, Massachusetts Institute of Technology, December 2000.

McKenney, K., "Development of a Weight Fixture for Improved Abdominal Fitness," SB Mechanical Engineering, Massachusetts Institute of Technology, May 2000.

EXTERNAL EXAMINATIONS

"Flow Topology and Large-Scale Wake Structures Around Elite Cyclists," Timothy Neville Crouch, Monash University, Australia, Advisor: Professor John Sheridan, December 2013.

"A Study of the Relationship Between Surface Features and the In-Flight Performance of Footballs," David Mark Rogers, Ph.D., Loughborough University, United Kingdom, Advisor: Dr. Andy Harland, June 2011.

"The Design and Development of a Novel Training System for Cricket," Laura M. Justham, Ph.D., Loughborough University, United Kingdom, Advisor: Dr. Andy West, May 2007.

"Customisation of Sport Grips Using Rapid Manufacturing Methodologies," David Barrass, Ph.D. Loughborough University, United Kingdom, Advisor: Professor Roy Jones, November 2006.

"Possible Ways to Improve the Comfort, Fit and Visual Performance of Swimming Goggles," Dan Coe, Ph.D., Loughborough University, United Kingdom, Advisor: Dr. Mike Caine, September 2005.

MEDIA COVERAGE

"Wearable Devices Give Athletes a Personal Performance Boost", *iQ Intel*, iq.intel.com, June 12, 2015.

"Gaining STE@M in Sports Technology, *Slice of Life*, Blog by the MIT Alumni Association, slice.mit.edu, June 17, 2014.

"World Cup 2014: Adidas' Barzuca Ball is the Most High Tech Yet, *CBSNews*, cbsnews.com, June 10, 2014.

"Sports Wearables are the Wave of the Future", *The Boston Globe*, bostonglobe.com, May 25, 2014.

"Engineering Thrills – MIT's STE@M is Developing Next Generation Sporting Equipment, technologyreview.com, February 18, 2014.

"Winter Olympics 2014: The Fine Line Between Innovation and Technological Doping", *CBSNews*, cbsnews.com, February 12, 2014.

"Winter Olympics 2014: At Winter Olympics, Innovation Found in Unexpected Sports", *CBSNews*, cbsnews.com, February 11, 2014.

"Winter Olympics 2014: Team USA Olympic Speed Skaters Will Race in World's Fastest Suit", *CBSNews*, cbsnews.com, February 10, 2014.

"Winter Olympics 2014: Team USA's Bobsled, Luge and Skeleton Get High-Tech Tune-Up", *CBSNews*, cbsnews.com, February 7, 2014.

"New Technologies Ready to Assist NFL", *The Boston Globe*, bostonglobe.com, May 25, 2014.

"From a Pig's Bladder to Composite Microfiber: The Evolution of Sports Equipment", *Slice of Life*, Blog by the MIT Alumni Association, slice.mit.edu, August 1, 2012.

"El Doping Technológico Vuelve a Correr en Londres," esmateria.com, July 24, 2012.

"Fashion of The Future," Innovation Hub, WGBH Radio, July 19, 2012.

"Be Flexible. Take Risks. Blair Presents in MME's Pierson Lecture Series", Engineering @ Nebraska, p 19, Autumn 2011.

"Sports Engineering and Cycling Aerodynamics," *The Nebraska Engineer*, Vol. 37, No. 4, July 2011.

"How We Play Sports," *United Hemispheres*, January 2011.

"Its Ruff in the Ring," *Fetch with Ruff Ruffman*, WGBH – Boston, November 2010.

"Aerodynamics in Cyclocross?," *Cyclocross.com*, November 2010.

"Bicycling Wind Tunnel Testing," *Shining City*, NESN – New England Sports Network, September 2010.

"5 Ways to Make your Road Bike a Multisport Machine," *Bicycling Magazine*, April 2010.

"Riding Your Bike in the Aero Position – Interview with Kim Blair," *Bicycling.com*, April 2010.

"Mike Wankum, Wind Chaser," *Chronicle*, WCVB-5, March 31, 2010.

"10 Technologies Transforming Sports," Discovery.com, posted July 2009.

"MIT Students Perform Innovative Sports Research on PORON XRD," *Textile Insight*, March 2009.

"MISTI Selects First Winners of Global Seed Funds," *MIT News*, February, 2009.

"UNL Alumnus Sports Passion for Athletics," *Daily Nebraskan*, October 23, 2008.

"MIT Sports Innovation Program," *NESN - New England Sports Network*, April 30, 2008.

"NHL Suits Up Like Never Before, Hopes Look Will Lure Fans," *Boston Globe*, June 21, 2007

MEDIA COVERAGE (Continued)

"Making Sports an Exact Science - MIT Throws its Brainpower at Equipment Research," *Boston Globe*, April 27, 2008.

"Fitness that Fits – Smartrainer Customizes Workouts," *BusinessWeek*, February 20, 2008.

"Who's No. 1 – Top 20 Countdown of Sports Technology Innovations," *ESPN Classic*, December 2007.

"Technology: New Hockey Uniforms Save Energy," *Discovery News,* online, October 5, 2007.

"Urheilu on jatkuvaa mittaamista", *Kaleva*, 3 Päivänä 2007 (Oulu, Finland newspaper, July 3, 2007).

"Hockey Outfits Go Hi-Tech With MIT Help," MIT News, July 2, 2007.

"From Lincoln to Boston," *Engineering @ Nebraska*, Summer 2007.

"High-Tech Hydration is Boon for Athletes," *Boston Globe*, June 10, 2007.

"From Tee to Cup, It's Technology Season," *Boston Globe,* March 30, 2007.

"Tech Report with Lennard Zinn: The Science Behind the Sport," VeloNews, www.velonews.com, January 23, 2007.

Zinn and the Art of Triathlon Bikes: Aerodynamics, Bike Fit, Speed Tuning, and Maintenance, Lennard Zinn, Velo Press, Boulder CO, 2007.

"Getting Fit Glued To The Tube," *BusinessWeek online*, October 16, 2006.

"MIT Undergrads Have a Corker," *Mass High Tech*, May 22, 2006.

"iClub Looks to Take a Slice Off the Golf Swing Monitoring Market," *Mass High Tech*, April 14, 2006.

"Figuring Ways to Go Faster With the Flow," *Boston Globe*, April 10, 2006.

"Golf's Digital Divide - The New Tools of the Game: $50,000 Simulators and $4,500 Sensor Vests. How Technology is Driving a Wedge Between Haves and Have-nots," *The Wall Street Journal*, April 8-9, 2006.

"Skating on the Cutting Edge - 2 MIT Students See Gold in Design," *Boston Globe*, February 26, 2006.

"Athletic Aging: As the World's Fitness Generation Grows Older, it is Changing the way Doctors and Equipment Makers Look at Exercise," *Newsweek International*, February 20, 2006.

"Cool Research Centers On Olympic Skates," *Tech Talk*, Vol. 50, No. 17, February 15, 2006.

"The Hot List – The Scientists," *Golf Digest*, Vol. 57., No. 2, February 2006.

"Workout Regimens Take Forward Step," *Boston Globe*, December 19, 2005.

"Liberty Seguros: Winds Of Change," *PEZ Cycling News*, www.pezcycling.com, November 2, 2005.

"Flying Solo," *Cycle Sport America,* November 2005.

"Tech Report: The Heirs of Indurain? Contador and Sanchez Hit the MIT Wind Tunnel," *VeloNews*, www.velonews.com, October 26, 2005.

"Hub Firm Spinning Its Wheels for Gain," *Boston Herald*, October 1, 2005.

"Liberty Ensures Its Presence Will be Felt," *Boston Globe*, October 1, 2005.

"Sports Technology and Innovation," *Commonwealth Journal*, WUMB Radio News Magazine, September 18, 2005.

"Alumni Awards," *Nebraska Magazine*, Summer 2005.

"USA: Applying Science to Sports," *HDNet World Report*, HD Net Television Network, August 2005.

"Space Age Sports: Science is Being Utilized to Improve Modern Sports Equipment and Athlete Performance", *The NewsHour*, PBS Television Network, July 2005.

MEDIA COVERAGE (Continued)

"The Hot List – The Scientists," *Golf Digest*, Vol. 56, No. 2, February 2005.

"Gear Heads: At MIT's Center for Sports Innovation, Winning is an Engineering Problem," *Technology Review – MIT News*, Vol. 108., No.2, February 2005.

"Fast Forward: Performance Footwear Technology and Testing are Leaping Into a New Realm," *SGB – Sporting Goods Business*, Vol. 37, Issue 12, December 2004.

"Testing, One, Two, Three," *Mercedes Momentum*, Vol. 10, No. 3, Winter 2004.

"Making the Pitch for Sports Engineering," *SWE - Magazine for Women in Engineering*, Vol. 50, No. 5, Conference 2004.

"Q&A with Kim Blair, Ph.D. of the MIT Center for Sports Innovation," *SportSpin,* www.sportspin.com, October 2004.

"Black Light: The Sorcerer's Stone of Today's Designers, Carbon Fiber – Incredibly Strong and Lightweight – Is Showing Up In Everything From Fishing Rods to Race Cars," *Men's Journal*, September 2004.

"Stuff Yourself Now, Pay Later," *Sporting News*, June 28, 2004.

"Tour Tech - Rocket Science: Mating Aerospace Engineering with Cycling Engineering, Cervélo Has Found a Home at the Tour," *VeloNews*, www.velonews.com, June 25, 2004.

"IDEAS Boston, 2004" *Boston Globe*, June 13, 2004.

"Cervelo & CSC Fine-Tune at MIT," *Cycling News*, www.cyclingnews.com, June 8, 2005.

"High Tech High Performance: Innovative Sporting Products Enhance Performance," *ACE Fitness Matters*, Vol. 10, Issue 3, May/June 2004.

"Weather and Baseball," *Eye on our Atmosphere First Alert Doppler Special*, WBZ-4 Television Network, April 10, 2004.

"What's Next – Advances in Sporting Goods," *SGB – Sporting Goods Business*, Vol. 36, Issue 12, December 2003.

"Top Speed," *Only a Game*, NPR Radio Network, May 24, 2003.

"Space Age Sports at MIT," *Boston Globe*, January 7, 2003.

"A Whole New Ball Game: Engineers are Changing the Face of Sports By Developing All Sorts of Technology That Helps Athletes Move Quicker and Play Harder," *ASEE Prism*, December, 2002.

"Summer Equipment," *Performance*, Discovery Canada Television Series, November 15, 2002.

"Revenge of the Nerds: Who needs NASA? At MIT's Center for Sports Innovation, Brainy Jocks Try to Build a Better Ski Boot and Running Shoe," *Forbes*, September 16, 2002.

"Actually, It Is Rocket Science: A the First Church of What Happens Next – MIT – A NASA Trained Engineer and His Stable of Whiz Kids are Jump-Starting the Future of Outdoor Gear," *Outside*, April 2002.

"Center for Sports Innovation: The Center for Sports Innovation (CSI), an Off Shoot of the Massachusetts Institute of Technology, Plays an Important Part in the Development of New Products for the Sports Industry," *Worth Global Style Network*, www.wgsn.com, October 5, 2002.

"Breaking Out of the Boardroom," *Women's Wear Daily*, December 13, 2001.

"Better Playing Through Science," *Riverdeep*, www.riverdeep.net, March 12, 2001.

"Kill the Ump? Science May Banish Human Error From Officiating," *Bloomberg Press*, December 30, 2000.

MEDIA COVERAGE (Continued)

"Play Like a Pro," *7 News*, WHDH Television Network, December 27, 2000.

"Beyond Gore-Tex: In the Future, Thos Running Shoes Won't Just Cushion Your Feet -- They Might Propel You Like a Rocket. The Latest in Athletic Engineering Is Designed to Turn Weekend Warriors Into Supermen," *GQ*, September 2000.

"Sports Technology: How Much is Too Much?," *Insight*, CNN International Television Network, August 2000.

"New Center Focuses on Athletic Innovation," *Technology Review*, Vol. 103, No. 4, July/August 2000.

"Rocket Science and Sports," *Associated Press Wire Service*, June 24, 2000.

"Can Hamilton Win the Tour? Against the Clock and the Mountains, He's in the Elite," *The Ride*, www.ridezine.com, June 2000.

"Calling Balls and Strikes in an MIT Lab," Brainard Dispatch, May 11, 2012.

"MIT Center for Sports Innovation," *Front Row*, New England Sports Network, April 10, 2000.

"A New Center for Sports Innovation," *MIT Report*, April, 2000.

"High Tech from MIT May Save the Ump and Make Arguments Over Balls and Strikes a Thing of the Past," *Here and Now*, WBUR News Radio, March 20, 2000.

"Pedal Power," *Extreme Machines,* The Discovery Channel Television Network, March 2000.

"MIT Takes Aim at Sporting Goods Innovation," *Sporting Goods Intelligence*, Vol. 17, No. 13, March 27, 2000.

"Computerized Umpiring? That Would Be A Bad Call," *Concord Monitor*, March 25, 2000.

"Athlete Inventors - MIT Students Hit, Run, Field, and then Tinker," *The Christian Science Monitor*, March 9, 2000.

"Building a Better Bat: MIT'S Sports Lab Aims to Give a $4.7 Billion Industry Something it Lacks, Ongoing Innovation through R&D," *The Boston Globe*, February, 24, 2000.

"Research Center Focuses on Oar, Wheel, Rod and Bat," *MIT Tech Talk*, Vol. 44, No. 18, January 26, 2000.

"The Future of Sports," *7 News*, WHDH Television Network, December 24, 1999.

"Ride With the Wind," *MIT Tech Talk*, Vol. 44, No. 13, November 17, 1999.

LITIGATION SUPPORT

I have been qualified as an expert in District courts. I have been deposed five times and provided inside consulting for litigation matters. My duties have included discovery assistance, literature searches, document review, patent analysis, and writing expert and rebuttal reports. I have provided technical assistance for litigation matters including reverse engineering and analysis as well as designed, developed, and utilized equipment for performance testing of patent claims.

Foley & Lardner, LLP representing Woodway USA, Inc. **2015 – Present**

United States District Court Eastern District of New York, 2013 Civ. 01276, Speedfit LLC and Aurel Astilean v. Woodway USA Inc. and Douglas G. Bayerlein.

Patent Infringement case related to treadmills. Prepared and submitted expert report and rebuttal reports on invalidity. Deposed.

Maschoff Brennan, representing Icon Health & Fitness, Inc. **2012 – 2013**

JAMS, Inc. Reference No. 1200047858. Icon Health & Fitness, Inc., Claimant, v. Dayco International, Inc. and Spirit Manufacturing, Inc. d/b/a Spirit Fitness Products, Respondents.

Patent infringement case related to fitness equipment. Prepared and submitted expert report on infringement and rebuttal reports on claim construction and engineering analyses. Present during JAMS hearing.

United States District Court for the District of Utah (Northern Division). Civil Action No. 1:10-cv-00195-RJS-DBP, Icon Health & Fitness, Inc., Plaintiff and Counterclaim Defendant, v. Park City Entertainment, Inc., Defendant and Counterclaim Plaintiff.

Patent infringement case related to fitness equipment. Prepared and submitted expert report on claim construction. Deposed.

Workman | Nydegger, representing Icon Health & Fitness, Inc. **2012**

United States District Court for the District of Utah (Northern Division). Civil Action No. 2:10-cv-01264-PMW, Icon Health & Fitness, Inc., Plaintiff, v. Fitness Equipment Services LLC, d/b/a/ Sole Fitness, Spirit Manufacturing, Inc, d/b/a Spirit Fitness Products, Defendants.

United States District Court for the District of Utah (Northern Division). Civil Action No. 1:10-cv-00195-DAK, Icon Health & Fitness, Inc., Plaintiff, v. Park City Entertainment, Inc., Defendant.

Patent infringement cases related to fitness equipment. Discovery assistance including document review, patent analysis, engineering analysis and technical support.

Cases transferred to Maschoff Gilmore & Israelsen (which became Maschoff Brennan) October 2012.

Miller Canfield, representing Dickinson Wright, P.L.L.C. **2012**

United States District Court, Eastern District of Michigan (Southern Division). Case No. 09-12102 Warrior Sports, Inc., Plaintiff-Appellee, v. Dickinson Wright, P.L.L.C., Defendant, Appellant.

Malpractice case related to an underlying patent infringement case regarding lacrosse equipment. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Prepared and submitted expert report on infringement. Deposed.

Williams Mullen, representing Fitness Anywhere **2011**

United States District Court, Eastern District of Virginia (Norfolk Division). C.A. 2:11CV156 HCM/DEM. Fitness Anywhere, LLC, Plaintiff, v. Lifeline International, Inc., Defendant.

Patent infringement case related to fitness equipment. Discovery assistance including document review, patent analysis, literature searches, engineering analysis and technical support. Prepared and submitted expert report on infringement and rebuttal report on invalidity. Deposed.

LITIGATION SUPPORT (Continued)

Sunstein, Kann, Murphy & Timbers LLP, representing MacNeill Engineering Company 2009 - 2010

United States District Court, District of Delaware. C.A. No. 08-469-GMS.
Softspikes, LLC and Pride Manufacturing Company, LLC, Plantiffs, v. MacNeill Engineering Company, Inc., Defendant.

Patent infringement case related to golf cleats. Discovery assistance including document review, patent analysis, technical support, engineering analysis, designed, built and used test mechanism to test performance of accused products against patent claims.

Sterne, Kessler, Goldstein & Fox PLLC, representing adidas International 2009

United States Patent and Trademark Office. Control No.: 95/001,198.

Re-examination of a patent related to portable training devices. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Prepared and submitted declaration including obviousness analysis.

Fish & Richardson PC, representing Callaway Golf Company 2008

United States District Court, District of Delaware. C.A. No. 07-367-SLR.
Callaway Golf Company, Plaintiff, v. Acushnet Company, Defendant.

Patent infringement case related to golf clubs. Discovery assistance including document review, patent analysis, and providing technical support and engineering analysis.

Paul, Hastings, Janofsky & Walker LLP, representing Bridgestone Golf 2005 – 2007

(Case transferred from Sughrue Mion, PLLC, March 2006)
United States District Court, District of Delaware. C.A. No. 05-132-JJF.
Bridgestone Sports Co., LTD., and Bridgestone Golf, Inc., Plaintiffs, v. Acushnet Company, Defendant.

Patent infringement case related to golf balls. Discovery assistance including document review, patent analysis, literature searches, engineering analysis and technical support. Prepared and submitted expert report. Deposed.

Kegler, Brown, Hill & Ritter Co., LPA, representing High Cedar Enterprises 2005 – 2006

United States District Court, Central District of California, Southern Division. SACV 05-535-AHS.
High Cedar Enterprises, Co., and Karakal Far East, Ltd., a/k/a Karakal Golf Grips, Plaintiffs, v. Winn Inc., Defendant.

Patent infringement case related to golf grips. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Supervised third party testing of products involved in the case. Prepared and submitted expert report on invalidity and rebuttal report on infringenment. Deposed.

Sughrue Mion, PLLC, representing Eaton Corporation 2003

United States District Court, Central District of California, Southern Division. CV 03-1568-SJO.
Winn Inc., and Ben Huang, an individual, Plaintiff, v. Eaton Corporation, Defendant.

Patent infringement case related to golf grips. Discovery assistance including document review, patent analysis, engineering analysis and technical support. Prepared and submitted expert report on invalidity and rebuttal report on infringement. Deposed.

EXHIBIT D

MATERIALS CONSIDERED

In connection with my study of this matter, I have reviewed the following materials:

1. U.S. Patent No. 8,986,169, including its file history
2. U.S. Patent No. 9,039,580, including its file history
3. U.S. Design Patent No. D736,866, including file history
4. U.S. Design Patent No. D753,776, including file history
5. Complaint and Exhibits (Dkt. 1), November 16, 2015
6. Woodway's Answer, Affirmative Defense, and Counterclaims and Exhibits (Dkt. 54), July 25, 2016
7. Woodway's Preliminary Infringement Contentions, April 18, 2016
8. Plaintiffs' Preliminary Non-Infringement Contentions, May 27, 2016
9. Plaintiffs' Preliminary Invalidity Contentions, May 27, 2016
10. Woodway's Supplemental Preliminary Infringement Contentions, July 18, 2016
11. Stipulated Protective Order (Dkt. 52-1), July 21, 2016
12. Plaintiffs' Supplemental Non-Infringement Contentions and Exhibits, August 8, 2016
13. Plaintiffs' Supplemental Invalidity Contentions and Exhibits, August 8, 2016
14. Plaintiffs' Opening and Responsive Claim Construction Brief and Exhibits (Dkt. 59 – 63)
15. Woodway's Opening and Responsive Claim Construction Briefs and Exhibits (Dkt. 55, 64)
16. Supplemental Declaration of Kadie M. Jelenchick and Exhibits (Dkt. 65 – 65-8), September 6, 2016
17. Plaintiffs' Reply Claim Construction Brief (Dkt. 66)
18. Declaration of Christine K. Bush and Exhibits 27 and 28 (Dkt. 67 – 67-2), September 20, 2016
19. Plaintiffs' Markman Presentation, November 28, 2016

20. Woodway USA, Inc.'s Tutorial and Claim Construction Presentation, November 28, 2016

21. Markman Hearing Transcript, November 28, 2016

22. Claim Construction Ruling (Dkt. 76), December 8, 2016

23. Deposition transcript of Jeremiah Rabe, October 18, 2016

24. Deposition transcript of Gerardo Aristi, October 19, 2016

25. Deposition transcript of Chapco 30(b)(6), October 20, 2016

26. Deposition transcript of Samsara 30(b)(6), November 1, 2016

27. Deposition transcript of Robert Weinstein, November 30, 2016

28. Deposition transcript of Bruce Bickford, December 12, 2016

29. Deposition of Douglas Bayerlein, December 14, 2016

30. Deposition Exhibits 1-379

31. U.S. Patent No. 219,439

32. U.S. Patent No. 1,211,765

33. U.S. Patent No. 3,489,408

34. U.S. Patent No. 3,637,206

35. U.S. Patent No. 3,642,279

36. U.S. Patent No. 3,669,238

37. U.S. Patent No. 3,968,543

38. U.S. Patent No. 4,334,676

39. U.S. Patent No. 4,548,405

40. U.S. Patent No. 4,614,337

41. U.S. Patent No. 4,635,928

42. U.S. Patent No. 4,726,581

43. U.S. Patent No. 5,162,988

44. U.S. Patent No. 5,411,279

45. U.S. Patent No. 5,411,455

46. U.S. Patent No. 5,470,293

47. U.S. Patent No. 5,538,489

48. U.S. Patent No. 5,577,598

49. U.S. Patent No. 5,709,632

50. U.S. Patent No. 5,887,579

51. U.S. Patent No. 6,042,514

52. U.S. Patent No. 6,053,848

53. U.S. Patent No. 6,146,315

54. U.S. Patent No. 6,348,025

55. Photographs and CAD of Woodway treadmills and their assemblies and components

56. Photographs of an Original TrueForm Runner Treadmill and its assemblies and components

57. Photographs of a Redesigned TrueForm Runner Treadmill and its assemblies and components

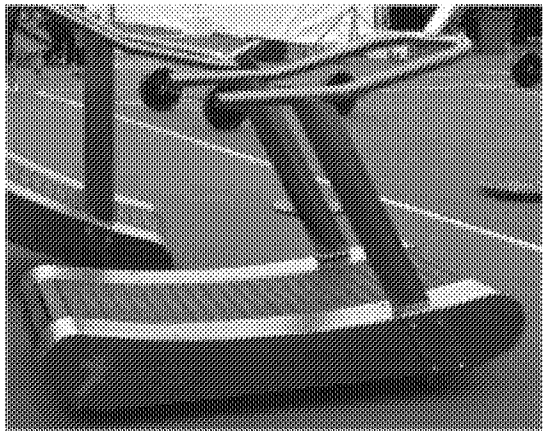
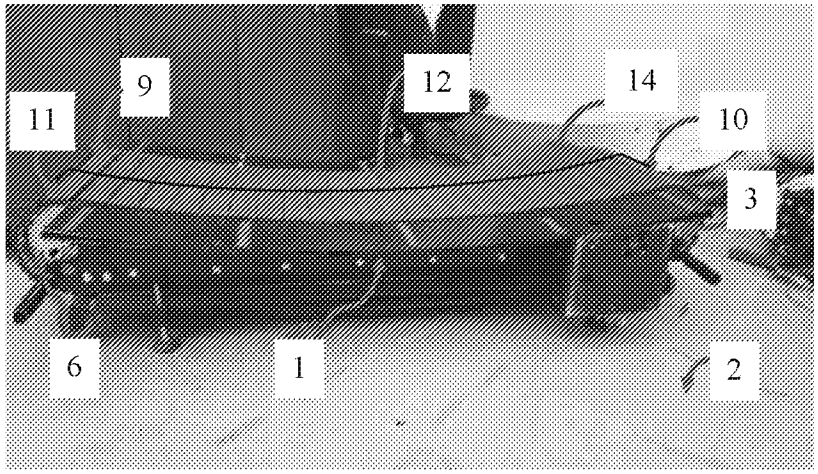
58. Photographs of SkillMill and its assemblies and components

59. Koyo Catalog, http://www.jtekt-na.com/assets/ce/Documents/(B2018E-1)%20Needle%20Roller%20Bearing%20Catalog.pdf

60. The Federal Circuit Bar Association Model Patent Jury Instructions, last edited July 2016

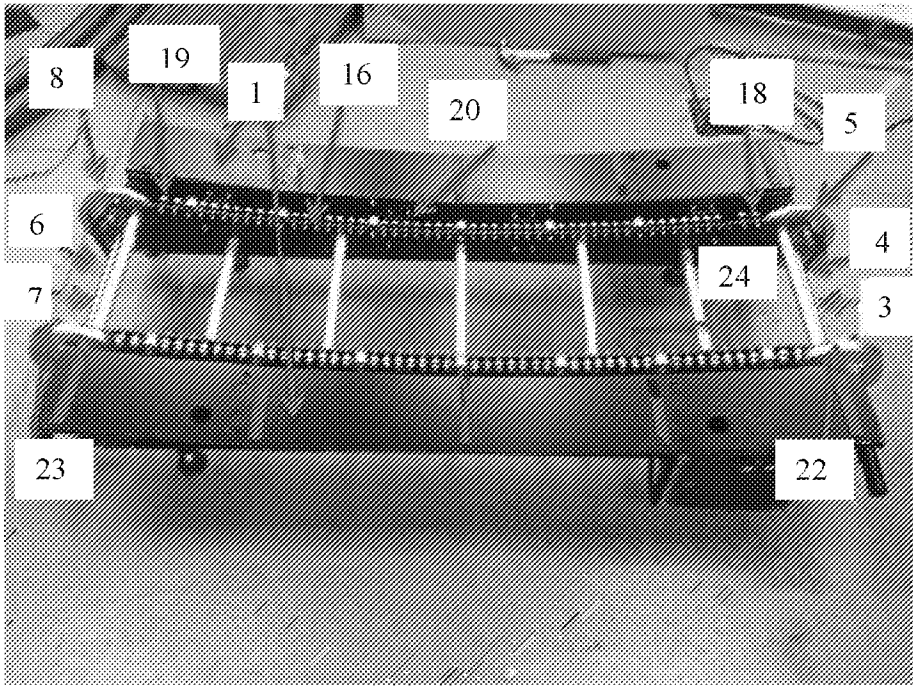
61. Littelfuse, Inc., *55505 Hall Effect Flange Mount Geartooth Speed Sensor* (October 16, 2015), http://www.littelfuse.com/~/media/electronics/datasheets/hall_effect_sensors/littelfuse_hall_effect_sensors_55505_datasheet.pdf.pdf

CONTAINS CONFIDENTIAL INFORMATION

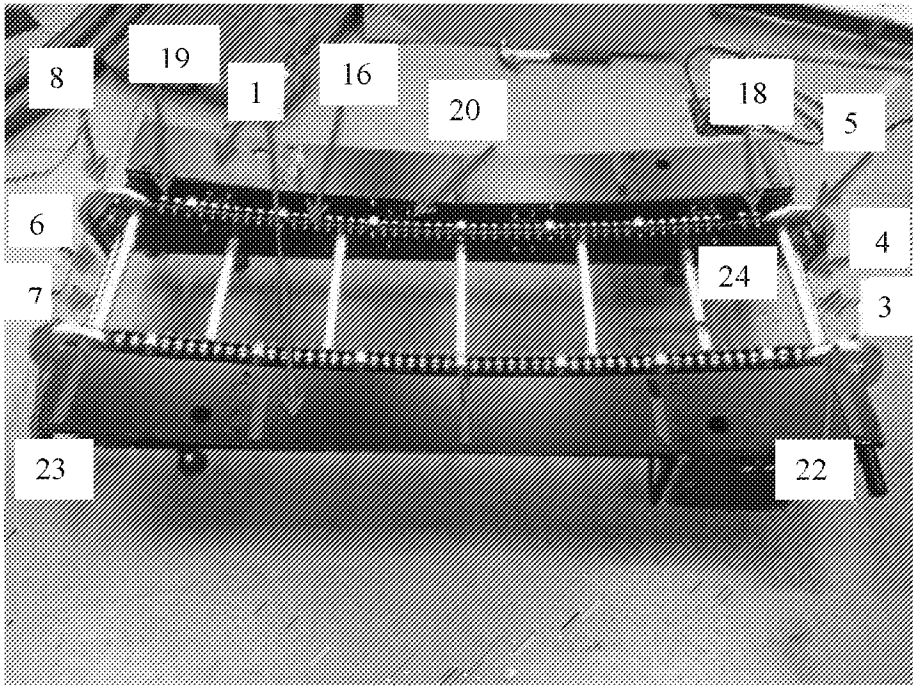
the '169 patent	Claim Chart Directed To Original Design	
11. A manually operated treadmill comprising:	A "manually operated treadmill" is literally each Original TrueForm Runner Treadmill. As described in the product literature attached as Exhibit G and as Chapco and Samsara have admitted, the Original TrueForm Runner Treadmill is human powered and non-motorized.	
a frame supported on a substantially horizontal surface;	A "frame supported on a substantially horizontal surface" is present literally in each Original TrueForm Runner. As shown, a frame [1], which designates the entire frame assembly not a single piece of metal is supported on a substantially horizontal surface [2], *e.g.*, the ground. Chapco's and Samsara's argument that the Original TrueForm Runner Treadmill does not meet this claim limitation because it has two frames and not one frame is inconsistent with the '169 patent's disclosure. The specification of the '169 patent states that "the frame may have substantially any configuration suitable for providing structure and support for the manual treadmill." Col. 5, ll. 65-67. Nothing about the plain and ordinary meaning of "frame" requires a single unitary structure.	

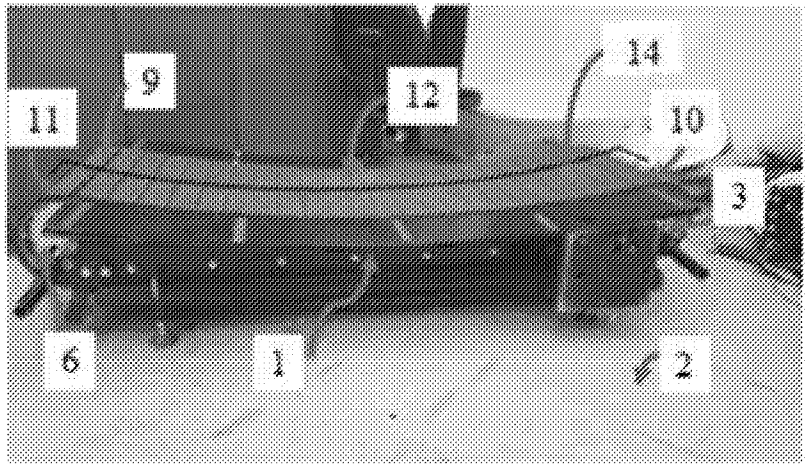
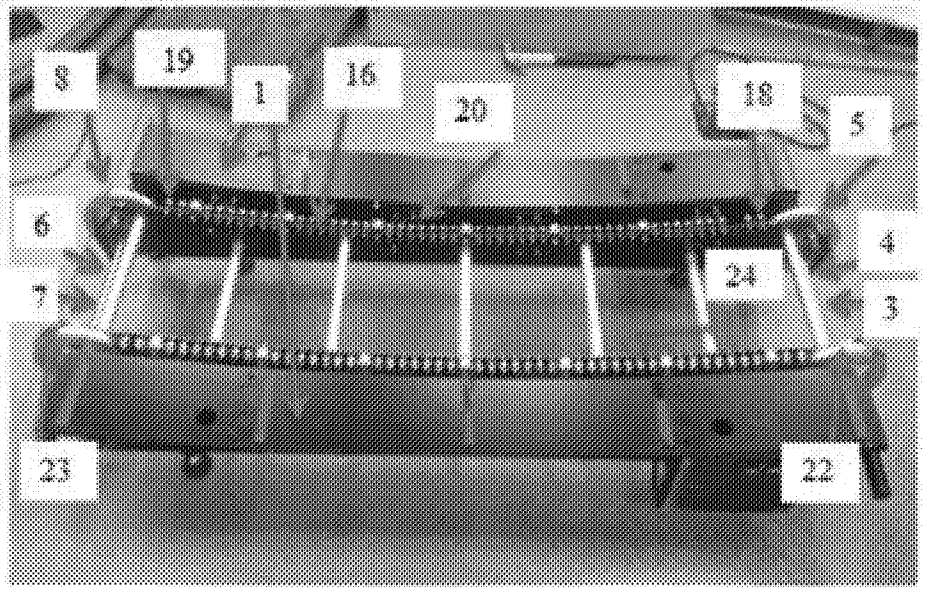
LIFECORE Ex. 1002

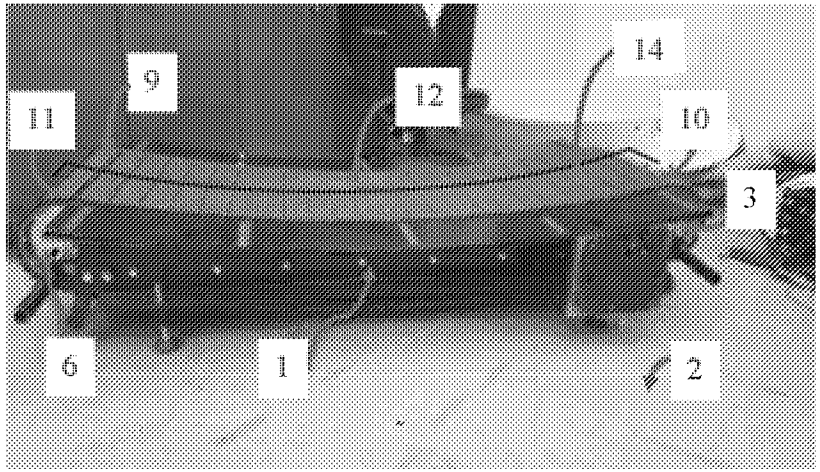
CONTAINS CONFIDENTIAL INFORMATION

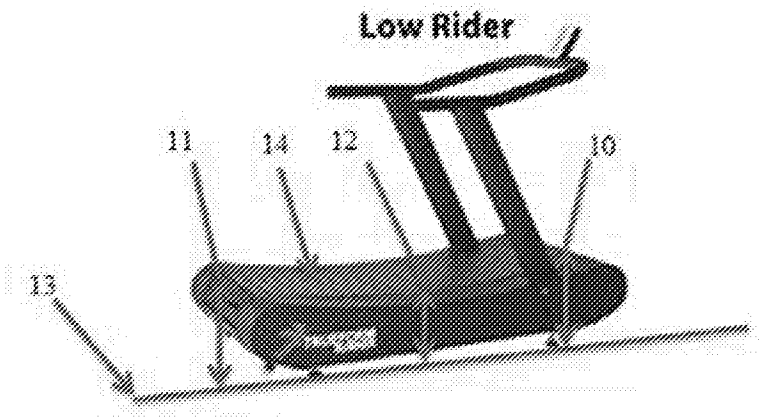
the '169 patent	Claim Chart Directed To Original Design	
a front shaft assembly supported by the frame and comprising: a front shaft; and at least one front running belt pulley supported by the front shaft;	A "front shaft assembly" having a "front shaft" and "at least one front running belt pulley supported by the front shaft" are literally present in each Original TrueForm Runner. As shown, the frame [1] supports a shaft assembly [3] (i.e., the "front shaft assembly"), which includes a shaft [4] (i.e., the "front shaft") and a pulley [5] (i.e., the "at least one front running belt pulley"). The plain and ordinary meaning of "support" does not require that components must be directly or physically connected or touching. "Support" may be provided directly, may be provided indirectly via an intermediary component or series of components, may bear some of the weight of another component or a series of components, and/or may bear all of the weight of another component or series of components. Here, the frame supports the front shaft assembly indirectly via the bearing rail. More particularly and as shown, a bearing rail is coupled to the front shaft assembly [3] whereby the bearing rail is coupled to the frame [1]. In this regard, "the term 'coupled' means the joining of two members directly or indirectly to one another. … Such joining may be achieved with the two members or the two members and any additional intermediate members." Col. 32, ll. 10-14. Thus, via the bearing rail, the front shaft assembly [3] is supported by the frame [1].	

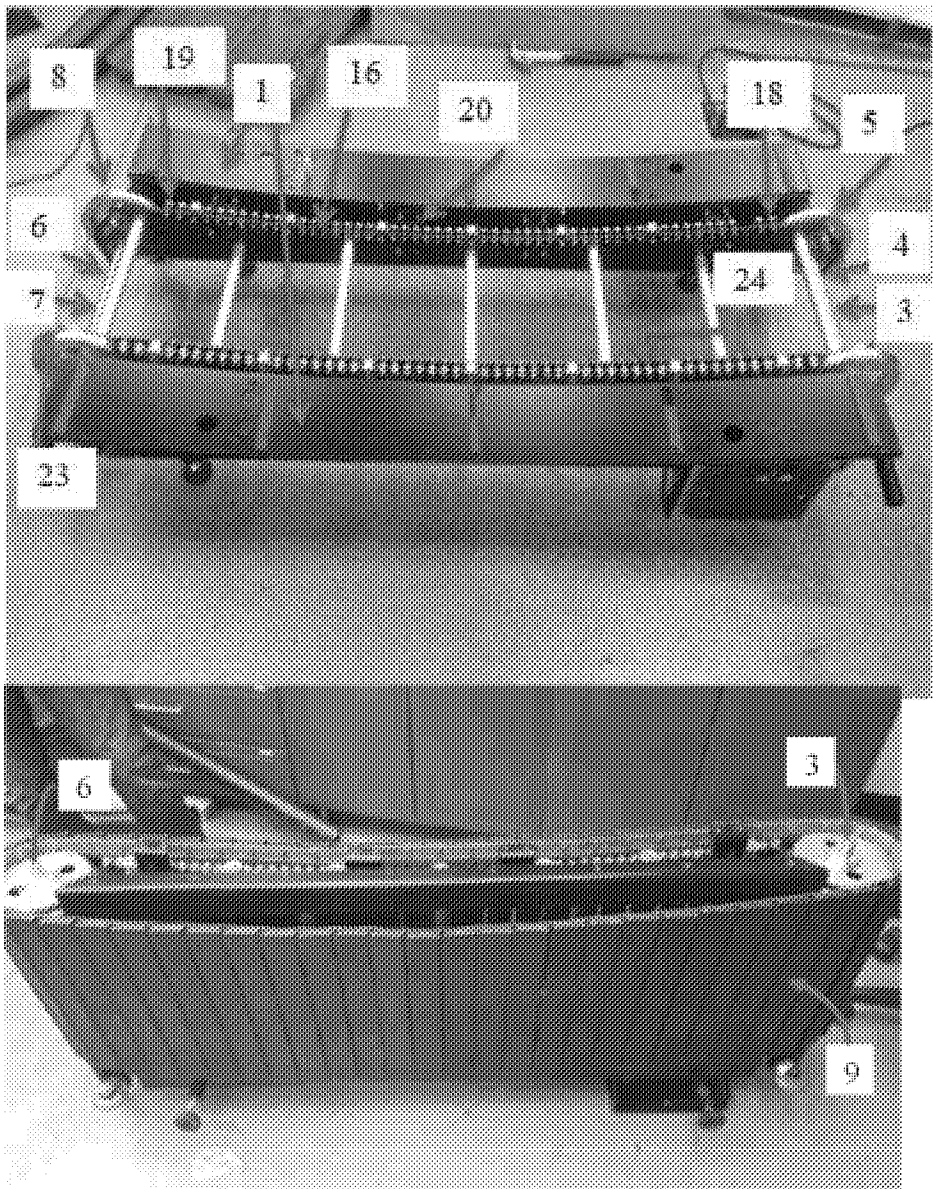
LIFECORE Ex. 1002

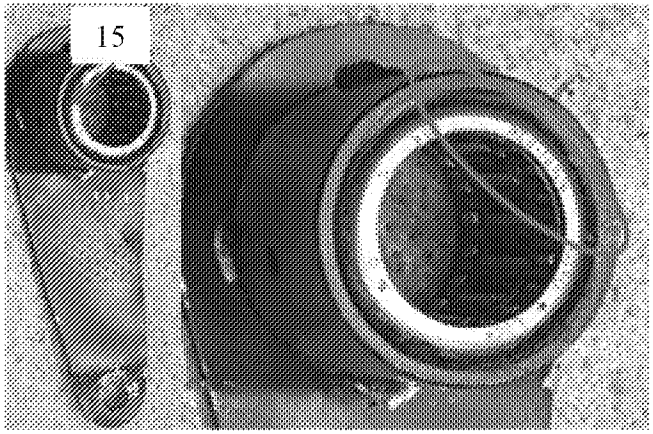
the '169 patent	Claim Chart Directed To Original Design	
a rear shaft assembly supported by the frame and spaced a distance from the front shaft and comprising: a rear shaft; and at least one rear running belt pulley supported by the rear shaft;	A "rear shaft assembly" having a "rear shaft supported by the frame" spaced from "the front shaft," and an "at least one rear running belt pulley" are literally present in each Original TrueForm Runner Treadmill. As shown, the frame [1] supports another shaft assembly [6] (i.e., the "rear shaft assembly"), which is spaced from the front shaft assembly [3] and includes a shaft [7] (i.e., the "rear shaft") and a pulley [8] (i.e., the "at least one rear running belt pulley"). The plain and ordinary meaning of "support" does not require that components must be directly or physically connected or touching. "Support" may be provided directly, may be provided indirectly via an intermediary component or series of components, may bear some of the weight of another component or a series of components, and/or may bear all of the weight of another component or series of components. Here, the frame supports the rear shaft assembly indirectly via the bearing rail. More particularly and as shown, a bearing rail is coupled to the rear shaft assembly [6] whereby the bearing rail is coupled to the frame [1]. In this regard, "the term 'coupled' means the joining of two members directly or indirectly to one another. … Such joining may be achieved with the two members or the two members and any additional intermediate members." *See* the '169 patent at col. 32, ll. 10-14. Thus, via the bearing rail, the rear shaft assembly [6] is supported by the frame [1].	

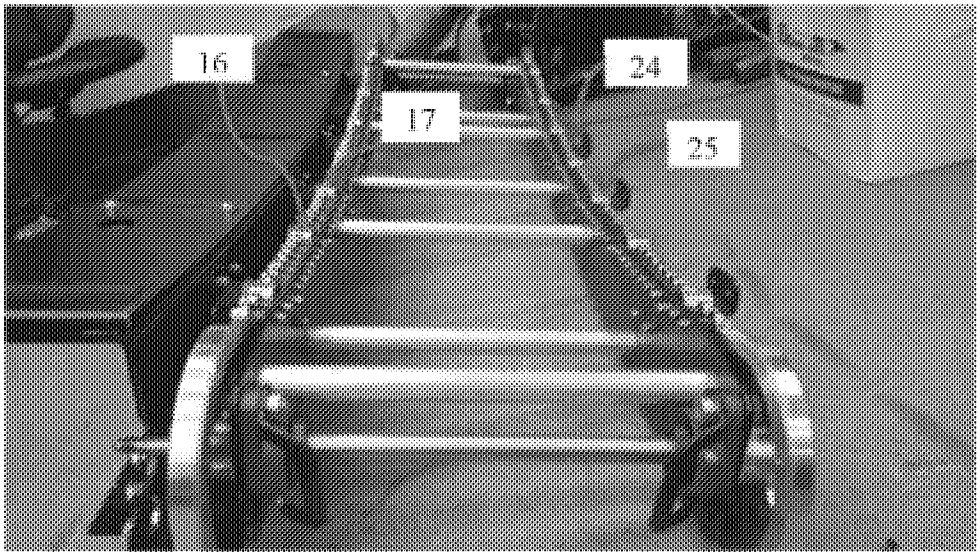
the '169 patent	Claim Chart Directed To Original Design	
a running belt supported at least in part by the front shaft assembly and the rear shaft assembly,	A "running belt" that is "supported at least in part by the front shaft assembly and the rear shaft assembly" is literally present in each Original TrueForm Runner Treadmill. As shown, the running belt [9] is supported, at least in part, by the front and rear shaft assemblies [3] and [6], respectively. More particularly, the front shaft assembly [3] includes at least one front running belt pulley [5] while the rear shaft assembly [6] includes at least one rear running belt pulley [8], each of which support, at least in part, the running belt [9]. Because the at least one front running belt pulley [5] is included with the front shaft assembly [3] and the at least one rear running belt pulley [8] is included with the rear shaft assembly [6], the front and rear shaft assemblies [3] and [6] in turn support, at least in part, the running belt [9].	 

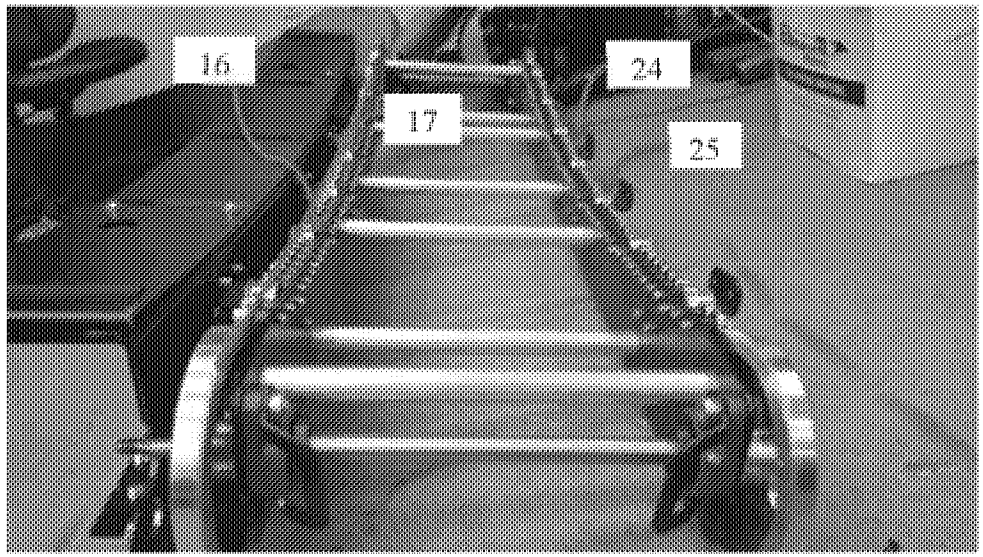
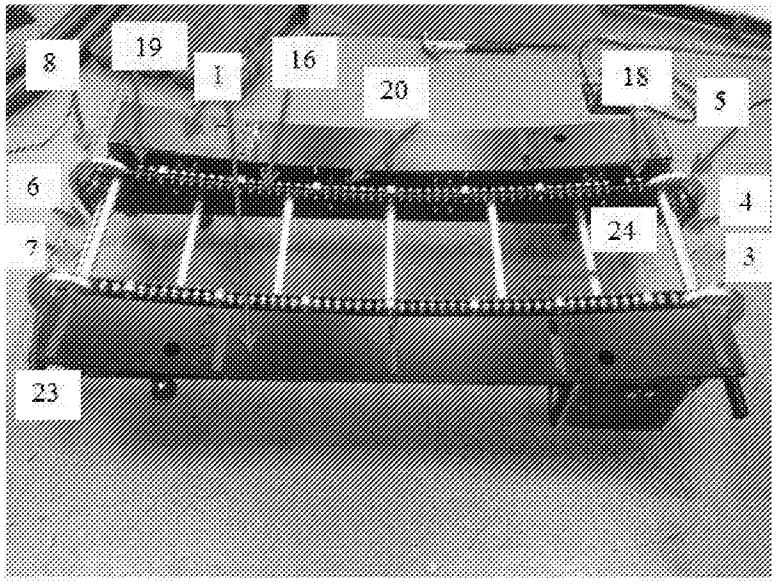
the '169 patent	Claim Chart Directed To Original Design	
the running belt including a front belt portion adjacent the front shaft assembly, a rear belt portion adjacent the rear shaft assembly, and a central belt portion intermediate the front belt portion and the rear belt portion,	The "running belt" having a "front portion," "rear belt portion," and "central belt portion intermediate the front belt portion and the rear belt portion" is literally present in each Original TrueForm Runner Treadmill. As shown, the plain and ordinary meaning of the "running belt" [9] includes a front portion [10] adjacent the front shaft assembly [3], a rear belt portion [11] adjacent the rear shaft assembly [6], and a central belt portion [12] that is intermediate the front portion [10] and the rear belt portion [11].	

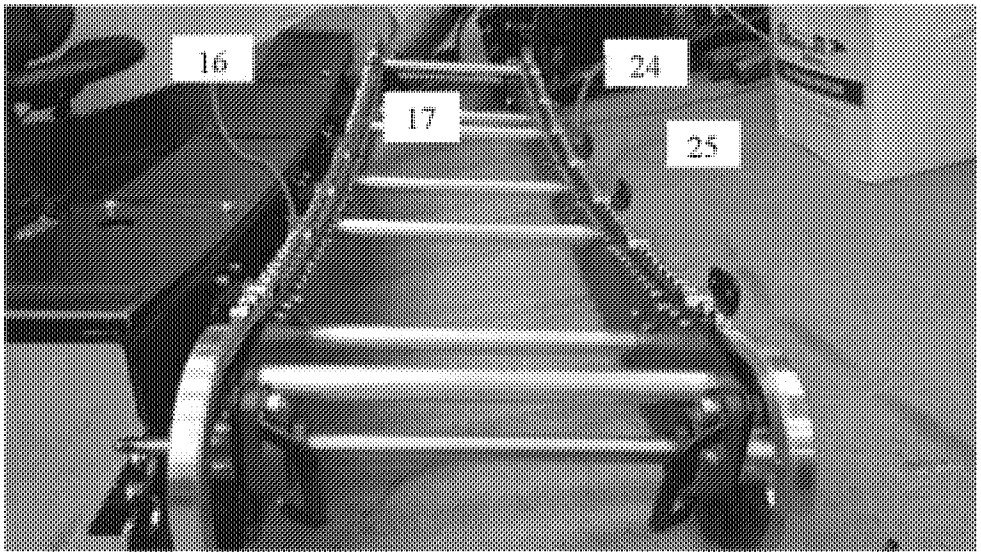
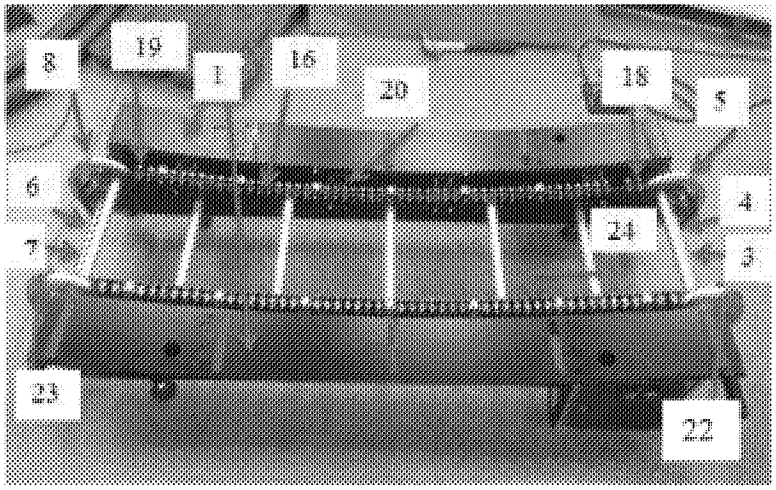
the '169 patent	Claim Chart Directed To Original Design	
the front belt portion and the rear belt portion being positioned vertically higher than a lowest point found in the central belt portion to form a curved running surface upon which a user of the treadmill may walk or run,	The "front belt portion" and "rear belt portion being positioned vertically higher than a lowest point found in the central belt portion to form a curved running surface upon which a user of the treadmill may walk or run" are literally present in each Original TrueForm Runner Treadmill. As shown, a horizontal plane line [13] has been inserted on the picture of the representative TrueForm Low Rider Treadmill. While the horizontal plane line [13] is shown as angled, this is due to the orientation of the product in the photograph. In this regard, the horizontal plane line [13] represents a horizontal planar support surface for the treadmill (i.e., a ground surface). Insertion of vertically perpendicular lines from the horizontal line [13] to each of the highest points on the front portion [10] and rear belt portion [11] as well as the lowest point on the central belt portion [12] indicates that the front belt portion [10] and rear belt portion [11] are vertically higher than the central belt portion [12]. Due to the front belt portion [10] and rear belt portion [11] being vertically higher than the central belt portion [12], a curved running surface [14] is formed, which Chapco and Samsara admit is present in the Original TrueForm Runner Treadmill.	

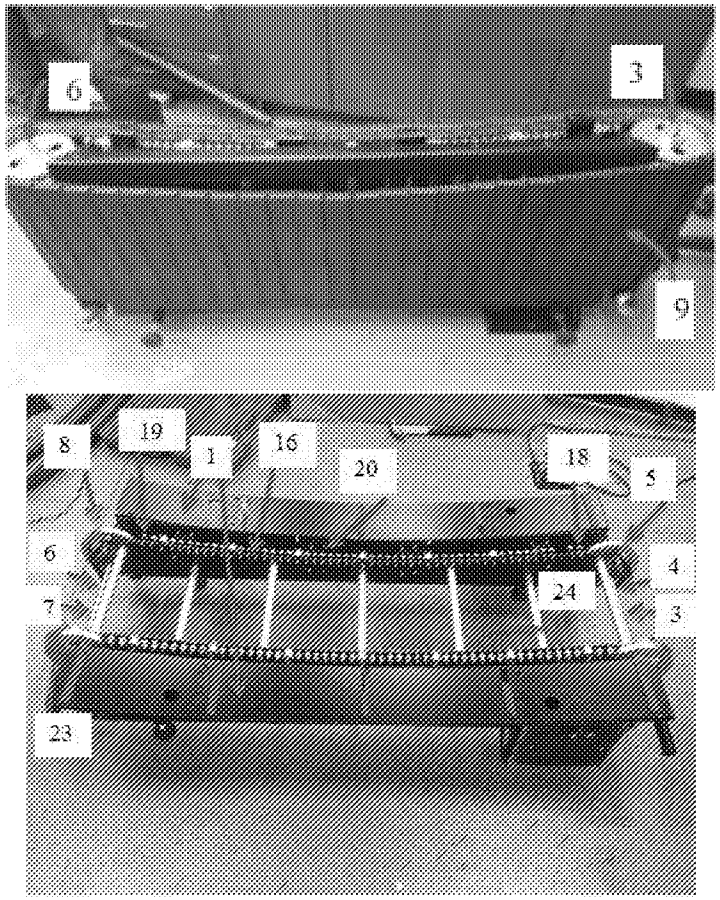
the '169 patent	Claim Chart Directed To Original Design	
wherein gravitational force acting upon weight of the user's body on the running belt relative to the lowest point of the running belt causes rotation of the running belt, front shaft, and the rear shaft without the aid of a motor;	"Gravitational force acting upon weight of the user's body on the running belt relative to the lowest point of the running belt" that "causes rotation of the running belt, front shaft, and the rear shaft without the aid of a motor" is literally present in each Original TrueForm Runner Treadmill. According to the product literature at Exhibit G, the treadmill is "non-motorized, powered by you. … The TrueForm requires ***the runner to turn the belt*** with their own power, which means better results" (emphasis added). Further, the force of gravity acts on all objects in the Earth's gravitational field. Thus, treadmill users are acted on by the force of gravity. That force is transmitted to the treadmill through the contact points of the user on the treadmill. Thus, the running belt [9] rotates from the runner with "their own power" and the "gravitational force acting upon weight of the user's body." Because the running belt [9] is disposed on the front and rear pulleys [5] and [8], rotation of the running belt [9] causes rotation of the front and rear pulleys [5] and [8]. In turn, rotation of the front and rear pulleys [5] and [8] causes rotation of the front and rear shafts [4] and [7].	

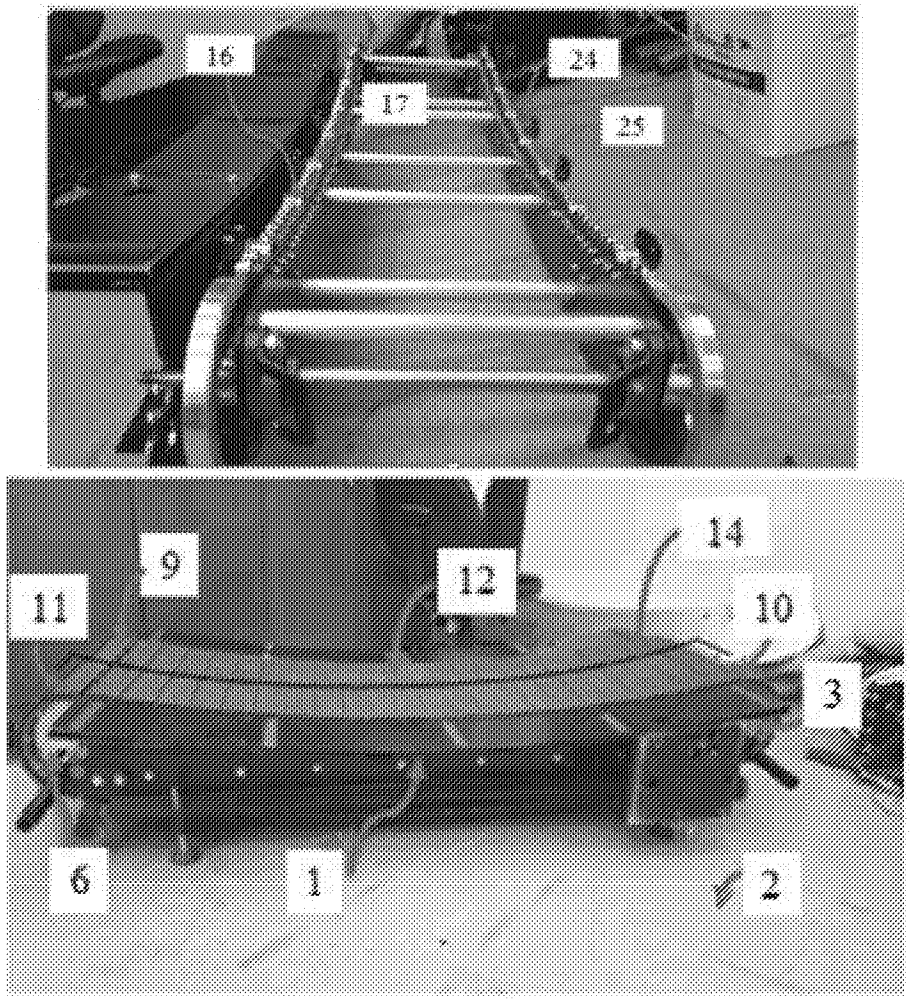
the '169 patent	Claim Chart Directed To Original Design	
a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction; and	A "safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" is literally present in each Original TrueForm Runner Treadmill. As shown, the safety device [15] is adjoined to the rear shaft [7]. As also shown, the safety device [15] is a Koyo brand with a model number of RCB-121616. This model number corresponds with a "regular clutch and bearing assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction" as described in the Koyo catalog. Thus, because the safety device [15] is adjoined to the rear shaft [7] and because the safety device [15] "allows free overrun" in one rotational direction, the safety device [15] "cooperate[s] with the rear shaft to permit rotation the rear shaft in only one direction."	 

the '169 patent	Claim Chart Directed To Original Design	
at least one bearing rail having a plurality of bearings rotatably coupled to the at least one bearing rail and forming a top profile,	"At least one bearing rail having a plurality of bearings rotatably coupled to the at least one bearing rail and forming a top profile" is literally present in each Original TrueForm Runner Treadmill. Chapco personnel in internal documents and in deposition refer to the structure depicted at the right as a "bearing rail." Deposition of Jeremiah Rabe, October 18, 2016, pp. 88-99, 113-117, Exs. 12, 16. Mr. Rabe agrees that "inner frame" is synonymous with "bearing rail" and that the three models of the TrueForm Runner have the same "rail bearing curved" as depicted in Exhibit 16. Indeed, a person of ordinary skill in the art would understand that the photograph to the right shows two rails with bearings whose top profile corresponds to the shape of the running surface, as required by the Court's claim construction. As shown, a person of ordinary skill in the art would understand that at least one bearing rail with a plurality of bearings [16] is rotatably coupled and therefore forms a top profile [17].	

the '169 patent	Claim Chart Directed To Original Design	
the top profile defined by a front profile portion adjacent the front shaft assembly, a rear profile portion adjacent the rear shaft assembly, and a central profile portion intermediate the front profile portion and the rear profile portion,	A "top profile defined by a front profile portion adjacent the front shaft assembly, a rear profile portion adjacent the rear shaft assembly, and a central profile portion intermediate the front profile portion and the rear profile portion" is literally present in each Original TrueForm Runner Treadmill. As shown, the top profile [17] has a front profile portion [18] adjacent the front shaft assembly [3], a rear profile portion [19] adjacent the rear shaft assembly [6], and a central profile portion [20] intermediate the front profile portion [18] and rear profile portion [19].	 

the '169 patent	Claim Chart Directed To Original Design	
the central profile portion having a concave curve, and the front profile portion and the rear profile portion being continuations of the concave curve;	"The central profile portion having a concave curve" where "the front profile portion and the profile rear portion [are] continuations of the concave curve" is literally present in each Original TrueForm Runner Treadmill. As shown, the central profile portion [20] has a concave curve. As also shown, the front profile portion [18] and the rear profile portion [19] do not include any breaks or interruptions; rather, the front profile portion [18] and the rear profile portion [19] are continuations of the concave curve of the central profile portion [20].	 

the '169 patent	Claim Chart Directed To Original Design	
wherein the running surface of the running belt is supported by the top profile of the at least one bearing rail such that the running surface substantially corresponds to the shape of the top profile of the at least one bearing rail.	"The running surface" being "supported by the top profile of the at least one bearing rail" to cause "the running surface [to] substantially correspond[] to the shape of the top profile of the at least one bearing rail" is literally present in each Original TrueForm Runner Treadmill. As shown, the running belt [9] is supported by the plurality of bearings [16] mounted to the at least one bearing rail along the top profile [17] of at least one bearing rail. Because the running belt is supported in this manner, the running surface substantially corresponds to the top profile [17] of the at least one bearing rail.	

the '169 patent	Claim Chart Directed To Original Design	
		

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LIFECORE Ex. 1002

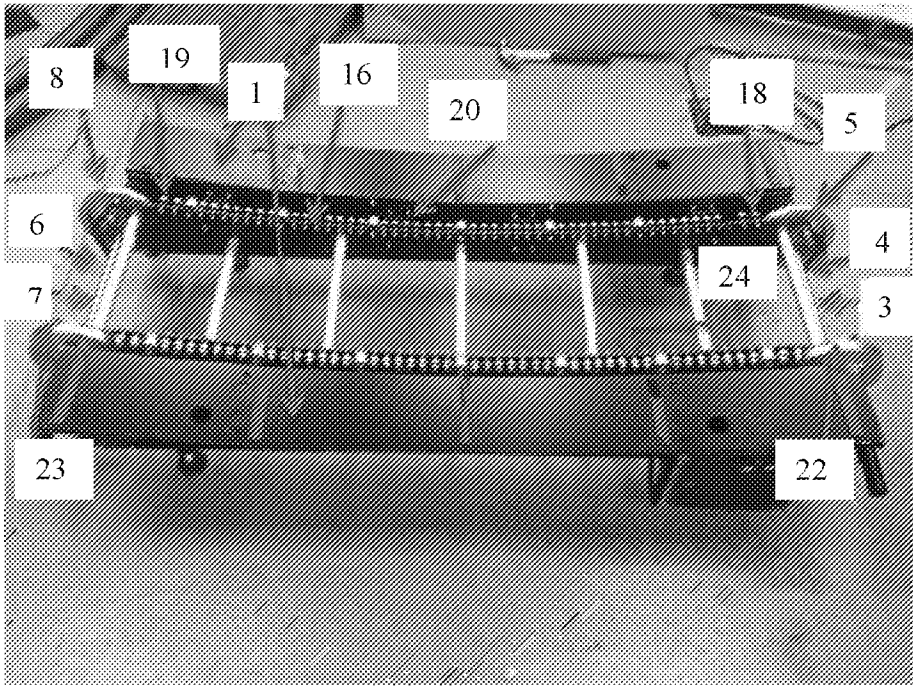
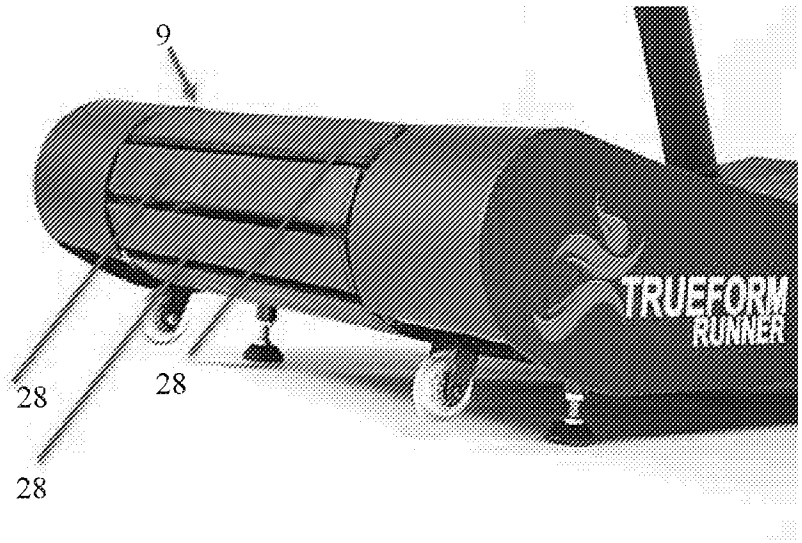
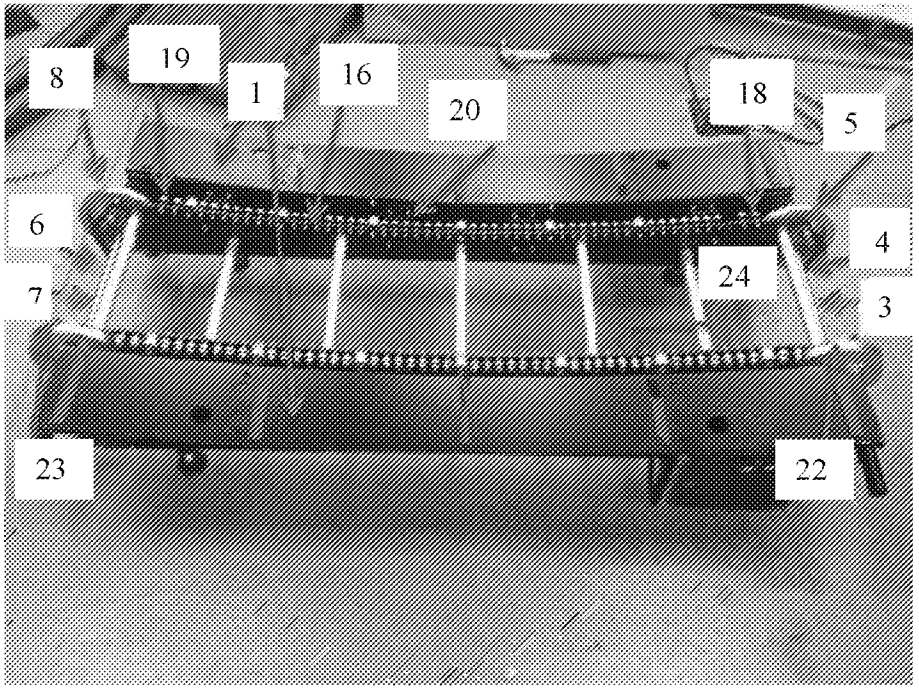
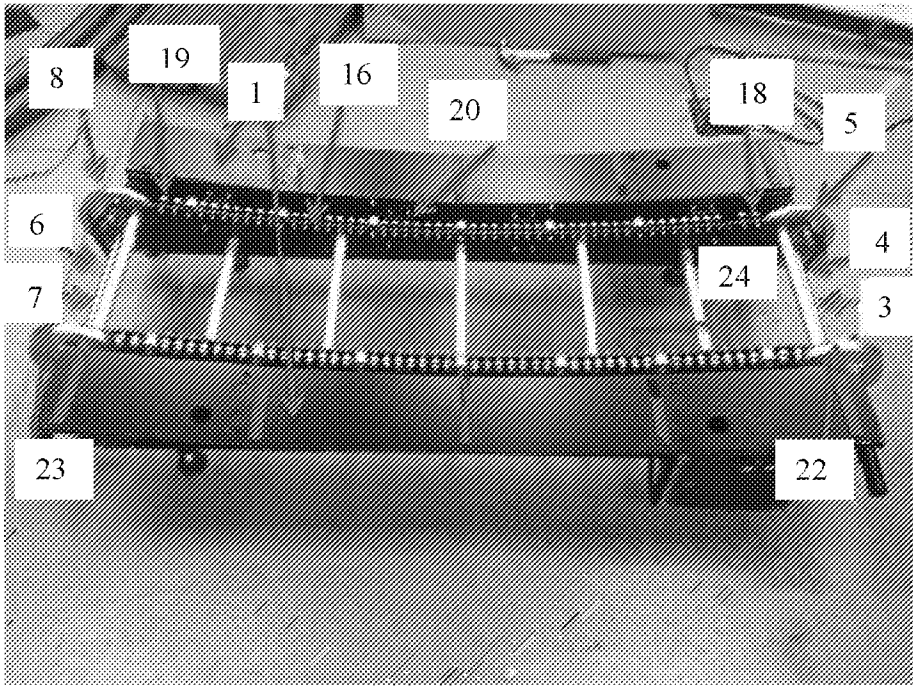
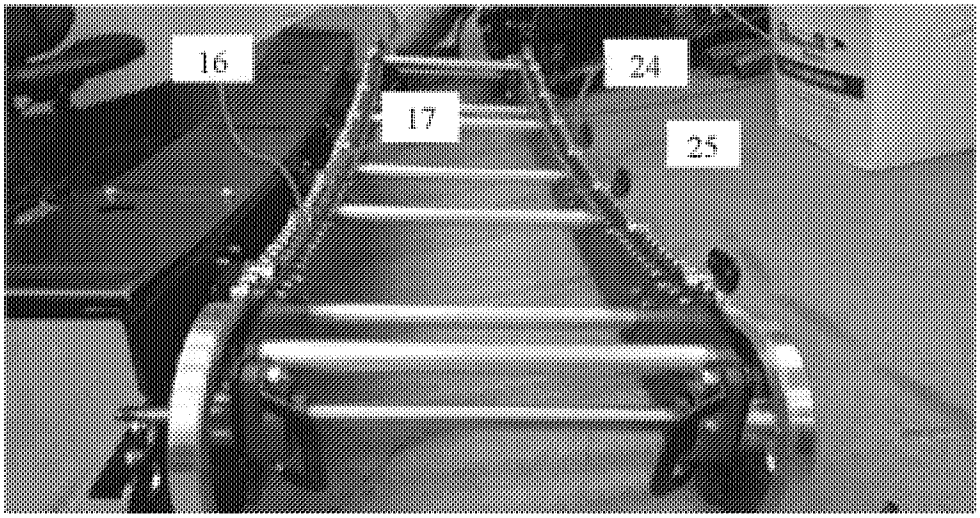
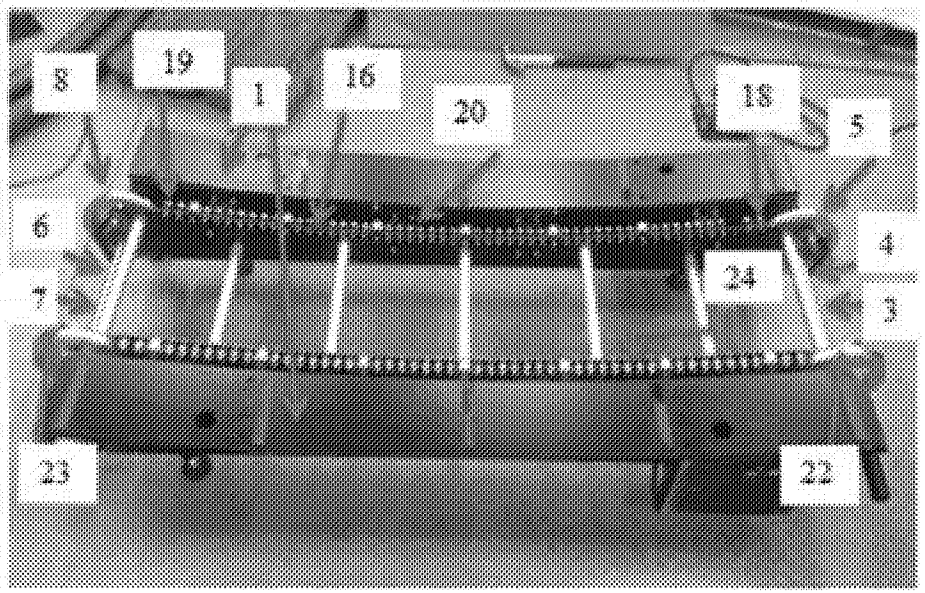
the '169 patent	Claim Chart Directed To Original Design	
12. The manually operated treadmill of claim 11, the at least one bearing rail extending along the frame and longitudinally aligned with one of the at least one front running belt pulley and one of the at least one rear running belt pulley.	The "at least one bearing extending along the frame and longitudinally aligned with one of the at least one front running belt pulley and one of the at least one rear running belt pulley" is literally present in each Original TrueForm Runner Treadmill. As shown, the at least one bearing rail [16], as that phrase is construed by the Court, extends along the frame [1] and is longitudinally aligned with each of the front running belt pulley [5] and rear running belt pulley [8].	

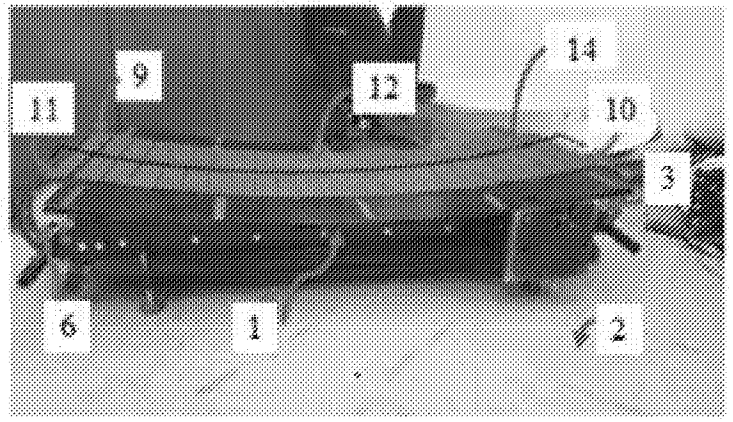
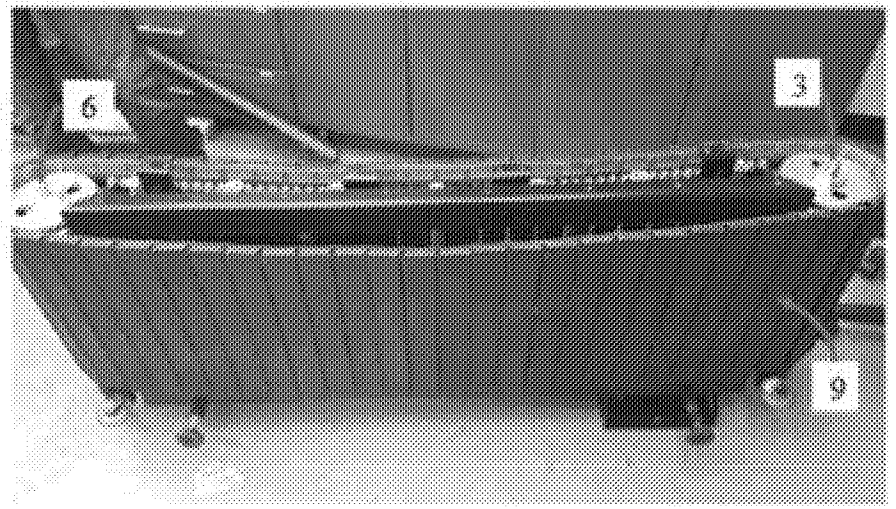
Exhibit E **CONTAINS CONFIDENTIAL INFORMATION**

the '169 patent	Claim Chart Directed To Original Design	
13. The manually operated treadmill of claim 12, wherein the running belt comprises a plurality of laterally extending slats.	"A plurality of laterally extending slats" is literally present in each Original TrueForm Runner Treadmill. As shown, the running belt [9] includes a plurality of laterally extending slats [28]. Chapco and Samsara agree.	

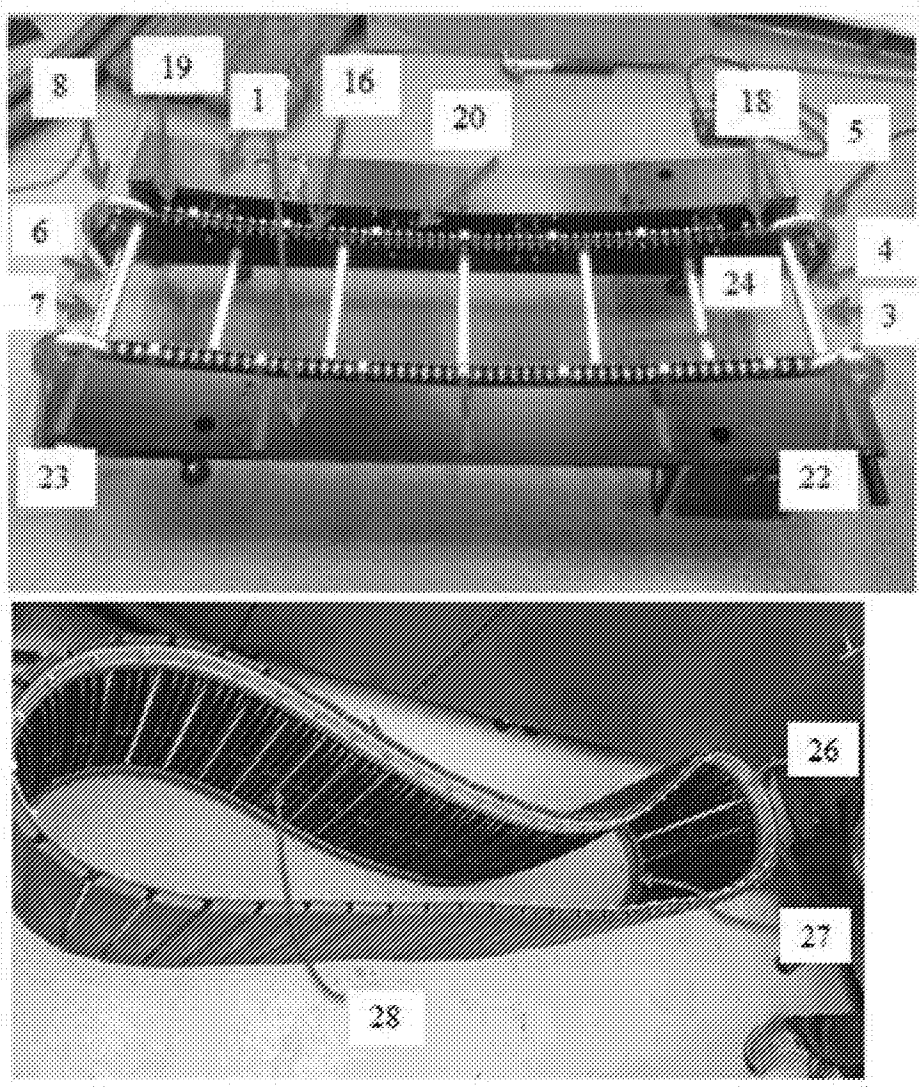
the '169 patent	Claim Chart Directed To Original Design	
14. The manually operated treadmill of claim 13, wherein: the front shaft assembly comprises a second front running belt pulley supported by the front shaft and spaced laterally from the at least one front running belt pulley;	"The front shaft assembly" having "a second front running belt pulley supported by the front shaft and spaced laterally from the at least one front running belt pulley" is literally present in each Original TrueForm Runner Treadmill. As shown, the front shaft assembly [3] includes a front shaft [4] that supports the at least one front running belt pulley [5] and a second front running belt pulley [22]. As discussed above, the plain and ordinary meaning of "support" does not require that components must be directly or physically connected or touching. "Support" may be provided directly, may be provided indirectly via an intermediary component or series of components, may bear some of the weight of another component or a series of components, and/or may bear all of the weight of another component or series of components.	

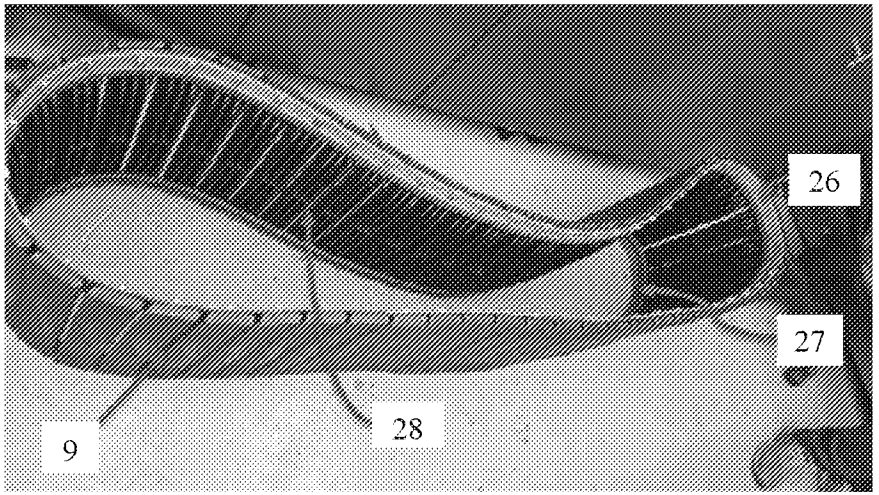
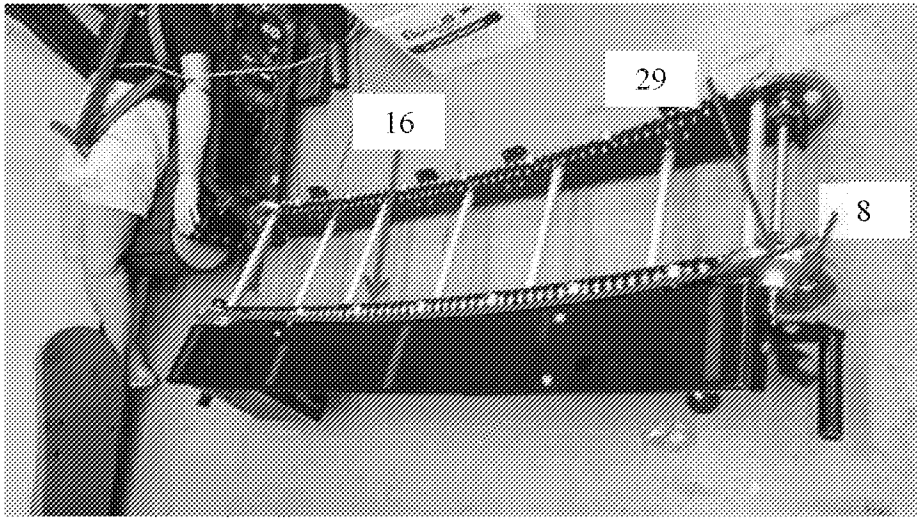
the '169 patent	Claim Chart Directed To Original Design	
the rear shaft assembly comprises a second rear running belt pulley supported by the rear shaft and spaced laterally from the at least one rear running belt pulley;	"The rear shaft assembly" having "a second rear running belt pulley supported by the rear shaft and spaced laterally from the at least one rear running belt pulley" is literally present in each Original TrueForm Runner Treadmill. As shown, the rear shaft assembly [6] includes a rear shaft [7] that supports the at least one rear running belt pulley [8] and a second rear running belt pulley [23]. As discussed above, the plain and ordinary meaning of "support" does not require that components must be directly or physically connected or touching. "Support" may be provided directly, may be provided indirectly via an intermediary component or series of components, may bear some of the weight of another component or a series of components, and/or may bear all of the weight of another component or series of components.	

the '169 patent	Claim Chart Directed To Original Design	
the at least one bearing rail further comprises a second bearing rail having a plurality of bearings forming a top profile matching the top profile of the first of the at least one bearing rail, the second bearing rail being longitudinally aligned with the second front running belt pulley and the second rear running belt pulley;	"A second bearing rail having a plurality of bearings forming a top profile matching the top profile of the first of the at least one bearing rail" and being "longitudinally aligned with the second front running belt pulley and the second rear running belt pulley" is literally in each Original TrueForm Runner Treadmill. As shown, a second bearing rail, as that phrase has been defined by the Court, has a plurality of bearings [24] and forms a top profile [25]. The top profile [25] of the bearings [25] matches the top profile [17] of the first bearing rail. As also shown, the second bearing rail [24] is longitudinally aligned with the second front running belt pulley [22] and the second rear running belt pulley [23].	 

the '169 patent	Claim Chart Directed To Original Design	
		
the running belt comprises a first endless belt and a second endless belt, wherein the first endless belt is supported by the at least one front running belt pulley, the first of the at least one bearing rail, and the at least one rear running belt pulley, and wherein the second endless belt is supported by the second front running belt pulley, the second bearing rail, and the second	The "running belt" having "a first endless belt and a second endless belt, wherein the first endless belt is supported by the at least one front running belt pulley, the first of the at least one bearing rail, and the at least one rear running belt pulley, and wherein the second endless belt is supported by the second front running belt pulley, the second bearing rail, and the second rear running belt pulley" is literally present in each Original TrueForm Runner Treadmill. The running belt [9] includes a first endless belt [27] and a second endless belt [26], where the first endless belt [27] is supported by the first running belt pulley [5], the at least one first bearing rail, and the first rear running belt pulley [8] while the second endless belt [27] is supported by the second front running belt pulley [22], the second of the at least one bearing rail, and the second rear running belt	

LIFECORE Ex. 1002

the '169 patent	Claim Chart Directed To Original Design	
rear running belt pulley;	pulley [23].	

the '169 patent	Claim Chart Directed To Original Design	
and the plurality of laterally extending slats extend between the first endless belt and the second endless belt.	The "plurality of laterally extending slats" that "extend between the first endless belt and the second endless belt" are literally present in each Original TrueForm Runner Treadmill. As shown, the slats [28] extend laterally across the running belt [9] between the first endless belt [27] and the second endless belt [26]. Chapco and Samsara agree.	
15. The manually operated treadmill of claim 14, wherein the rear profile portion of the at least one bearing rail is positioned and shaped to provide a smooth transition for the running belt from the at least one bearing rail onto the at least one rear running belt pulley.	The "the rear portion of the at least one bearing rail is positioned and shaped to provide a smooth transition for the running belt from the at least one bearing rail onto the at least one rear running belt pulley" is literally present in each Original TrueForm Runner Treadmill. As shown, a continuous curve [29] of the bearing rail, which corresponds with the top profile [17], is inserted to show the smooth transition from the at least one bearing rail onto the at least one rear running belt pulley [8].	

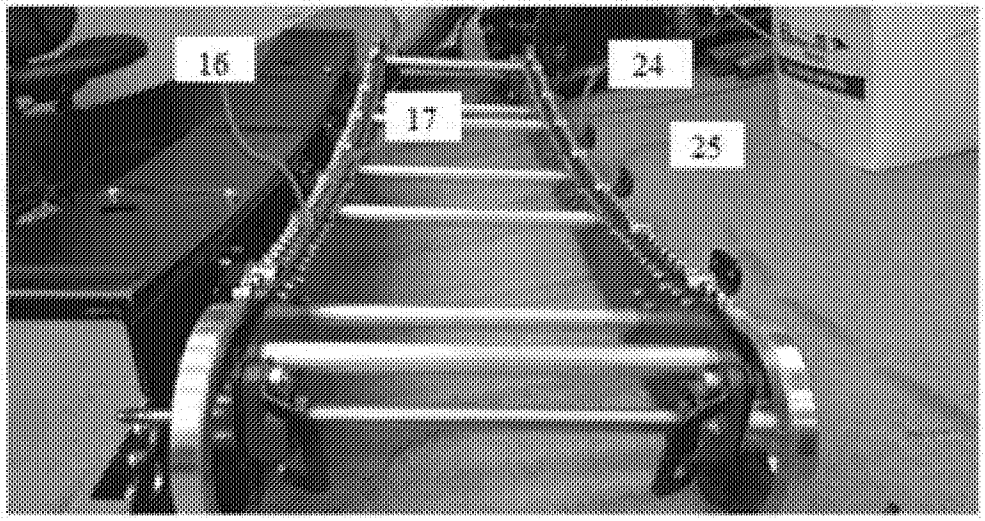
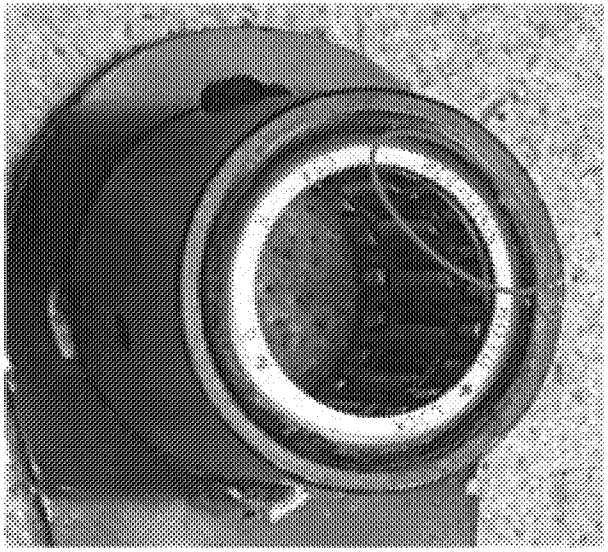
the '169 patent	Claim Chart Directed To Original Design	
		
16. The manually operated treadmill of claim 11, wherein the safety device comprises a one-way bearing.	The "safety device" comprising "a one-way bearing" is literally present in each Original TrueForm Runner Treadmill. As shown, the safety device [15] is a Koyo brand with a model number of RCB-121616. This model number corresponds with a "regular clutch and ***bearing*** assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction" as described in the Koyo catalog.	

Exhibit E **CONTAINS CONFIDENTIAL INFORMATION**

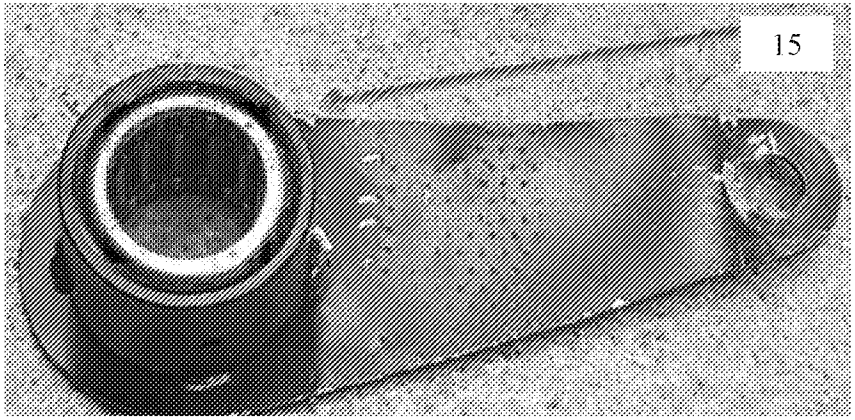
the '169 patent	Claim Chart Directed To Original Design	
		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

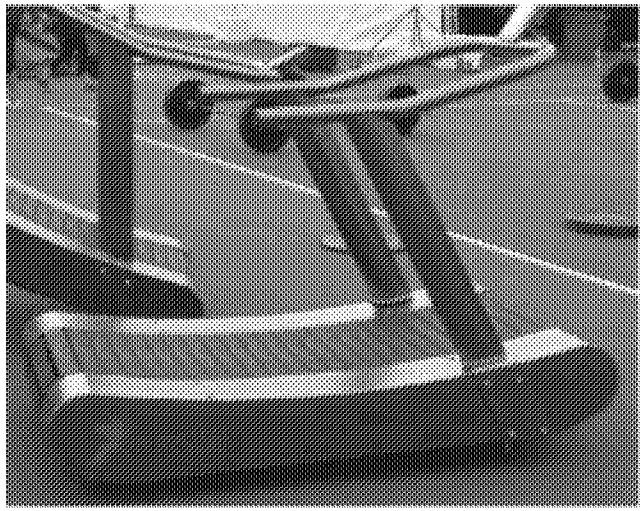
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
1. A manually powered treadmill comprising:	A "manually powered treadmill" is literally each of the Original and Redesigned TrueForm Runner Treadmills. As described in the product literature attached as Exhibit G and as Chapco and Samsara have admitted, the Original and Redesigned TrueForm Runner Treadmills are human powered and non-motorized.		

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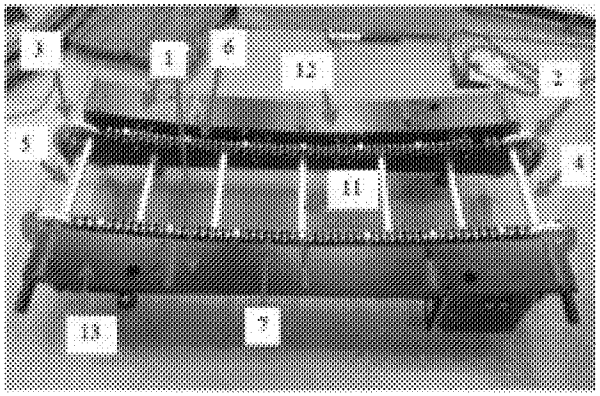
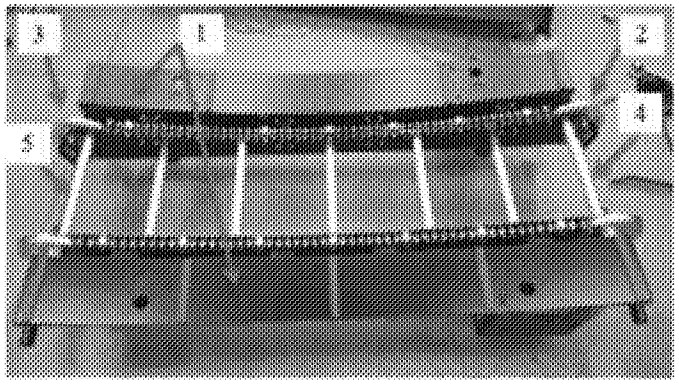
Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a frame having a front end and a rear end positioned opposite the front end;	A "frame having a front end and a rear end positioned opposite the front end" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, the frame [1], which designates the entire frame assembly not a single piece of metal, has a front end [2] and a rear end [3], where the front end [2] is positioned opposite the rear end [3]. Chapco's and Samsara's argument that the Original TrueForm Runner Treadmill does not meet this claim limitation because it has two frames and not one frame is inconsistent with the '580 patent's disclosure. The specification of the '580 patent states that "the frame may have substantially any configuration suitable for providing structure and support for the manual		

LIFECORE Ex. 1002

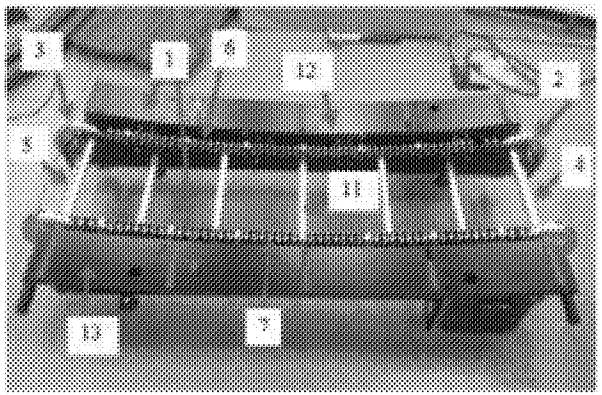
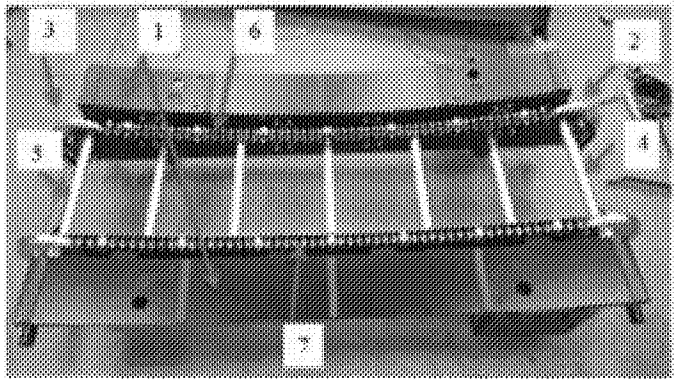
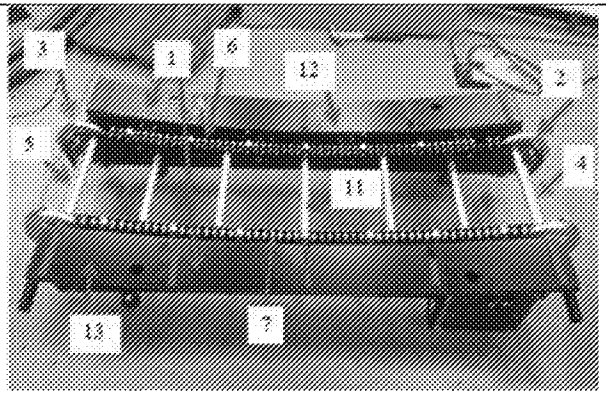
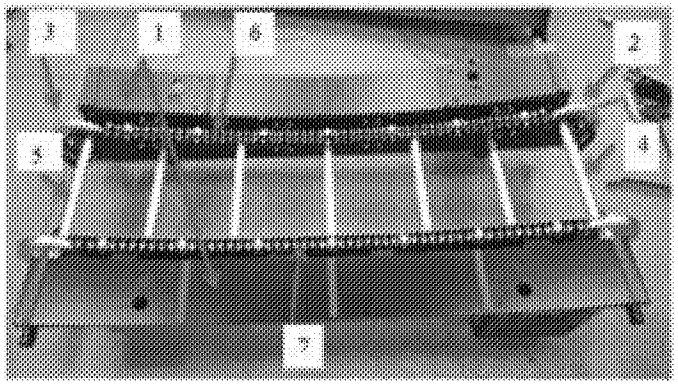
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	treadmill." Col. 5, ll. 65-67. Nothing about the plain and ordinary meaning of "frame" requires a single unitary structure.		
a front shaft rotatably coupled to the frame at the front end;	A "front shaft rotatably coupled to the frame at the front end" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, to a person of ordinary skill in the art, a front shaft [4] is rotatably coupled to the frame [1] at the front end [2]. In this regard, "the term 'coupled' means the joining of two members directly or indirectly to one another. … Such joining may be achieved		

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	with the two members or the two members and any additional intermediate members." Thus, coupling of the front shaft [4] to the frame [1] may be directly or indirectly, such as through an intermediary component or series of components (e.g., via bearing rail [6] or [7]). It is not required that each part be connected in such a way to permit rotation of one entire element relative to the other element.		
a rear shaft rotatably coupled to the frame at the rear end;	A "rear shaft rotatably coupled to the frame at the rear end" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, to a person of ordinary skill in the art, a rear shaft [5] is rotatably coupled to the frame [1] at the rear end [3]. In this regard, "the term 'coupled' means the		

LIFECORE Ex. 1002

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	joining of two members directly or indirectly to one another. … Such joining may be achieved with the two members or the two members and any additional intermediate members." Thus, coupling of the rear shaft [5] to the frame [1] may be directly or indirectly, such as through an intermediary component or series of components (e.g., via bearing rail [6] or [7]). It is not required that each part be connected in such a way to permit rotation of one entire element relative to the other element.		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

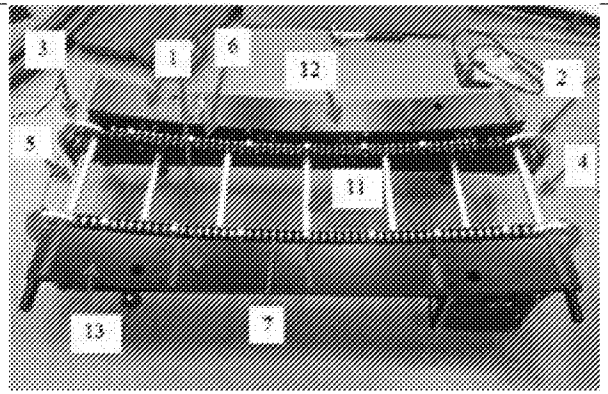
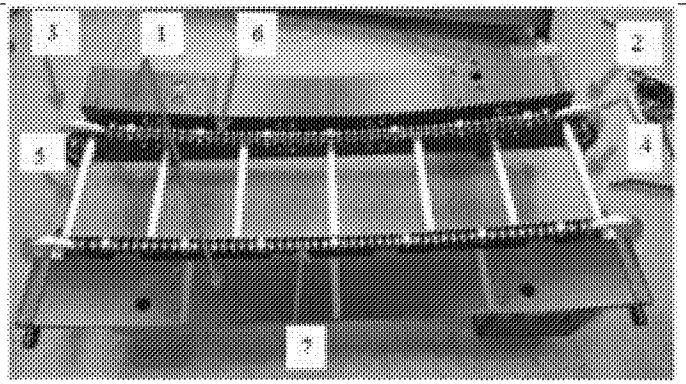
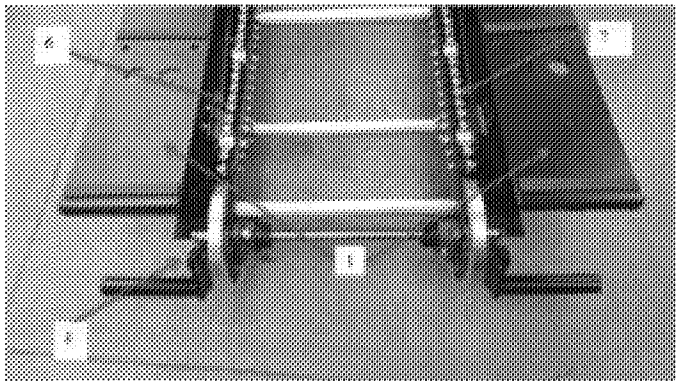
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame;	A "first bearing rail having a plurality of bearings" and "attached to a left side of the frame" are literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a plurality of bearings [6] are supported by a bearing rail, which is the first rail with bearings whose top profile corresponds to the shape of the running surface, and the bearing rail is attached to the left side of the frame [1].		 

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

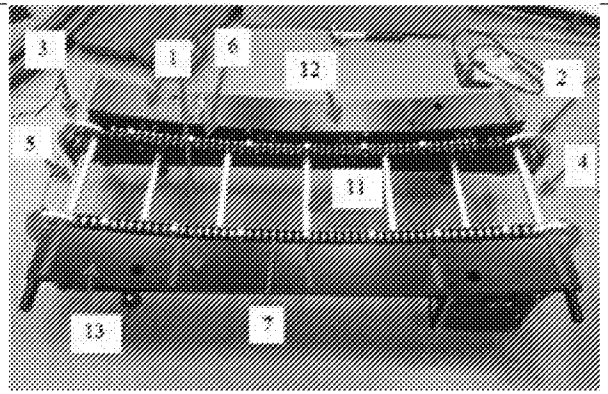
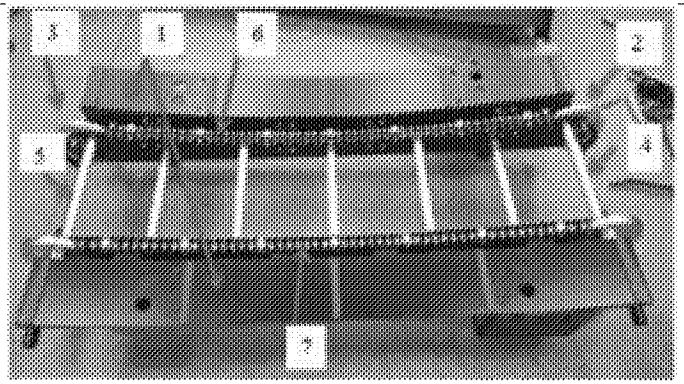
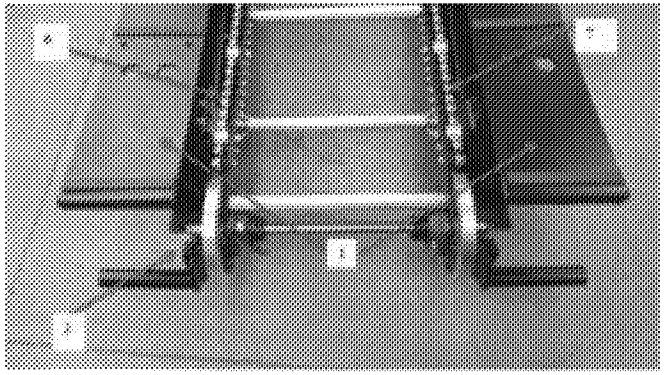
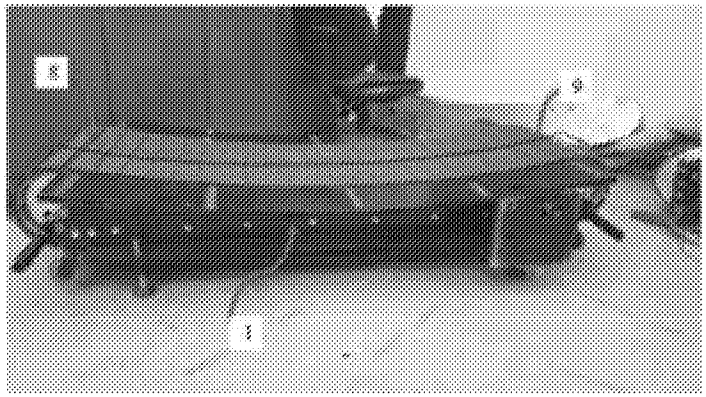
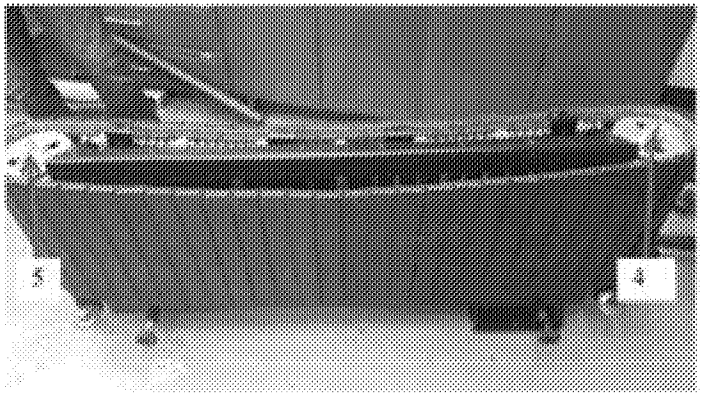
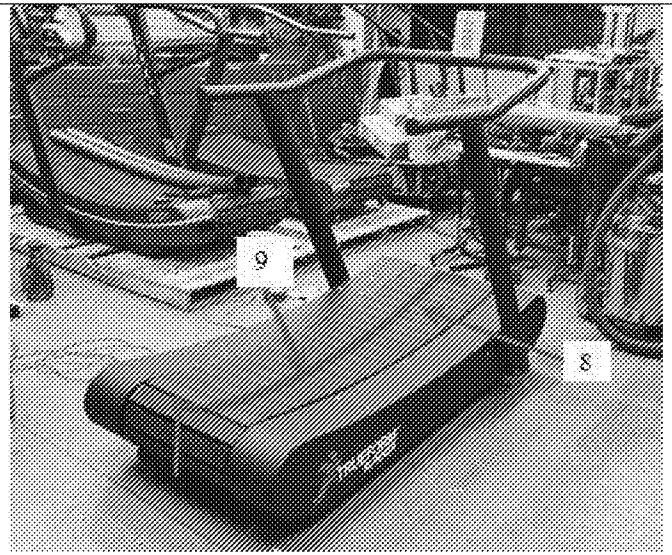
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame;	A "second bearing rail having a plurality of bearings" and "attached to a right side of the frame" are literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a plurality of bearings [7] are supported by a bearing rail, which is the second rail with bearings whose top profile corresponds to the shape of the running surface, and the bearing rail is attached to the right side of the frame [1].		 

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a running belt supported by the first bearing rail and the second bearing rail and disposed about the front shaft and the rear shaft, wherein the running belt follows a curved running surface; and	A "running belt" supported by the "first bearing rail" and the "second bearing rail" and following a "curved running surface" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, to a person of ordinary skill in the art, a running belt [8] follows a curved running surface [9]. The running belt [8] is supported by the plurality of bearings [6] and [7] which are in turn supported by the first bearing rail and the second bearing rail. The running belt [8] is supported by the first and second bearing rails. The running belt is also disposed about the front shaft [4] and the rear shaft [5]. The plain and ordinary meaning of "support" does not require that components must be	 	

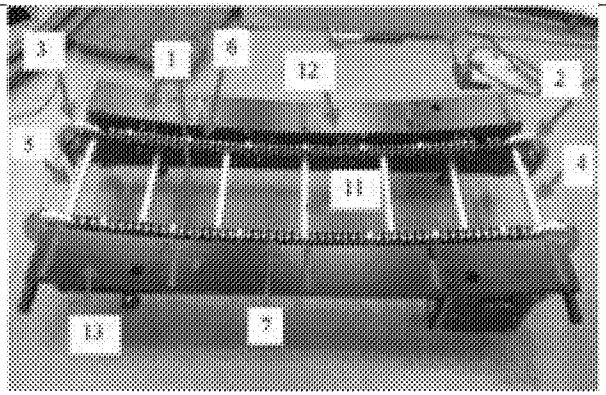
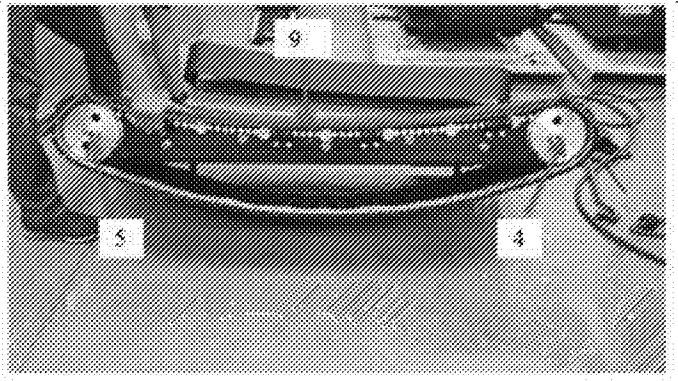
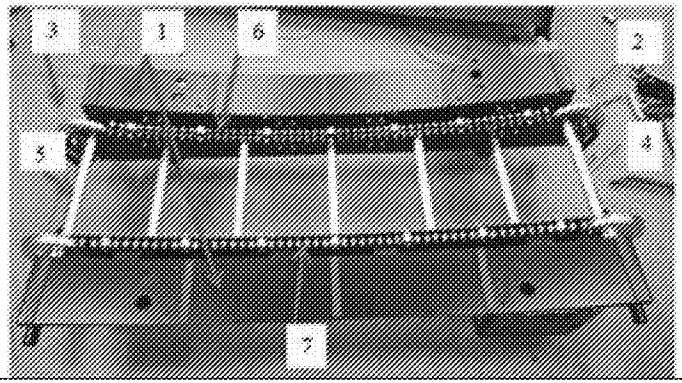
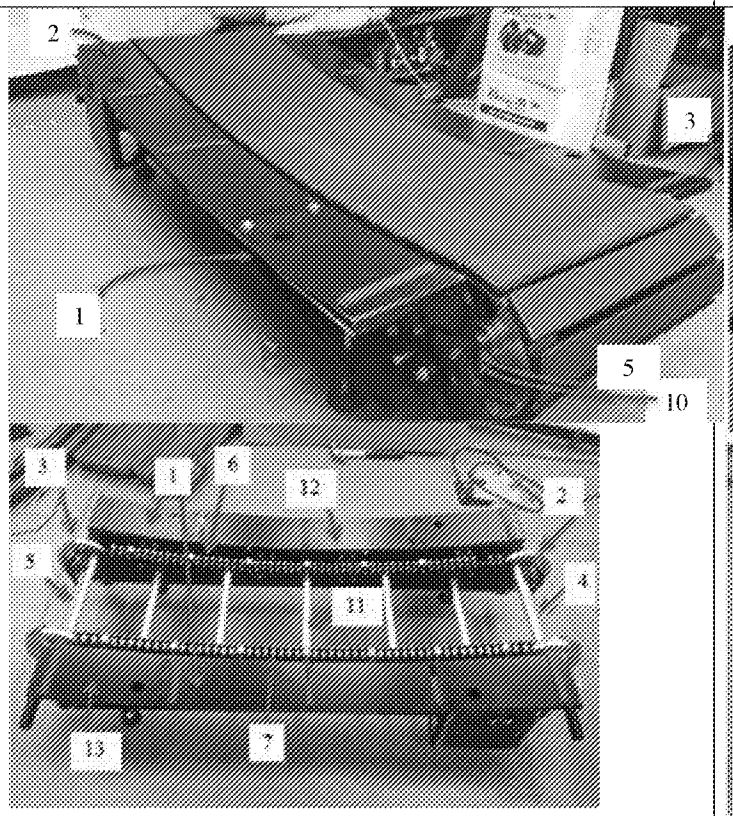
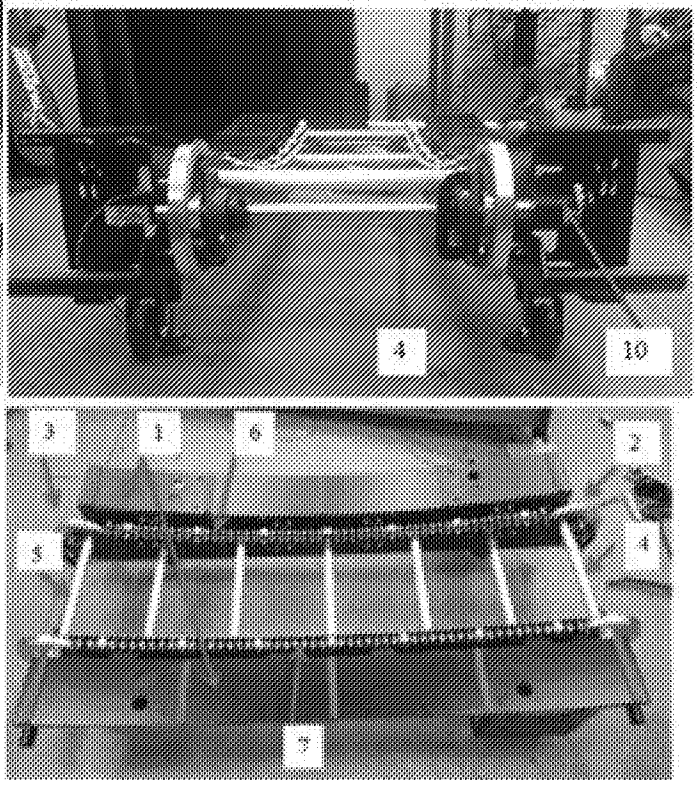
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	directly or physically connected or touching. "Support" may be provided directly, may be provided indirectly via an intermediary component or series of components, may bear some of the weight of another component or a series of components, and/or may bear all of the weight of another component or series of components.		 

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.	A "safety device coupled to at least one of the front shaft and the rear shaft" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown in the Original Design, the safety device [10] is coupled to the rear shaft [5], to which Chapco and Samsara agree. As shown in the Redesign, the safety device [10] is coupled to the front shaft [4], to which Chapco and Samsara also agree. As also shown, the safety device [10] of the Original Design is a Koyo brand with a model number of RCB-121616 while the safety device [10] of the Redesign is a Koyo brand with a model number of RCB-162117. Each of these model numbers corresponds with a "regular clutch and bearing assembly" that "transmits torque between		

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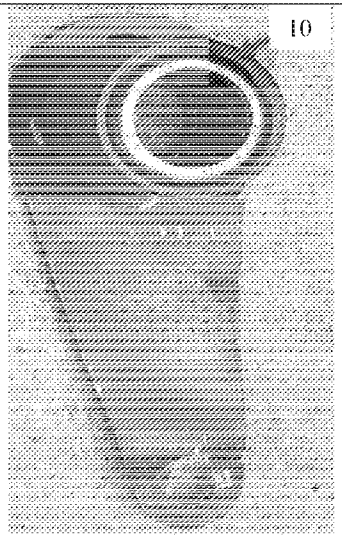
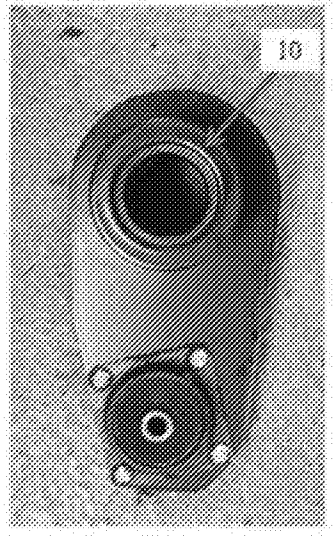
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	[the] shaft and housing in one direction and allows free overrun in the opposite direction" as described in the Koyo catalog. In regard to the Original Design, because the safety device [10] is coupled to the rear shaft [5] and because the safety device [10] "allows free overrun," in one rotational direction, the safety device [10] is "structured to substantially prevent rotation of … the rear shaft in a first rotational direction while permitting rotation of the … rear shaft in a second rotational direction opposite the first rotational direction." In regard to the Redesign, because the safety device [10] is coupled to the front shaft [4] and because the safety device [10] "allows free overrun," in one rotational direction, the safety device [10] is "structured to substantially		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

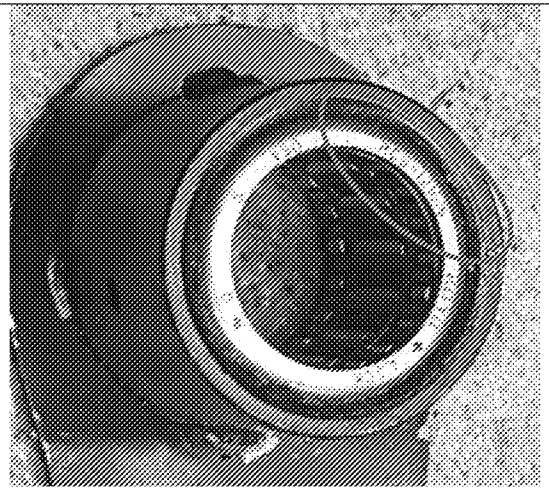
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	prevent rotation of … the front shaft … in a first rotational direction while permitting rotation of … the front shaft … in a second rotational direction opposite the first rotational direction."		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

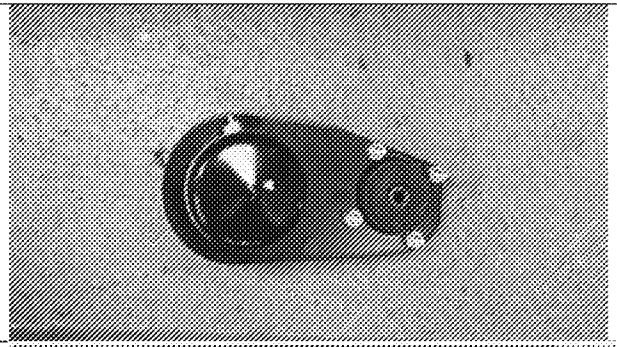
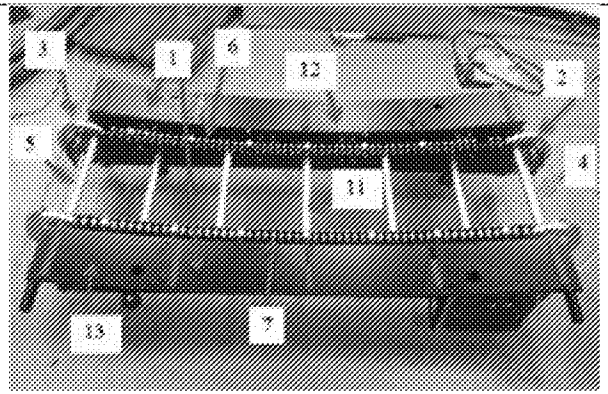
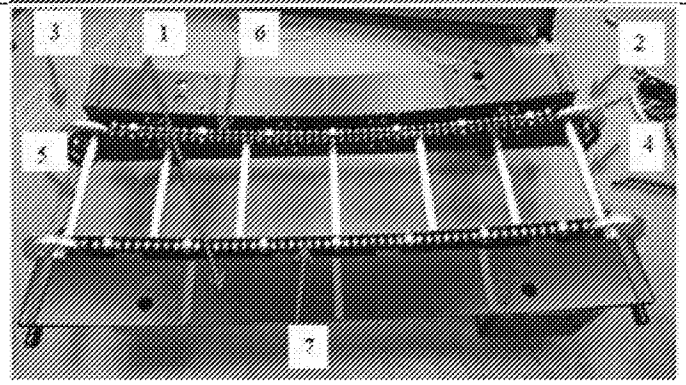
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			
4. The manually powered treadmill of claim 1, wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft.	"Each one of the first and second bearing rails" being "attached longitudinally to the frame between the front shaft and rear shaft" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, the bearing rails are longitudinally attached to the frame [1] between the front shaft [4] and the rear shaft [5].		

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Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

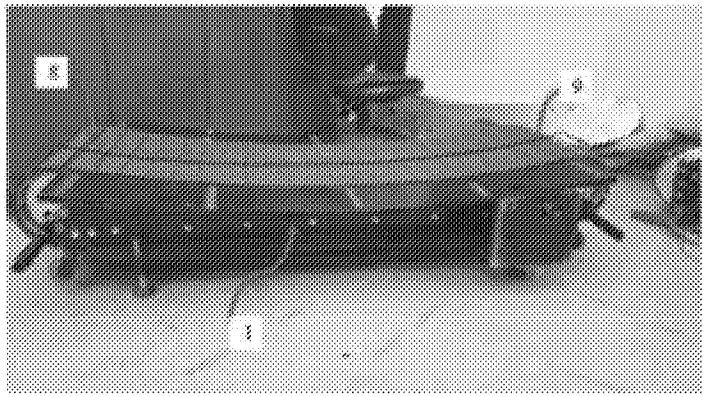
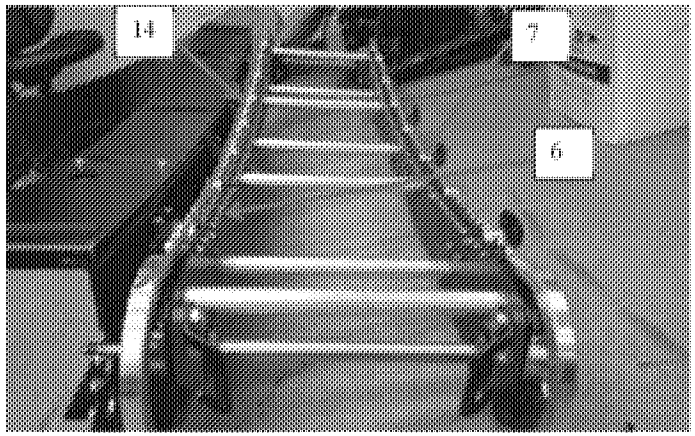
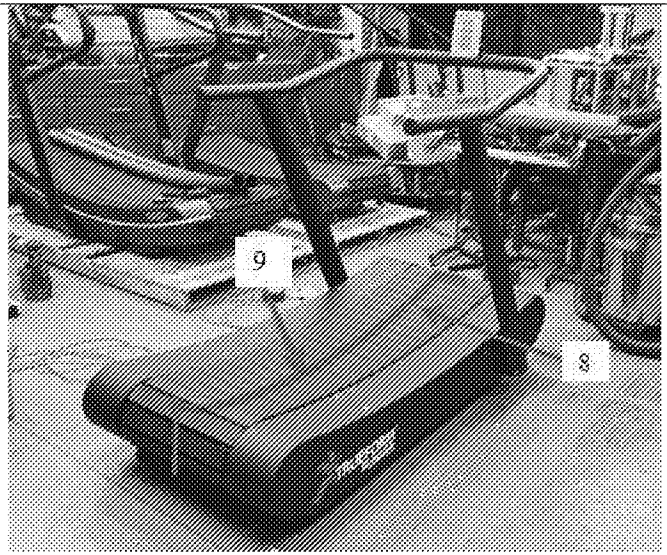
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
5. The manually powered treadmill of claim 1, wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface.	"Each one of the first bearing rail and the second bearing rail" that "define in part a top profile corresponding to the curved running surface" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. The top profile edge of the bearing rails is curved. The plurality of bearings [6] and [7], which in part support the running belt [8], are mounted to the bearing rails to follow this top profile to create the curved running surface. As seen in the photographs, the top surface of the bearing rails corresponds to the curved running surface.	 	

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

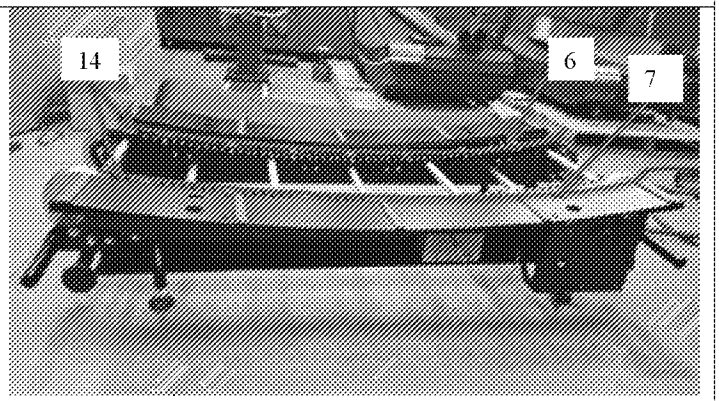
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

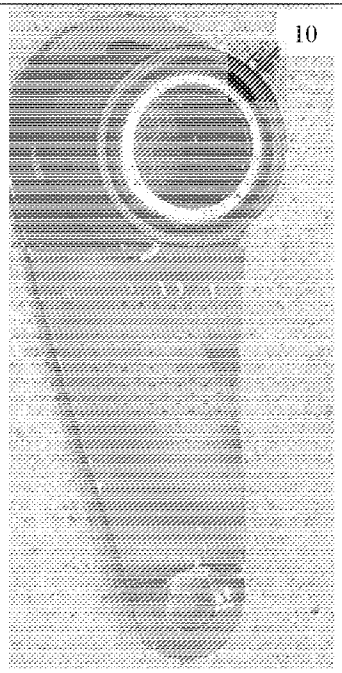
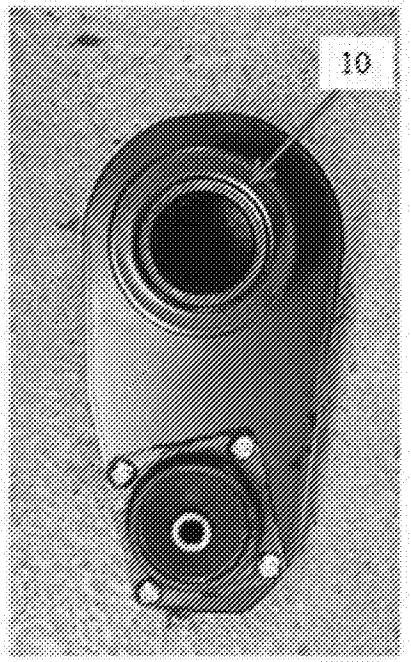
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
6. The manually powered treadmill of claim 1, wherein the safety device includes a one-way bearing.	The "safety device" includes "a one-way bearing" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samara agree. As shown, the safety device [10] of the Original Design is a Koyo brand with a model number of RCB-121616 while the safety device of the Redesign is Koyo brand with a model number of RCB-162117. Each model number corresponds with a "regular clutch and ***bearing*** assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction," as described in the Koyo catalog.		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

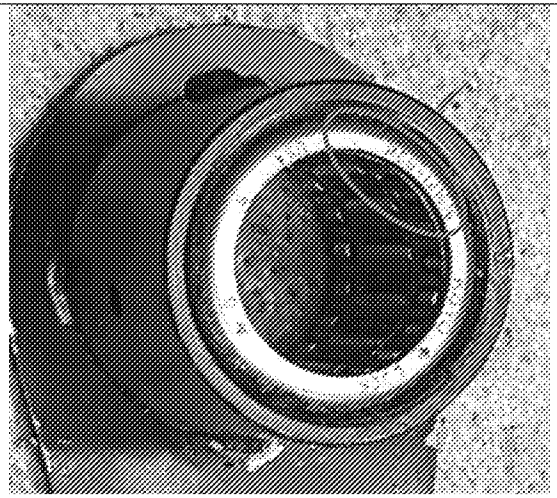
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

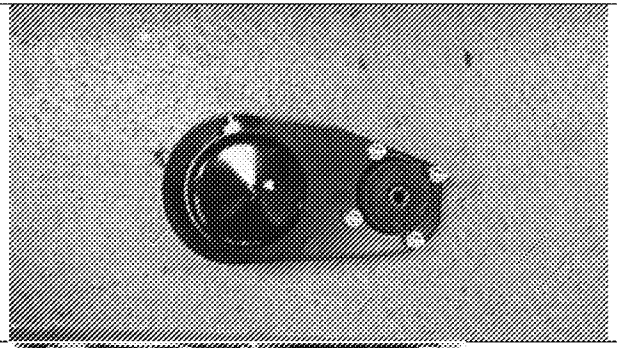
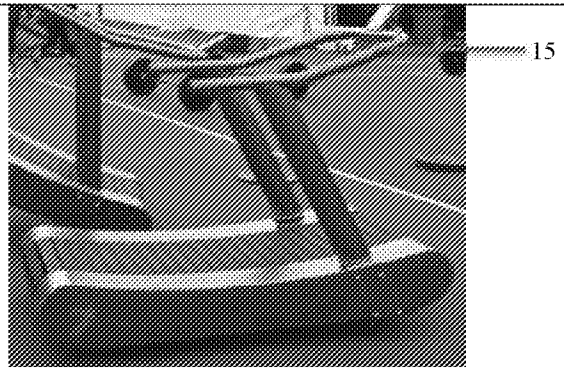
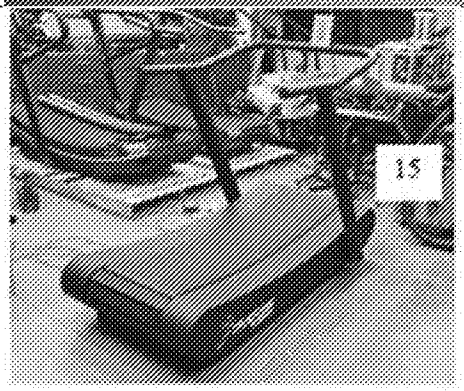
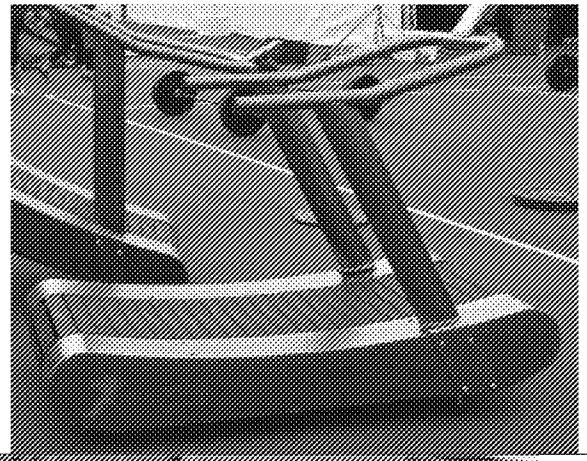
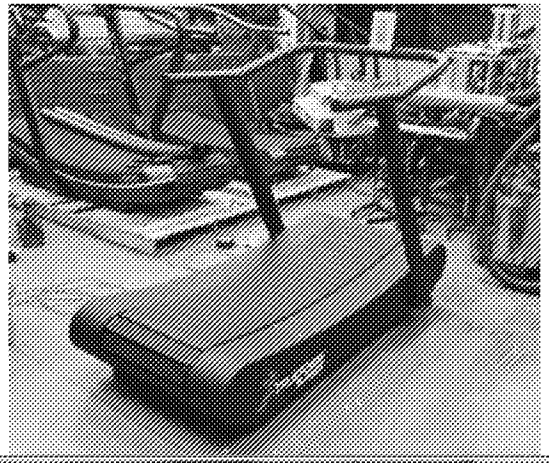
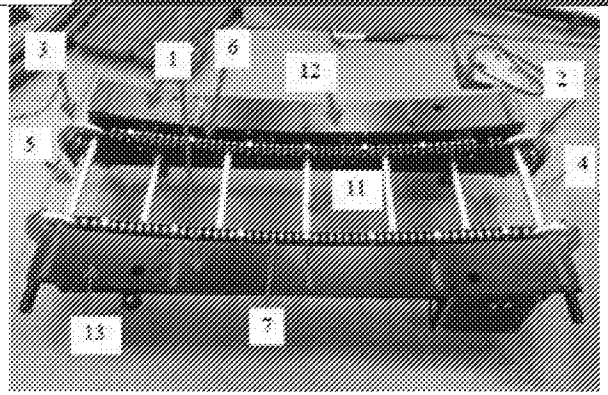
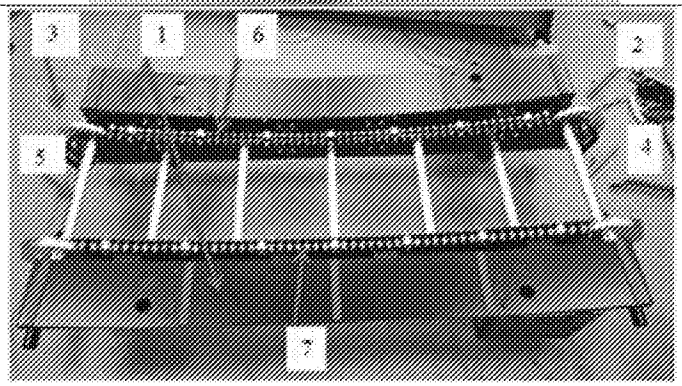
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			
10. The manually powered treadmill of claim 1, further comprising a handrail attached to the frame and structured to provide a support structure for the user of the manually powered treadmill.	A "handrail attached to the frame" which is "structured to provide a support structure for the user of the manually powered treadmill" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, the manually powered treadmill includes a handrail [15] that is structured to provide a support structure to a user of the manually powered treadmill.		

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
11. A manually powered treadmill, comprising:	A "manually powered treadmill" is literally each of the Original and Redesigned TrueForm Runner Treadmills. As described in the product literature attached as Exhibit G and as Chapco and Samsara have admitted, the Original and Redesigned TrueForm Runner Treadmills are human powered and non-motorized.		
a frame having a front end and a rear end positioned opposite the front end;	A "frame having a front end and a rear end positioned opposite the front end" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, the frame [1], which designates the entire frame assembly not a single piece of metal, has a front end [2] and a rear end [3], where the front end [2] is positioned		

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the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	opposite the rear end [3]. Chapco's and Samsara's argument that the Original TrueForm Runner Treadmill does not meet this claim limitation because it has two frames and not one frame is inconsistent with the '580 patent's disclosure. The specification of the '580 patent states that "the frame may have substantially any configuration suitable for providing structure and support for the manual treadmill." Col. 5, ll. 65-67. Nothing about the plain and ordinary meaning of "frame" requires a single unitary structure.		

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

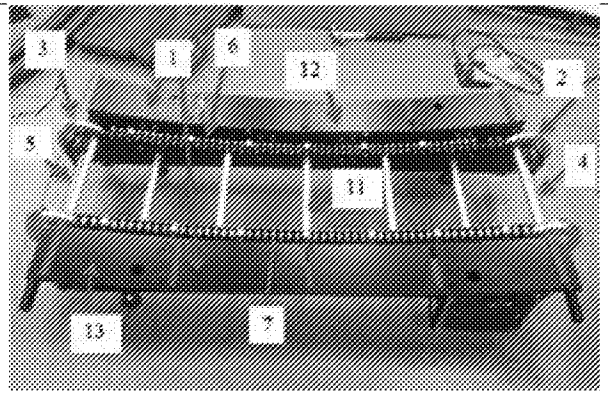
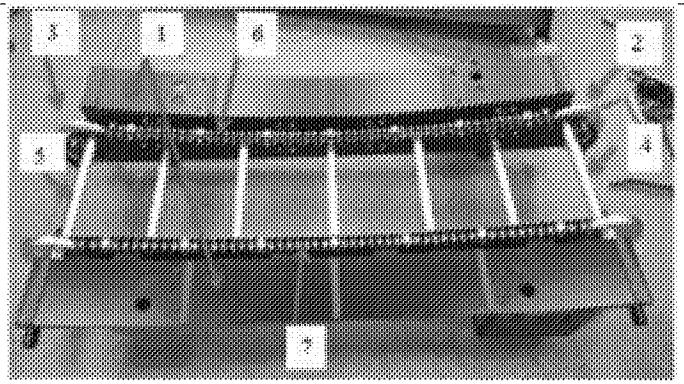
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a front shaft attached to the frame adjacent the front end;	A "front shaft attached to the frame adjacent the front end" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a front shaft [4] is attached to the frame [1] at the front end [2]. In this regard, "the term 'coupled' means the joining of two members directly or indirectly to one another. ... Such joining may be achieved with the two members or the two members and any additional intermediate members." *See* the '580 patent at col. 32, ll. 10-14. The term "coupling" is analogous to the term "attached." Therefore, attachment of the front shaft [4] to the frame [1] may be directly or indirectly, such as through an intermediary member (e.g., via bearing rail)		

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

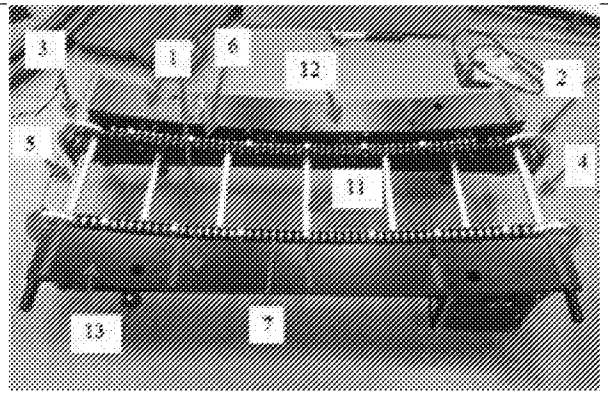
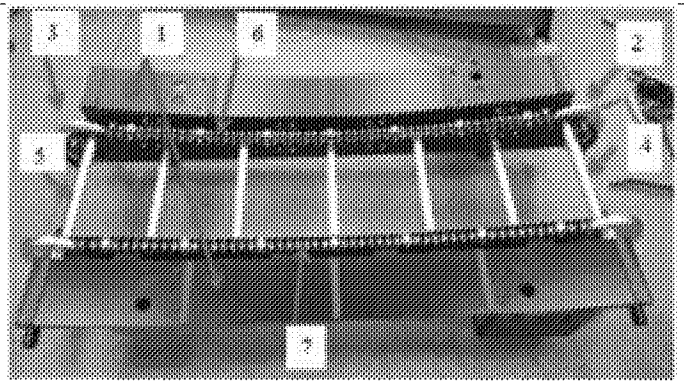
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a rear shaft attached to the frame adjacent the rear end;	A "rear shaft attached to the frame adjacent the rear end" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a rear shaft [5] is attached to the frame [1] adjacent the rear end [3]. In this regard, "the term 'coupled' means the joining of two members directly or indirectly to one another. … Such joining may be achieved with the two members or the two members and any additional intermediate members." *See* the '580 patent at col. 32, ll. 10-14. The term "coupling" is analogous to the term "attached." Therefore, attachment of the front shaft [5] to the frame [1] may be directly or indirectly, such as through an intermediary member (e.g., via bearing rail).		
a first bearing rail	A "first bearing rail having		

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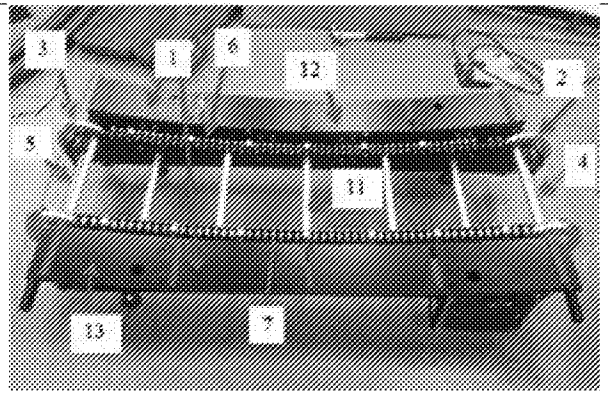
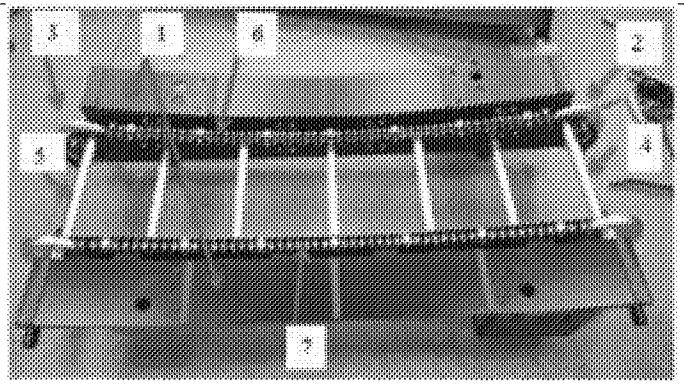
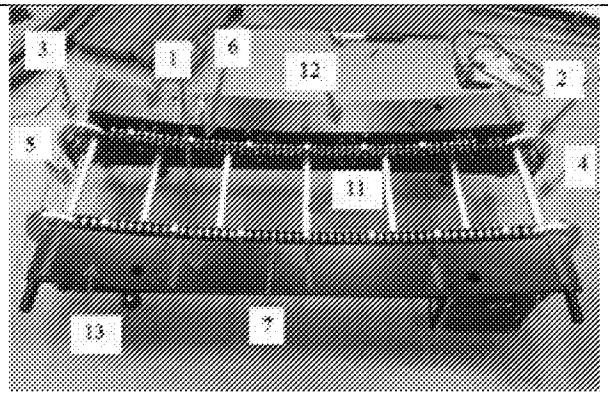
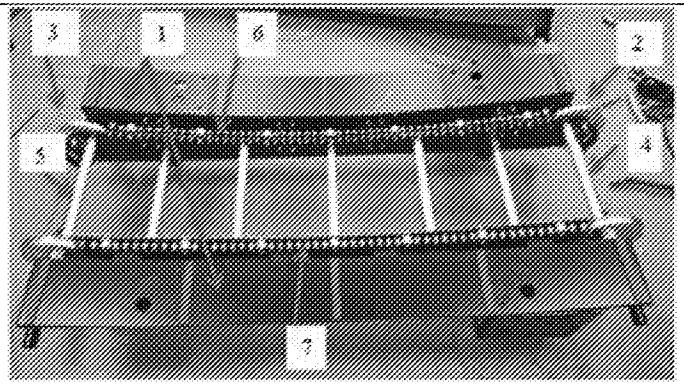
Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
having a plurality of bearings, the first bearing rail attached to a left side of the frame;	a plurality of bearings" and "attached to a left side of the frame" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a plurality of bearings [6] are supported by a bearing rail, which is the first rail with bearings whose top profile corresponds to the shape of the running surface, and the bearing rail is attached to the left side of the frame [1].		
a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame;	A "second bearing rail having a plurality of bearings" and "attached to a right side of the frame" are literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a plurality of bearings [7] are supported by a bearing rail, which is the second rail with bearings whose top profile corresponds to the shape		

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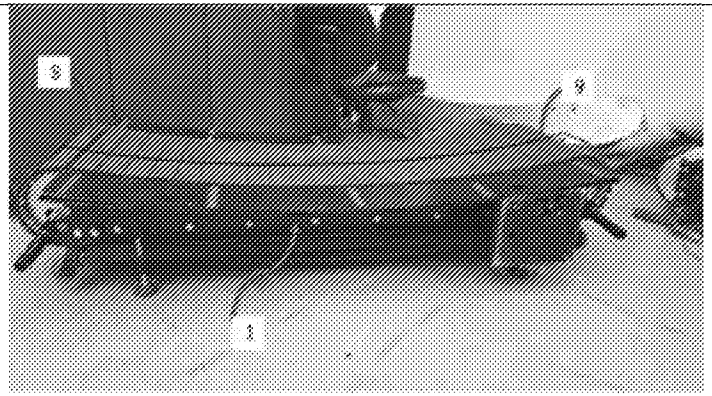
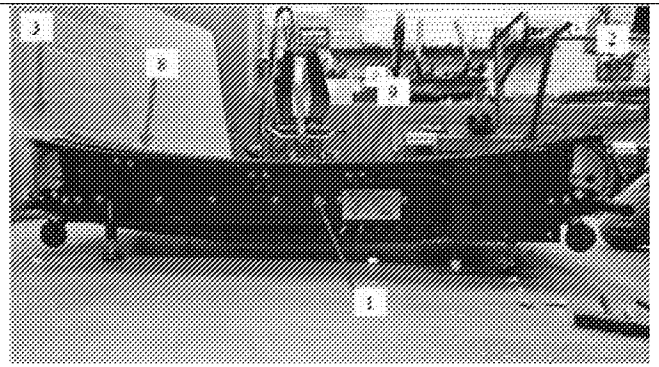
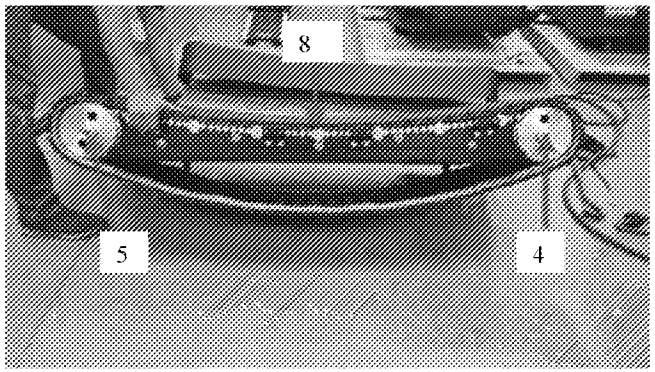
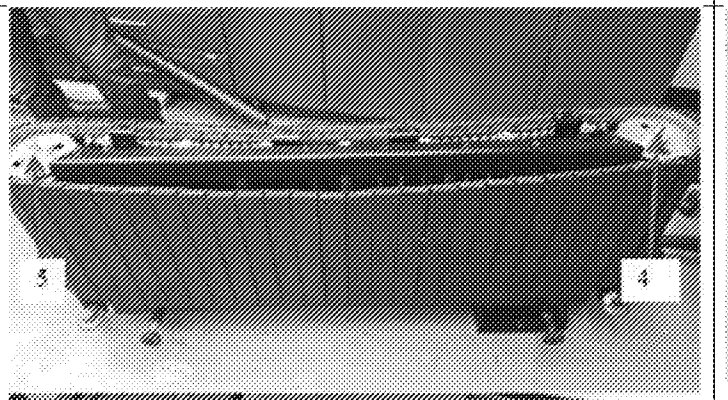
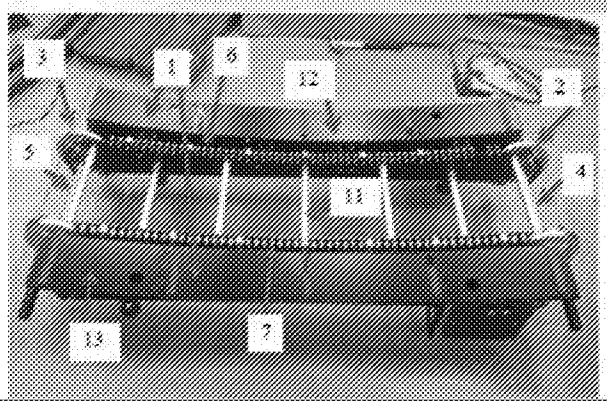
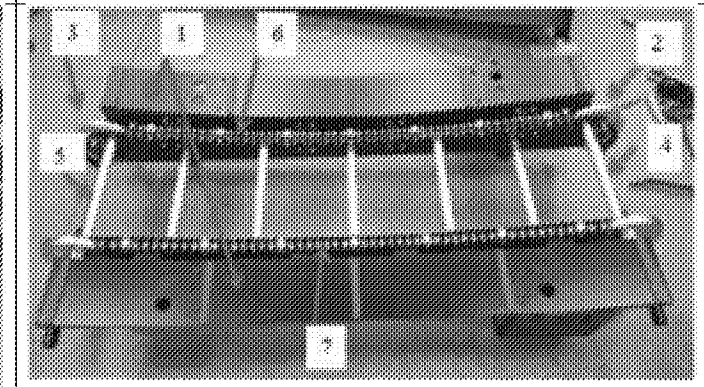
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	of the running surface, and the bearing rail is attached to the right side of the frame [1].		
a running belt at least partially disposed about the front shaft and the rear shaft and at least partially supported by the first bearing rail and the second bearing rail,	A "running belt" that is "at least partially disposed about the front shaft and the rear shaft and at least partially supported by the first bearing and the second bearing rail" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a running belt [8] is supported by the first bearing rail and the second bearing rail and disposed about the front shaft [4] and the rear shaft [5].		 

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
		 	

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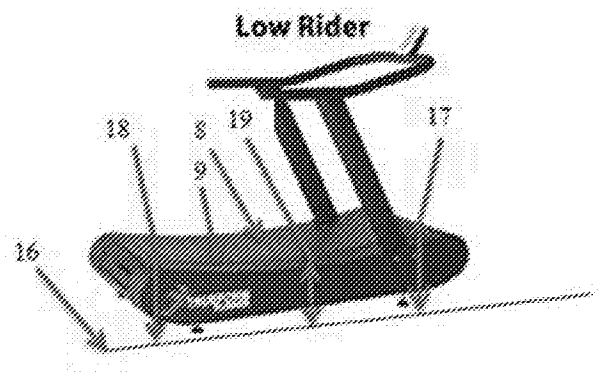
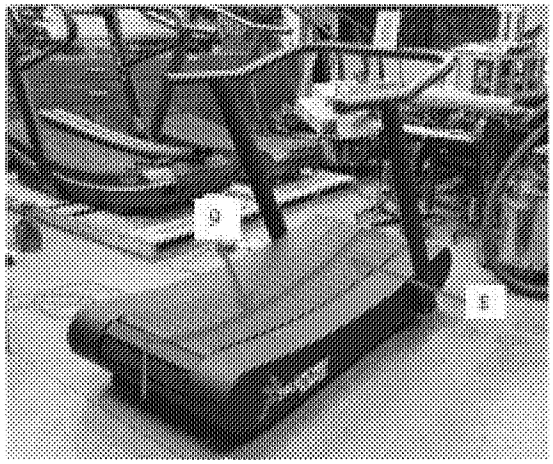
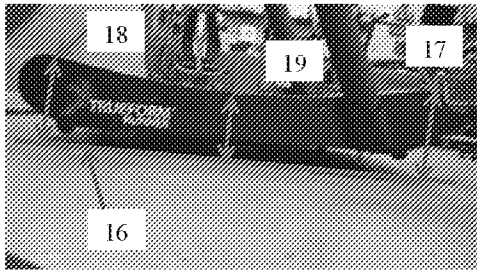
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
wherein the running belt includes a front belt portion proximate the front end, a rear belt portion proximate the rear end, and a central belt portion intermediate the front and rear belt portions, wherein the central belt portion is positioned vertically closer to a ground surface supporting the frame than the front and rear belt portions such that the running belt follows a curved running surface;	The "running belt" having "front belt portion," a "rear belt portion," and "a central belt portion" that is "positioned vertically closer to a ground surface … than the front and rear belt portions such that the running belt follows a curved running surface" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, the running belt [8] includes a front belt portion [17] proximate the front end, a rear belt portion [18] proximate the rear end, and a central belt portion [19] intermediate the front belt portion [17] and the rear belt portion [18]. As also shown, a horizontal plane line [16] has been inserted on the picture of each of the Original and Redesigned TrueForm Runner Treadmills. While the horizontal plane line [16]		 

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the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	is shown as angled, this is due to the orientation of the treadmills. In this regard, the horizontal plane line [16] represents a ground surface that supports the treadmill. Relative to the horizontal plane line [16], the central portion [19] is vertically lower (i.e., closer to the horizontal plane line [16]) than each of the front belt portion [17] and the rear belt portion [18]. Due to the front belt portion [17] and rear belt portion [18] being vertically higher than the central belt portion [19], a curved running surface [9] is formed.		

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

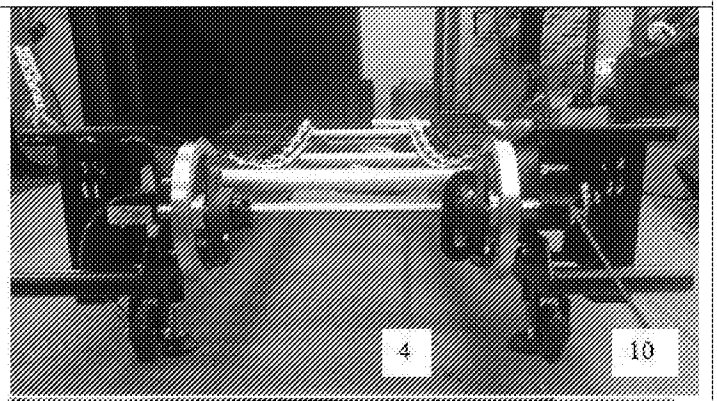
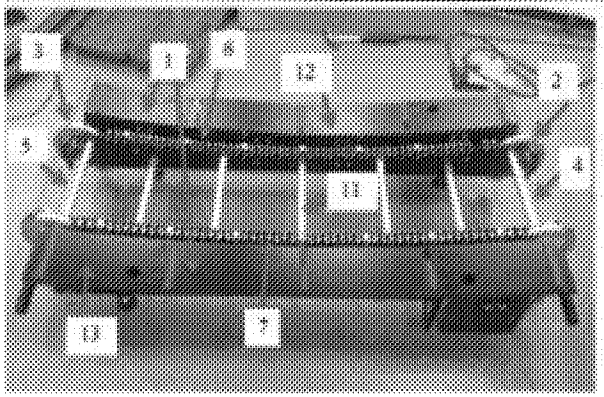
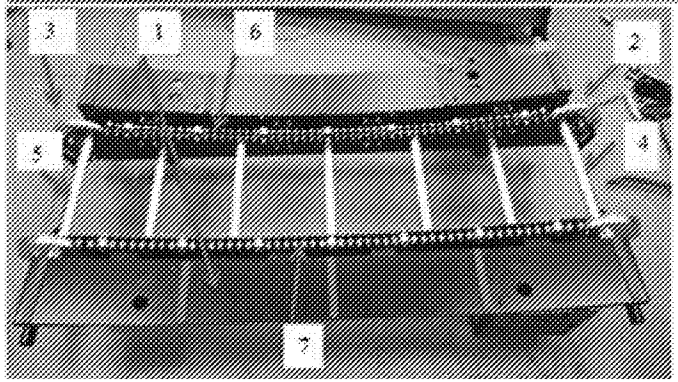
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
and a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction.	A "safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of at least one of the front shaft and the rear shaft in a second rotational direction" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown in the Original Design, the safety device [10] is coupled to the rear shaft [5]; Chapco and Samsara agree. As shown in the Redesign, the safety device [10] is coupled to the front shaft [4]; Chapco and Samara agree. As also shown, the safety device [10] of the Original Design is a Koyo brand with a model number of RCB-121616 while the safety device [10] of the Redesign is a Koyo brand with a model number of RCB-162117.		
			

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

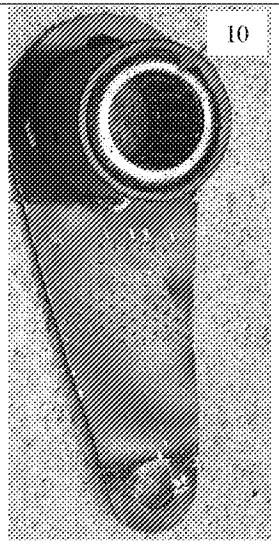
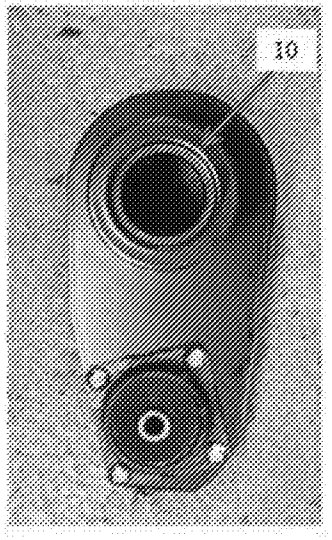
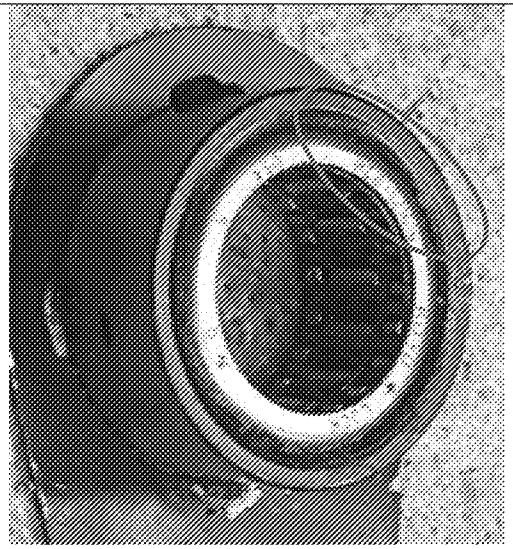
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	Each of these model numbers corresponds with a "regular clutch and bearing assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction," as described in the Koyo catalog. In regard to the Original Design, because the safety device [10] is coupled to the rear shaft [5] and because the safety device [10] "allows free overrun," in one rotational direction, the safety device [10] "substantially prevent[s] rotation of … the rear shaft in a first rotational direction while permitting rotation of … the rear shaft in a second rotational direction opposite the first rotational direction." In regard to the Redesign, because the safety device [10] is coupled to the front shaft [4] and because the		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	safety device [10] "allows free overrun," in one rotational direction, the safety device [10] "substantially prevent[s] rotation of … the front shaft in a first rotational direction while permitting rotation of … the front shaft in a second rotational direction opposite the first rotational direction."		

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CONTAINS CONFIDENTIAL INFORMATION

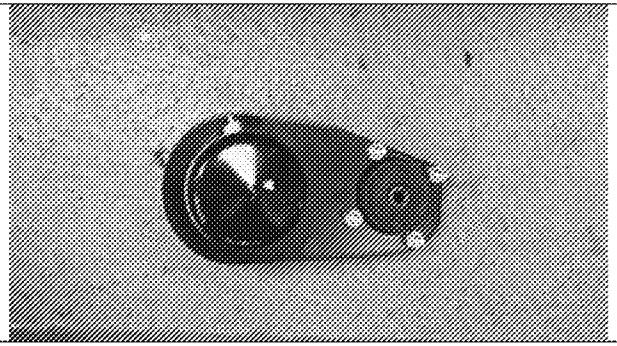
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

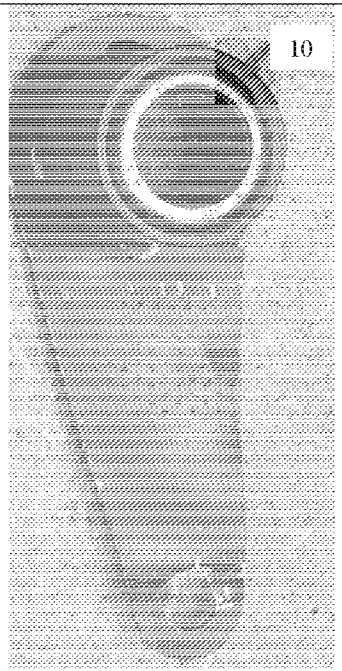
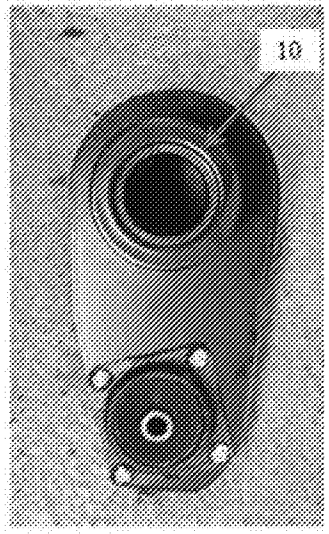
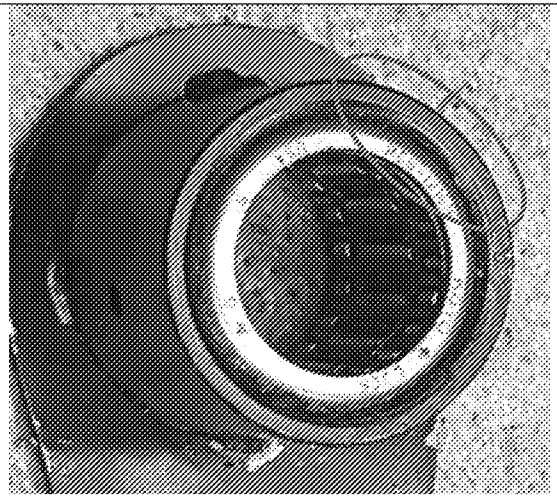
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
12. The manually powered treadmill of claim 11, wherein the safety device includes a one-way bearing.	The "safety device" including "a one-way bearing" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, the safety device [10] of the Original Design is a Koyo brand with a model number of RCB-121616 while the safety device of the Redesign is Koyo brand with a model number of RCB-162117. Each model number corresponds with a "regular clutch and ***bearing*** assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction," as described in the Koyo catalog.		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			

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CONTAINS CONFIDENTIAL INFORMATION

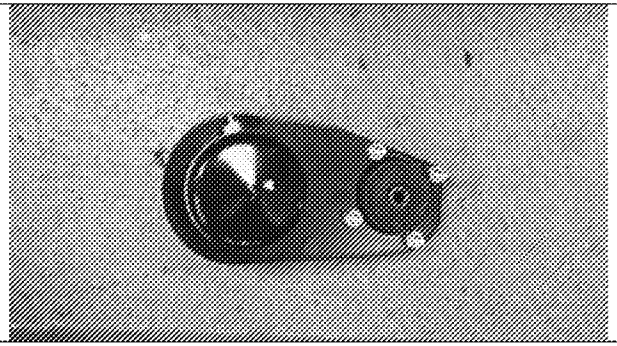
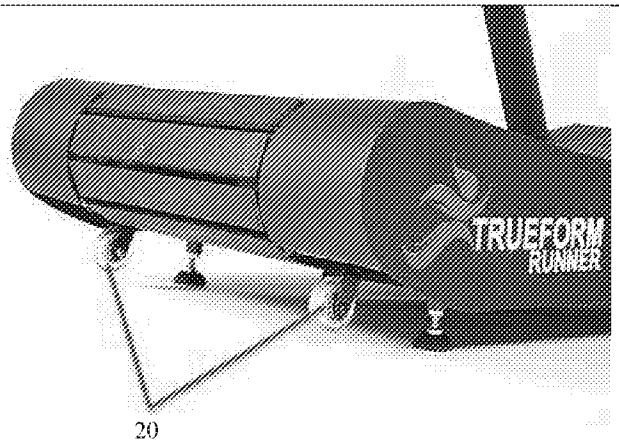
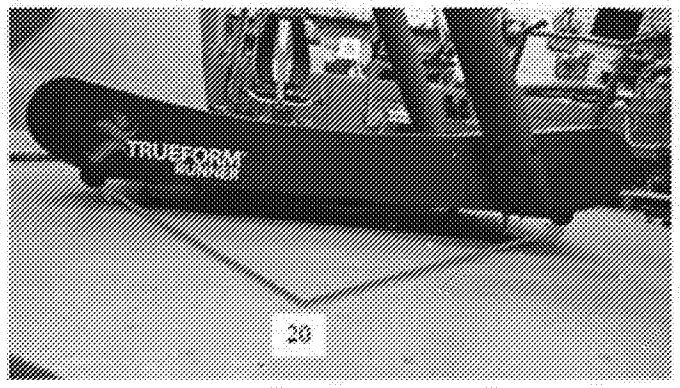
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			
13. The manually powered treadmill of claim 11, further comprising a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating	A "pair of wheels mounted to the frame" that "are not in contact with the ground surface when the manually powered treadmill is in an operating position" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, a pair of wheels [20] are not in contact with a ground surface when each of the Original Design and Redesign is in an operating position whereby a user may walk or run on the treadmill (i.e., the operating		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

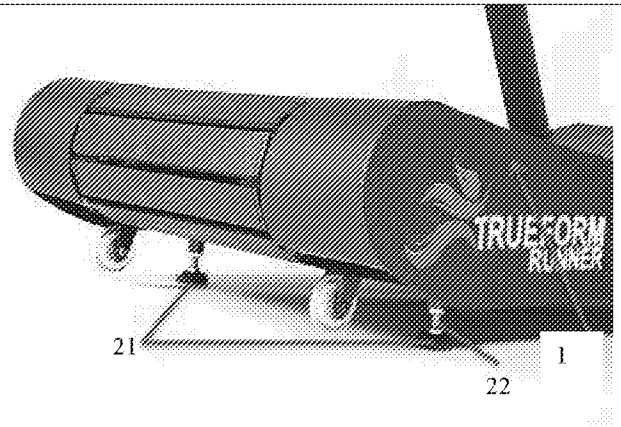
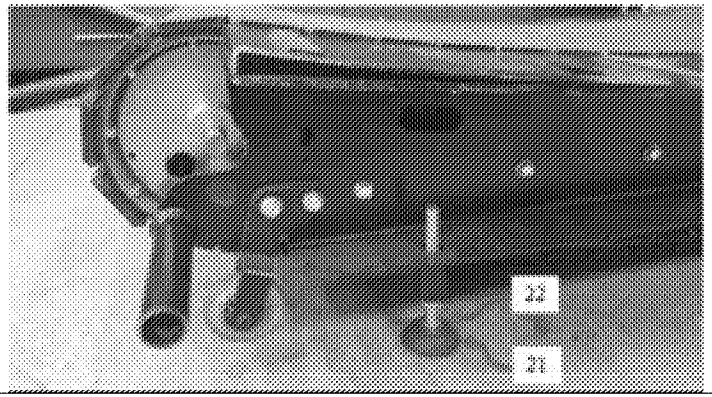
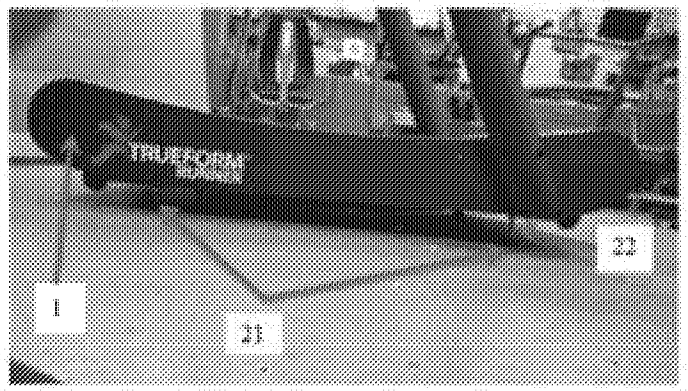
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
position.	position).		
14. The manually powered treadmill of claim 11, further comprising support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface.	"Support feet coupled to the frame" that are "vertically adjustable relative to the ground surface" are literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, support feet [21] are coupled to the frame [1] using a threaded rod [22]. The threaded nature of the rod [22] allows the rod [22] to be rotatably movable towards the frame [1] and away from the frame [1] to adjust the incline of the treadmill to a ground surface.	 	

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Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

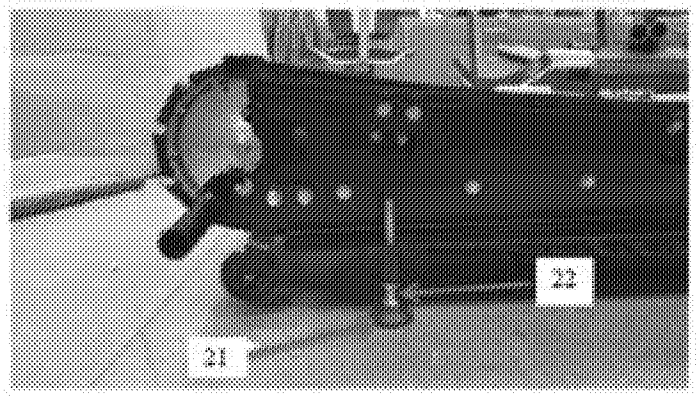
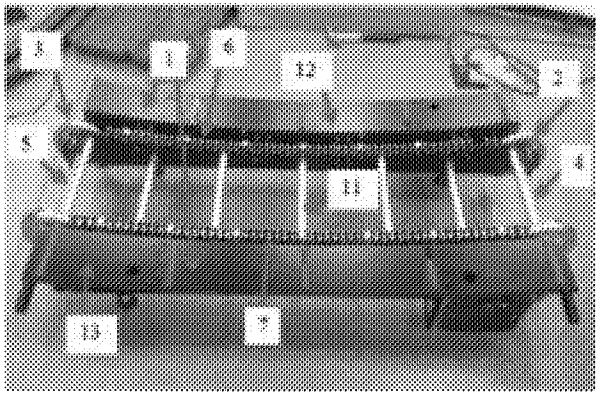
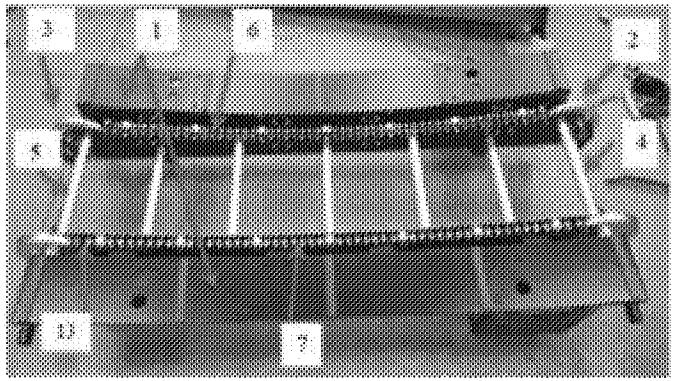
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			
18. The manually powered treadmill of claim 11, wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft.	"Each one of the first and second bearing rails" being "attached longitudinally to the frame between the front shaft and rear shaft" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, the first bearing rail and the second bearing rail are longitudinally attached to the frame [1] between the front shaft [4] and the rear shaft [5].		
19. A manually	A "manually powered		

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Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

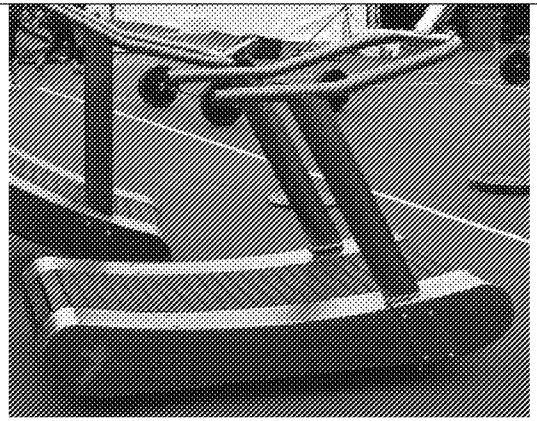
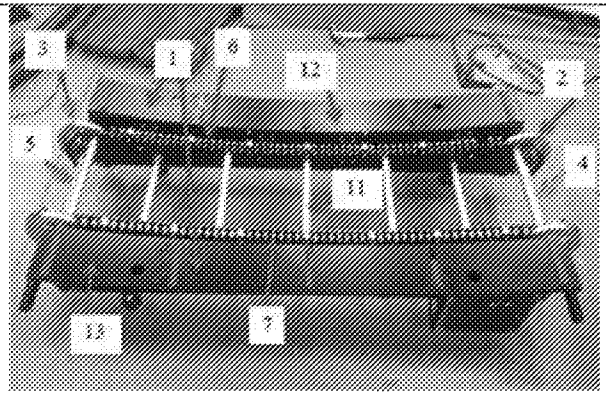
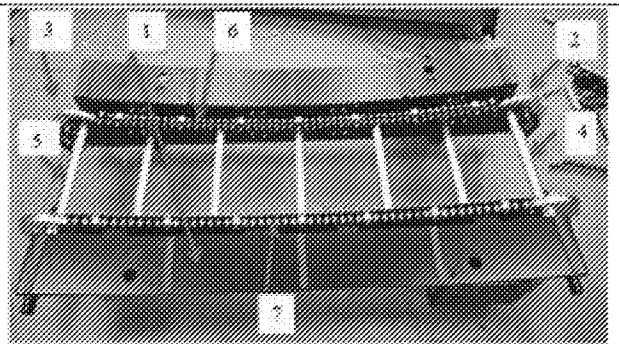
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
powered treadmill, comprising:	treadmill" is literally each of the Original and Redesigned TrueForm Runner Treadmills. As described in the product literature attached as Exhibit G and as Chapco and Samsara have admitted, the Original and Redesigned TrueForm Runner Treadmills are human powered and non-motorized.		
a frame having a front end and a rear end;	A "frame having a front end and a rear end" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, the frame [1] has a front end [2] and a rear end [3].		

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Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

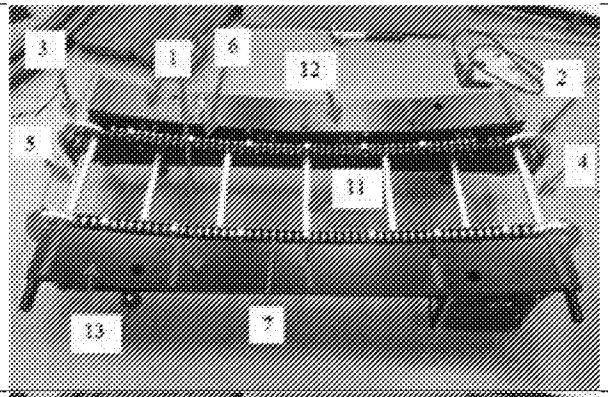
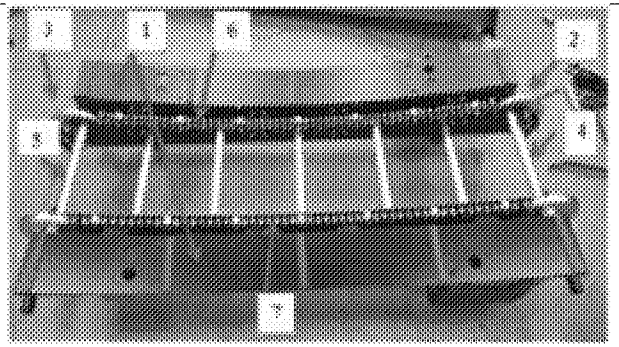
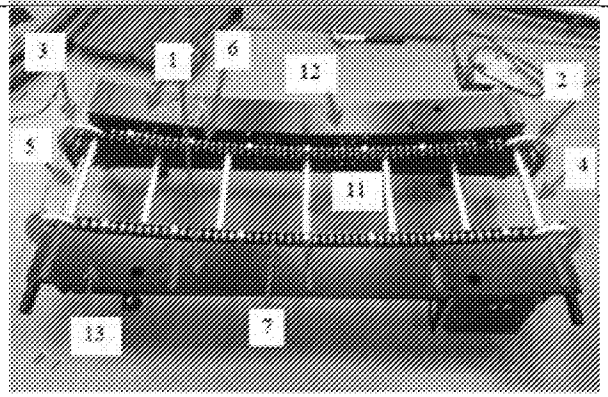
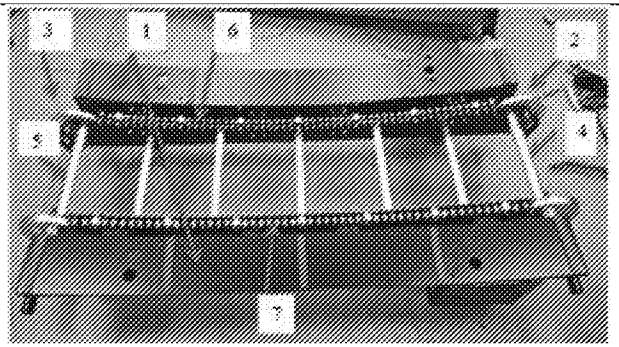
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame;	A "first bearing rail having a plurality of bearings" and "attached to a left side of the frame" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a first bearing rail supporting a plurality of bearings [6] is attached to one side of the frame [1] (i.e., the left side).		
a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame;	A "second bearing rail having a plurality of bearings" and "attached to a right side of the frame" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a second bearing rail supporting a plurality of bearings [7] is attached to the other side of the frame [1] (i.e., the right side).		

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Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

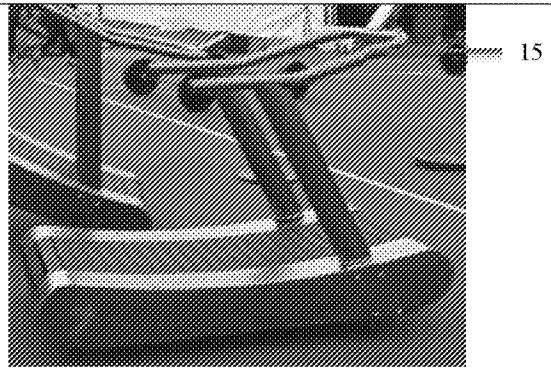
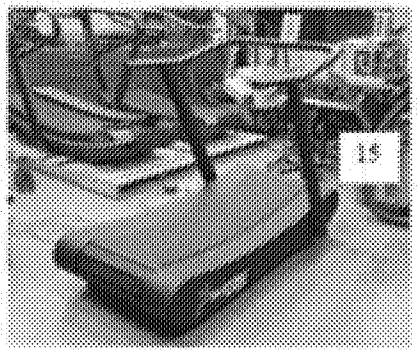
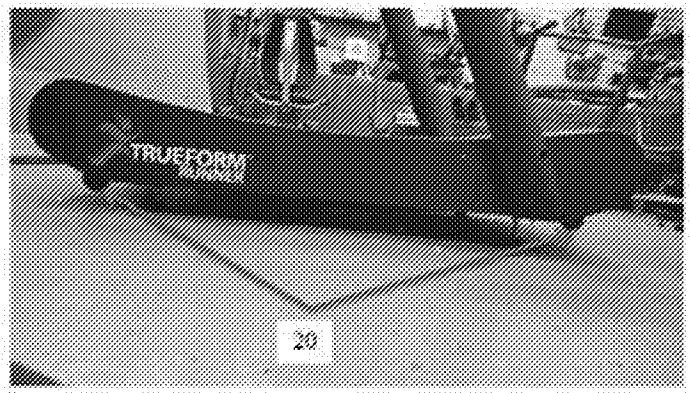
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
a handrail attached to the frame and structured to provide a support structure for a user of the manually powered treadmill;	A "handrail attached to the frame" and "structured to provide a support structure for a user of the manually powered treadmill" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, the manually powered treadmill includes a handrail [15] structured to provide a support structure for a user.		
a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position;	A "pair of wheels mounted to the frame" that "are not in contact with the ground surface when the manually powered treadmill is in an operating position" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, a pair of wheels [20] are not in contact with a ground surface when		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

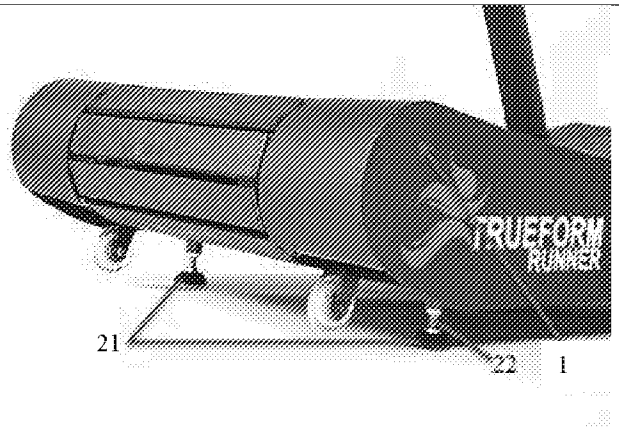
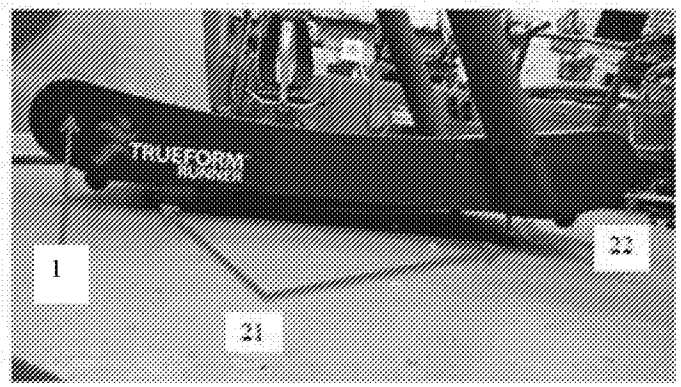
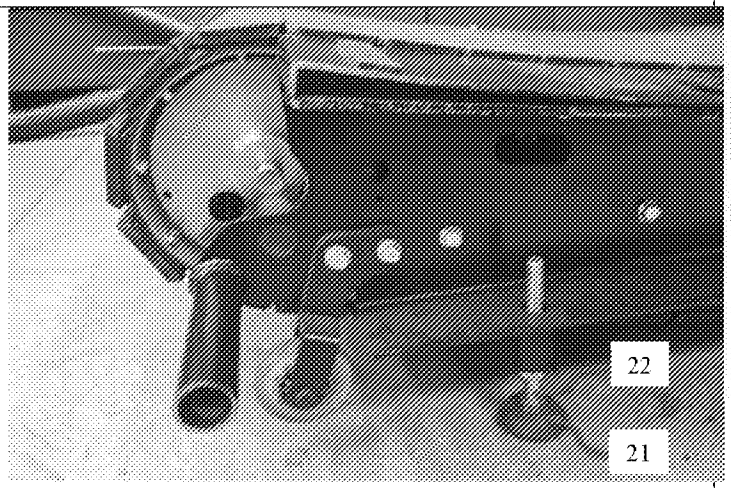
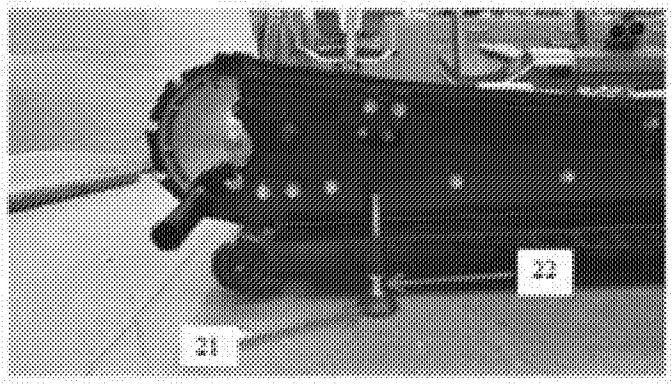
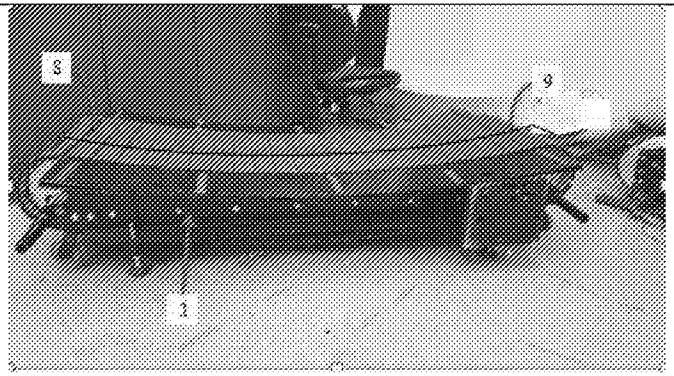
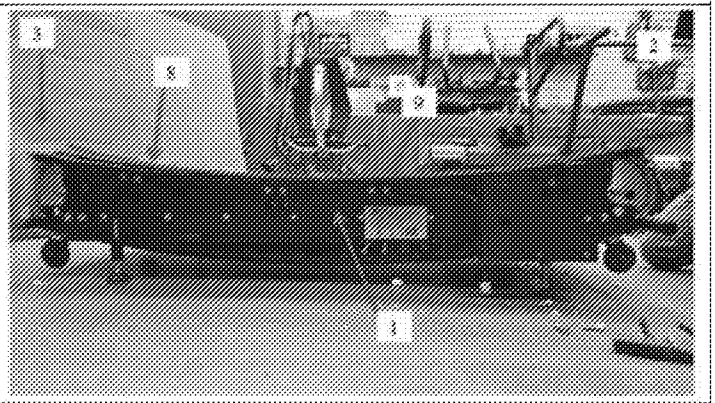
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	each of the Original and Redesigned TrueForm Runner Treadmills are in an operating position whereby a user may walk or run on the treadmill (i.e., the operating position).		
at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface;	"Support feet coupled to the frame" that are "vertically adjustable relative to the ground surface" are literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, support feet [21] are coupled to the frame [1] using a threaded rod [22]. The threaded nature of the rod [22] allows the rod [22] to be rotatably movable towards the frame [1] and away from the frame [1] to adjust the incline of the treadmill relative to a ground surface.		

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			
a running belt supported by the first and second bearing rails, wherein the running belt follows a curved running surface;	A "running belt" supported by the "first bearing rail" and the "second bearing rail" and following a "curved running surface" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a running belt [8] follows a curved running surface [9]. As also shown, the running		

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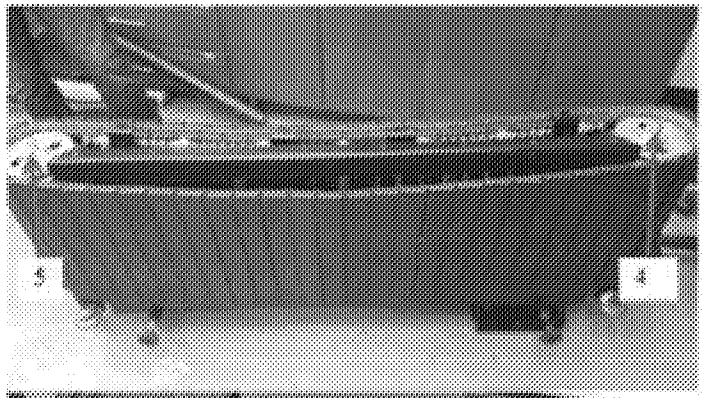
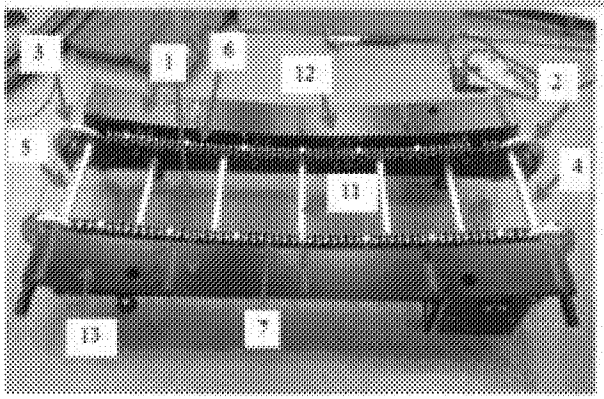
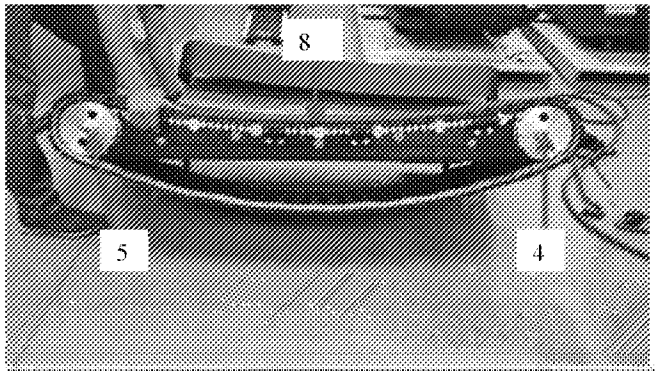
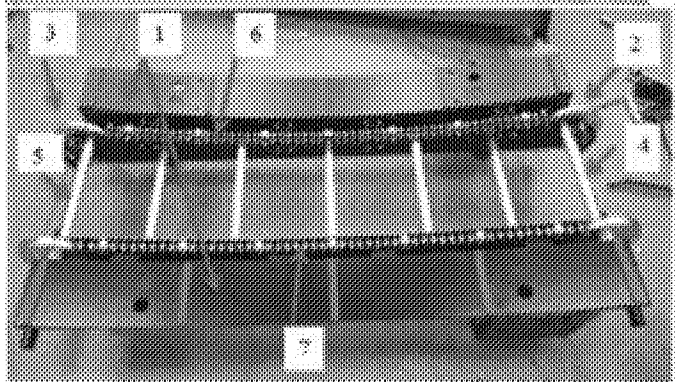
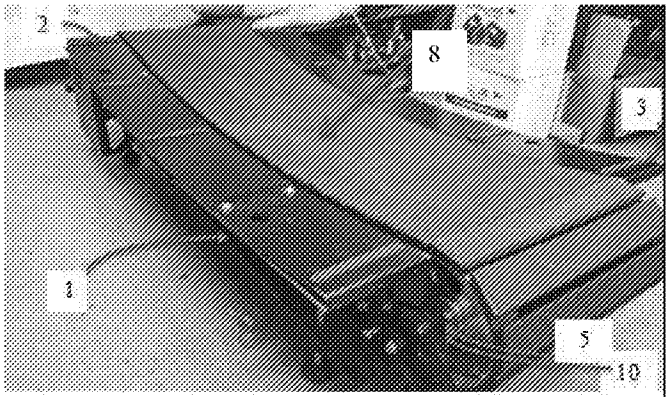
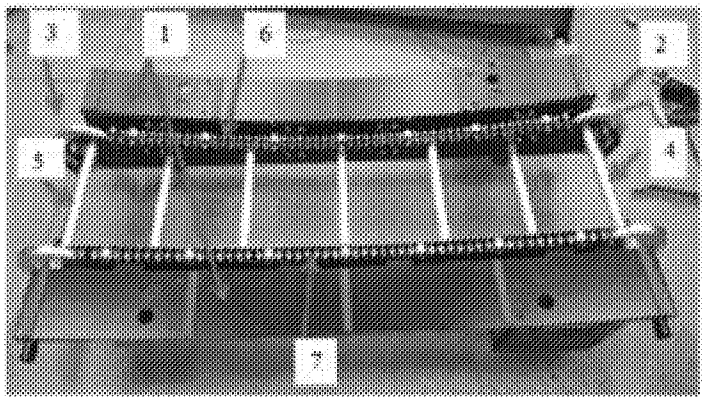
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	belt [8] is supported by the plurality of bearings [6] of the first bearing rail [6] and the plurality of bearing [7] of the second bearing rail. The plain and ordinary meaning of "support" does not require that components must be directly or physically connected or touching. "Support" may be provided directly, may be provided indirectly via an intermediary component or series of components, may bear some of the weight of another component or a series of components, and/or may bear all of the weight of another component or series of components.	 	 

Exhibit F

CONTAINS CONFIDENTIAL INFORMATION

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
and a safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt in a first direction and permit movement of the running belt in a second direction opposite the first direction.	A "safety device" that is "coupled to the frame" and "operatively coupled to the running belt" to "substantially prevent movement of the running belt in a first direction and permit movement" in a "second direction" is literally in each of the Original and Redesigned TrueForm Runner Treadmills. As shown in the Original Design, the safety device [10] is coupled to the rear shaft [5], which is coupled to the frame [1]. As shown in the Redesign, the safety device [10] is coupled to the front shaft [4], which is coupled to the frame [1]. As also shown, the safety device [10] of the Original Design is a Koyo brand with a model number of		

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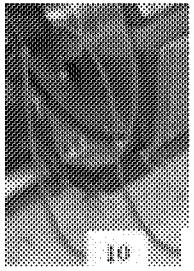
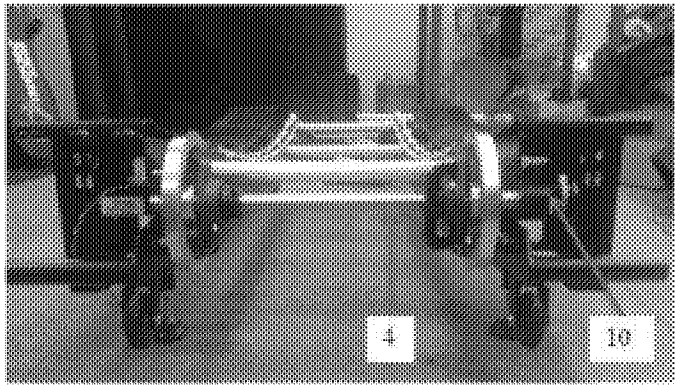
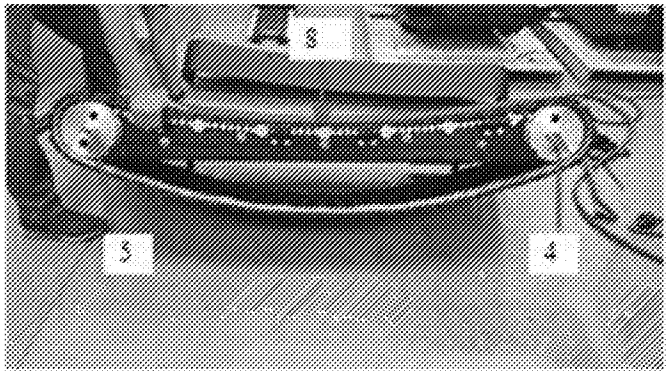
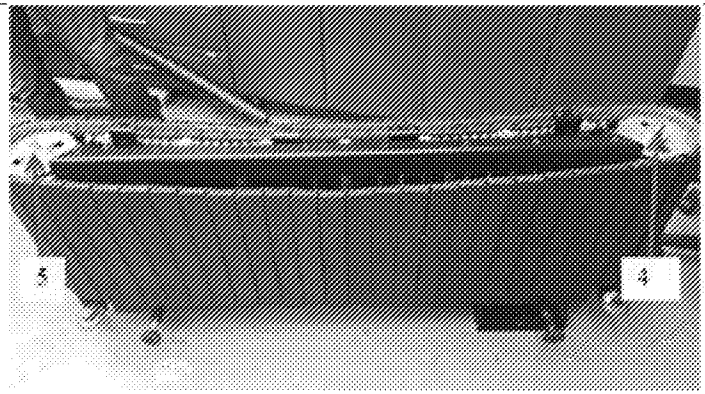
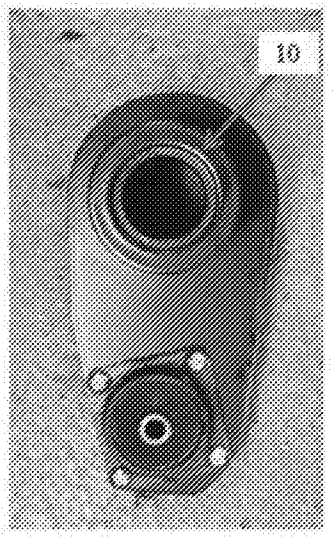
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	RCB-121616 while the safety device [10] of the Redesign is a Koyo brand with a model number of RCB-162117. Each of these model numbers corresponds with a "regular clutch and bearing assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction," as described in the Koyo catalog. In regard to the Original Design, because the safety device [10] is coupled to the rear shaft [5] and because the safety device [10] "allows free overrun," in one rotational direction, the safety device [10] is structured to substantially prevent rotation of the rear shaft [5] in a first rotational direction while permitting rotation of the rear shaft [5] in a second rotational direction opposite the first rotational	 5	 

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	direction. Because the running belt [8] is disposed about the rear shaft [5], rotational movement of the running belt [8] is affected/constrained by the movement of the rear shaft [5]. Thus, the safety device [10] is structured to substantially prevent movement of the running belt [8] in a first direction and permit movement of the running belt [8] in a second direction that is opposite the first direction. In regard to the Redesign, because the safety device [10] is coupled to the front shaft [4] and because the safety device [10] "allows free overrun," in one rotational direction, the safety device [10] is structured to substantially prevent rotation of the front shaft [4] in a first rotational direction while permitting rotation of the front shaft [4] in a second rotational direction opposite the first rotational		

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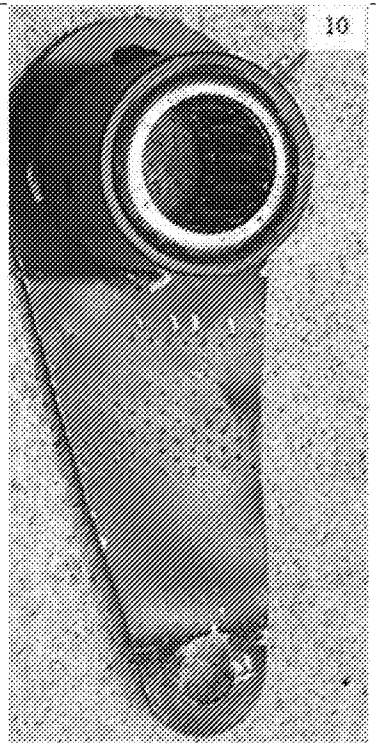
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	direction. Because the running belt [8] is disposed about the front shaft [4], rotational movement of the running belt [8] is affected/constrained by the movement of the front shaft [4]. Thus, the safety device [10] is structured to substantially prevent movement of the running belt [8] in a first direction and permit movement of the running belt [8] in a second direction that is opposite the first direction.		

Exhibit F

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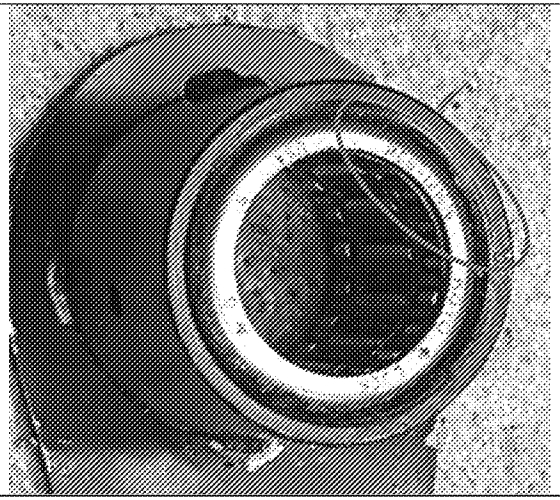
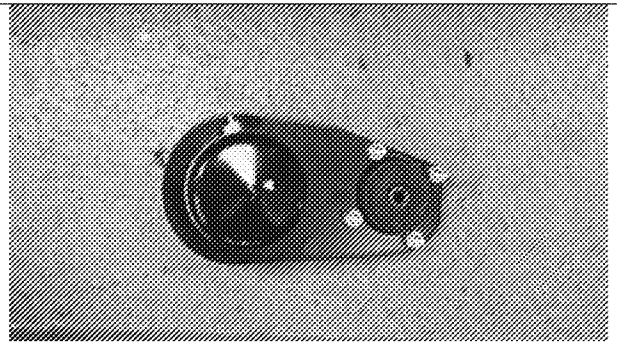
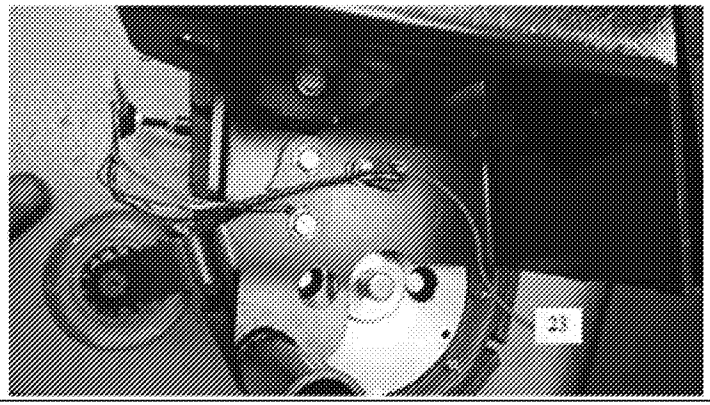
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			
20. The manually powered treadmill of claim 19, further comprising a sensor configured to acquire data indicative of a speed of the running belt.	A "sensor configured to acquire data indicative of a speed of the running belt" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, each of the Original and Redesigned TrueForm Runner Treadmills includes a sensor [23] that is configured to acquire data		

LIFECORE Ex. 1002

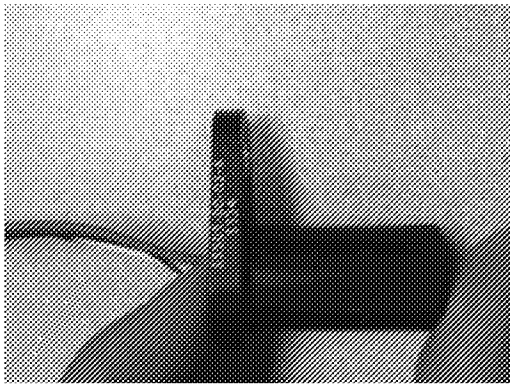
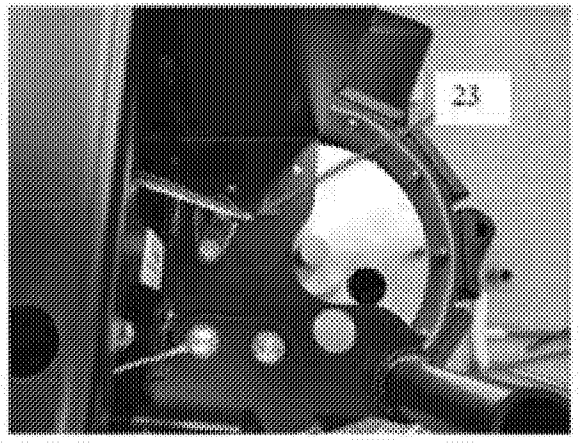
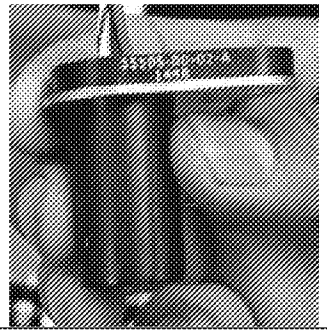
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	indicative of the speed of the running belt. As shown in the bottom picture, Model Number 55505-00-02-A is a Hall Effect Sensor provided by Littelfuse, Inc., which is "primarily for … speed sensing," as described in the literature.		 
25. A method, comprising:			

Exhibit F

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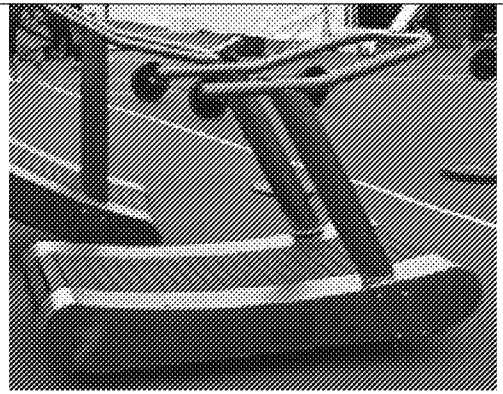
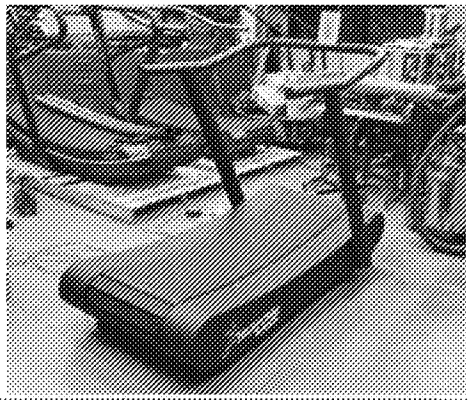
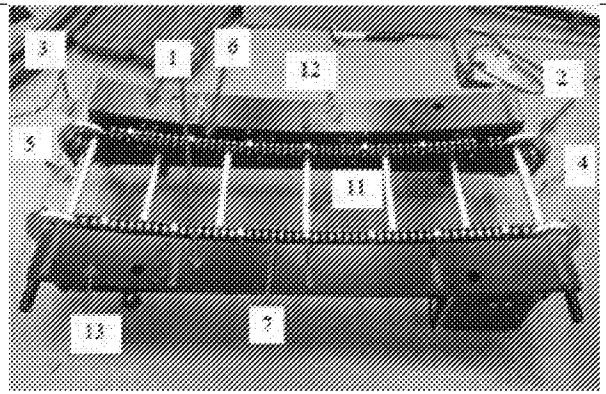
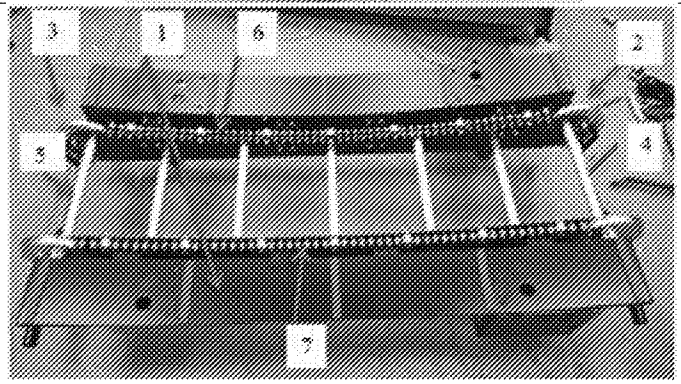
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
providing a manually powered treadmill,	A "manually powered treadmill" is literally each of the Original and Redesigned TrueForm Runner Treadmills. As described in the product literature attached as Exhibit G and as Chapco and Samsara have admitted, the Original and Redesigned TrueForm Runner Treadmills are human powered and non-motorized.		
the manually powered treadmill having a frame with a front end and rear end;	A "frame having a front end and a rear end" is literally provided in each of the Original and Redesigned TrueForm Runner Treadmills; Chapco and Samsara agree. As shown, the frame [1], which designates the entire frame assembly not a single piece of metal, has a front end [2] and a rear end [3]. Chapco's and Samsara's argument that the Original and Redesigned TrueForm		

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the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	Runner Treadmill does not meet this claim limitation because it has two frames and not one frame is inconsistent with the '580 patent's disclosure. The specification of the '580 patent states that "the frame may have substantially any configuration suitable for providing structure and support for the manual treadmill." Col. 5, ll. 65-67. Nothing about the plain and ordinary meaning of "frame" requires a single unitary structure.		
providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first	A "first bearing rail" having "a plurality of bearings" and a "second bearing rail" having a "plurality of bearings" where "the first and second bearing rails define a curved top profile" and "extend[] longitudinally on the frame" is literally provided in each of the Original and Redesigned TrueForm Runner Treadmills.		

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CONTAINS CONFIDENTIAL INFORMATION

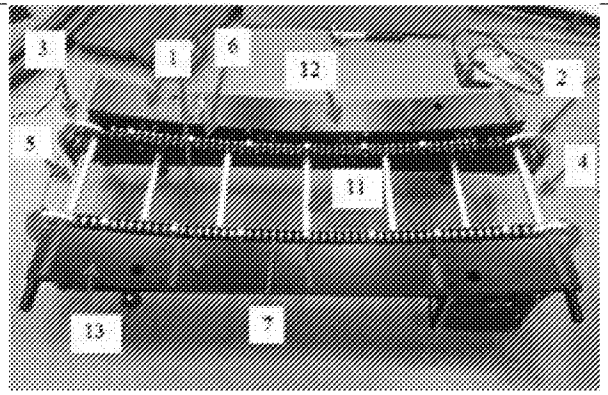
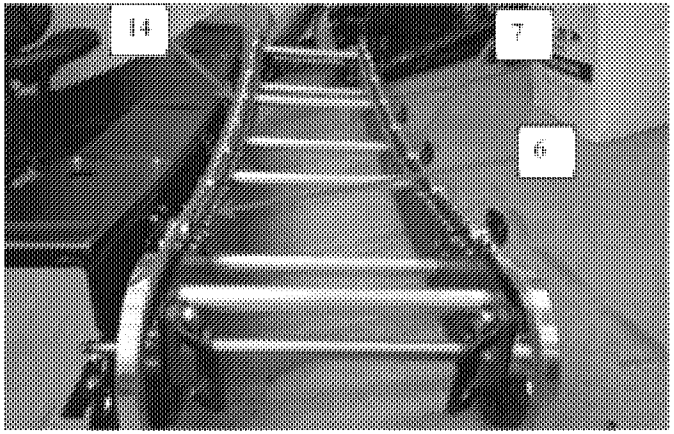
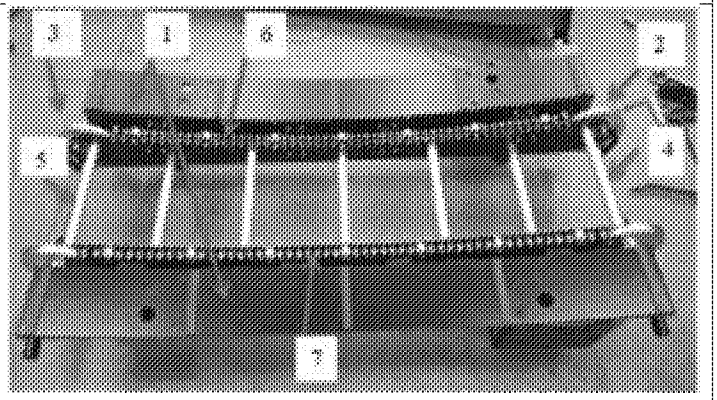
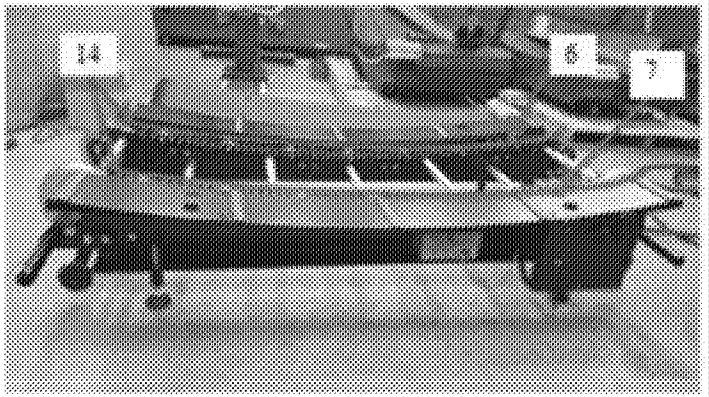
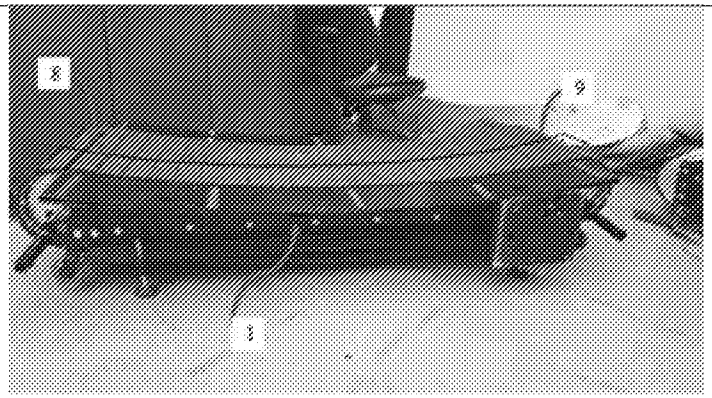
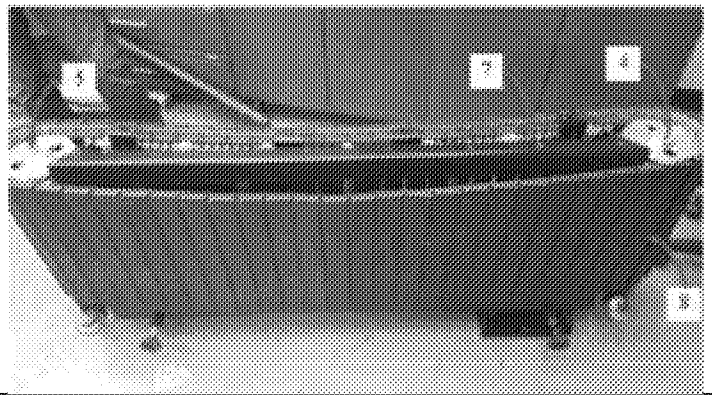
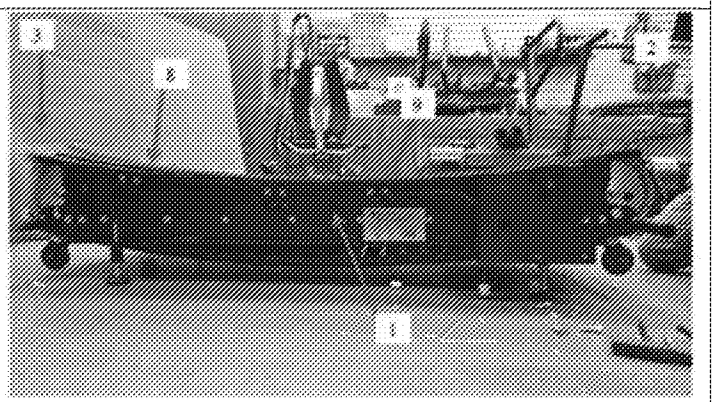
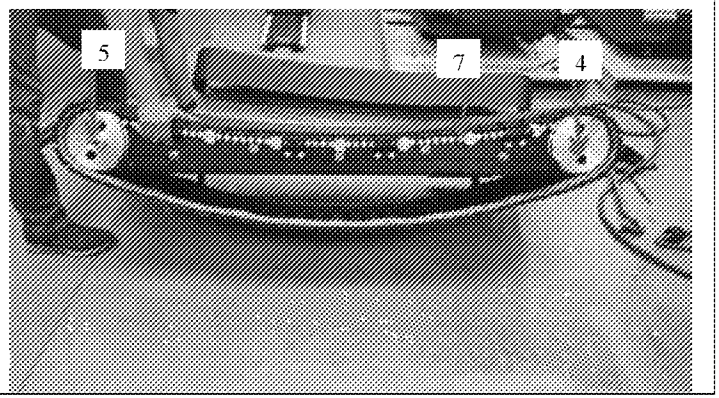
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
and second bearing rails define a curved top profile;	As shown, a first bearing rail is attached longitudinally to one side of the frame [1] (i.e., the left side), while a second bearing rail is attached longitudinally to the other side of the frame [1] (i.e., the right side. As also shown, the top edge of the first bearing rail to which the plurality of bearings [6] are mounted and the top edge of the second bearing rail to which the plurality of bearings [7] are mounted define a curved top profile [14].	 	 

Exhibit F **CONTAINS CONFIDENTIAL INFORMATION**

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails;	A "running belt" that is disposed "on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown, a running belt [8] follows a curved running surface [9]. The running belt [8] is disposed on the first bearing rail and the second bearing rail. Because the curved top profile [14] is proximate the curved running surface [9], the curved running surface [9] corresponds to the curved top profile [14].	 	 

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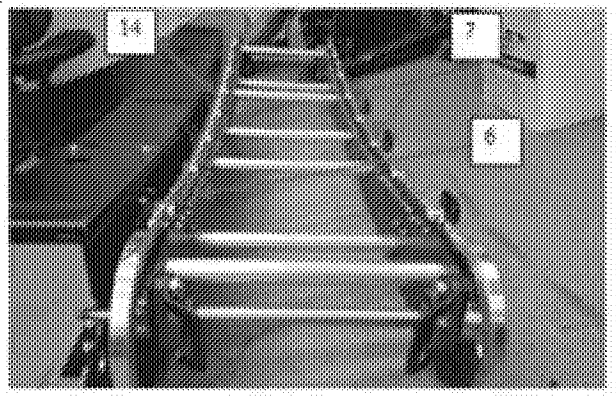
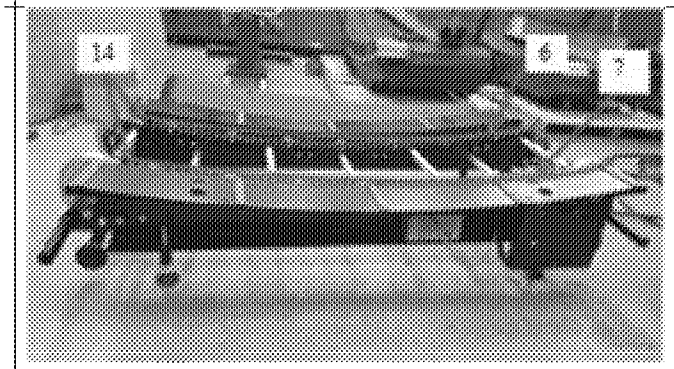
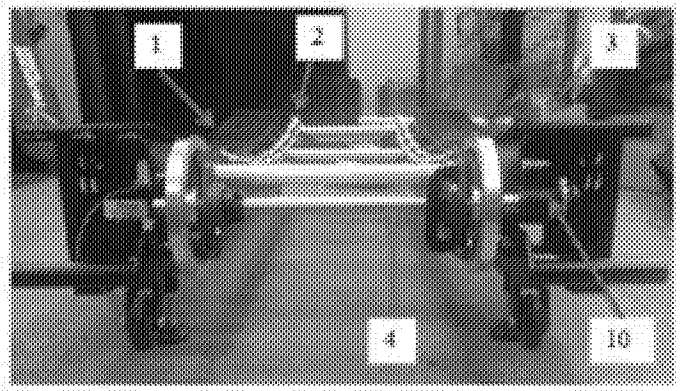
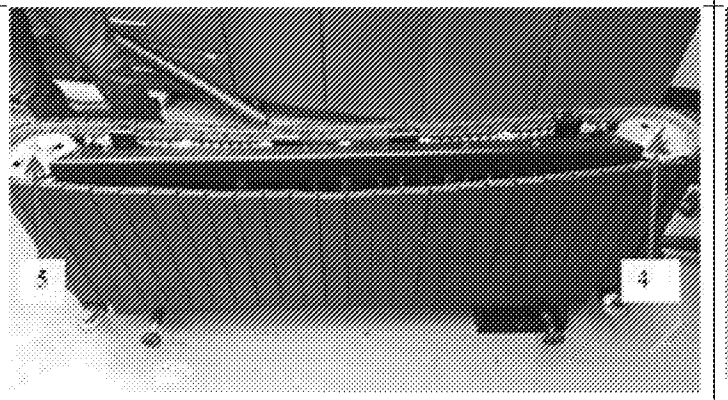
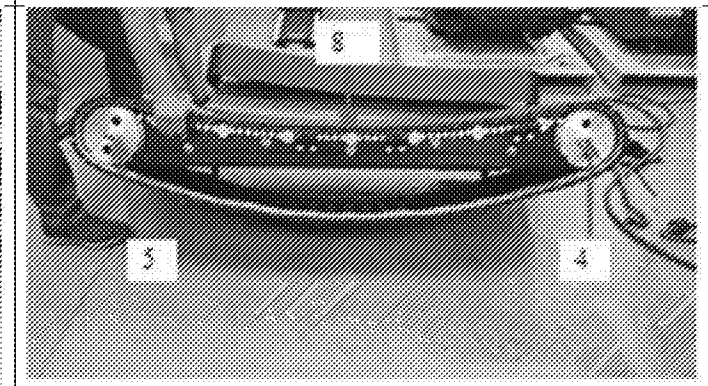
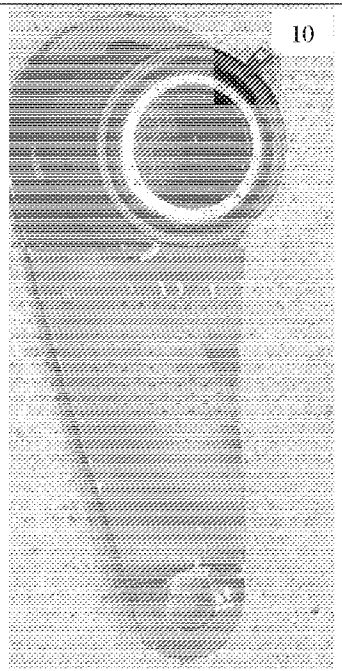
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			
permitting movement of the running belt in a first direction; and substantially preventing movement of the running belt in a second direction opposite the first direction.	The "running belt" being only permitted to move in one direction and "substantially prevent[ed]" from moving "in a second direction opposite the first direction" is literally present in each of the Original and Redesigned TrueForm Runner Treadmills. As shown in the Original Design, the safety device [10] is coupled to the rear shaft [5]; Chapco and Samsara agree. As shown in the Redesign, the safety device [10] is coupled to		

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	the front shaft [4]; Chapco and Samsara agree. As also shown, the safety device [10] of the Original Design is a Koyo brand with a model number of RCB-121616 while the safety device [10] of the Redesign is a Koyo brand with a model number of RCB-162117. Each of these model numbers corresponds with a "regular clutch and bearing assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction,." As described in the Koyo catalog. In regard to the Original Design, because the safety device [10] is coupled to the rear shaft [5] and because the safety device [10] "allows free overrun," (*id.*), in one rotational direction, the safety device [10] is structured to		

the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	substantially prevent rotation of the rear shaft [5] in a first rotational direction while permitting rotation of the rear shaft [5] in a second rotational direction opposite the first rotational direction. Because the running belt [8] is disposed about the rear shaft [5], rotational movement of the running belt [8] is affected/constrained by movement of the rear shaft [5]. Thus, the safety device [10] is structured to substantially prevent movement of the running belt [8] in a first direction and permit movement of the running belt [8] in a second direction that is opposite the first direction. In regard to the Redesign, because the safety device [10] is coupled to the front shaft [4] and because the safety device [10] "allows free overrun," (*id.*), in one rotational direction, the safety device [10] is structured to substantially		

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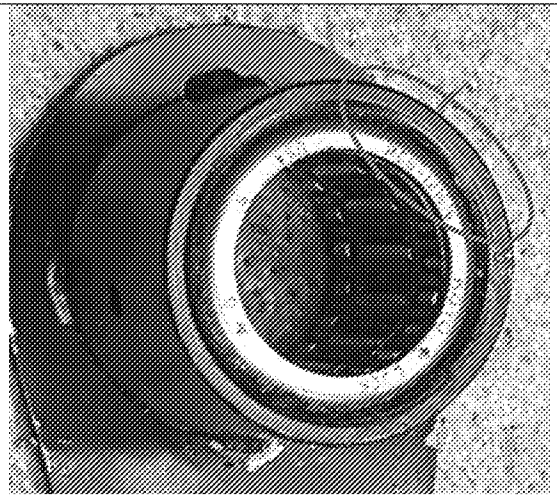
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
	prevent rotation of the front shaft [4] in a first rotational direction while permitting rotation of the front shaft [4] in a second rotational direction opposite the first rotational direction. Because the running belt [8] is disposed about the front shaft [4], rotational movement of the running belt [8] is affected/constrained by movement of the front shaft [4]. Thus, the safety device [10] is structured to substantially prevent movement of the running belt [8] in a first direction and permit movement of the running belt [8] in a second direction that is opposite the first direction.		

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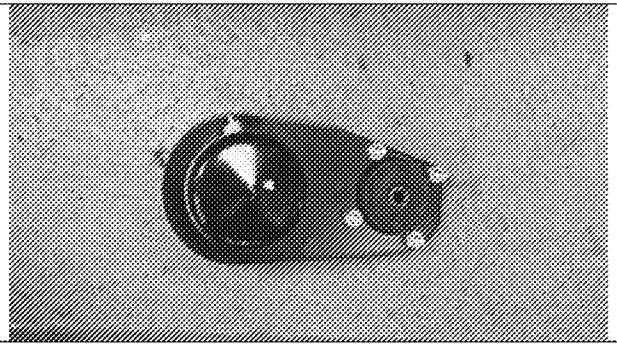
the '580 patent		Claim Chart Directed To Original Design	Claim Chart Directed To Redesign
			

EXHIBIT 15

CONTAINS CONFIDENTIAL – ATTORNEYS' EYES ONLY INFORMATION

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC, Plaintiffs, vs. WOODWAY USA, INC., Defendant.	Civil Action No. 3:15-cv-1665 (JCH) March 30, 2017

REBUTTAL EXPERT REPORT OF KIM B. BLAIR, Ph.D.

CONTAINS CONFIDENTIAL – ATTORNEYS' EYES ONLY INFORMATION

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3. Dependent claims 6 and 12 of the '580 patent are not anticipated or obvious based on Schmidt 100
4. Independent claim 25 of the '580 patent is not anticipated or obvious based on Schmidt 101
5. Dependent claims 10 and 14 of the '580 patent are not anticipated or obvious based on Schmidt 101

I. Schmidt in combination with Ziebell does not anticipate or render obvious claims 1, 4-6, 10, 11, 12, 14, 18, and 25 of the '580 patent under 35 U.S.C. §§ 102 & 103 102

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7. Lack of motivation to combine 125

VII. ANALYSIS OF THE GIACHETTI INVALIDITY ALLEGATIONS DIRECTED TO THE ASSERTED CLAIMS OF THE '169 PATENT 125

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XII. SIGNATURE 176

I, Kim B. Blair, Ph.D., hereby make the following disclosure pursuant to Fed. R. Civ. P. 26(a)(2).

1. I am the same Kim Blair who submitted an expert report in this matter on March 2, 2017, which I incorporate by reference in its entirety. For brevity, I will not repeat my background, experience, or qualifications here.

2. Since March 2, 2017, I have neither authored nor co-authored any additional publications beyond those detailed in my curriculum vitae, which was attached to my initial expert report.

3. Since March 2, 2017, I have not provided any testimony as an expert at trial or by deposition beyond those matters detailed in Paragraph 19 of my initial report.

4. The compensation for my time spent in working on issues in this case continues to be $450 per hour. I continue to be compensated for my expenses in connection with this matter. Just as with my initial report, my compensation is not dependent on or related in any matter to the outcome of the current litigation. I have no financial interest whatsoever in the outcome of this litigation.

5. For this report, I have been asked by Woodway USA, Inc. ("Woodway") to review and analyze the March 2, 2017 Opening Expert Report of Dr. Robert Giachetti Re: Invalidity of United States Patent No. 8,986,169 and United States Patent No. 9,039,580 ("Giachetti Opening Report") and to respond and comment on this Opening Report and Dr. Giachetti's opinions and conclusions contained therein.[1]

6. In my study of the Giachetti Opening Report and in forming my opinions disclosed herein that respond to the same, I have relied on my own experience and education as

[1] Within this report, just as in my initial report, I may refer to Woodway's U.S. Patent Nos. 8,986,169 and 9,039,580 as "the '169 patent" and "the '580 patent," respectively, or collectively, "the patents-in-suit."

well as information learned through discussions with Woodway personnel, and from examining the '169 and '580 patents, the '169 and '580 patents' file histories, including the referenced priority patent applications, certain deposition testimony from this case, documents produced during discovery, the materials cited in this report and my initial expert report as well as the materials identified in the Giachetti Opening Report and referred to in Exhibit B to the same. I relied on these materials to varying degrees; some very much and some not at all.

I. SUMMARY OF OPINIONS

7. As discussed in detail below, I expect to testify regarding my opinions on issues relating to the validity of the '169 and '580 patents raised by Chapco, Inc. ("Chapco") and Samsara Fitness, LLC ("Samsara") in view of the various alleged prior art references identified in the Giachetti Opening Report,[2] the alleged indefiniteness of the patents-in-suit, and to comment on certain other issues and deficiencies in the Giachetti Opening Report.[3] I further expect to testify about my background, experience and qualifications, the claims, specification, and prosecution histories of the patents-in-suit, prior art as it relates to the issue of validity, and to the significance of the Woodway inventions, including in the context of the prior art.

8. More specifically, I have arrived at the following opinions:

(a) The asserted claims of the '580 patent are **not** anticipated or rendered obvious by any of the prior art relied on by Chapco and Samsara and their expert as summarized in the below chart.

[2] Many of the references included in the Giachetti Opening Report were not previously identified in Chapco's and Samsara's preliminary or supplemental invalidity contentions. As such, I did not previously have the benefit of reviewing the substance of these specific new contentions to better understand the basis for Chapco's and Samsara's invalidity allegations with respect to these particular references.

[3] Dr. Giachetti has offered no opinion regarding the validity of Woodway's asserted design patents – U.S. Design Patent Nos. D736,866 and D753,776. As this is a rebuttal report, I have not been asked nor am I providing at this time any opinions regarding these patents, which I understand are presumed valid. However, I reserve the right to supplement or amend this report to include any opinions regarding these patents in the event their validity is challenged.

U.S. Patent No. 9,039,580
(Asserted Claims: 1, 4, 5, 6, 10, 11, 12, 13, 14, 18, 19, 20, and 25)

Asserted Claims	Reference Identified In Giachetti Opening Report	Invalidity Contention
1, 4, 5, 6, 10, 11, 12, 13, 14, 18, 19, 20, and 25	Socwell (U.S. Patent No. 5,709,632)	§ 102(b)
1, 4, 5, 6, 10, 11, 12, 13, 14, 18, 19, 20, and 25	Haber (U.S. Patent No. 5,411,455) in combination with Socwell	§ 103
1, 4, 5, 6, 10, 11, 12, 13, 14, 18, 19, 20, and 25	Magid (U.S. Patent No. 5,538,489) in combination with Socwell	§ 103
1, 4, 5, 6, 10, 11, 12, 13, 14, 18, 19, and 25	Cutter (U.S. Patent No. 3,642,279) in combination with Magid	§ 103
1, 4, 5, 6, 10, 11, 12, 18, and 25	Schönenberger (U.S. Patent No. 4,334,676) in combination with Magid	§ 103
1, 4, 5, 6, 10, 11, 12, 18, and 25	Abelbeck (U.S. Patent No. 6,042,514) in combination with Magid	§ 103
1, 4, 5, 6, 10, 11, 12, 14, 18, and 25	Eschenbach (U.S. Patent No. 6,053,848) in combination with Magid	§ 103
1, 4, 5, 6, 10, 11, 12, 14, 18, and 25	Schmidt (U.S. Patent No. 1,211,765)	§§ 102/103
1, 4, 5, 6, 10, 11, 12, 14, 18, and 25	Schmidt in combination with Ziebell (U.S. Patent No. 641,424)	§§ 102/103
1, 4, 5, 6, 10, 11, 12, 13, 14, 18, 19, and 25	Chickering (U.S. Patent No. 3,637,206) in combination with Magid	§ 103

(b) The asserted claims of the '169 patent are **not** anticipated or rendered obvious by any of the prior art relied on by Chapco and Samsara and their expert as summarized in the below chart.

U.S. Patent No. 8,590,169
(Asserted Claims: 11, 12, 13, 14, 15, and 16)

Asserted Claims	Reference Identified In Giachetti Opening Report	Invalidity Contention
11, 12, 13	Socwell	§ 102(b)
11, 12, 13, 14, 15, and 16	Pasqualin Application (U.S. Pub. No. 2006/0287165 in combination with Socwell	§ 103
11, 12, and 16	Cutter in combination with Haber	§ 103
11, 12, 13, 14, 15, and 16	Schönenberger in combination with Haber	§ 103
11, 12, 13, 14, 15, and 16	Schmidt	§§ 102/103
11, 12, 13, 14, 15, and 16	Schmidt in combination with Chickering	§ 102/103
11, 12, 13, 14, 15, and 16	Schmidt in combination with Magid	§§ 102/103
11, 12, 13, 14, 15, and 16	Schmidt in combination with Ziebell	§§ 102/103

(c) The asserted claims of the patents-in-suit are not rendered indefinite by the use of the term "support" or a variant of "support" in the claim language.[4]

II. BACKGROUND AND SUMMARY OF THE PATENTS AND ASSERTED CLAIMS

9. I discuss the background and summary of the patents-in-suit and their asserted claims[5] in my initial expert report. For brevity, I will not repeat that section here, and instead incorporate it by reference.

10. I would, however, like to augment my discussion describing movement of the running belt in a curved, motorless treadmill. The phrases "intended direction" and "unintended direction" are used throughout this report to refer to a directional movement of the running surface of the treadmill belt, where "intended direction" means an expected directional movement of the running surface of the treadmill belt and "unintended direction" means an unexpected directional movement of the running surface of the treadmill belt. This is illustrated in more detail with respect to annotated Figure 5 of the patents-in-suit. The red and green arrows indicate the direction of movement of the upper surface, defined as the "running surface", of the treadmill belt.

[4] At page 2 of the Giachetti Opening Report, Dr. Giachetti indicates that it is his "opinion to a reasonable degree of engineering certainty that there is clear and convincing evidence that each asserted claim of Bayerlein '169 and Bayerlein '580 patents is invalid under 35 U.S.C. §§ 102, 103 and/or **112**" (emphasis added). With the exception of his brief discussion of indefiniteness at pages 9-10, it is not apparent that Dr. Giachetti is offering any opinion with respect to any other alleged § 112 defenses. As this is a rebuttal report, I have not been asked nor am I providing at this time any opinions regarding any other § 112 defenses that have not been raised. However, I reserve the right to supplement or amend this report to include any opinions regarding any other § 112 challenges raised in the future.

[5] In various places in the Giachetti Opening Report, there are references to claims 2, 3, 21, and 22 of the '580 patent, which Woodway is not alleging are infringed. I have not provided any opinions with respect to these unasserted claims.

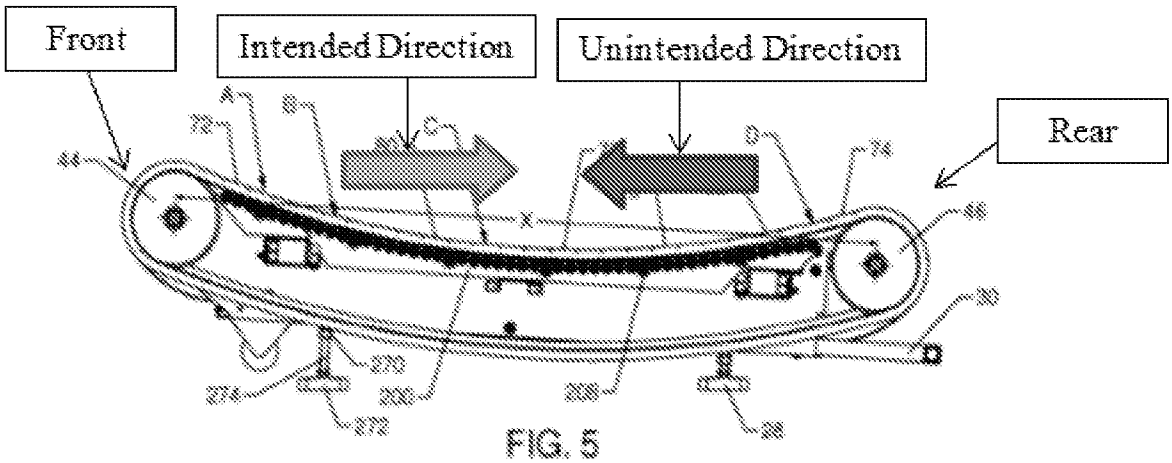


FIG. 5

11. With reference to this annotated Figure 5, the "Front" refers to the portion of the treadmill that the user faces when walking, running, in the conventional, forward motion, or otherwise using the treadmill. The "Front" may include a display device that depicts information relating to usage of the treadmill. When a user is utilizing the treadmill in a normal operating mode, the treadmill belt rotates in an "intended direction," which is clockwise as seen in Figure 5 which correlates to movement of the running surface in the direction of the green arrow as annotated in Figure 5 above.

12. As previously discussed in my initial report, curved, manual treadmills create a unique safety hazard for a user. Because it is common for a user to enter or mount the treadmill from the rear of the unit, when a user steps on the rear of the treadmill, the user's weight may cause the running surface of the running belt to unexpectedly move toward the front of the unit (which is the reverse of the normal operating direction of the running surface). This is shown above in Figure 5, as and referred to herein as the "unintended direction." Depending on how quickly and where a user mounts the treadmill, the running surface may move in the unintended direction and create a potential safety hazard. The unpredictable and unexpected running surface

movement may startle the user, create a temporary feeling of loss of control, or even cause the user to fall.

III. APPLICABLE LAW

13. Although I am not a lawyer, just as with my initial expert report, I have been advised about certain aspects of the law as it relates to Chapco's and Samsara's invalidity allegations. In forming my opinions, I have been asked to assume certain legal principles. Counsel for Woodway has provided me with the current (last edited July 2016) version of the Model Patent Jury Instructions published by the Federal Circuit Bar Association, and I have taken guidance from those form instructions on matters that relate to my opinions expressed herein. If there is some change in the applicable law to which I am alerted, or if the Court adopts some substantially different instructions for the jury to follow, I will reconsider my opinions accordingly. Also, if there is some change in the applicable substantive law between the time of this report and any future expert testimony, my opinions may change as well.

14. I understand that an issued patent is presumed valid, and its invalidity must be demonstrated by clear and convincing evidence. On a scale of standards of proof, as you move from a preponderance of the evidence, where the proof need only be sufficient to tip the scale in favor of the party proving the fact, to beyond a reasonable doubt, where the fact must be proven to a very high degree of certainty, I understand that clear and convincing evidence is between these two standards.

15. It is my understanding that the standard of proof does not change depending on whether a prior art reference was previously considered by the PTO during prosecution of the applications that issued into the patents-in-suit. However, I am told that in instances where a

particular reference was before the Examiner, using this same reference to establish the necessary clear and convincing evidence to invalidate the patent may be especially difficult.

16. When analyzing alleged anticipation and obviousness, as set forth below, I understand that there is a presumption that a person of ordinary skill in the art[6] was fully aware of all prior art existing at the time of the invention. I also understand that "prior art" includes publications, including patents, that were published more than one year before the priority date of the patents-in-suit.[7]

17. I further understand that in analyzing alleged anticipation and obviousness, each asserted claim must be separately assessed.[8]

A. Anticipation

18. I understand that a patent claim is invalid as anticipated if each and every limitation of that claim can be found in a single prior art reference, either expressly or inherently.

B. Obviousness

19. If a patent is not anticipated by a single prior art reference, I understand that it may still be invalid as obvious in light of the prior art. I understand that in evaluating obviousness, it is appropriate to determine the scope and content of the prior art, the differences between the prior art and the claims at issue, and the level of ordinary skill in the art.

20. I also understand that I am to consider whether the prior art teaches away from combining elements in the prior art. I also understand that other "secondary considerations" may

[6] Throughout this report I may refer to a person of ordinary skill in the art as a "PHOSITA."

[7] For the purposes of my opinions discussed herein, I do not dispute that the references cited in the Giachetti Opening Report constitute prior art. But, as discussed further below, I do not agree that certain of the references would be pertinent to or considered by a person of ordinary skill in the art because these references are outside the relevant field of the Woodway inventions claimed in the patents-in-suit.

[8] As I understand it, all grounds of invalidity must be evaluated on a claim-by-claim basis, comparing the claim language to the prior art under consideration, which Dr. Giachetti failed to do in the Giachetti Opening Report.

be considered, such as commercial success of the claimed invention, long felt but unsolved needs in the art, failure of others to meet those needs, whether others copied the invention, whether the invention achieved unexpected results, whether others in the field praised the invention, whether persons having ordinary skill in the art of the invention expressed surprise or disbelief regarding the invention, and whether the inventor proceeded contrary to the accepted wisdom in the field. Taking into account these factors, I understand that a patent claim is invalid as obvious if the claimed subject matter as a whole would have been obvious in view of the prior art to one of ordinary skill in the art.

21. Further, I agree with Dr. Giachetti and understand that it is impermissible to use hindsight when analyzing the alleged obviousness of the asserted claims. I understand that a challenger cannot prove obviousness merely be demonstrating that each of its elements was independently known in the prior art. Rather, a challenger must show a motivation or a reason that would have prompted a person of ordinary skill in the art to combine the references.

C. Indefiniteness

22. I understand that each claim of a patent, when read in light of the specification, must recite the claimed invention precisely enough to allow a person of ordinary skill in the art to understand the scope of the invention. A claim is invalid for indefiniteness if a person of ordinary skill in the art is unable to discern the scope of the claimed invention.

IV. THE COURT'S CLAIM CONSTRUCTION ORDER

23. In my initial report I discuss the Court's claim constructions, and for brevity, I do not duplicate that section here.

24. My analysis for my opinions discussed herein is based on the specific constructions adopted by the Court, and where the Court ruled that no further construction was necessary, I understand that I am to apply the ordinary and customary meaning to those claim

terms and phrases as understood by a person of ordinary skill in the art in the context of the relevant patent-in-suit.

25. Dr. Giachetti appears to deviate from this methodology as there are a number of misstatements in the Giachetti Opening Report with respect to claim construction. In my opinion, these errors taint Dr. Giachetti's invalidity analysis.

26. First, the Court did not define "frame," as Dr. Giachetti suggests in paragraph 72 of the Giachetti Opening Report.

27. Second, while the Court noted Webster's II definition of "bearing," it did not construe "bearing" according to any definition, contrary to paragraph 110 of the Giachetti Opening Report.

28. Third, Dr. Giachetti's assertions regarding the Court's construction of "rotatably coupled" in paragraph 111 of the Giachetti Opening Report are false. The Court did not construe the phrase "rotatably coupled," finding it required no further construction beyond the Court's construction of the term "coupled."

29. Fourth, contrary to the statement in paragraph 112 of the Giachetti Opening Report, the Court declined to construe the term "running belt," finding that the claims themselves were clear regarding this phrase.

30. Fifth, the Court construed "bearing rail" to mean "a rail with bearings whose top profile corresponds to the shape of the running surface." The Court did not find that a "bearing rail with roller bearings is equivalent to a bearing rail with a bearing plate intended for sliding contact," as stated in paragraph 119 of the Giachetti Opening Report.

V. PERSON OF ORDINARY SKILL IN THE ART

31. For the purposes of this report, I address the validity of the asserted claims from the perspective of a hypothetical person of ordinary skill in the art. In this report, I adopt the

definition of a person of ordinary skill in the art as described in my initial report, which in my opinion, is a person with a bachelor of science degree in mechanical engineering or at least two years of experience in the treadmill industry, including experience and knowledge of the design, construction, testing, and operation of manual treadmills.

32. I disagree with Dr. Giachetti's more stringent standard as to who constitutes a person of ordinary skill in the art.[9] As an initial matter, Dr. Giachetti does not provide what he considered in coming to his opinion in this regard or otherwise explain what the relevant field of "art" is.

33. In my opinion, it is not necessary for the relevant person of ordinary skill in the art to be a degreed engineer. Indeed, as I understand it, certain of the named inventors of the patents-in-suit are not degreed engineers. Also, I do not agree that the relevant person of ordinary skill in the art must have knowledge in the field of anthropometry. Nothing in the asserted claims in the patents-in-suit requires any understanding of the study of human proportion.

VI. ANALYSIS OF THE GIACHETTI INVALIDITY ALLEGATIONS DIRECTED TO THE ASSERTED CLAIMS OF THE '580 PATENT

A. Socwell does not anticipate claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent under 35 U.S.C. § 102

34. Dr. Giachetti opines that Socwell anticipates claims 1, 4-6, 10-14, 18-20, and 25 under 35 U.S.C. § 102. I disagree.

35. I understand that Socwell was considered during prosecution of the patent application that matured into the '580 patent. Further, Socwell is prior art to the claims of the

[9] My opinions with respect to the validity of the patents-in-suit would be further bolstered if I had applied Dr. Giachetti's proposed definition of a person of ordinary skill in the art.

'580 patent. As such, I have incorporated those considerations into my analysis of whether Dr. Giachetti clearly established his invalidity position.

36. After reviewing Socwell and for the reasons set forth below, it is my opinion that Socwell does not anticipate claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent.

1. Independent claims 1, 11, and 19 of the '580 patent are not anticipated by Socwell

37. Each of independent claims 1, 11, and 19 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1);

- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11); and

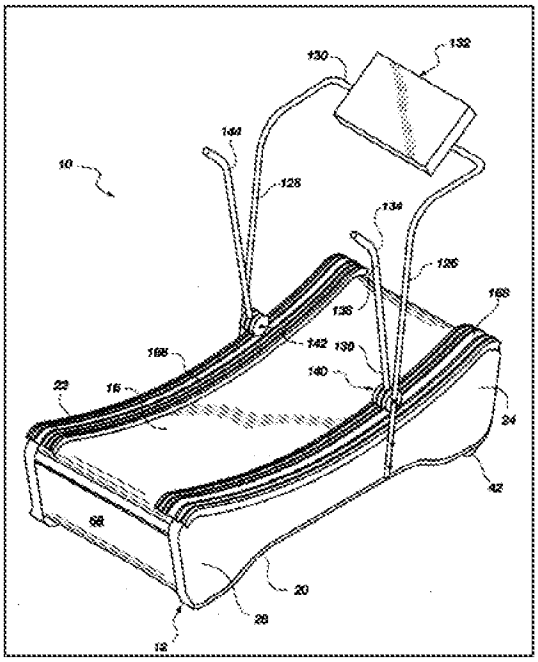
- a "running belt [that] follows a curved running surface" and "safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt in a first direction and permit movement of the running belt in a second direction opposite the first direction" (claim 19).

While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the limitations recited in each of claims 11 and 19.

38. Socwell does not expressly or inherently disclose "a running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the

at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

39. Socwell discloses a curved deck treadmill (10) having a frame (12), a roller assembly (14), a deck (56), and among other components a belt (16) "rotatably mounted ... to the roller assembly 14."[10]



40. Socwell does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the running surface (or the exposed surface as seen in the figure above) (16) is free to move in the intended direction (away from the display (132)) and in the unintended direction (toward the display (132)) (*i.e.*, the running surface is freely movable in both rotational directions).

41. While Dr. Giachetti suggests that Socwell anticipates independent claims 1, 11, and 19 of the '580 patent, Dr. Giachetti does not identify any device, component, or system of Socwell that could be considered analogous to the "safety device" of claim 1. Rather, Dr.

[10] Socwell at col. 5, lines 13-14.

Giachetti at paragraph 61 of the Giachetti Opening Report merely states that Socwell discloses "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction." However, Dr. Giachetti does not provide any citation or support substantiating that claim.[11]

42. I have reviewed Socwell and cannot find any support for Dr. Giachetti's proposition that Socwell discloses as safety device. Without that claim limitation, Socwell cannot anticipate any of these claims.

43. Additionally, nowhere does Socwell teach or suggest that the belt is only movable or rotatable in one direction.

44. Therefore, Socwell does not expressly or inherently disclose "a running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

45. Each of dependent claims 1, 11, and 19 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1);

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt ... at

[11] Dr. Giachetti's omission of Socwell in his discussion of "A Device to Ensure Unidirectional Movement of the Belt" in paragraphs 129-138 of the Giachetti Opening Report is telling, as he appears to concede that Socwell does not disclose any safety mechanism to ensure unidirectional movement of the running belt.

least partially supported by the first bearing rail and the second bearing rail" (claim 11); and

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first and second bearing rails" (claim 19).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitations recited in each of independent claims 11 and 19.

46. Socwell does not expressly or inherently disclose a "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1.

47. With reference to Figure 5 of Socwell below, Socwell discloses a belt securing assembly (94) where "[p]referably, the belt securing assemblies 94 provide a means for substantially conforming the inherent flexible nature of the belt 16 to the arcuate configuration."[12] "The belt securing assembly 94 comprises a roller 98 having an axle 100 which rotatably engages a mounting bracket 96."[13]

[12] Socwell at col. 9, lines 48-51.
[13] *Id.* at col. 9, lines 58-60.

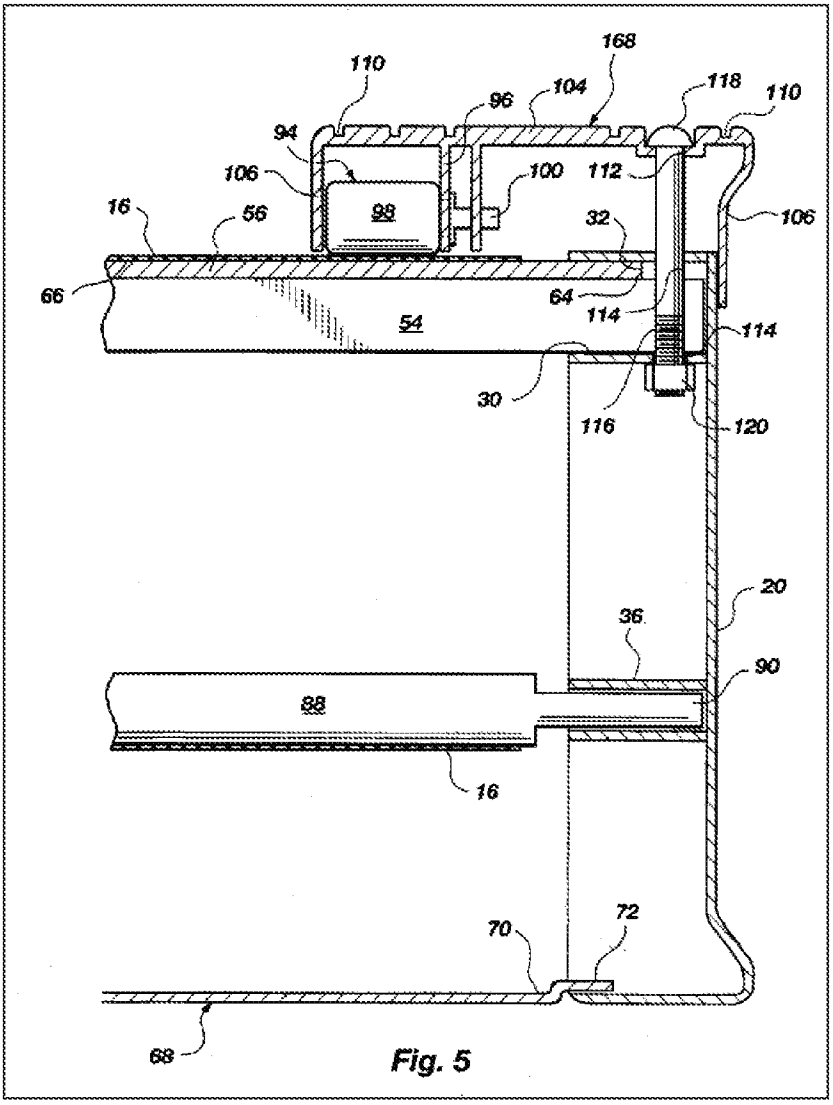


Fig. 5

48. In the Giachetti Opening Report, Dr. Giachetti analogized the "bearings" of independent claim 1 to the roller (98) of Socwell. Dr. Giachetti also suggests that the belt securing assembly (94) is analogous to the "bearing rail" in independent claim 1. In my opinion, these analogies are flawed.

49. Independent claim 1 requires "a running belt **supported** by the first bearing rail and the second bearing rail" (emphasis added). In contrast, Figure 5 of Socwell clearly shows the roller (98) positioned vertically above the running belt (16). Due to the position of the roller (98), the roller (98) does not support any of the weight of the belt (16) as the term "support" is

understood by a person of ordinary skill in the art. In this respect and discussed in greater detail below, the term "support" indicates some type of weight-bearing relationship, where the support may be provided directly, may be provided indirectly, may bear some of the weight of another component, and/or may bear all of the weight of another component. Thus, in the embodiment depicted in Figure 5 of Socwell, the roller (98) and belt securing assembly (94) does not "support" the running belt (16).

50. Further, the necessary modification of the belt securing assembly (94) to place the roller (94) below the belt (16) to support the belt (16) would render the belt securing assembly (94) inoperable for its articulated intended purpose of holding the belt (16) in an arcuate configuration.[14] Additionally, modifications including placing the roller (94) below the deck (56) or in between the deck (56) and the belt (16) would result in the roller (94) being unable to exert a force on the belt (16) to hold the belt in the arcuate configuration.

51. Therefore, Socwell does not expressly or inherently disclose "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. It is my belief that a person of ordinary skill in the art would not recognize Socwell as teaching or suggesting this limitation as it would result in a modification of the belt securing assembly (94) that would render it inoperable for its intended purpose of holding the belt (16) in an arcuate configuration. (*See also* the similar limitations in independent claims 11 and 19.)

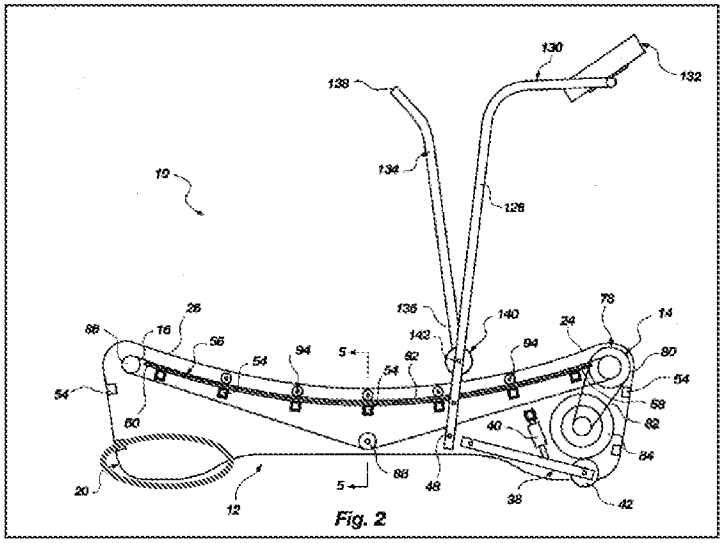
52. Independent claim 19 recites the following limitation:

[14] *See* Socwell at col. 9, lines 44-47.

- "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface[.]"

53. It is my opinion that Socwell does not expressly or inherently disclose "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as recited in independent claim 19 of the '580 patent.

54. Socwell discloses a curved deck treadmill (10) with wheels (42).



With reference to annotated Figure 2 of Socwell seen above and the part of the frame (12) near where the reference number (20) is positioned (circled above), Socwell simply does not disclose "support feet." The circled portion is a surface. A PHOSITA would not recognize that surface to be analogous to "support feet." Further, the circled portion is a solid, non-moveable object. Thus, the circled area is not "vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" like the "support feet" in independent claim 19 of the '580 patent.

55. Therefore, Socwell does not expressly or inherently disclose "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of

the manually powered treadmill relative to the ground surface" as in independent claim 19 of the '580 patent.

56. It is my opinion that Socwell does not expressly or inherently disclose "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19 of the '580 patent.

57. Socwell discloses a curved deck treadmill (10) with wheels (42).

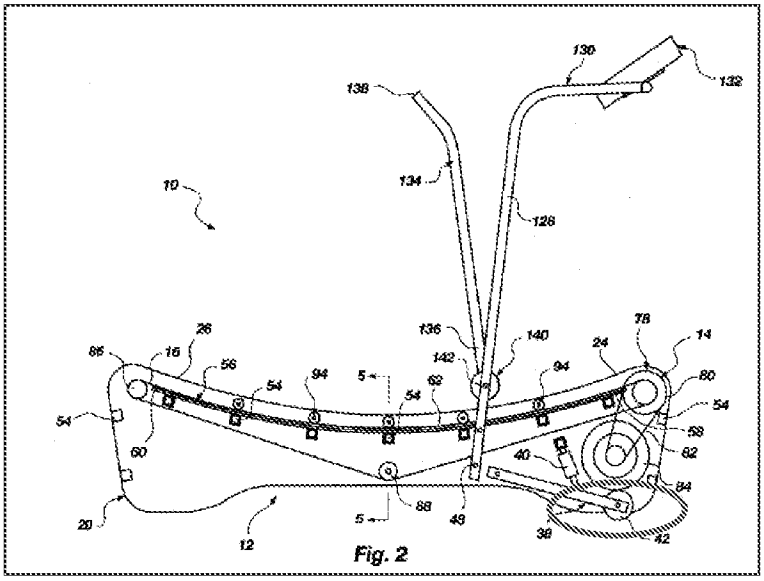


Fig. 2

With reference to annotated Figure 2 of Socwell above, the wheels (42) are clearly shown in a position that would engage with the ground or support surface for the treadmill (10). The disclosure of Socwell does not explicitly disclose that the wheels (42) are not in contact with the ground surface when the treadmill is in an operating position. Rather, a force absorbing member (40) is used to "absorb any forces or shocks sustained while moving the present invention from one location to another."[15] Thus, there is no need for the wheels (42) to avoid contact with the ground surface because it appears that the wheels (42) may move vertically upward and

[15] Socwell at col. 9, lines 9-11.

downward to absorb forces or shocks. In this regard, if the treadmill (10) is in the operating position, the wheels (42) may move slightly upward, but not off the ground surface as the ground surface is the force that pushes the wheels (42) upward.

58. Accordingly, it is my opinion that a PHOSITA would not conclude that Socwell expressly or inherently discloses "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 19 of the '580 patent.

59. Therefore and because not all the limitations of independent claims 1, 11, and 19 are disclosed, taught, or suggested by Socwell, it is my opinion that Socwell does not anticipate independent claims 1, 11, and 19.

2. Dependent claims 4-5 and 18 of the '580 patent are not anticipated by Socwell

60. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft," dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18 recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

61. As explained above, it is my opinion that Socwell does not anticipate "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second

bearing rail" as in independent claim 1. (*See also* the similar limitations in independent claim 11.)

62. Because dependent claims 4-5 require the limitations of independent claim 1 and because Socwell does not anticipate the above-quoted limitations of independent claim 1, Socwell cannot therefore anticipate the further narrowing limitations of dependent claims 4-5.

63. Because dependent claim 18 requires the limitations of independent claim 11 and because Socwell does not anticipate the above-quoted limitations of independent claim 11, Socwell cannot therefore anticipate the further narrowing limitations of dependent claim 18.

64. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18 with respect to Socwell. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitations required by claims 4, 5, or 18 are met.

65. Therefore, it is my opinion that Socwell does not anticipate "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18.

3. Dependent claims 6 and 12 of the '580 patent are not anticipated by Socwell

66. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I

am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

67. As I explained above, Socwell does not expressly or inherently disclose any device, component, or system that could be considered analogous to the "safety device" or any device that restricts the movement/rotation of treadmill belt to only one rotational direction.

68. Further, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, Socwell does not anticipate independent claims 1 and 11. Therefore, Socwell cannot anticipate dependent claims 6 and 12.

69. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

70. Therefore, it is my opinion that Socwell does not anticipate "wherein the safety device includes a one-way bearing" as in claims 6 and 12 of the '580 patent.

4. Dependent claim 13 of the '580 patent is not anticipated by Socwell

71. It is my opinion that Socwell does not expressly or inherently disclose "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating position" as in claim 13 of the '580 patent for the same reasons as set forth for the similar limitation in independent claim 19 of the '580 patent above.

72. Further, claim 13 requires the limitations of independent claim 11. As explained above, Socwell does not anticipate independent claim 11. Therefore, Socwell cannot anticipate dependent claims 13.

73. Therefore, it is my opinion that Socwell does not anticipate "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating position" as in claim 13 of the '580 patent.

5. Dependent claim 14 of the '580 patent is not anticipated by Socwell

74. It is my opinion that Socwell does not expressly or inherently disclose "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 14 of the '580 patent for the same reasons as set forth for the similar limitation in independent claim 19 of the '580 patent above.

75. Further, claim 14 requires the limitations of independent claim 11. As explained above, Socwell does not anticipate independent claim 11. Therefore, Socwell cannot anticipate dependent claim 14.

76. Therefore, it is my opinion that Socwell does not anticipate "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 14 of the '580 patent.

6. Independent claim 25 of the '580 patent is not anticipated by Socwell

77. It is my opinion that Socwell does not anticipate independent claim 25 of the '580 patent.

78. Socwell does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

79. As I explained above, the belt (16) of Socwell is free to move in an intended direction (away from the display (132)) and in an unintended direction (toward the display (132)). Socwell does not disclose any device, component, or system that permits the movement of the running belt (16) of Socwell in only one rotational direction.

80. Further, nowhere does Socwell teach or suggest that the belt is only movable or rotatable in one direction.

81. As such, it is my opinion that Socwell does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

82. Therefore and because not all the limitations of independent claim 25 are disclosed by Socwell, it is my opinion that Socwell does not anticipate independent claim 25.

7. Dependent claims 10 and 20 of the '580 patent are not anticipated by Socwell

83. Claim 10 depends from independent claim 1. Claim 20 depends from independent claim 19. As dependent claims, each of claims 10 and 20 include all of the limitations from the claim or claims from which they depend.

84. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 20. Thus, even if all the limitations of the claim on which this claim depends were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 20 is met.

85. As such, because Socwell does not expressly or inherently disclose various limitations in each of independent claims 1 and 19, Socwell cannot therefore anticipate claims 10 and 20 of the '580 patent.

B. Haber in combination with Socwell does not render obvious claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent under 35 U.S.C. § 103

86. Dr. Giachetti opines that Haber in combination of Socwell renders obvious claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent under 35 U.S.C. § 103. I disagree.

87. I understand that Haber was not considered during prosecution of the patent application that matured into the '580 patent, but Haber is considered prior art to the claims of the '580 patent.

88. After reviewing Socwell and Haber, and for the reasons set forth below, it is my opinion that Socwell in combination with Haber does not render obvious claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent.

1. Independent claims 1, 11, and 19 of the '580 patent are not obvious based on Haber in combination with Socwell

89. Each of independent claims 1, 11, and 19 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1);

- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11); and

- a "running belt [that] follows a curved running surface" and "safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt in a first direction and permit movement of the running belt in a second direction opposite the first direction" (claim 19).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to

reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation recited in each of independent claims 11 and 19.

90. As I described above, Socwell does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

91. Haber adds nothing to this disclosure of Socwell in relation to these missing elements.

92. Haber discloses a user-propelled treadmill (Fig. 2) with a flat or planar running surface and a clutch assembly (Fig. 5).

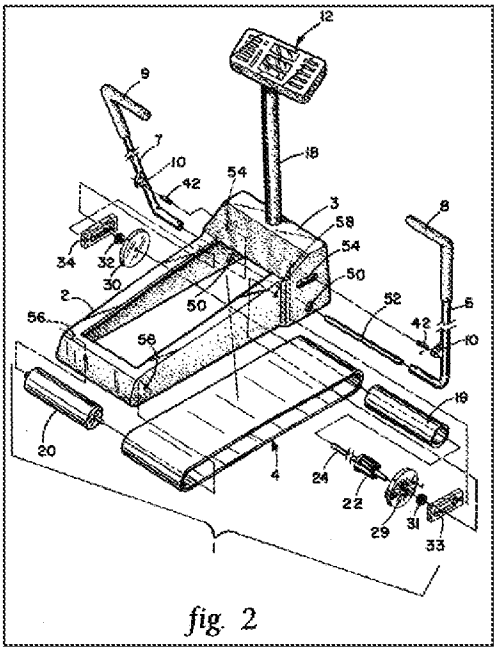


fig. 2

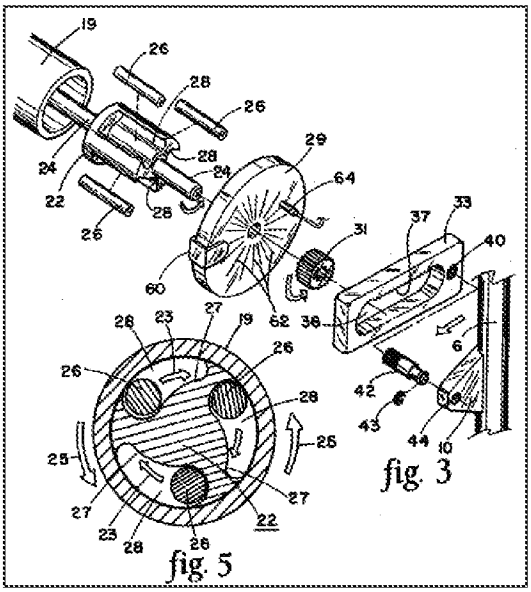


fig. 3

fig. 5

93. The running belt (4) of Haber is free to rotate in any direction resulting in the running surface being free to move in any direction (away from the display (12) using the earlier "intended direction" nomenclature) and in the opposite direction (toward the display (12) using the earlier "unintended direction" nomenclature). Haber does not disclose any means for restricting the rotation of the running belt (4) to only one rational direction.

94. While Haber discloses a one-way clutch (22), the one-way clutch (22) is used with the handlebars (6) and (7) and **not** the treadmill belt (4). In this regard and in operation of the treadmill of Haber, "so long as the handlebars 6 and 7 are pulled rearwardly and the one way clutch 22 rotates in the counter clockwise direction," the front drum 19 rotates in counter clockwise direction.[16] When the "handlebars 6 and 7 are pushed in the forward direction away from the user," the one way clutch 22 "will have no effect on the rotation of the front drum 19 and the tread 4."[17]

95. In the section of the Opening Giachetti Report entitled "A Device to Ensure Unidirectional Movement of the Belt," Dr. Giachetti asserts that the "one-way clutch (22) [is] "of conventional design," *i.e.*, a design understandable to a PHOSITA to perform the same function as the other unidirectional devices available by that 1995 time frame." However, as explained above, the one-way clutch (22) of Haber is used with the handlebars (6) and (7) and has **no** effect on the operation of the treadmill belt (4).

96. Additionally, it is my opinion that a PHOSITA would have no reason to combine Haber with Socwell to arrive at a manually operated treadmill having a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at

[16] Haber at col. 4, lines 25-27.
[17] *Id.* at col. 4, lines 37-38 and 45-46.

least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

97. First, Dr. Giachetti does not provide any motivation for this combination.

98. Second, even combining the teachings of Haber and Socwell, there is no teaching or suggestion for a "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. Even analogizing the one-way clutch (22) of Haber to the "safety device," as explained above, the one-way clutch (22) of Haber only acts on the handlebars and not the treadmill belt. Further, there is no reason to modify the arrangement of the one-way clutch (22) such that it acts on the treadmill belt (4). The only motivation for such an arrangement appears to stem from Mr. Nicholas Oblamski's declaration, where he articulates the potentially unwanted characteristic of unexpected reverse belt rotation in a curved treadmill.[18] However, as I have been instructed, the simple hindsight evaluation of Mr. Nicholas Oblamski's declaration is insufficient to establish a motivation to combine.

99. Thus, it is my opinion that the combination of Haber and Socwell does not render obvious the limitation of a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear

[18] *See* Declaration of Mr. Nicholas Oblamski dated August 11, 2014 at paragraphs 11-13.

shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

100. Each of independent claims 1, 11, and 19 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1);

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt ... at least partially supported by the first bearing rail and the second bearing rail" (claim 11); and

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first and second bearing rails" (claim 19).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitations recited in each of independent claims 11 and 19.

101. As explained above, it is my opinion that Socwell does not expressly or inherently disclose "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. Haber adds nothing to the disclosure of Socwell in this regard. As shown in Figure 2 of Haber below, there are no rails or structure whatsoever for supporting the treadmill belt (4).

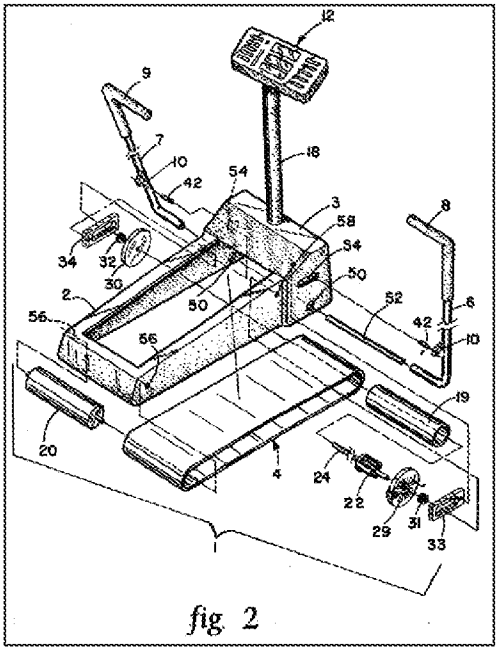


fig. 2

102. Accordingly, it is my opinion that the combination of Haber and Socwell does not teach or suggest "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1.

103. It is my opinion that Socwell in combination with Haber does not disclose, teach, or suggest "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19 of the '580 patent.

104. As explained above, Socwell does not expressly or inherently disclose "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19 of the '580 patent. Haber adds nothing to this disclosure of Socwell in this regard.

105. As shown in Figure 1 of Haber below, there are no support elements that elevate the treadmill as the treadmill appears to be flat and rest on a ground or support surface.

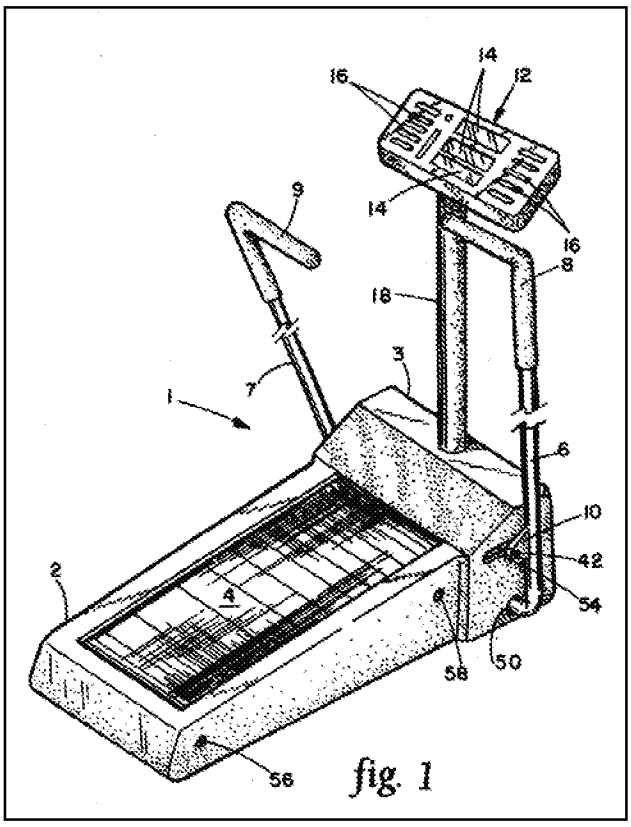


fig. 1

Additionally, Dr. Giachetti does not assert that Haber teaches anything, with respect to the asserted claims, other than the clutch assembly (*i.e.*, no "support feet").

106. Therefore, it is my opinion that Haber in combination with Socwell does not render obvious "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as recited in claim 19 of the '580 patent.

107. It is my opinion that the combination of Haber and Socwell does not teach or suggest "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19 of the '580 patent.

108. As explained above, it is my opinion that Socwell does not expressly or inherently disclose "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19 of the '580 patent. Haber adds nothing to this disclosure of Socwell in this regard. In this regard, Haber does not disclose anything analogous to "a pair of wheels mounted to the frame." *See* Figure 1 of Haber above. It appears that Dr. Giachetti's conclusion to the contrary is premised exclusively on impermissible hindsight.

109. Therefore, it is my opinion that the combination of Haber and Socwell does not teach or suggest "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19 of the '580 patent.

110. In conclusion, not all the limitations of independent claims 1, 11, and 19 are disclosed, taught, or suggested by Haber in combination with Socwell. Thus, it is my opinion that Haber in combination with Socwell does not render independent claims 1, 11, and 19 obvious under 35 U.S.C. § 103.

2. Dependent claims 4-5 and 18 of the '580 patent are not obvious based on Haber in combination with Socwell

111. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft," dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18

recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

112. As explained above, it is my opinion that the combination of Haber and Socwell does not render the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" in independent claim 1 as obvious. (*See also* the similar limitations in independent claim 11.)

113. Because dependent claims 4-5 require the limitations of independent claim 1 and because the combination of Haber and Socwell does not render independent claim 1 obvious, the combination of Haber and Socwell cannot therefore render the further narrowing limitations of dependent claims 4-5 as obvious. Because dependent claim 18 requires the limitations of independent claim 11, the combination of Haber and Socwell cannot therefore render the further narrowing limitations of dependent claim 18 as obvious.

114. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18 with respect to the combination of Socwell and Haber. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

115. Therefore, it is my opinion that the combination of Haber and Socwell does not render the following limitations of "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile

corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18 as obvious.

3. Dependent claims 6 and 12 of the '580 patent are not obvious based on Haber in combination with Socwell

116. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

117. As I explained above, the combination of Haber and Socwell does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

118. Further, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Haber and Socwell does not render independent claims 1 and 11 obvious. Therefore, the combination of Haber and Socwell cannot render dependent claims 6 and 12 obvious.

119. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

120. Therefore, it is my opinion that the combination of Haber and Socwell does not render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

4. Dependent claim 13 of the '580 patent is not obvious based on Haber in combination with Socwell

121. It is my opinion that the combination of Haber and Socwell does not disclose, teach, or suggest "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating position" as in claim 13 of the '580 patent for the same reasons as set forth for the similar limitation in independent claim 19 of the '580 patent above.

122. Further, claim 13 requires the limitations of independent claim 11. As explained above, the combination of Haber and Socwell does not render independent claim 11 obvious. Therefore, the combination of Haber and Socwell cannot render dependent claim 13 as obvious.

123. Accordingly, it is my opinion that the combination of Haber and Socwell does not render the limitation of "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating position" in claim 13 of the '580 patent as obvious.

5. Dependent claim 14 of the '580 patent is not obvious based on Haber in combination with Socwell

124. It is my opinion that the combination of Haber and Socwell does not disclose, teach, or suggest "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 14 of the '580 patent for the same reasons as set forth above for the similar limitation in independent claim 19 of the '580 patent.

125. Further, claim 14 requires the limitations of independent claim 11. As explained above, the combination of Haber and Socwell does not render independent claim 11 obvious. Therefore, the combination of Haber and Socwell cannot render dependent claim 14 as obvious.

126. Therefore, it is my opinion that the combination of Haber and Socwell does not render the limitation of "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" in claim 14 of the '580 patent as obvious.

6. Independent claim 25 of the '580 patent is not obvious based on Haber in combination with Socwell

127. It is my opinion that combination of Haber and Socwell does not render independent claim 25 of the '580 patent as obvious.

128. As explained above, Socwell does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

129. For the reasons set forth above, Haber adds nothing to this disclosure of Socwell.

130. As such, it is my opinion that combination of Haber and Socwell does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

131. For the reasons set forth above, it is also my opinion that Haber in combination with Socwell does not disclose, teach, suggest, or otherwise render obvious at least the limitations of "providing a first bearing rail and a second bearing rail, the first and second

bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile" and "disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail" of independent claim 25.

132. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Haber and Socwell, it is my opinion that the combination of Haber and Socwell does not render independent claim 25 obvious.

7. Dependent claims 10 and 20 of the '580 patent are not obvious based on Haber in combination with Socwell

133. Claim 10 depends from independent claim 1. Claim 20 depends from independent claim 19. As dependent claims, each of claims 10 and 20 include all of the limitations from the claim or claims from which they depend.

134. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 20. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 20 is met.

135. As such, because the combination of Haber and Socwell does not render independent claims 1 and 19 as obvious, Socwell cannot therefore render dependent claims 2 and 20 of the '580 patent as obvious.

8. Lack of motivation to combine

136. In addition to the reasons I provided above that show a PHOSITA would not combine Haber with Socwell, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Socwell or Haber in his section regarding "Motivation to Combine References." While it is unclear what

specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Socwell and Haber, in the above sections, I have provided reasons why a PHOSITA would not combine these references.

C. Magid in combination with Socwell does not render obvious claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent under 35 U.S.C. § 103

137. Dr. Giachetti opines that Magid in combination with Socwell render claims 1, 4-6, 10-14, 18-20, and 25 as obvious under 35 U.S.C. § 103 of the '580 patent. I disagree.

138. I understand that Magid was considered during prosecution of the patent application that matured into the '580 patent. Further, Magid is prior art to the claims of the '580 patent.

139. For the reasons set forth below, it is my opinion that Magid in combination with Socwell does not render claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent as obvious under 35 U.S.C. § 103.

1. Independent claims 1, 11, and 19 of the '580 patent are not obvious based on Magid in combination with Socwell

140. Each of independent claims 1, 11, and 19 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1);

- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11); and

- a "running belt [that] follows a curved running surface" and "safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt

> in a first direction and permit movement of the running belt in a second direction opposite the first direction" (claim 19).

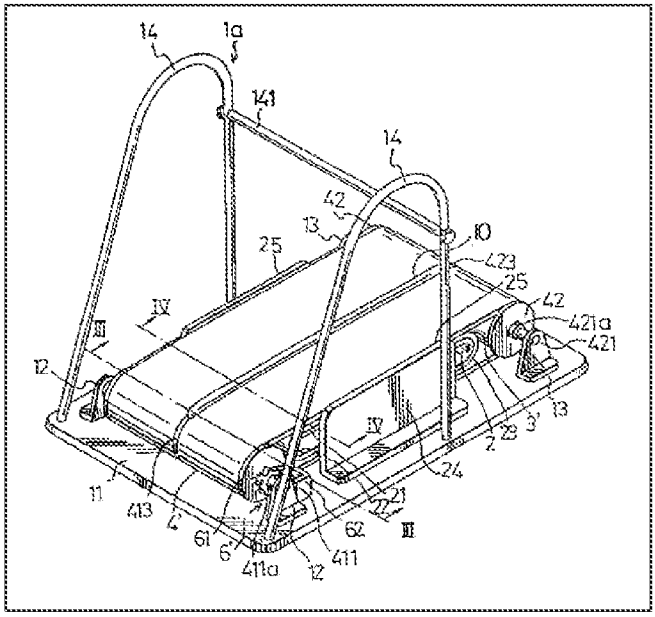
A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in each of claims 11 and 19.

141. As I described above, Socwell does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

142. Magid adds nothing to the disclosure of Socwell in relation to these missing elements.

143. Magid discloses a "unidirectional control means 6, 6' is installed to permit only unidirectional movement of the left and right foot belts 4, 4'."[19]

[19] Magid at col. 4, lines 46-48.



The "control means 6, 6' includes a pair of ratchet gears 61 attached to outer ends of the front rollers 41 ... and a pair of pawls 62" where one pawl 62 engages with one ratchet gear 61 to "permit only unidirectional rotation of the front rollers 41, thereby preventing bidirectional movement of the foot belts 4, 4'."[20] Magid also discloses that the "ratchet gears may be attached to the rear rollers 42 to achieve the same result."[21]

144. It is my opinion that a PHOSITA would not combine the teachings of Magid with that of Socwell. Magid is focused on a two-belt therapeutic treadmill while Socwell is focused on a single belt exercise treadmill. In this regard, Magid teaches two flat, parallel foot belts that "move independently when treaded by the left and right feet of the user, thereby preventing the action of the user's left foot from influencing the action of his right foot and vice-versa."[22] An intent of Magid is to provide two independently moving treadmill belts for therapeutic purposes and not a single treadmill belt.[23] If a single treadmill belt were utilized, then "the action of the

[20] *Id.* at col 4, lines 48-55.
[21] *Id.*at col. 4, lines 59-60.
[22] *Id.* at col. 5, lines 19-27.
[23] *See* Figure 1 of Magid which shows a single treadmill belt and is labeled as "prior art." Thus, the teaching and focus of Magid is to move away from a single treadmill belt device to a two-treadmill belt device.

user's left foot from influencing the action of his right foot and vice-versa" would be lost.[24] As such, it is my opinion that due to the explicit disclosure of Magid, there is a not motivation to combine the teachings of Magid with the teachings of a single-belt treadmill, such as Socwell.

145. Additionally, Magid is not relevant to the patents-in-suit. A PHOSITA would examine the teachings of other treadmills having curved running surfaces, like in Socwell, and not a treadmill belt with a flat or planar surface, such as in Magid. In this regard, the design and engineering requirements of a treadmill having a curved running surface differ from those of a treadmill with a flat or planar running surface. Design and engineering requirements urge a PHOSITA to avoid combining the teachings of Socwell with Magid, particularly given the above, where Magid expressly teaches away from a single-belt treadmill.

146. Moreover, a PHOSITA would not modify the treadmill of Socwell to include the unidirectional control means (6) and (6') of Magid based on the teachings of Socwell and Magid. As explained above, the treadmill belt of Socwell is free to move in both a forward direction and a rearward direction. When a user steps onto the rear of the treadmill having a curved running surface, the user's weight may cause the treadmill belt to move in the unintended rotational direction. But and despite Socwell teaching a curved running surface, Socwell does not recognize this potentially unwanted characteristic. Magid shows a flat or planar treadmill belt and, in turn, the aforementioned undesired characteristic is irrelevant to Magid. That is, when a user begins to use the device of Magid, the user not concerned with a treadmill belt moving in the unintended direction. Simply, a potential safety hazard exists for users mounting treadmills having curved running surfaces and such a safety hazard is not present in treadmills having flat or planar running surfaces. In this regard and expectedly, Magid does not disclose any type of potential safety hazard when the user mounts the device of Magid. Thus, while Magid discloses

[24] Magid at col. 5, lines 19-27.

a unidirectional control means (6) and (6') for "permit[ting] only unidirectional movement of the left and right foot belts," I see no impetus, reason, or motivation to combine Magid with Socwell.

147. Additionally, it is my opinion that the relative location of the "safety device" (*e.g.*, coupled to the front shaft or the rear shaft) is immaterial to the obviousness analysis of independent claim 1 with respect to this limitation. In this regard, Dr. Giachetti contends that a potential misunderstanding of the Examiner in interpreting the location (*i.e.*, front or rear) of the unidirectional control means (6) and (6') of Magid in the prosecution history of the application that matured in the '169 patent impacted the conclusion of patentability of independent claim 1 with respect to the above-quoted claim limitation, I disagree.

148. In the Notice of Allowance in the application that matured in the '580 patent, the Examiner provided the following reasons for allowing the application:

> The prior art fails to disclose or render obvious the limitations of the independent claims. The prior art discloses a human-powered treadmill with a frame, a pair of shafts, and a curved running belt disposed on the shafts. *See, e.g.*, U.S. Patent 1,211,765 (Schmidt). However, the prior art lacks the same in combination with a pair of bearing rails, each bearing rail comprising a plurality of bearings, the bearing rails supporting the running belt **and a safety device associated with one of the shafts** to prevent that shaft and the running belt from rotating in one direction while allowing free rotation in the opposite direction.[25]

Clearly, the Examiner did not place any patentable weight on the relative location of the "safety device." Further, the earlier '169 patent and this case were both in front of the same Examiner. There, during prosecution of the '169 patent, the same Examiner stated in response to Mr. Nicholas Oblamski's declaration[26] that "Applicant's argument that it would be unobvious to

[25] *See* Notice of Allowance mailed April 16, 2015 in the application that matured into the '580 patent at p. 3 (emphasis added).
[26] *See* Declaration of Mr. Nicholas Oblamski dated August 11, 2014.

move Magid's safety device to the rear roller is unpersuasive for the reasons set forth below."[27] This is in near direct contrast to the conclusion of Dr. Giachetti: "The prosecution history reflects that during prosecution, the applicant represented that it is an improvement over Magid to place the safety device on the rear shaft, an argument the examiner accepted in the context of that application" (emphasis added).[28]

149. Thus and contrary to Dr. Giachetti's opinion, the Examiner appears to conclude – and I agree – that the relative placement of the "safety device" is immaterial to the obviousness analysis.

150. In sum, it is my opinion that Magid in combination with Socwell does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

151. Each of independent claims 1, 11, and 19 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1);

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt ... at least partially supported by the first bearing rail and the second bearing rail" (claim 11); and

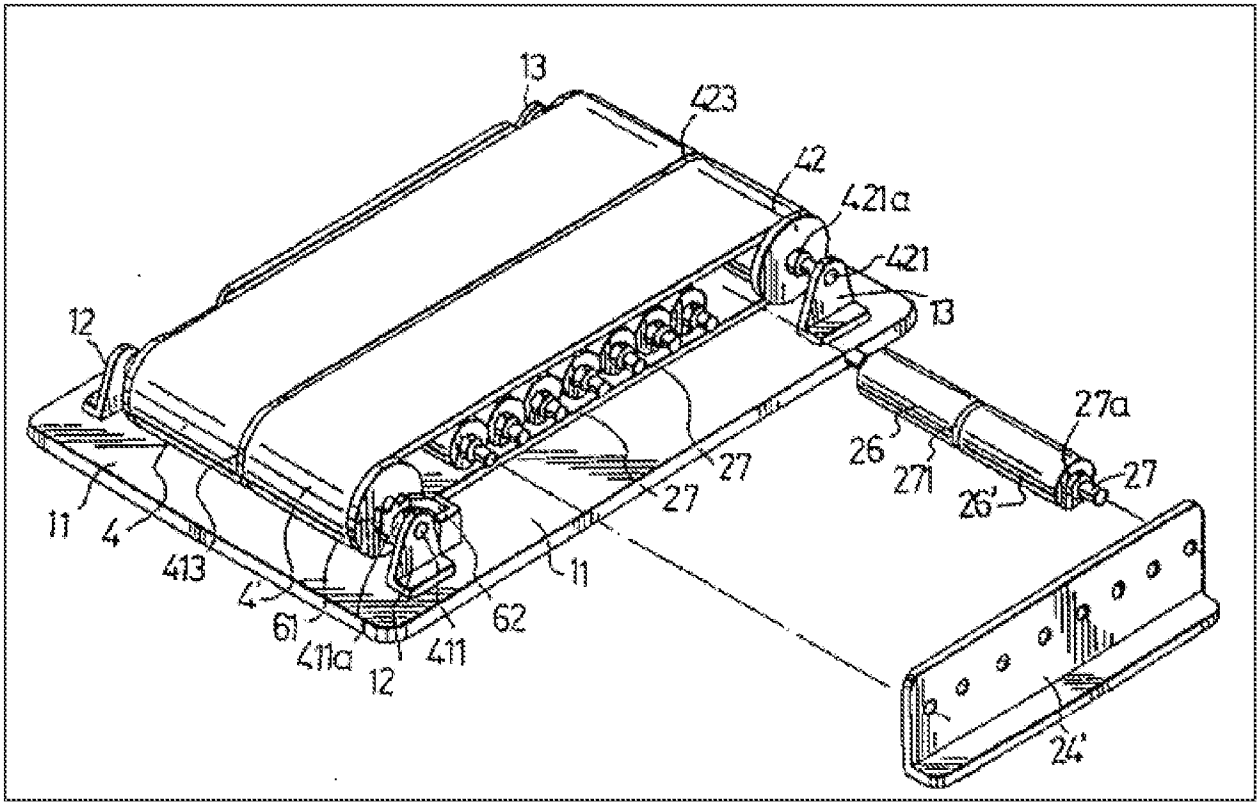
[27] *See* Final Rejection mailed October 17, 2014 in the application that matured into the '169 patent at p. 12.
[28] Opening Giachetti Report at paragraph 74.

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first and second bearing rails" (claim 19).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitations recited in each of independent claims 11 and 19.

152. As explained above, it is my opinion that Socwell does not expressly or inherently disclose "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1.

153. Magid adds nothing to the disclosure of Socwell in relation to these missing elements. Magid shows a roller (26) supporting the belt (4) and another, different roller (26') supporting a different treadmill belt (4').



154. Magid does not disclose, teach, or suggest any component that could be considered analogous to the claimed "bearing rail." Even looking at the roller (26'), a PHOSITA would readily recognize that the roller (26') is a conventional conveyor roller, *see*, *e.g.*, U.S. Pat. Nos. 4,681,215 & 2,768,725 for examples of conveyor rollers.[29] A conveyor roller is not analogous to a rail with bearings.

155. Further, Dr. Giachetti does not point to any specific component in the treadmill of Magid that could be considered analogous to the "first bearing rail" and the "second bearing rail."

156. Therefore, it is my opinion that the combination of Magid and Socwell does not disclose, teach, or suggest "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the

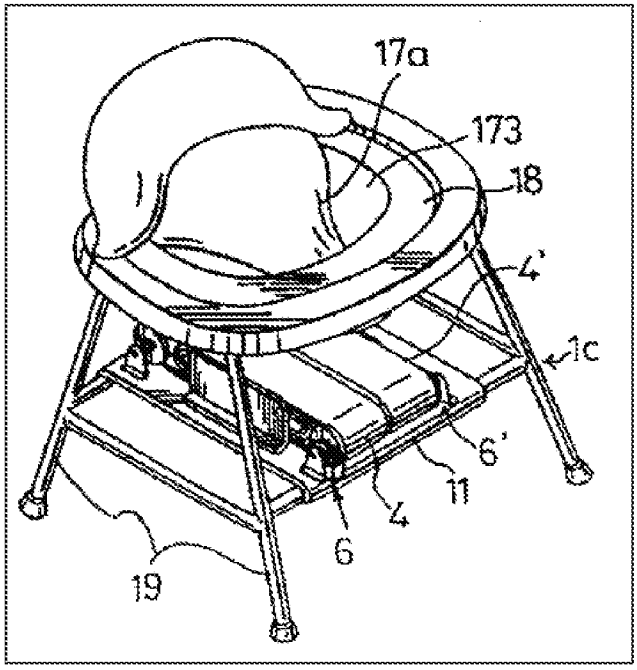
[29] To the extent Dr. Giachetti suggests that conveyor rollers are pertinent to the discussion of the prior art, I disagree that a PHOSITA would find them relevant.

second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

157. It is my opinion that Magid in combination with Socwell does not disclose, teach, or suggest "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19.

158. As explained above, Socwell does not expressly or inherently disclose "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19 of the '580 patent.

159. Magid adds nothing to this disclosure of Socwell. Magid discloses leg members (19). *See* Figure 6 of Magid below. However, Magid does not teach or suggest that the leg members (19) are adjustable relative to a support surface. Rather, the leg members (19) appear to be not adjustable.



Additionally, there does not appear to be any motivation to make the leg members (19) adjustable in length as that would likely render the device unstable and perhaps not provide the requisite support for the treadmill.

160. Therefore, it is my opinion that Magid in combination with Socwell does not disclose, teach, or suggest "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19.

161. It is my opinion that the combination of Magid and Socwell does not disclose, teach, or suggest "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19 of the '580 patent.

162. As explained above, it is my opinion that Socwell does not expressly or inherently disclose "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill

is in an operating position" as in independent claim 19 of the '580 patent. Magid adds nothing to this disclosure of Socwell.

163. While Magid discloses wheels that support a treadmill frame, *see*, *e.g.*, Figures 5 and 7, the wheels of Magid are shown to be in constant contact with the ground surface. Nowhere does Magid disclose, teach, or suggest that the "pair of wheels are mounted so that the pair of wheels **are not in contact with a ground surface when the manually powered treadmill is in an operating position**" as in independent claim 19 of the '580 patent (emphasis added). Further, modifying the treadmill devices to make the wheels not be in contact with the ground surface when the treadmill device is in an operating position would render the treadmill device unstable for use.

164. As such, it appears that the only way to arrive at the conclusion that the combination of Magid and Socwell discloses "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19 of the '580 patent is through hindsight analysis, which is impermissible.

165. Therefore, it is my opinion that the combination of Magid and Socwell does not teach or suggest "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19 of the '580 patent.

166. In conclusion, not all the limitations of independent claims 1, 11, and 19 are disclosed, taught, or suggested by Magid in combination with Socwell. Thus, it is my opinion that Magid in combination with Socwell does not render independent claims 1, 11, and 19 obvious under 35 U.S.C. § 103.

2. Dependent claims 4-5 and 18 of the '580 patent are not obvious based on Magid in combination with Socwell

167. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft," dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18 recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

168. As explained above, it is my opinion that the combination of Magid and Socwell does not render the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" in independent claim 1 as obvious. (*See also* the similar limitations in independent claim 11.)

169. Because dependent claims 4-5 require the limitations of independent claim 1 and because the combination of Magid and Socwell does not render independent claim 1 obvious, the combination of Magid and Socwell cannot therefore render the further narrowing limitations of dependent claims 4-5 as obvious. Because dependent claim 18 requires the limitations of independent claim 11 and because the combination of Magid and Socwell does not render independent claim 11 obvious, the combination of Magid and Socwell cannot therefore render the further narrowing limitations of dependent claim 18 as obvious.

170. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18 with respect to the combination of Magid and Socwell. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

171. Therefore, it is my opinion that the combination of Magid and Socwell does not render the following limitations of "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18 as obvious.

3. Dependent claims 6 and 12 of the '580 patent are not obvious based on Magid in combination with Socwell

172. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

173. As I explained above, the combination of Magid and Socwell does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a

first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

174. Further, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Magid and Socwell does not render independent claims 1 and 11 obvious. Therefore, the combination of Magid and Socwell cannot render dependent claims 6 and 12 obvious.

175. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

176. Therefore, it is my opinion that the combination of Magid and Socwell does not render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

4. Dependent claim 13 of the '580 patent is not obvious based on Magid in combination with Socwell

177. It is my opinion that the combination of Magid and Socwell does not expressly or inherently disclose "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating position" as in claim 13 of the '580 patent for the same reasons as set forth for the similar limitation in independent claim 19 of the '580 patent above.

178. Further, claim 13 requires the limitations of independent claim 11. As explained above, the combination of Magid and Socwell does not render independent claim 11 obvious. Therefore, the combination of Magid and Socwell cannot render dependent claim 13 as obvious.

179. Accordingly, it is my opinion that the combination of Magid and Socwell does not render the limitation of "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an operating position" in claim 13 of the '580 patent as obvious.

5. Dependent claim 14 of the '580 patent is not obvious based on Magid in combination with Socwell

180. It is my opinion that the combination of Magid and Socwell does not expressly or inherently disclose "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 14 of the '580 patent for the same reasons as set forth above for the similar limitation in independent claim 19 of the '580 patent.

181. Further, claim 14 requires the limitations of independent claim 11. As explained above, the combination of Magid and Socwell does not render independent claim 11 obvious. Therefore, the combination of Haber and Socwell cannot render dependent claim 14 as obvious.

182. Therefore, it is my opinion that the combination of Magid and Socwell does not render the limitation of "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" in claim 14 of the '580 patent as obvious.

6. Independent claim 25 of the '580 patent is not obvious based on Magid in combination with Socwell

183. It is my opinion that the combination of Magid and Socwell does not render independent claim 25 of the '580 patent as obvious.

184. As explained above, Socwell does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a

first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

185. For the reasons set forth above, Magid adds nothing to this disclosure of Socwell.

186. As such, it is my opinion that the combination of Magid and Socwell does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

187. For the reasons set forth above, it is also my opinion that Magid in combination with Socwell does not disclose, teach, suggest, or otherwise render obvious at least the limitations of "providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile" and "disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail" of independent claim 25.

188. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Magid and Socwell, it is my opinion that the combination of Magid and Socwell does not render independent claim 25 obvious.

7. Dependent claims 10 and 20 of the '580 patent are not obvious based on Magid in combination with Socwell

189. Claim 10 depends from independent claim 1. Claim 20 depends from independent claim 19. As dependent claims, each of claims 10 and 20 include all of the limitations from the claim or claims from which they depend.

190. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 20. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 20 is met.

191. As such, because the combination of Magid and Socwell does not render independent claims 1 and 19 as obvious, the combination of Magid and Socwell cannot therefore render dependent claims 20 and 10 of the '580 patent as obvious.

8. Lack of motivation to combine

192. In addition to the reasons I provided above that show a PHOSITA would not combine Magid with Socwell, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Socwell or Magid in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Socwell and Magid, in the above section, I have provided reasons why a PHOSITA would not combine these references.

D. Cutter in combination of Magid does not render obvious claims 1, 4-6, 10-14, 18, 19, and 25 of the '580 patent under 35 U.S.C. § 103

193. Dr. Giachetti opines that Cutter in combination with Magid render claims 1-6, 10-14, 18, 19, 21, 22, and 25 of the '580 patent as obvious under 35 U.S.C. § 103. I disagree.

194. I also understand that Cutter was considered during prosecution of the patent application that matured into the '580 patent. Further, Cutter is prior art to the claims of the '580 patent.

195. For the reasons set forth below, it is my opinion that Cutter in combination with Magid does not render claims 1, 4-6, 10-14, 18, 19, and 25 of the '580 patent as obvious under 35 U.S.C. § 103.

1. Independent claims 1, 11, and 19 of the '580 patent are not obvious based on Cutter in combination with Magid

196. Each of independent claims 1, 11, and 19 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1);

- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11); and

- a "running belt [that] follows a curved running surface" and "safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt in a first direction and permit movement of the running belt in a second direction opposite the first direction" (claim 19).

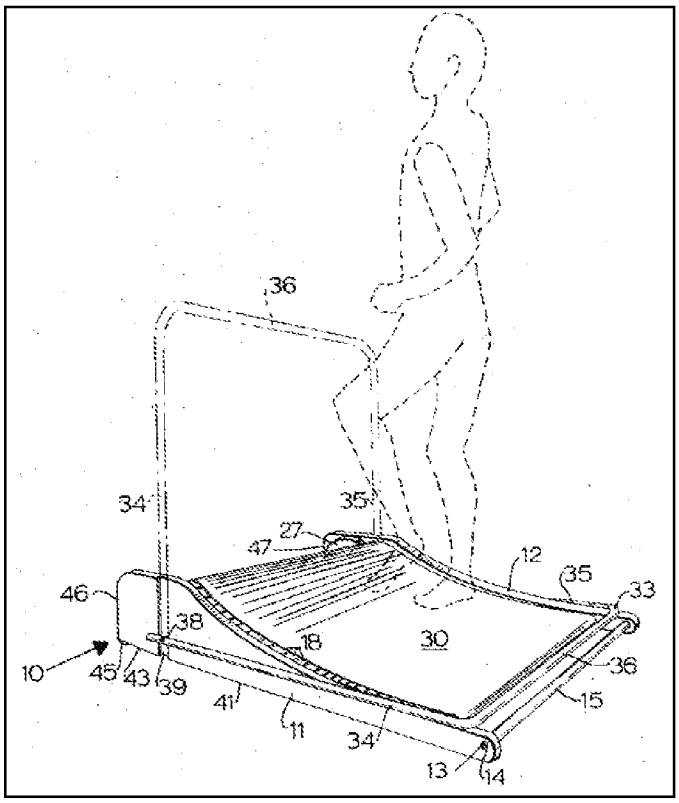
A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in each of claims 11 and 19.

197. As I described above, Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent

rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

198. Cutter adds nothing to the disclosure of Magid in relation to these missing elements.

199. Cutter discloses a treadmill (10) with a running belt (30) that has a curved surface proximate the front of the treadmill (10) and a substantially flat or planar surface proximate the rear of the treadmill (10).



Cutter does not disclose any device, system, or component that could be considered analogous to the "safety device" in claim 1 let alone any device, system, or feature configured to enable the running belt (30) to rotate in only one rotational direction. In this regard, the belt (30) of Cutter is free to move in two rotational directions.

200. That said, Cutter does appear to recognize the need for safety in a treadmill. In this regard, Cutter discloses that a "principal problem has been that of how to restrain the user from walking off or running off or falling off the end of the machine and possibly injuring himself, and how to exercise this restraint without so encumbering his body that he is unable to move naturally with the freedom of normal walking, jogging, or running."[30] Cutter then offers potential solutions for keeping the user on the treadmill (*e.g.*, a motor, harnesses and belts, a handle), and concludes that these potential solutions are inadequate/undesirable because they may encumber the user of the treadmill, and offers the generally "concave path [of the treadmill belt (30)] ... [where] whether walking, running, or jogging, [the user] tends to achieve almost at once a natural balance in position at the proper instantaneous angle along the curve" to maintain their position on the treadmill.[31]

201. Thus, to the extent that Cutter discloses safety as being of a concern for users of a treadmill, Cutter does not disclose any device or safety mechanism for restricting rotation/movement of the treadmill belt to only the intended direction. Further, the disclosed problem of Cutter is towards keeping a user on a treadmill and not addressing a potential safety issue when the user mounts the treadmill.

202. Further, as shown in Figure 1 of Cutter above, a rear portion of the running belt (30) (away from the rod (34)) is substantially flat. Because users typically mount from the rear of the treadmill, the user will step on the substantially flat portion of the belt (30). However, there is likely to be no or very little unexpected belt (30) rotation of the belt and movement of the running surface in the unintended direction (*i.e.*, towards the rod (34)) due to the belt being flat

[30] Cutter at col. 1, lines 8-13.
[31] *See id.* at col. 1, lines 15-26, 60-62.

in this area. Thus, limiting undesirable unintended directional rotation of the running belt (30) is likely not a concern in the treadmill (10) of Cutter.

203. As a result, a PHOSITA reading Cutter would i) not be aware of potentially undesirable and unexpected treadmill belt rotation and resulting movement of the running surface on a treadmill with a curved running surface, and ii) not be made aware of a possible solution for addressing this potentially unwanted characteristic.

204. Therefore, Cutter does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. As such, Cutter adds nothing to the disclosure of Magid in relation to these missing elements.

205. Finally and for similar reasons as I explained above with respect to Socwell and Magid, a PHOSITA would not combine the teachings of Cutter and Magid because i) Magid focuses on a two-belt treadmill and teaches away from using a single belt treadmill like in Cutter, and ii) the treadmill of Magid is specifically intended for therapeutic use by "people with uncoordinated feet movements, such as small children, physically handicapped people and old people"[32] such that implementation of a curved or non-planar running surface would be difficult to use for therapeutic purposes, which teaches away from implementing a curved or non-planar running surface (such as in Cutter) with the treadmill of Magid. Additionally, I note that Dr. Giachetti does not appear to have provided any reasons for combining the teachings of Cutter with Magid.

[32] Magid at col. 1, lines 30-35 and at col. 5, lines 52-55.

206. In sum, it is my opinion that Cutter in combination with Magid does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

207. Each of independent claims 1, 11, and 19 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1);

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt ... at least partially supported by the first bearing rail and the second bearing rail" (claim 11); and

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first and second bearing rails" (claim 19).

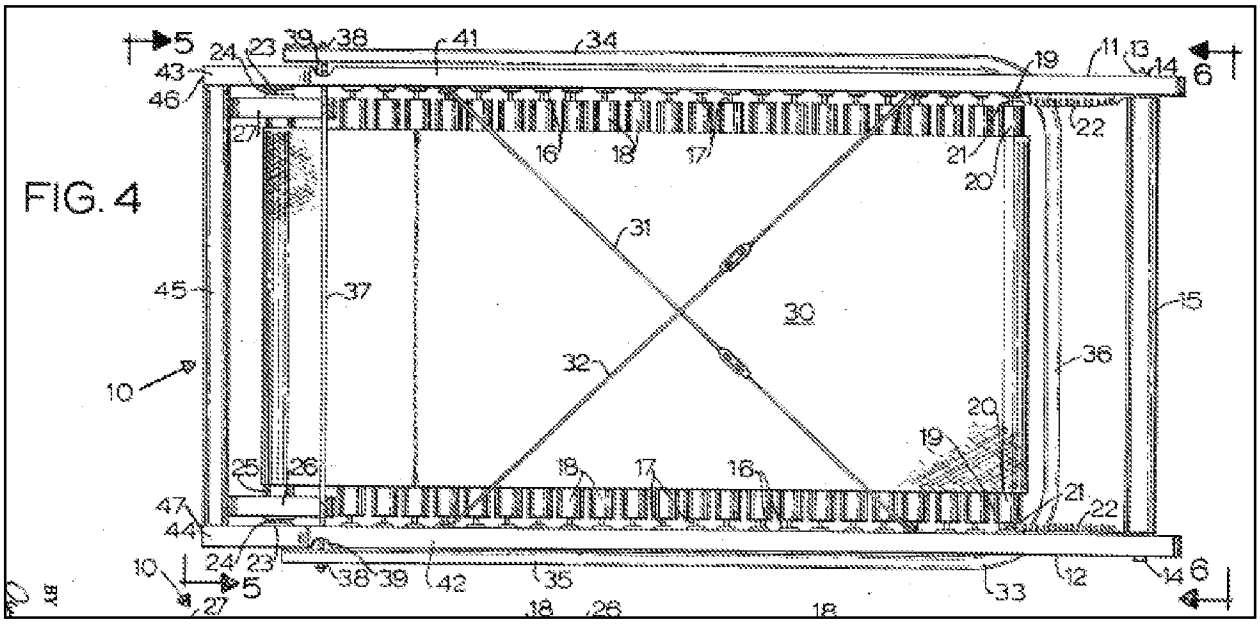
A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitations recited in each of independent claims 11 and 19.

208. As explained above, it is my opinion that Magid does not expressly or inherently disclose "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left

side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1.

209. Cutter adds nothing to the disclosure of Magid in relation to these missing elements. Dr. Giachetti states that "Cutter discloses at least one bearing rail having a plurality [of] journaling sockets located on the inside face of the frame side members and arranged to provide a curving path; and part 18 described as rollers, continuous running belt (30) supported by the bearing rail and at least partially disposed about the front and rear shafts (25, 20)."[33] I disagree.

210. My opinion is that the Cutter discloses the same or similar structure as that in Magid. In this regard and as shown in Figure 4 of Cutter below, rollers (18) extend between the left side member (11) and the right side member (12).



211. Like in Magid and for the reasons as set forth above, a PHOSITA would readily recognize that the rollers (18) of Cutter are conventional conveyor rollers, *see*, *e.g.*, U.S. Pat.

[33] Opening Giachetti Report at paragraph 121.

Nos. 4,681,215 & 2,768,725 for examples of conveyor rollers. As such, these rollers are not analogous to a rail with bearings. The remaining disclosure of Cutter does not disclose any other structure that could be considered analogous to the claimed "bearing rails." Therefore, the disclosure of Cutter adds nothing to that of Magid.

212. Accordingly, it is my opinion that the combination of Magid and Cutter does not disclose, teach, or suggest "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

213. It is also my opinion that Cutter in combination with Magid does not disclose, teach, suggest, or render obvious the limitation of "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19.

214. Cutter discloses wheels (45) attached to the treadmill.

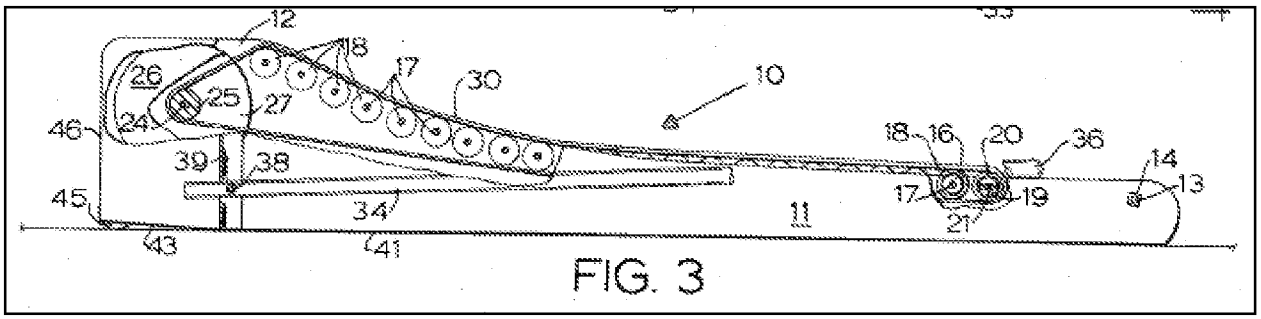


FIG. 3

Cutter does not teach or suggest any type of structure that could be considered to "support feet." Rather, as shown, the treadmill (10) simply rests on a support surface.

215. Magid adds nothing to the disclosure of Cutter. As explained above, Magid does not expressly or inherently disclose "at least two support feet coupled to the frame, wherein the

support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19.

216. Therefore, it is my opinion that Cutter in combination with Magid does not disclose, teach, or suggest "at least two support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in independent claim 19.

217. In conclusion, because not all the limitations of independent claims 1, 11, and 19 are disclosed, taught, or suggested by Cutter in combination with Magid, it is my opinion that Cutter in combination with Magid does not render independent claims 1, 11, and 19 obvious under 35 U.S.C. § 103.

2. Dependent claims 4-5 and 18 of the '580 patent are not obvious based on Cutter in combination with Magid

218. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft," dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18 recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

219. As explained above, it is my opinion that the combination of Cutter and Magid does not render the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt

supported by the first bearing rail and the second bearing rail" in independent claim 1 as obvious. (*See also* the similar limitations in independent claim 11.)

220. Because dependent claims 4-5 require the limitations of independent claim 1 and because the combination of Cutter and Magid does not render independent claim 1 obvious, the combination of Cutter and Magid cannot therefore render the further narrowing limitations of dependent claims 4-5 as obvious. Because dependent claim 18 requires the limitations of independent claim 11 and because the combination of Cutter and Magid does not render independent claim 11 obvious, the combination of Cutter and Magid cannot therefore render the further narrowing limitations of dependent claim 18 as obvious.

221. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18 with respect to Cutter and Magid. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

222. Therefore, it is my opinion that the combination of Cutter and Magid does not render the following limitations of "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18 as obvious.

3. Dependent claims 6 and 12 of the '580 patent are not obvious based on Cutter in combination with Magid

223. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

224. As I explained above, the combination of Cutter and Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

225. Further, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Cutter and Magid does not render independent claims 1 and 11 obvious. Therefore, the combination of Cutter and Magid cannot render dependent claims 6 and 12 obvious.

226. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

227. Therefore, it is my opinion that the combination of Cutter and Magid does not render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

4. Dependent claim 14 of the '580 patent is not obvious based on Cutter in combination with Magid

228. It is my opinion that the combination of Cutter and Magid does not expressly or inherently disclose "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 14 of the '580 patent for the same reasons as set forth above for the similar limitation in independent claim 19 of the '580 patent.

229. Further, claim 14 requires the limitations of independent claim 11. As explained above, the combination of Cutter and Magid does not render independent claim 11 obvious. Therefore, the combination of Cutter and Magid cannot render dependent claim 14 as obvious.

230. Therefore, it is my opinion that the combination of Cutter and Magid does not render the limitation of "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" in claim 14 of the '580 patent as obvious. '

5. Independent claim 25 of the '580 patent is not obvious based on Cutter in combination with Magid

231. It is my opinion that the combination of Cutter and Magid does not render independent claim 25 of the '580 patent as obvious.

232. As explained above, Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

233. For the reasons set forth above, Cutter adds nothing to the disclosure of Magid in relation to these missing elements.

234. As such, it is my opinion that the combination of Cutter and Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

235. For the reasons set forth above, it is also my opinion that Cutter in combination with Magid does not disclose, teach, suggest, or otherwise render obvious at least the limitations of "providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile" and "disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail" of independent claim 25.

236. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Cutter and Magid, it is my opinion that the combination of Cutter and Magid does not render independent claim 25 obvious.

6. Dependent claims 10 and 13 of the '580 patent are not obvious based on Cutter in combination with Magid

237. Claim 10 depends from independent claim 1. Claim 13 depends from independent claim 11. As dependent claims, each of claims 10 and 13 include all of the limitations from the claim or claims from which they depend. As such, because the combination of Cutter and Magid does not render independent claims 1 and 11 as obvious, the combination of

Cutter and Magid cannot therefore render dependent claims 10 and 13 of the '580 patent as obvious.

7. Lack of motivation to combine

238. In addition to the reasons I provided above that show a PHOSITA would not combine Magid with Cutter, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Magid in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Cutter and Magid in the above section, I have provided reasons why a PHOSITA would not combine these references.

E. Schönenberger in combination with Magid does not render obvious claims 1, 4-6, 10-12, 18, and 25 of the '580 patent under 35 U.S.C. § 103

239. Dr. Giachetti opines that Schönenberger in combination with Magid render claims 1, 4-6, 10-12, 18, and 25 as obvious under 35 U.S.C. § 103 of the '580 patent. I disagree.

240. I understand that Schönenberger was considered during prosecution of the patent application that matured into the '580 patent. Further, Schönenberger is prior art to the claims of the '580 patent.[34]

241. For the reasons set forth below, it is my opinion that Schönenberger in combination with Magid does not render claims 1, 4-6, 10-12, 18, and 25 of the '580 patent as obvious under 35 U.S.C. § 103.

1. Independent claims 1 and 11 of the '580 patent are not obvious based on Schönenberger in combination with Magid

242. Each of independent claims 1 and 11 recite the following limitations:

[34] As I understand it from my discussion with Nicholas Oblamski, Woodway has incorporated the transportation mechanism of the running belt disclosed in Schönenberger in its motorized and non-motorized treadmill products Per Mr. Oblamski, use and adoption of this technology predated his employment at Woodway, which began more than 16 years ago.

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1); and

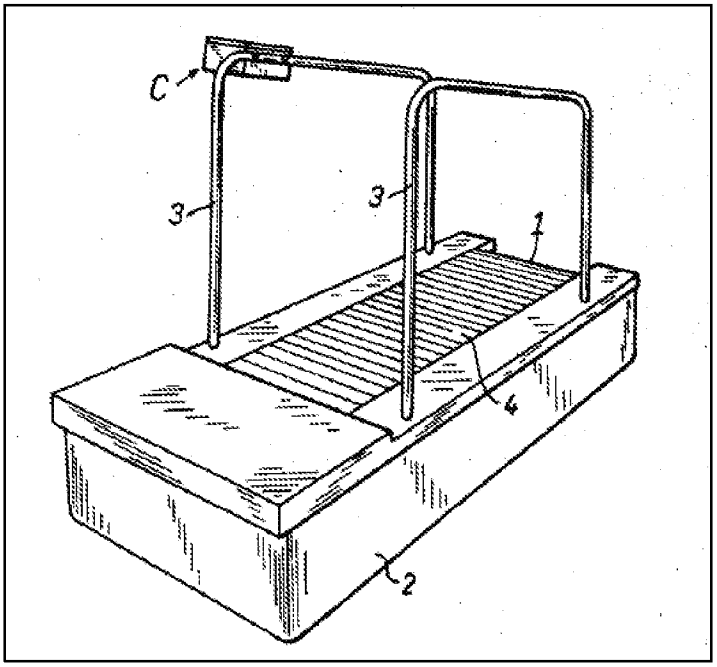
- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in independent claim 11.

243. As I described above, Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

244. Schönenberger adds nothing to the disclosure of Magid in relation to these missing elements.

245. Dr. Giachetti incorrectly cites to Schönenberger as disclosing a curved surface. A review of Schönenberger shows that it only discloses a treadmill having a flat or planar running surface. *See* Figure 1 of Schönenberger below.



246. Thus, neither Magid nor Schönenberger contemplate a treadmill having a curved or non-planar running surface.

247. Therefore, the combination of Magid and Schönenberger cannot disclose, teach, or suggest the limitations relating to a "running belt [that] follows a **curved running surface**" as provided for in independent claim 1 (emphasis added). As a result, the combination of Schönenberger and Magid does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

248. Additionally and for similar reasons as I explained above with respect to Socwell and Magid, a PHOSITA would not combine the teachings of Schönenberger and Magid because Magid focuses on a two-belt therapeutic treadmill and specifically teaches away from using a single belt treadmill like in Schönenberger because a single belt treadmill would not enable a

"user's left foot from influencing the action of his right foot and vice-versa."[35] Further, I note that Dr. Giachetti does not appear to have provided any specific reasons for combining the teachings of Schönenberger with Magid.

249. In sum, it is my opinion that Schönenberger in combination with Magid does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitations in independent claim 11.)

250. In conclusion, because not all the limitations of independent claims 1 and 11 are disclosed, taught, or suggested by Schönenberger in combination with Magid, it is my opinion that Schönenberger in combination with Magid does not render independent claims 1 and 11 obvious under 35 U.S.C. § 103.

2. Dependent claims 6 and 12 of the '580 patent are not obvious based on Schönenberger in combination with Magid

251. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

[35] Magid at col. 5, lines 19-27.

252. As I explained above, the combination of Schönenberger and Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

253. Further, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Schönenberger and Magid does not render independent claims 1 and 11 obvious. Therefore, the combination of Schönenberger and Magid cannot render dependent claims 6 and 12 obvious.

254. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

255. Therefore, it is my opinion that the combination of Schönenberger and Magid does not render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

3. Independent claim 25 of the '580 patent is not obvious based on Schönenberger in combination with Magid

256. It is my opinion that combination of Schönenberger and Magid does not render independent claim 25 of the '580 patent as obvious.

257. As explained above, Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a

first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

258. For the reasons set forth above, Schönenberger adds nothing to this disclosure of Magid in relation to these missing elements.

259. As such, it is my opinion that the combination of Schönenberger and Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

260. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Magid and Schönenberger, it is my opinion that the combination of Magid and Schönenberger does not render independent claim 25 obvious.

4. Dependent claims 4, 5, 10, and 18 of the '580 patent are not obvious based on Schönenberger in combination with Magid

261. Claims 4, 5, and 10 depend from independent claim 1. Claim 18 depends from independent claim 11. As dependent claims, each of claims 4, 5, 10, and 18 include all of the limitations from the claim or claims from which they depend.

262. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

263. Because the combination of Schönenberger and Magid does not render independent claims 1 and 11 as obvious, the combination of Schönenberger and Magid cannot therefore render dependent claims 4, 5, 10, and 18 of the '580 patent as obvious either.

5. Lack of motivation to combine

264. In addition to the reasons I provided above that show a PHOSITA would not combine Magid with Schönenberger, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Magid or Schönenberger in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Schönenberger and Magid, in the above section, I have provided reasons why a PHOSITA would not combine these references.

F. Abelbeck in combination with Magid does not render obvious claims 1, 4-6, 10-12, 18, and 25 of the '580 patent under 35 U.S.C. § 103

265. Dr. Giachetti opines that Abelbeck in combination with Magid render claims 1-6, 10-12, 18, and 25 obvious under 35 U.S.C. § 103 of the '580 patent. I disagree.

266. I understand that Abelbeck (like Magid) was considered during prosecution of the patent application that matured into the '580 patent. Further, Abelbeck is prior art to the claims of the '580 patent.

267. For the reasons set forth below, it is my opinion that Abelbeck in combination with Magid does not render claims 1, 4-6, 10-12, 18, and 25 of the '580 patent as obvious under 35 U.S.C. § 103.

1. Independent claims 1 and 11 of the '580 patent are not obvious based on Abelbeck in combination with Magid

268. Each of independent claims 1 and 11 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1); and

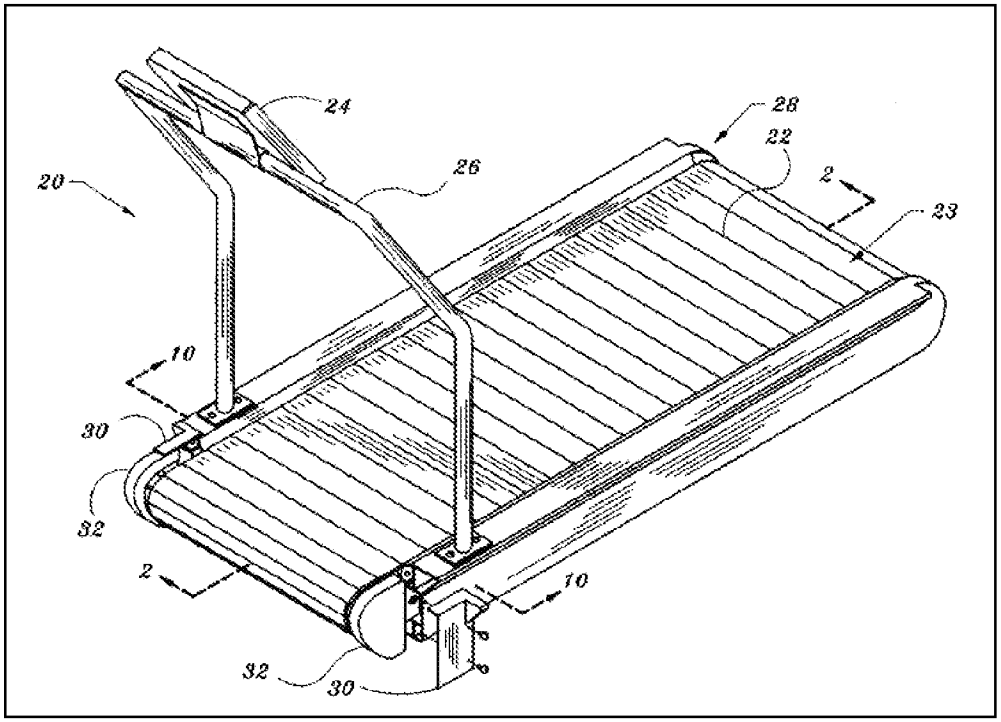
- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in independent claim 11.

269. As I explained above, Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

270. Abelbeck adds nothing to the disclosure of Magid in relation to these missing elements.

271. Abelbeck discloses a treadmill having a flat or planar running surface. *See* Figure 1 of Abelbeck below.



272. Thus, neither Magid nor Abelbeck contemplate a treadmill having a curved or non-planar running surface.

273. Therefore, the combination of Magid and Abelbeck cannot disclose, teach, or suggest the limitations relating to a "running belt [that] follows a **curved running surface**" as provided for in independent claim 1 (emphasis added). As a result, the combination of Abelbeck and Magid does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

274. Further, Abelbeck does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the belt (22) of Abelbeck is free to rotate in any direction resulting in free movement of the running surface in an intended

and in an unintended direction. Moreover, Dr. Giachetti does not cite to Abelbeck to assert that any device could be considered analogous to the claimed "safety device."

275. Additionally and for similar reasons as I explained above with respect to Socwell and Magid, (and with Schönenberger and Magid) a PHOSITA would not combine the teachings of Abelbeck and Magid because Magid focuses on a two-belt therapeutic treadmill and specifically teaches away from using a single belt treadmill like in Abelbeck because a single belt treadmill would not enable a "user's left foot from influencing the action of his right foot and vice-versa."[36] I also note that Dr. Giachetti does not appear to have provided any specific reasons for combining the teachings of Abelbeck with Magid.

276. In sum, it is my opinion that Abelbeck in combination with Magid does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitations in independent claim 11.)

277. In conclusion, because not all the limitations of independent claims 1 and 11 are disclosed, taught, or suggested by Abelbeck in combination with Magid, it is my opinion that Abelbeck in combination with Magid does not render independent claims 1 and 11 obvious under 35 U.S.C. § 103.

[36] Magid at col. 5, lines 19-27.

2. Dependent claims 6 and 12 of the '580 patent are not obvious based on Abelbeck in combination with Magid

278. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

279. As I explained above, the combination of Abelbeck and Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

280. Further, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Abelbeck and Magid does not render independent claims 1 and 11 obvious. Therefore, the combination of Abelbeck and Magid cannot render dependent claims 6 and 12 obvious.

281. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

282. Therefore, it is my opinion that the combination of Abelbeck and Magid does not render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

3. Independent claim 25 of the '580 patent is not obvious based on Abelbeck in combination with Magid

283. It is my opinion that combination of Abelbeck and Magid does not render independent claim 25 of the '580 patent as obvious.

284. As explained above, Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

285. For the reasons set forth above, Abelbeck adds nothing to this disclosure of Magid.

286. As such, it is my opinion that the combination of Abelbeck and Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

287. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Magid and Abelbeck, it is my opinion that the combination of Magid and Abelbeck does not render independent claim 25 obvious.

4. Dependent claims 4, 5, 10, and 18 of the '580 patent are not obvious based on Abelbeck in combination with Magid

288. Claims 4, 5, and 10 depend from independent claim 1. Claim 18 depends from independent claim 11. As dependent claims, each of claims 4, 5, 10, and 18 include all of the limitations from the claim or claims from which they depend.

289. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18 with respect to the combination of the Schönenberger and Magid. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

290. Because the combination of Abelbeck and Magid does not render independent claims 1 and 11 as obvious, the combination of Abelbeck and Magid cannot therefore render dependent claims 4, 5, 10, and 18 of the '580 patent as obvious either.

5. Lack of motivation to combine

291. In addition to the reasons I provided above that show a PHOSITA would not combine Magid with Abelbeck, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Magid or Abelbeck in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Abelbeck and Magid, in the above section, I have provided reasons why a PHOSITA would not combine these references.

G. Eschenbach in combination with Magid does not render obvious claims 1, 4-6, 10-12, 14, 18, and 25 of the '580 patent under 35 U.S.C. § 103

292. Dr. Giachetti opines that Eschenbach in combination with Magid render claims 1, 4-6, 10, 11, 12, 14, 18, and 25 of the '580 patent as obvious under 35 U.S.C. § 103. I disagree.

293. I also understand that Eschenbach (like Magid) was considered during prosecution of the patent application that matured into the '580 patent. Further, Eschenbach is prior art to the claims of the '580 patent.

294. For the reasons set forth below, it is my opinion that Abelbeck in combination with Magid does not render claims 1, 4-6, 10-12, 14, 18, and 25 of the '580 patent as obvious under 35 U.S.C. § 103.

1. Independent claims 1 and 11 of the '580 patent are not obvious based on Eschenbach in combination with Magid

295. Each of independent claims 1 and 11 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1); and

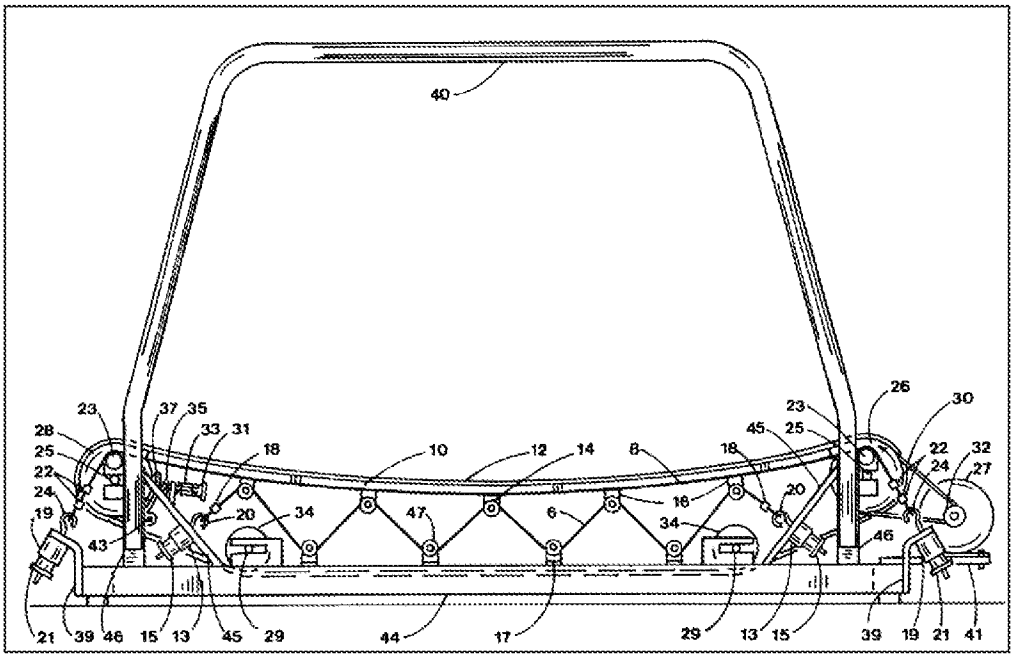
- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in claim 11.

296. As I described above, Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent

rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

297. Eschenbach adds nothing to the disclosure of Magid in relation to these missing elements. Eschenbach shows a running belt (12) supported by a deck (10).



The "[d]eck (10) is supported by first cable pair 8 that are in slidable contact with curved support surfaces (23) and attached at the cable ends to eyebolts (24) by cable clamps (22). ... Rotation of knobs (21) change the cable (8) length between the curved support surfaces (23) to vary deck (10) curvature."[37]

298. Eschenbach does not disclose any device, system, or component that could be considered analogous to the "safety device" in claim 1 let alone any device, system, or feature configured to enable the running belt (12) to rotate in only one rotational direction.

[37] Eschenbach at col. 5, lines 1-10.

299. Additionally and as disclosed in Eschenbach, a motor (27) is used to drive the belt (12). Eschenbach does not appear to disclose that the treadmill could exclude a motor (*i.e.*, be manually operated or powered). This is significant because it is expected that the motor (27) will exert a holding torque on the roller (26) when the motor 27 is not in use. If the roller (26) is held stationary, then the belt (12) cannot rotate in either an intended or in an unintended direction. Thus, rotation of the treadmill belt in an unintended direction is not relevant to the treadmill of Eschenbach.

300. As a result, a PHOSITA reading Eschenbach would i) not be aware of potentially undesirable and unexpected treadmill belt movement on a treadmill with a curved running surface, and ii) not be made aware of a possible solution for addressing this potentially unwanted characteristic.

301. Therefore, Eschenbach does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. As such, Eschenbach adds nothing to the disclosure of Magid.

302. Finally and for similar reasons as I explained above with respect to Socwell and Magid, a PHOSITA would not combine the teachings of Eschenbach and Magid because i) Magid focuses on a two-belt treadmill and teaches away from using a single belt treadmill like in Eschenbach, and ii) the treadmill of Magid is specifically intended for therapeutic use by "people with uncoordinated feet movements, such as small children, physically handicapped people and

old people"[38] such that implementation of a curved or non-planar running surface would be difficult for therapeutic use, which teaches away from implementing a curved or non-planar running surface (such as in Eschenbach) with the treadmill of Magid.

303. Additionally, I note that Dr. Giachetti does not appear to have provided any reasons for combining the teachings of Eschenbach with Magid.

304. In sum, it is my opinion that Eschenbach in combination with Magid does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitation in independent claim 11.)

305. Each of independent claims 1 and 11 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1); and

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt ... at least partially supported by the first bearing rail and the second bearing rail (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my

[38] Magid at col. 1, lines 30-35 and at col. 5, lines 52-55.

remarks and analysis for this limitation is equally applicable for the similar limitation in claim 11.

306. As explained above, it is my opinion that Magid does not expressly or inherently disclose "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1.

307. Eschenbach adds nothing to the disclosure of Magid in relation to these missing elements. Dr. Giachetti states that "Eschenbach discloses at least one bearing rail (described as flexible linking) having a plurality of bearings (described as idlers), a running belt (described as an endless belt 12) supported by the bearing rail and at least partially disposed about the front and rear shafts."[39] I disagree.

308. As shown in the Figure of Eschenbach above, Eschenbach does **not** show "bearings" or any other device that may considered analogous to "bearings" that support the running belt (12). Rather, the running belt (12) is supported by a predominately flat structure – the deck (10). Therefore, the disclosure of Eschenbach adds nothing to that of the disclosure of Magid in relation to the missing elements.

309. Accordingly, it is my opinion that the combination of Magid and Eschenbach does not disclose, teach, or suggest "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. (*See also* the similar limitation in independent claim 11.)

[39] Opening Giachetti Report at paragraph 128.

310. In conclusion, because not all the limitations of independent claims 1 and 11 are disclosed, taught, or suggested by Eschenbach in combination with Magid, it is my opinion that Eschenbach in combination with Magid does not render independent claims 1 and 11 obvious under 35 U.S.C. § 103.

2. Dependent claims 4-5 and 18 of the '580 patent are not obvious based on Eschenbach in combination with Magid

311. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft," dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18 recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

312. As explained above, it is my opinion that the combination of Eschenbach and Magid does not render the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" in independent claim 1 as obvious. (*See also* the similar limitations in independent claim 11.)

313. Because dependent claims 4-5 require the limitations of independent claim 1 and because the combination of Eschenbach and Magid does not render independent claim 1 obvious, the combination of Eschenbach and Magid cannot therefore render the further narrowing limitations of dependent claims 4-5 as obvious. Because dependent claim 18 requires the

limitations of independent claim 11 and because the combination of Eschenbach and Magid does not render independent claim 11 obvious, the combination of Eschenbach and Magid cannot therefore render the further narrowing limitations of dependent claim 18 as obvious.

314. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18 with respect to the combination of Eschenbach and Magid. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

315. Therefore, it is my opinion that the combination of Eschenbach and Magid does not render the following limitations of "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18 as obvious.

3. Dependent claims 6 and 12 of the '580 patent are not obvious based on Eschenbach in combination with Magid

316. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below)to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

317. As I explained above, the combination of Eschenbach and Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

318. Further, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Eschenbach and Magid does not render independent claims 1 and 11 obvious. Therefore, the combination of Eschenbach and Magid cannot render dependent claims 6 and 12 obvious.

319. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

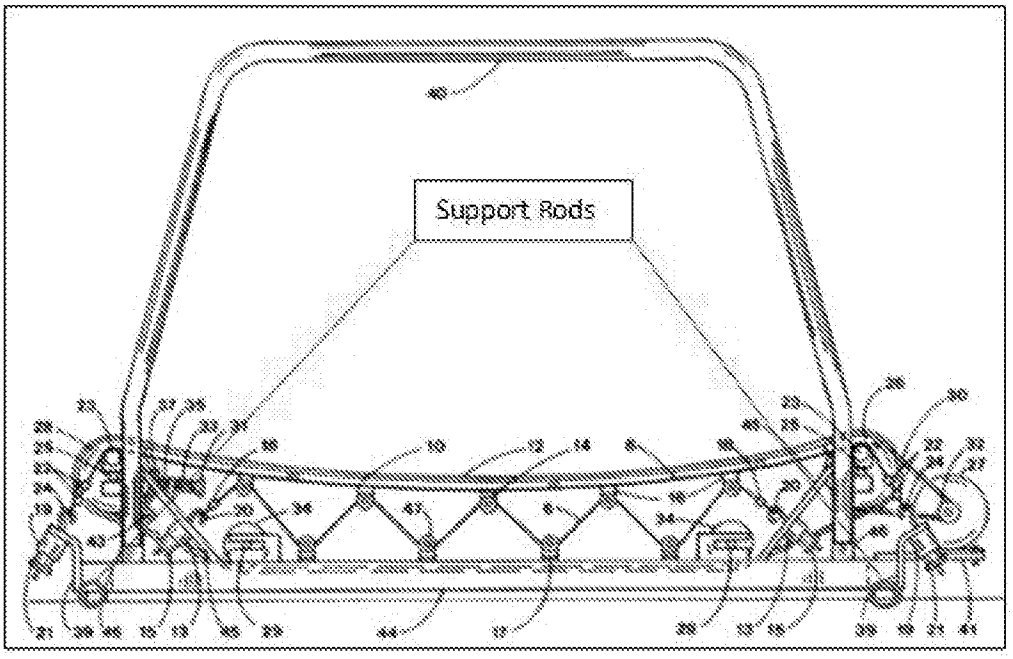
320. Therefore, it is my opinion that the combination of Eschenbach and Magid does not render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

4. Dependent claim 14 of the '580 patent is not obvious based on Eschenbach in combination with Magid

321. It is my opinion that Eschenbach in combination with Magid does not disclose, teach, suggest, or otherwise render obvious at least the limitation of "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 14.

322. As explained above, Magid does not expressly or inherently disclose "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" as in claim 14.

323. Eschenbach adds nothing to the disclosure of Magid in relation to the missing elements. Eschenbach discloses rods (circled) that support the treadmill.



Even analogizing those support rods to the "support feet" of claim 14, Eschenbach does not disclose that these support rods are movable. In this respect, there is no disclosure in Eschenbach regarding how these support rods would move.

324. Therefore, because all of the elements of claim 14 and the limitations included in independent claim 11 are not taught or suggested by the combination of Magid and Eschenbach and for the reasons set forth above, it is my opinion that Eschenbach in combination with Magid does not render obvious "support feet coupled to the frame, wherein the support feet are vertically adjustable to adjust an incline of the manually powered treadmill relative to the ground surface" of claim 14.

5. Independent claim 25 of the '580 patent is not obvious based on Eschenbach in combination with Magid

325. It is my opinion that combination of Eschenbach and Magid does not render independent claim 25 of the '580 patent as obvious.

326. It is my opinion that Eschenbach in combination with Magid does not disclose, teach, or suggest a "running belt [that] follows a top curved running surface" and "permitting movement of the running belt in a first direction" and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

327. As explained above, Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

328. For the reasons set forth above, Eschenbach adds nothing to the disclosure of Magid in relation to the missing elements.

329. As such, it is my opinion that the combination of Eschenbach and Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

330. For the reasons set forth above, it is also my opinion that Eschenbach in combination with Magid does not disclose, teach, suggest, or otherwise render obvious at least the limitations of "providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile" and "disposing a running

belt on the plurality of bearings of the first bearing rail and the second bearing rail" of independent claim 25.

331. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Magid and Eschenbach, it is my opinion that the combination of Magid and Eschenbach does not render independent claim 25 obvious.

6. Dependent claim 10 of the '580 patent is not obvious based on Eschenbach in combination with Magid

332. Claim 10 depends from independent claim 1. As a dependent claim, claim 10 includes all of the limitations from the claim or claims from which they depend. Because the combination of Eschenbach and Magid does not render independent claim 1 as obvious, the combination of Eschenbach and Magid cannot therefore render dependent claim 10 of the '580 patent as obvious either.

7. Lack of motivation to combine

333. In addition to the reasons I provided above that show a PHOSITA would not combine Magid with Eschenbach, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Magid or Eschenbach in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Eschenbach and Magid, in the above section, I have provided reasons why a PHOSITA would not combine these references.

H. Schmidt does not anticipate or render obvious claims 1, 4-6, 10-12, 14, 18, and 25 of the '580 patent under 35 U.S.C. §§ 102 & 103

334. Dr. Giachetti opines that Schmidt anticipates claims 1, 4-6, 10, 11, 12, 14, 18, and 25 under 35 U.S.C. § 102 of the '580 patent. I disagree.

335. I understand that Schmidt was considered during prosecution of the patent application that matured into the '580 patent. Further, Schmidt is prior art to the claims of the '580 patent.

336. Additionally, I understand that this reference was not disclosed in either of Chapco and Samsara's preliminary or supplemental invalidity contentions. As such, I did not have the benefit of referencing those contentions to better understand what their position was prior to reading Dr. Giachetti's report.

337. For the reasons set forth below, it is my opinion that Schmidt does not render claims 1, 4-6, 10-12, 14, 18, and 25 of the '580 patent as obvious under 35 U.S.C. § 103 or anticipated under 35 U.S.C. § 102.

1. Independent claims 1 and 11 of the '580 patent are not anticipated or obvious based on Schmidt

338. Each of independent claims 1 and 11 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1); and

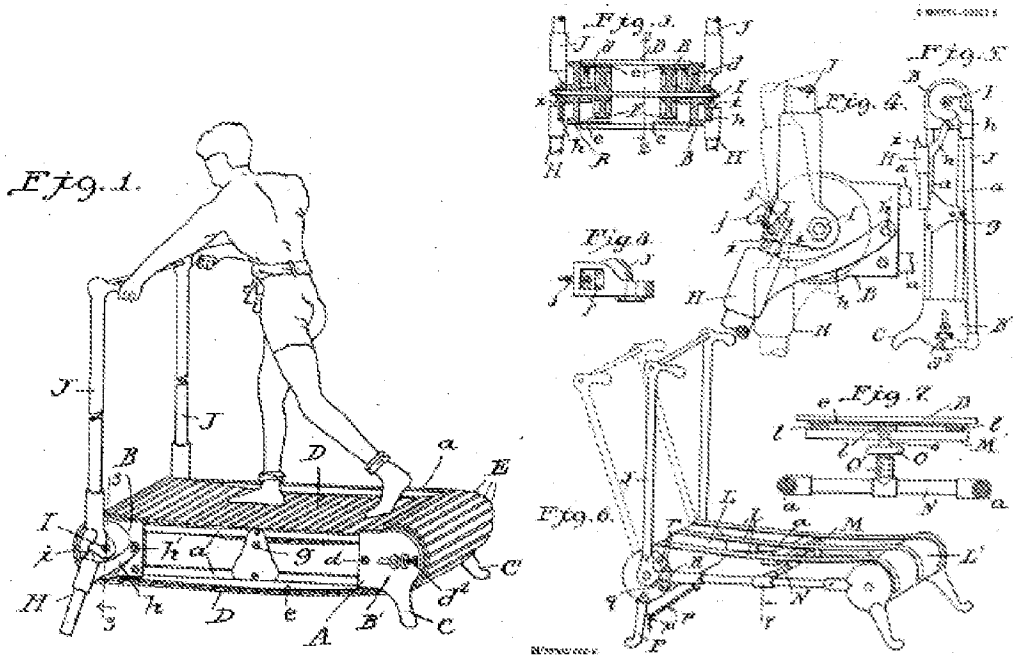
- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my

remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in claim 11.

339. Schmidt does not expressly or inherently disclose "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

340. Schmidt discloses a health exerciser having a frame (A), end members (B) and (B'), struts or side members (a), rollers (F) and (F'), and a flexible tread (D) with rods (d) that are "provided for properly supporting ... [the user's] weight."[40]



341. Schmidt does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the belt (D) of the treadmill of Schmidt is free to rotate in an intended direction and an unintended direction.

[40] Schmidt, p. 2, col. 1, lines 33-35.

342. To the extent Schmidt discloses a curved running belt (D) surface, Schmidt appears to fail to recognize that i) users tend to mount a treadmill from the rear, and ii) that there is an increased chance of unexpected running belt rotation in a reverse direction (*i.e.*, a belt rotation direction that is opposite to that of the normal operating direction of rotation, which would result from walking in the forward direction). In contrast, claim 1 explicitly requires "a safety device coupled to at least one of the front shaft and the rear shaft, **wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction**" (emphasis added).

343. That said, Schmidt does appear to recognize the need for safety in a treadmill. In this regard, Schmidt discloses the following:

> When the flexible tread is laid over the frame, it will engage with rolls F F', but will sag at the after part of the apparatus just forwardly of rolls F. This construction is preferable for the reason that, when the operator is exercising on the device, he cannot slip off the back of the apparatus.[41]

Accordingly, Schmidt like Cutter (as described above) is focused on keeping a user on the treadmill during usage of the treadmill.

344. Thus, to the extent that Schmidt discloses safety as being of a concern for users of a treadmill, Schmidt does not disclose any device or safety mechanism for restricting rotation of the treadmill belt and the resulting movement of the running surface to only the intended direction. Further, the disclosed problem of Schmidt is towards keeping a user on a treadmill and not addressing a potential safety issue when the user **mounts** the treadmill.

[41] Schmidt at col. 4, lines 96-102.

345. Dr. Giachetti states that "Schmidt also discloses a device to ensure unidirectional movement in that the reference explicitly teaches an option for freely rotating or stationary front and rear shafts as desired."[42] I disagree.

346. Simply, Schmidt does not disclose a device to ensure unidirectional movement of the treadmill belt (D). While Schmidt discloses that the "rolls [F and F'] may be either stationary or rotatable,"[43] Schmidt also discloses that "the invention embodies a framework on which is mounted suitable friction means over which an **endless flexible tread is adapted to glide**" (emphasis added).[44] Thus, the belt (D) will "glide" over the rolls (F) and (F') when they are stationary. The rolls (F) and (F') have nothing to do with constraining the direction of rotation of the belt (D) to only one direction.

347. In sum, Schmidt does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitation in independent claim 11.)

348. Each of independent claims 1 and 11 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1); and

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the

[42] Opening Giachetti Report at paragraph 134; *see* paragraph 138.
[43] Schmidt at col. 2, line 74.
[44] *Id.* at col. 2, lines 60-63.

> second bearing rail attached to a right side of the frame," and "a running belt ... at least partially supported by the first bearing rail and the second bearing rail (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation is equally applicable for the similar limitation in claim 11.

349. With reference to Figure 6 of Schmidt above, Schmidt does not disclose any assembly that could be considered analogous to a "bearing rail." This Court's construction of "bearing rail" includes a "rail with **bearings**" (emphasis added). However, in Dr. Giachetti's Expert Report, he analogizes the claimed "bearings" to the support rods (d) of Schmidt. Contrary to Dr. Giachetti's assertion, no PHOSITA would consider a rod to be equivalent to a bearing. A rod introduces friction and does not limit friction, like a bearing. Bearings relate to rotation.

350. Dr. Giachetti concludes that "[t]ogether with the curved running surface, Schmidt could have used pre-existing art and incorporated wheels or bearings into the rails (d) of the Schmidt device because this method was well known and understood."[45] However, Dr. Giachetti provides no support for this conclusion. Dr. Giachetti goes on to state that "even before Schmidt, several teachings disclosed running belts, lateral slats and an endless belt mechanism to ensure running belt tracking,"[46] but states no motivation as to why a PHOSITA would modify the rails (d) of Schmidt to include the bearings or rollers.

[45] Opening Giachetti Report at paragraph 117.
[46] *Id.*

351. However, there is not any reason to modify the treadmill of Schmidt in the manner as suggested by Dr. Giachetti. Firstly, nowhere does Schmidt disclose such a modification. Secondly, including an additional component, such as a bearing, to the rods (d) would add more expense to the treadmill of Schmidt and make the treadmill more complicated. And finally, there simply isn't any reason to make this modification without using impermissible hindsight reasoning based on the '580 patent.

352. It appears that Dr. Giachetti is misinterpreting the term "bearing rail" in contrast to this Court's claim construction ruling. This Court ruled that the term bearing rail should be construed as a rail with bearings whose top profile corresponds to the shape of the running surface. Dr. Giachetti states that: "As the Court noted and in accordance with ordinary power transmission technology, component (d), as described in Schmidt, provides a similar friction and wear reduction function taught as part of Bayerlein."[47] Thus, Dr. Giachetti is introducing limitations/characterizations into the definition of the term "bearing rail" (*e.g.*, a friction component) that are not found in this Court's definition.

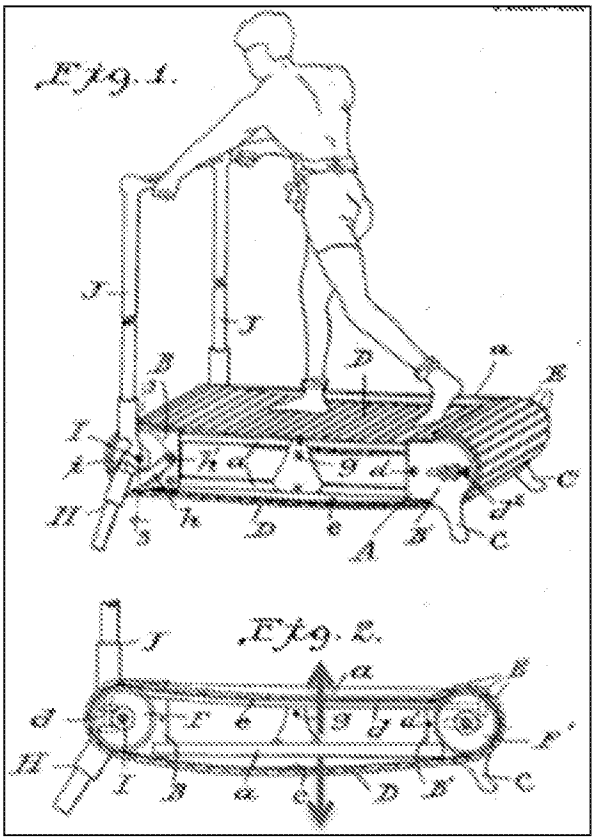
353. Accordingly, it is my opinion Schmidt does not disclose, teach, or suggest "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. (*See also* the similar limitation in independent claim 11.)

354. As an aside, in Dr. Giachetti's Expert Report, he repeatedly concludes that the "curved running surface's profile [of Schmidt] is enforced by the weight of the belt, the action of

[47] Opening Giachetti Report at paragraph 119.

gravity and intentional slack in the running belt,"[48] however, there appears to be a flaw in Dr. Giachetti's analysis.

355. While Schmidt discloses that it "is desirable ... to have the tread surface longitudinally concave,"[49] Schmidt does not appear to describe how the concave running surface is created or maintained. For example, Schmidt simply discloses that the tread (D) is laid upon the rods (d). However, gravity will act on the lower part of the tread (D) (*see* the annotations in Figure 2 of Schmidt below) to pull the tread (D) downward and the upper part of the tread (that a user runs on) upward.



Thus, the running surface tread (D) will be substantially planar between the rollers (F) and (F'). In use, the user's foot will push the impact point and potentially the surrounding area of the tread (D) downward until that portion of the tread (D) impacts the rods (d). As such, the rods (d) serve

[48] *Id.* at paragraph 49, 113-116 and Figure 7.
[49] Schmidt at col. 2, lines 118-121.

as a maximum allowed lowest depression point for the tread (D) during use. However, there is no teaching in Schmidt that the running surface tread (D) will assume a curved configuration in the absence of the weight of the user standing on the tread (D). In fact, depending upon the relative weight of the tread (D) assembly, it is quite possible that in the absence of the weight of the user, the weight of the tread (D) will cause the top surface of the tread to assume a planar configuration.

356. Based on the foregoing, I disagree with Dr. Giachetti's conclusion that "Schmidt solved the same problem as Woodway claims it solved ..., *i.e.*, inducing the running belt to assume and maintain the non-planar shape."[50]

357. In conclusion, because not all the limitations of independent claims 1 and 11 are disclosed, taught, or suggested by Schmidt, it is my opinion that Schmidt neither renders independent claims 1 and 11 obvious under 35 U.S.C. § 103 nor renders claims 1 and 11 anticipated under 35 U.S.C. § 103.

2. Dependent claims 4-5 and 18 of the '580 patent are not anticipated or obvious based on Schmidt

358. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft," dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18 recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

[50] Opening Giachetti Report at paragraph 113.

359. As explained above, it is my opinion that Schmidt does not anticipate or render the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" in independent claim 1 as obvious. (*See also* the similar limitations in independent claim 11.)

360. Because dependent claims 4-5 require the limitations of independent claim 1 and because the Schmidt does not anticipate or render independent claim 1 obvious, Schmidt cannot therefore anticipate or render the further narrowing limitations of dependent claims 4-5 as obvious. Because dependent claim 18 requires the limitations of independent claim 11 and because the Schmidt does not anticipate or render independent claim 11 obvious, Schmidt cannot therefore render the further narrowing limitations of dependent claim 18 as obvious.

361. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

362. Therefore, it is my opinion Schmidt does not anticipate or render the following limitations of "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18 as obvious.

3. Dependent claims 6 and 12 of the '580 patent are not anticipated or obvious based on Schmidt

363. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

364. As I explained above, Schmidt does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1. Further, Schmidt does not appear to disclose anything that could be considered analogous to a one-way bearing.

365. Moreover, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, Schmidt does not anticipate or render independent claims 1 and 11 obvious. Therefore, Schmidt cannot render dependent claims 6 and 12 obvious.

366. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

367. Therefore, it is my opinion that Schmidt does not anticipate or render obvious .

4. Independent claim 25 of the '580 patent is not anticipated or obvious based on Schmidt

368. It is my opinion that Schmidt does not anticipate or render independent claim 25 of the '580 patent as obvious.

369. For the reasons as set forth above, it is my opinion that Schmidt does not disclose, teach, or suggest a "running belt [that] follows a top curved running surface" and "permitting movement of the running belt in a first direction" and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25. In this regard, the belt (D) of Schmidt is free to move in a rearward direction and in a forward direction. Schmidt does not disclose any device, component, or system that permits the movement of the running belt (D) of Schmidt in only one rotational direction.

370. Also for the reasons set forth above, it is my opinion that Schmidt does not disclose, teach, suggest, or otherwise render obvious at least the limitations of "providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile" and "disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail" of independent claim 25. In this regard, Schmidt does not disclose, teach, or suggest any component that could be considered analogous to the claimed bearing rails.

371. Therefore and because not all the limitations of independent claim 25 are taught or suggested by Schmidt, it is my opinion that Schmidt does not anticipate or render independent claim 25 obvious.

5. Dependent claims 10 and 14 of the '580 patent are not anticipated or obvious based on Schmidt

372. Claim 10 depends from independent claim 1. Claim 14 depends from claim 11. Thus, claim 10 includes all the limitations of claim 1 while claim 14 includes all of the limitations of claim 11. Because Schmidt does not anticipate or render independent claims 1 and 11 as obvious, Schmidt cannot therefore anticipate or render dependent claims 10 and 14 of the '580 patent as obvious either.

I. Schmidt in combination with Ziebell does not anticipate or render obvious claims 1, 4-6, 10, 11, 12, 14, 18, and 25 of the '580 patent under 35 U.S.C. §§ 102 & 103

373. Dr. Giachetti opines that Schmidt in combination with Ziebell renders obvious claims 1, 4-6, 10, 11, 12, 14, 18, and 25 under 35 U.S.C. §§ 102 & 103 of the '580 patent.[51] I disagree.

374. I also understand that Ziebell was not considered during prosecution of the patent application that matured into the '580 patent. However, Ziebell is prior art to the claims of the '580 patent.

375. Additionally, I understand that this combination of references was not disclosed in either of Chapco and Samsara's preliminary or supplemental invalidity contentions. As such, I did not have the benefit of referencing those contentions to better understand what their position was prior to reading Dr. Giachetti's report.

376. For the reasons set forth below, it is my opinion that Schmidt in combination with Ziebell does not render claims 1, 4-6, 10-12, 14, 18, and 25 of the '580 patent as obvious under 35 U.S.C. § 103 or anticipated under 35 U.S.C. §§ 102 and 103.

1. Independent claims 1 and 11 of the '580 patent are not anticipated or obvious based on Schmidt in combination with Ziebell

377. Each of independent claims 1 and 11 recite the following limitations:

[51] *See* Expert Report of Mr. Giachetti at p. 3.

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1); and

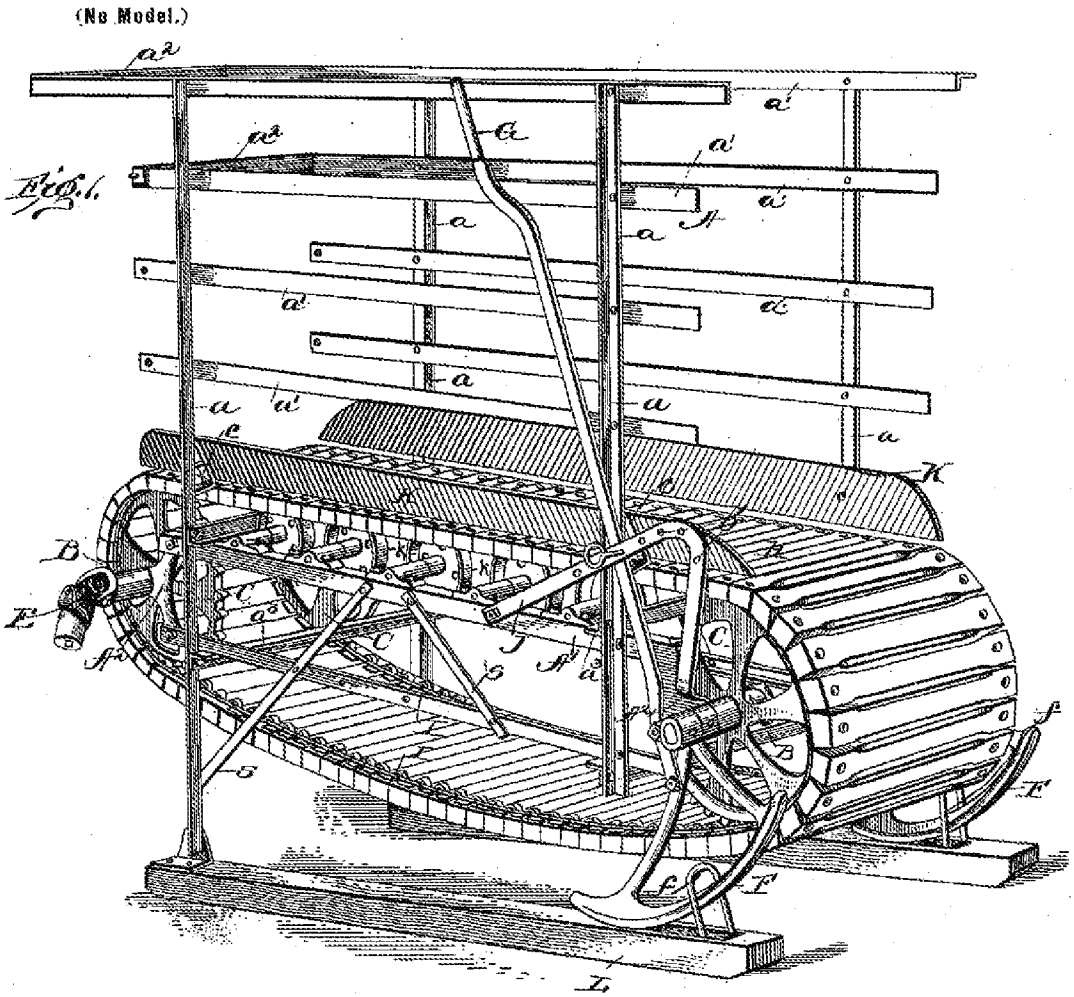
- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in claim 11.

378. As explained above, Schmidt does not expressly or inherently disclose "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

379. Ziebell adds nothing to the disclosure of Schmidt. Ziebell discloses an animal power machine. *See* Figure 1 of Ziebell below. The animal power machine includes a frame (A) and, among other components, an apron (H) that "is practically level on top and hangs loosely at the bottom by means of its own gravity."[52]

[52] Ziebell at col. 4, lines 71-73.



380. Nothing in Ziebell teaches or suggests anything analogous to the claimed "safety device." In this regard, the apron (H) is free to rotate in either direction. Indeed, Dr. Giachetti does not cite to Ziebell in the section of his expert report regarding safety devices.

381. Therefore, neither Schmidt nor Ziebell expressly or inherently disclose "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

382. Nonetheless and additionally, a PHOSITA would not combine the teachings of Ziebell and Schmidt. Ziebell is directed to extracting power (*e.g.*, a rotating shaft) from an

animal (*e.g.*, a horse, etc.). Schmidt is directed to a treadmill for use by a human. Power extraction and treadmills are two disparate fields. Further, a problem addressed by Ziebell is to provide a "neat, light, and very efficient animal power" as well as an animal power that "can be raised or lowered at the rear to end to accommodate the weight of the animal."[53] In contrast, a problem addressed by Schmidt is keeping a user on the treadmill during usage of the treadmill. Thus, Ziebell is directed to a different problem than Schmidt and is from a different field than Schmidt. Thus, I see no motivation to combine the teachings of Ziebell and Schmidt.

383. Additionally, Ziebell appears to be non-analogous art to the claims of the '580 patent (and the '169 patent). It is my understanding that a reference under 35 U.S.C. § 103 must be analogous prior art to the claimed invention, and a reference is analogous prior art if: (1) the reference is from the same field of endeavor as the claimed invention, or (2) the reference is reasonably pertinent to the problem faced by the inventor.

384. The field of the '580 and '169 patents is treadmills for human use. A focus of at least some of the claims of '580 and '169 patents is on a safety device for a manual powered treadmill having a curved running surface. A problem addressed by these patents is how to provide safety to a user as he/she mounts the treadmill. Ziebell is neither related to the field of the '580 and '169 patents (Animal Power Extraction vs. Treadmills for Human Use) nor reasonably pertinent to a problem addressed by the '580 and '169 patents (a neat animal power that can be raised or lowered at the rear end vs. providing safety to a user as he/she mounts the treadmill).

385. Therefore, it is my opinion that i) Ziebell is non-analogous art to the '580 and '169 patents, and ii) a PHOSITA would not be motivated to combine the teachings of Ziebell and Schmidt. In this regard, I also note that Dr. Giachetti has neither provided any evidence or

[53] *See* Ziebell at col. 1, lines 20-21 and 22-23.

reasons as to why Ziebell is analogous art to the '580 and '169 patents nor why there would be a motivation to combine the teachings of Ziebell with Schmidt.

386. In sum, it is my opinion that Ziebell in combination with Schmidt does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitation in independent claim 11.)

387. Each of independent claims 1 and 11 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1); and

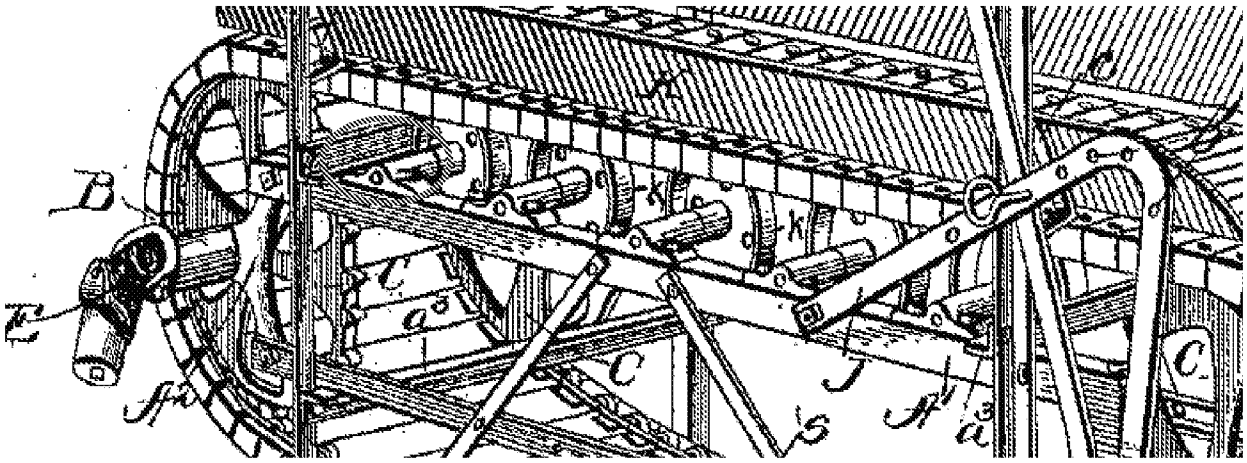
- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt ... at least partially supported by the first bearing rail and the second bearing rail (claim 11).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation is equally applicable for the similar limitation in claim 11.

388. As explained above, it is my opinion that Schmidt does not expressly or inherently disclose "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the

second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1.

389. Ziebell adds nothing to the disclosure of Schmidt. With reference to a zoomed-in Figure 1 of Ziebell below, Ziebell discloses "[o]n the top bar of the auxiliary frame A' are suitable bearings, in which are mounted a series of antifriction rolls k, on which the apron rests, and is maintained on top in a substantially horizontal position."[54]



390. Based on this disclosure, Dr. Giachetti concludes that "Ziebell discloses (in claim 4) at least one bearing rail (identified as an auxiliary frame [A'] mounted and maintained "upon said main frame or support [A]") having a plurality of bearings (described as sprockets or bearing wheels k), a running belt supported by the bearing rail and at least partially disposed about the front and rear shafts (B)."[55]

391. I understand that above-quoted disclosure of Ziebell in combination with the remaining disclosure of Ziebell to mean bearings are located on the top bar of the frame A' (circled in the picture above). Dr. Giachetti appears to equate claimed "bearings" to the rollers k. However, I interpret the rollers k to be a wheel with a shaft that is inserted and supported by the

[54] Ziebell at col. 3, lines 10-14.
[55] Opening Giachetti Report at paragraph 126.

feature circled above. In this regard, the tread is supported by the wheels and **not** the bearings. Therefore, I disagree that this interpretation of Dr. Giachetti meets the claim language.

392. Moving to my interpretation of Ziebell, I suspect the circled portion in zoomed in Figure 1 above to be the "bearings". The outside surface of the bearing is enclosed in the housing of the circled portion. If the tread were placed on these bearings, the fact that the outside surface of the bearing is enclosed in the housing will require the tread to ride on the outside surface of the housing, resulting in high friction hindering the ability of the tread to move thereby rendering the device unsuitable for its intended purpose.

393. Accordingly, it is my opinion the combination of Schmidt and Ziebell does not disclose, teach, or suggest "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. (*See also* the similar limitation in independent claim 11.)

394. In conclusion, because not all the limitations of independent claims 1 and 11 are disclosed, taught, or suggested by the combination of Schmidt and Ziebell, it is my opinion that the combination of Schmidt and Ziebell neither renders independent claims 1 and 11 obvious under 35 U.S.C. § 103 nor renders claims 1 and 11 anticipated under 35 U.S.C. § 102.

2. Dependent claims 4-5 and 18 of the '580 patent are not anticipated or obvious based on Schmidt in combination with Ziebell

395. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft,"

dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18 recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

396. As explained above, it is my opinion that the combination of Schmidt and Ziebell does not anticipate or render the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" in independent claim 1 as obvious. (*See also* the similar limitations in independent claim 11.)

397. Because dependent claims 4-5 require the limitations of independent claim 1 and because the combination of Schmidt and Ziebell does not anticipate or render independent claim 1 obvious, the combination of Schmidt and Ziebell cannot therefore anticipate or render the further narrowing limitations of dependent claims 4-5 as obvious. Because dependent claim 18 requires the limitations of independent claim 11 and because the combination of Schmidt and Ziebell does not anticipate or render independent claim 11 obvious, the combination of Schmidt and Ziebell cannot therefore render the further narrowing limitations of dependent claim 18 as obvious.

398. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

399. Therefore, it is my opinion that the combination of Schmidt and Ziebell does not anticipate or render the following limitations of "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18 as obvious.

3. Dependent claims 6 and 12 of the '580 patent are not anticipated or obvious based on Schmidt in combination with Ziebell

400. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

401. As I explained above, the combination of Schmidt and Ziebell does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1. Further, neither Schmidt nor Ziebell appears to disclose anything that could be considered analogous to a one-way bearing.

402. Moreover, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Schmidt and Ziebell does not anticipate or

render independent claims 1 and 11 obvious. Therefore, the combination of Schmidt and Ziebell cannot anticipate or render dependent claims 6 and 12 obvious.

403. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

404. Therefore, it is my opinion that the combination of Schmidt and Ziebell does not anticipate or render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

4. Independent claim 25 of the '580 patent is not anticipated or obvious based on Schmidt in combination with Ziebell

405. It is my opinion that the combination of Schmidt and Ziebell does not anticipate or render independent claim 25 of the '580 patent as obvious.

406. For the reasons as set forth above, it is my opinion that the combination of Schmidt and Ziebell does not disclose, teach, or suggest a "running belt [that] follows a top curved running surface" and "permitting movement of the running belt in a first direction" and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25. In this regard, the belt (D) of Schmidt is free to move in a rearward direction and in a forward direction. Schmidt does not disclose any device, component, or system that permits the movement of the running belt (D) of Schmidt in only one rotational direction. In this regard, the belt of Schmidt and Ziebell is free to move in both an intended and an unintended direction.

407. Also for the reasons set forth above, it is my opinion that the combination of Schmidt and Ziebell does not disclose, teach, suggest, or otherwise render obvious at least the

limitations of "providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile" and "disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail" of independent claim 25.

408. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Schmidt and Ziebell, it is my opinion that the combination of Schmidt and Ziebell does not anticipate or render independent claim 25 obvious.

5. Dependent claims 10 and 14 of the '580 patent are not anticipated or obvious based on Schmidt in combination with Ziebell

409. Claim 10 depends from independent claim 1. Claim 14 depends from claim 11. Thus, claim 10 includes all the limitations of claim 1 while claim 14 includes all of the limitations of claim 11. Because the combination of Schmidt and Ziebell does not anticipate or render independent claims 1 and 11 as obvious, the combination of Schmidt and Ziebell cannot therefore anticipate or render dependent claims 10 and 14 of the '580 patent as obvious either.

6. Lack of motivation to combine

410. In addition to the reasons I provided above that show a PHOSITA would not combine Schmidt with Ziebell, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Schmidt and Ziebell, in the above section, I have provided reasons why a PHOSITA would not combine these references.

J. Chickering in combination with Magid does not render obvious claims 1, 4-6, 10-14, 18, 19, and 25 of the '580 patent under 35 U.S.C. § 103

411. Dr. Giachetti opines that Chickering in combination with Magid render claims 1, 4-6, 10-14, 18, 19, and 25 of the '580 patent as obvious under 35 U.S.C. § 103. I disagree.

412. I understand that Chickering (like Magid) was considered during prosecution of the patent application that matured into the '580 patent. Further, Chickering is prior art to the claims of the '580 patent.

413. Additionally, I understand that this combination of references was not disclosed in either of Chapco and Samsara's preliminary or supplemental invalidity contentions. As such, I did not have the benefit of referencing those contentions to better understand what their position was prior to reading Dr. Giachetti's report.

414. For the reasons set forth below, it is my opinion that Chickering in combination with Magid does not render claims 1, 4-6, 10-14, 18, 19, and 25 of the '580 patent as obvious under 35 U.S.C. § 103.

1. Independent claims 1, 11, and 19 of the '580 patent are not obvious based on Chickering in combination with Magid

415. Each of independent claims 1, 11, and 19 recite the following limitations:

- a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 1);

- a "running belt [that] follows a curved running surface" and "a safety device for substantially preventing rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" (claim 11); and

- a "running belt [that] follows a curved running surface" and "safety device coupled to the frame and operatively coupled to the running belt, wherein the safety device is structured to substantially prevent movement of the running belt in a first direction and permit movement of the running belt in a second direction opposite the first direction" (claim 19).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the above-quoted similar limitation recited in each of claims 11 and 19.

416. As I described above, Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1.

417. Chickering adds nothing to the disclosure of Magid in regards to the missing elements. Chickering discloses a treadmill having a base (10) where a single endless belt (28) forms both an accelerating and a decelerating area. Rollers (29) are provided in the base (10) such that "when the endless belt 28 is placed about the rollers, it follows their contour and provides a forward accelerating area and a rear decelerating area."[56]

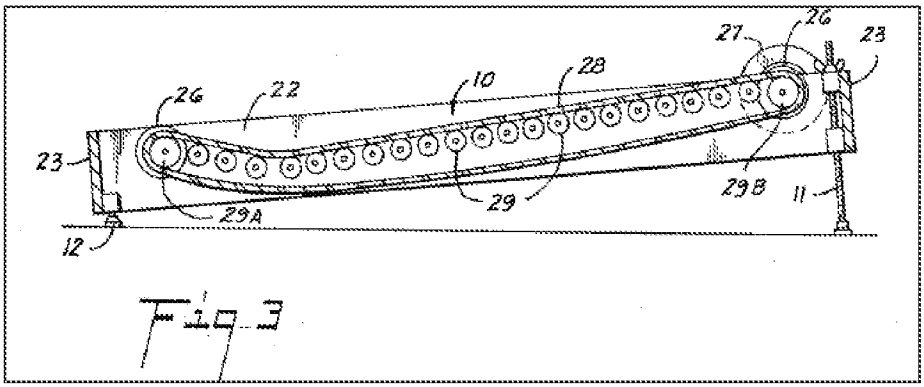


Fig. 3

[56] Chickering at col. 3, lines 6-9.

418. Chickering does not disclose any device, system, or component that could be considered analogous to the "safety device" in claim 1 let alone any device, system, or feature configured to enable the running belt (28) to rotate in only one rotational direction. To the extent Chickering discloses a curved running belt (28) surface, Chickering appears to fail to recognize that i) users tend to mount a treadmill from the rear (*i.e.*, at or near the area where reference number (22) is placed in Figure 3 of Chickering above), and ii) that there is an increased chance of unexpected running belt rotation in a reverse direction (*i.e.*, a belt rotation direction that is opposite to that of the normal operating direction, which would be the forward direction).

419. As a result, a PHOSITA reading Chickering would i) not be aware of potentially undesirable and unexpected running belt rotation on a treadmill with a curved running surface, and ii) not be made aware of any possible solutions for addressing this potentially unwanted characteristic.

420. That said, Chickering does appear to recognize the need for safety in a treadmill. In this regard, Chickering discloses the following:

> This invention relates to a new type of treadmill exercising device, and more particularly to an exercising device on which the user can simulate the acts of walking, jogging and running without relying on handles, belts or other external supports for maintaining his balance.[57]

As a solution, Chickering points to the two inclined portions of the treadmill shown in Figure 3 of Chickering above. "These combined decelerating and forward force-supporting characteristics of surface 25a enable a user of the device to both overcome the rearward motion and momentum imparted to his body during the first part of each step, and also to gain enough forward push to maintain his balance and position."[58]

[57] Chickering at col. 1, lines 3-7.
[58] Chickering at col. 2, lines 67-72.

421. Accordingly, Chickering, like Schmidt and Cutter (as described above), is focused on keeping a user on the treadmill during usage of the treadmill.

422. As such, to the extent that Chickering discloses safety as being of a concern for users of a treadmill, Chickering does not disclose any device or safety mechanism for restricting rotation/movement of the running belt to only the intended direction. Further, the disclosed problem of Chickering is towards keeping a user on a treadmill and not addressing a potential safety issue when the user **mounts** the treadmill.

423. Therefore, Chickering does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. As such, Chickering adds nothing to the disclosure of Magid.

424. Finally and for similar reasons as I explained above with respect to Socwell and Magid, a PHOSITA would not combine the teachings of Chickering and Magid because i) Magid focuses on a two-belt therapeutic treadmill and teaches away from using a single belt treadmill like in Chickering, and ii) the therapeutic treadmill of Magid is specifically intended for use by "people with uncoordinated feet movements, such as small children, physically handicapped people and old people."[59] Implementation of a curved or non-planar running surface would be inappropriate for therapeutic purposes and thus, teaches away from implementing a curved or non-planar running surface (such as in Chickering) with the treadmill of Magid. Additionally, I

[59] Magid at col. 1, lines 30-35 and at col. 5, lines 52-55.

note that Dr. Giachetti does not appear to have provided any reasons for combining the teachings of Chickering with Magid.

425. In sum, it is my opinion that Chickering in combination with Magid does not disclose, teach, or suggest a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

426. Each of independent claims 1, 11, and 19 recite the following limitations:

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" (claim 1);

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt ... at least partially supported by the first bearing rail and the second bearing rail" (claim 11); and

- "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first and second bearing rails" (claim 19).

A person having ordinary skill in the art would consider these limitations (for the purposes of the issues discussed below) to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 1 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitations recited in each of independent claims 11 and 19.

427. As explained above, it is my opinion that Magid does not expressly or inherently disclose "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1.

428. Chickering adds nothing to the disclosure of Magid. Dr. Giachetti states that "Chickering discloses at least one bearing rail (14, shown in Fig. 1 as distinct from the side wall of the frame (22)) having a plurality of bearings (13), a running belt (16, 28) supported by the bearing rail and at least partially disposed about the front and rear shafts (26, 29a, b)."[60] I disagree. Chickering does not disclose a bearing rail.

429. I disagree. Chickering does not disclose a bearing rail.

430. Like in Magid and for the reasons as set forth above, a PHOSITA would readily recognize that the rollers (13) and (18) are conveyor rollers, *see*, *e.g.*, U.S. Pat. Nos. 4,681,215 & 2,768,725 for examples of conveyor rollers. As such, the rollers and other disclosure of Chickering are not analogous to a rail with bearings. Therefore, the disclosure of Chickering adds nothing to that of Magid in relation to these missing elements.

431. Accordingly, it is my opinion that the combination of Magid and Chickering does not disclose, teach, or suggest "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" as in independent claim 1. (*See also* the similar limitations in independent claims 11 and 19.)

[60] Opening Giachetti Report at paragraph 122.

432. It is my opinion that the combination of Chickering and Magid does not disclose, teach, or suggest "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19.

433. Magid shows wheels which are in constant contact with a support surface, *see*, *e.g.*, Figure 7 of Magid below, and a treadmill that does not include wheels, *see*, *e.g.*, Figure 2 of Magid below.

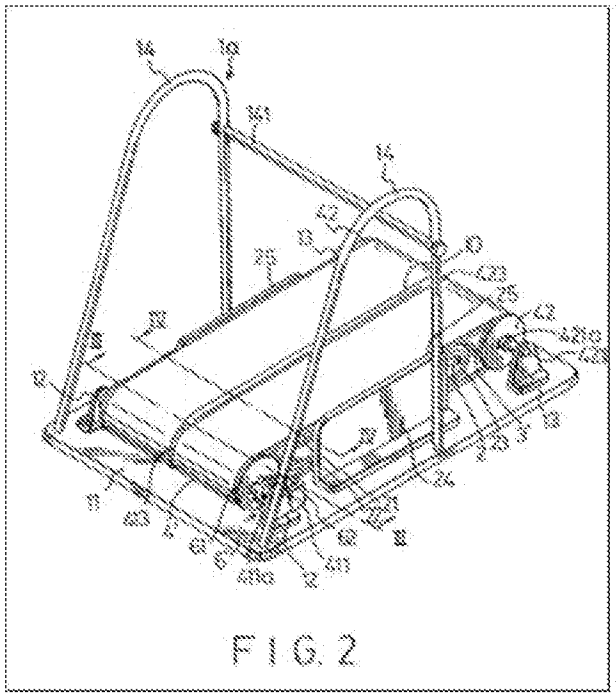


FIG. 2

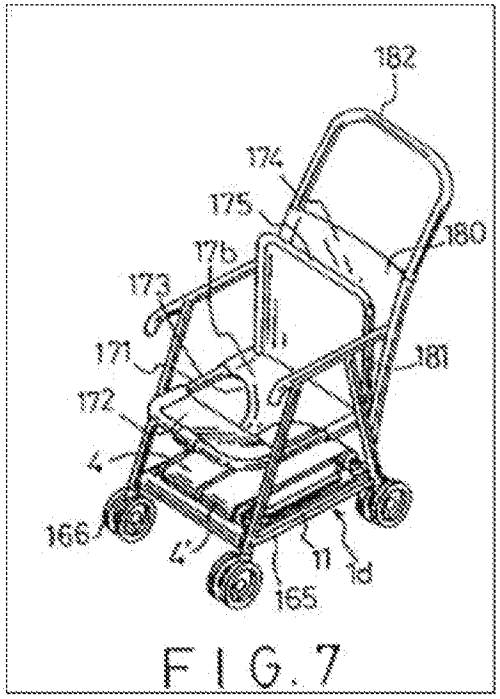
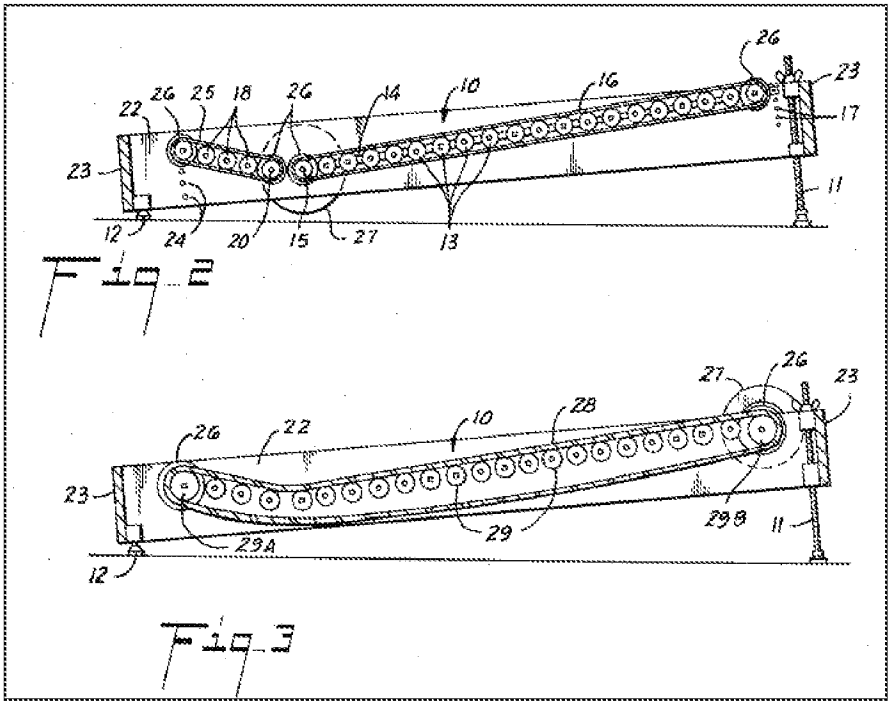


FIG. 7

434. Chickering shows a treadmill that does not include any wheels.



435. First, neither Chickering nor Magid disclose "wheels" that "are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in claim 19. The only disclosed wheels are in Magid and they are always in contact with the ground/support surface.

436. Second, there is not a motivation to modify the combination of Chickering and Magid to include "wheels" that are "re mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" like in claim 19. In this regard, there is not an explicit disclosure of this possibility in either reference. Additionally, if the wheels of Magid were not in constant contact with the ground surface, the device of Magid would lose its sturdiness thereby rendering it unfit for its intended purpose.

437. Thus, it is my opinion that the combination of Chickering and Magid does not disclose, teach, or suggest "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with a ground surface when the manually powered treadmill is in an operating position" as in independent claim 19.

438. In conclusion, because not all the limitations of independent claims 1, 11, and 19 are disclosed, taught, or suggested by the combination of Chickering and Magid, it is my opinion that the combination of Chickering and Magid does not render independent claims 1, 11, and 19 obvious under 35 U.S.C. § 103.

2. Dependent claims 4-5 and 18 of the '580 patent are not obvious based on Chickering in combination with Magid

439. Each of dependent claims 4-5 and 18 of the '580 patent recite narrowing limitations with respect to the first and second bearing rails of independent claims 1 and 11, respectively. In particular, dependent claim 4 recites "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft," dependent claim 5 recites "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface," and dependent claim 18 recites "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft."

440. As explained above, it is my opinion that the combination of Chickering and Magid does not render the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" in independent claim 1 as obvious. (*See also* the similar limitations in independent claim 11.)

441. Because dependent claims 4-5 require the limitations of independent claim 1 and because the combination of Chickering and Magid does not render independent claim 1 obvious, the combination of Chickering and Magid cannot therefore render the further narrowing limitations of dependent claims 4-5 as obvious. Because dependent claim 18 requires the

limitations of independent claim 11 and because the combination of Chickering and Magid does not render independent claim 11 obvious, the combination of Chickering and Magid cannot therefore render the further narrowing limitations of dependent claim 18 as obvious.

442. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 4, 5, or 18. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 4, 5, or 18 are met.

443. Therefore, it is my opinion that the combination of Chickering and Magid does not render the following limitations of "wherein each one of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 4, "wherein each one of the first bearing rail and the second bearing rail define in part a top profile corresponding to the curved running surface" of claim 5, and "wherein each of the first and second bearing rails are attached longitudinally to the frame between the front shaft and the rear shaft" of claim 18 as obvious.

3. Dependent claims 6 and 12 of the '580 patent are not obvious based on Chickering in combination with Magid

444. Each of claims 6 and 12 recite "wherein the safety device includes a one-way bearing." A person having ordinary skill in the art would consider these limitations to recite substantially the same subject matter. While I am going to reference this limitation with respect to claim 6 in this section, it should be understood that my remarks and analysis for this limitation are equally applicable for the similar limitation in claim 12.

445. As I explained above, the combination of Chickering and Magid does not expressly or inherently disclose a "running belt [that] follows a curved running surface" and "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety

device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in claim 1.

446. Moreover, claims 6 and 12 require the limitations of independent claims 1 and 11, respectively. As explained above, the combination of Chickering and Magid does not render independent claims 1 and 11 obvious. Therefore, the combination of Chickering and Magid cannot render dependent claims 6 and 12 obvious.

447. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 6 or 12. Thus, even if all the limitations of the claims on which those claims depend were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claims 6 or 12 are met.

448. Accordingly, it is my opinion that the combination of Chickering and Magid does not render "wherein the safety device includes a one-way bearing" of claims 6 and 12 of the '580 patent obvious.

4. Dependent claim 13 of the '580 patent is not obvious based on Chickering in combination with Magid

449. Dependent claim 13 in combination with independent claim 19 recites substantially the same subject matter as independent 19. Further, I have already concluded that independent claim 11 is not obvious based on the combination of Chickering and Magid.

450. Therefore, for the reasons set forth above and because dependent claim 13 incorporates all of the subject matter of independent claim 11, it is my opinion that "a pair of wheels mounted to the frame, wherein the pair of wheels are mounted so that the pair of wheels are not in contact with the ground surface when the manually powered treadmill is in an

operating position" in claim 13 is not obvious based on the combination of Chickering and Magid.

5. Independent claim 25 of the '580 patent is not obvious based on Chickering in combination with Magid

451. It is my opinion that combination of Chickering and Magid does not render independent claim 25 of the '580 patent as obvious.

452. As explained above, Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

453. For the reasons set forth above, Chickering adds nothing to the disclosure of Magid.

454. As such, it is my opinion that the combination of Chickering and Magid does not expressly or inherently disclose "a running belt [that] follows a top curved running surface," "permitting movement of the running belt in a first direction," and "substantially preventing movement of the running belt in a second direction opposite the first direction" as in independent claim 25.

455. For the reasons set forth above, it is also my opinion that Chickering in combination with Magid does not disclose, teach, suggest, or otherwise render obvious at least the limitations of "providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile" and "disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail" of independent claim 25.

456. Therefore and because not all the limitations of independent claim 25 are taught or suggested by the combination of Chickering and Magid, it is my opinion that the combination of Chickering and Magid does not render independent claim 25 obvious.

6. Dependent claims 10 and 14 of the '580 patent are not obvious based on Chickering in combination with Magid

457. Claim 10 depends from independent claim 1. Claim 14 depends from independent claim 19. As dependent claims, each of claims 10 and 14 include all of the limitations from the claim or claims from which they depend. Because the combination of Chickering and Magid does not render independent claims 1 and 11 as obvious, the combination of Chickering and Magid cannot therefore render dependent claims 10 and 14 of the '580 patent as obvious.

7. Lack of motivation to combine

458. In addition to the reasons I provided above that show a PHOSITA would not combine Magid with Chickering, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Magid in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Chickering and Magid, is required to show obviousness, in the above section, I have provided reasons why a PHOSITA would not combine these references.

VII. ANALYSIS OF THE GIACHETTI INVALIDITY ALLEGATIONS DIRECTED TO THE ASSERTED CLAIMS OF THE '169 PATENT

A. Socwell does not anticipate claims 11-13 of the '169 patent under 35 U.S.C. § 102

459. Dr. Giachetti opines that Socwell anticipates claims 11-13 of the '169 patent under 35 U.S.C. § 102. I disagree.

460. I understand that Socwell was considered during prosecution of the patent application that matured into the '169 patent. Further, Socwell is prior art to the claims of the '169 patent. As such, I have incorporated those considerations into my analysis of whether Dr. Giachetti clearly established his invalidity position.

461. After reviewing Socwell and for the reasons set forth below, it is my opinion that Socwell does not anticipate claims 11-13 of the '169 patent.

1. Independent claim 11 of the '169 patent is not anticipated by Socwell

462. It is my opinion that Socwell does not expressly or inherently disclose "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" as in independent claim 11 of the '169 patent.

463. Independent claim 1 of the '580 patent recites "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction."

464. As is clear, the difference with the "safety device" between '169 patent and the '580 patent is that claim 11 of the '169 patent states that the "safety device cooperat[es] with the rear shaft" while claim 1 of the '580 patent states that a "safety device [is] coupled to at least one of the front shaft and the rear shaft."

465. For the reasons set forth above, it is my opinion that the relative location of the "safety device" (*e.g.*, front shaft or rear shaft) is immaterial to the obviousness analysis.

466. Additionally and as explained above, Socwell does not expressly or inherently disclose "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and

the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" as in independent claim 1 of the '580 patent.

467. In summary and for the reasons set forth above, it is my opinion that Socwell does expressly or inherently disclose "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" as in independent claim 11.

468. It is also my opinion that Socwell does not expressly or inherently disclose "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11.

469. As explained above, it is my opinion that Socwell does not expressly or inherently disclose a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" of claim 1 of the '580 patent. I consider this limitation to be substantially similar to the limitation of "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" in claim 11 of '169 patent.

470. Therefore and for the reasons as set forth above, it is my opinion that Socwell does not explicitly or implicitly disclose the limitation of "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11.

471. Accordingly, because not all of the limitations of independent claim 11 is disclosed, taught, or suggested by Socwell, it is my opinion that Socwell does not anticipate independent claim 11.

2. Dependent claim 12 of the '169 patent is not anticipated by Socwell

472. Claim 12 depends from independent claim 11. As a dependent claim, claim 12 includes all of the limitations from the claim or claims from which they depend. Therefore, claim 12 includes the limitations of claim 11. Additionally, claim 12 recites the narrowing limitation of "the at least one bearing rail extending along the frame and longitudinally aligned with one of the at least one front running belt."

473. Dr. Giachetti does not assert that Socwell explicitly or implicitly discloses this limitation. Instead, he contends that the limitation is a predictable variation of the teachings of Socwell. This is not the standard for anticipation, which requires the challenger to show by clear and convincing evidence each and every limitation of the claim is expressly or inherently present in a single reference.

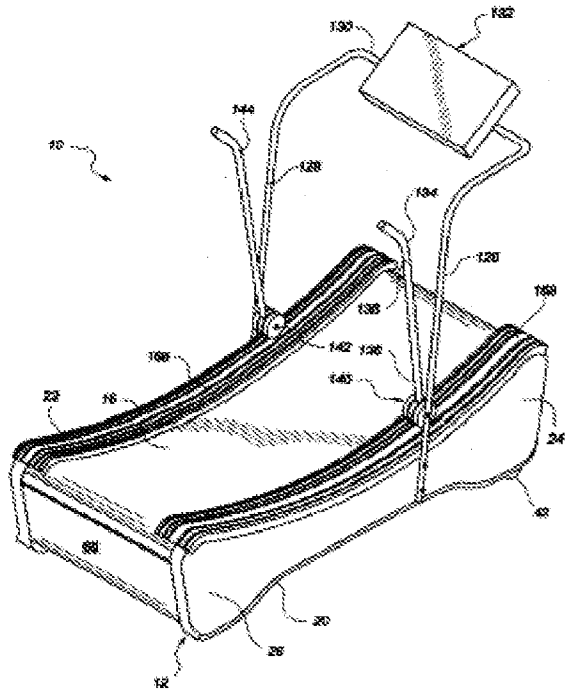
474. Moreover, as explained above, Socwell does not disclose a "bearing rail" as construed by this Court. Therefore, a further limitation on bearing rail cannot be disclose, taught, or suggested by Socwell.

475. Thus, Socwell does not anticipate "the at least one bearing rail extending along the frame and longitudinally aligned with one of the at least one front running belt" of claim 12.

3. Dependent claim 13 of the '169 patent is not anticipated by Socwell

476. Claim 13 recites "wherein the running belt comprises a plurality of laterally extending slats." As a dependent claim, claim 13 includes all of the limitations from the claim or claims from which they depend. Therefore, claim 13 includes the limitations of claim 11. As such, claim 13 is not anticipated for at least the reasons explained above with respect to claim 11.

477. Additionally, Socwell does not expressly or inherently disclose "wherein the running belt comprises a plurality of laterally extending slats" as in claim 13 of the '169 patent.



478. As seen in the figure above, Socwell does not expressly or inherently disclose any slats for the running belt. Rather, the running belt is configured as an endless belt and not a slatted running belt. Further, Socwell does not appear to disclose anything that could be considered analogous to a slatted running belt. Moreover, Dr. Giachetti does not cite to Socwell as having a slatted belt.

479. Therefore, Socwell does not anticipate "wherein the running belt comprises a plurality of laterally extending slats" as in claim 13 of the '169 patent.

B. Pasqualin in combination with Socwell does not render obvious claims 11-16 of the '169 patent under 35 U.S.C. § 103

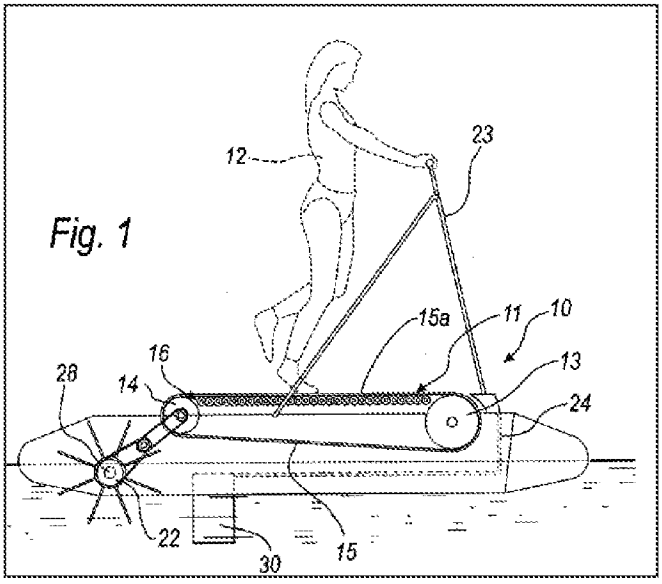
480. Dr. Giachetti opines that Pasqualin in combination with Socwell renders claims 11-16 of the '169 patent obvious under 35 U.S.C. § 103. I disagree.

481. I understand that Pasqualin (like Socwell) was previously considered during prosecution of the patent application that matured into the '169 patent.

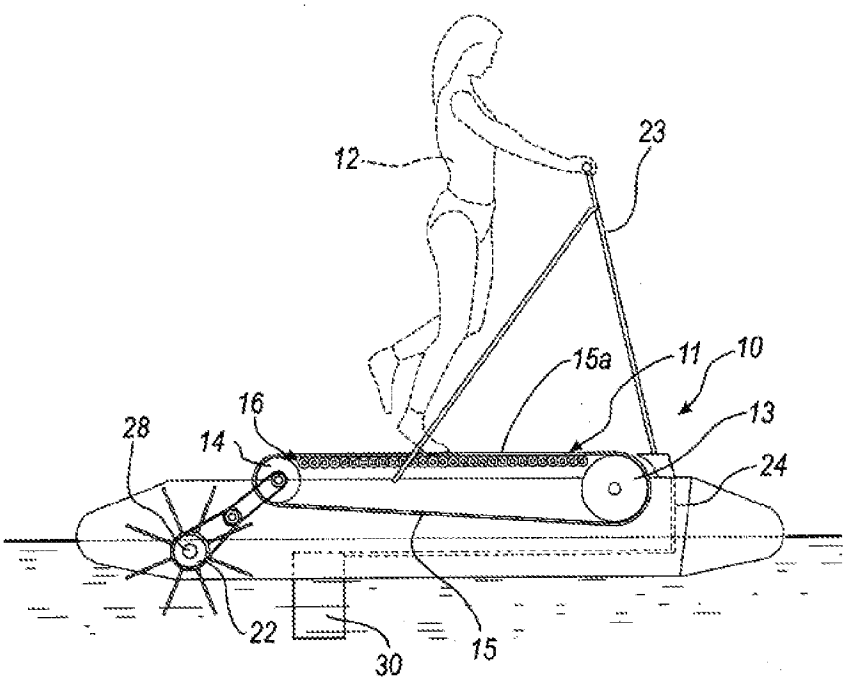
482. For the reasons set forth below, it is my opinion that Pasqualin in combination with Socwell does not render claims 11-16 of the '169 patent obvious under 35 U.S.C. § 103.

1. Independent claim 11 of the '169 patent is not obvious based on Socwell in combination with Pasqualin

483. It is my opinion that the combination of Pasqualin and Socwell does not render obvious the limitation of a "manually operated treadmill" having "a running belt ... [that] form[s] a curved running surface upon which a user of the treadmill may walk or run" and "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" as in independent claim 1.



484. Pasqualin discloses a muscle-powered vehicle (10) having a treadmill (11) that is "adapted to be actuated by the thrust of the feet and legs of a user 12 who walks or runs on it."



485. As shown, Pasqualin discloses a treadmill having a flat or planar running surface and not a treadmill having a curved or non-planar running surface. This is significant as a treadmill with a flat or planar running surface does not appear to possess the unwanted characteristic/safety hazard of the treadmill belt moving in the unintended direction. In this regard, gravity does not act on the flat or planar running surface to apply an additional force to the running belt to rotate it in the unintended direction. Thus, Pasqualin is unrelated to the problem of an increased chance of unexpected running belt rotate in the unintended rotational direction in a manual powered treadmill having a curved or non-planar running surface. Indeed, Dr. Giachetti does not cite to Pasqualin in his section regarding "Device to Ensure Unidirectional Movement of the Belt."

486. As explained above, Socwell does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." Further, as explained above and to the extent that Socwell discloses a curved running belt (16) surface, Socwell appears to

fail to recognize that i) users tend to mount a treadmill from the rear, and ii) that there is an increased chance of unintended running belt movement due to this mounting.

487. Regardless of whether Pasqualin discloses a treadmill with a flat or planar running surface, the combination of Socwell and Pasqualin fails to identify a potentially unwanted characteristic/safety hazard in a manually powered treadmill of unexpected running belt rotation. With an unknown problem - unexpected running belt rotation - neither Socwell nor Pasqualin provide a potential solution for addressing this problem.

488. As I have been instructed, using hindsight is impermissible in making an obviousness determination under 35 U.S.C. § 103. Here, it appears that the only reason to combine Socwell and Pasqualin is in light of Woodway's disclosures in the '169 patent where Mr. Nicholas Oblamski articulates the potentially unwanted characteristic/safety hazard of unexpected reverse belt rotation in a curved treadmill.

489. Thus, it is my opinion that the combination of Pasqualin and Socwell does not render obvious the limitation of a "manually operated treadmill" having "a running belt ... [that] form[s] a curved running surface upon which a user of the treadmill may walk or run" and "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in independent claim 11.

490. It is also my opinion that the combination of Pasqualin and Socwell does not disclose, teach, or suggest "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11. My understanding is that the term "bearing rail" means a "rail with bearings whose top profile corresponds to the shape of the running surface."

491. Pasqualin discloses free rollers (17a) on bars (17) that "form[] a surface which allows the sliding of the belt 15 and provides support for the user 12." It is my opinion that a PHOSITA would readily recognize that these free rollers (17a) and (17) are analogous to conveyor rollers and thus the rails to which they are attached would not be considered "bearing rails." S*ee, e.g.*, U.S. Pat. No. 4,681,215 & 2,768,725 for examples of conveyor rollers.

492. Additionally, independent claim 11 requires that the bearing rail have a shape that corresponds to the running surface, which is curved. If the rods (17) and rollers (17a) of Pasqualin are analogized to the "bearing rail" of claim 11, clearly, there is no curve in the surface defined by in the rods (17) and rollers (17a) like in the "bearing rail."

493. Pasqualin discloses a flat running belt surface and no suggestion that the running belt could be curved. Thus, there is no reason to modify the planar/flat structural configuration of the rods (17) and rollers (17a).

494. Turning to Socwell, as explained above, it is my opinion that Socwell does not explicitly or implicitly disclose the limitation of "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" in independent claim 11. Further, modification of the belt securing assembly (94) to place the roller (94) below the belt (16) to support the belt (16) would render the belt securing assembly (94) inoperable for its intended purpose of holding the belt (16) in its curvilinear configuration. Modifications including placing the roller (94) below the deck (56) or in between the deck (56) and the belt (16) would result in the roller (94) being unable to exert a force on the belt (16) to hold the belt in the curvilinear configuration.

495. Thus, each of Socwell and Pasqualin individually do not disclose, teach, or suggest "at least one bearing rail having a plurality of bearings" and a "running surface of the

running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11. Further, combining Socwell and Pasqualin is inappropriate in this instance as the belt securing assembly (94) of Socwell is intended to maintain the arcuate configuration of the running belt. As the running belt of Pasqualin is flat, a PHOSITA would have no reason to combine the teachings of Pasqualin and Socwell.

496. In conclusion, because not all of the limitations of independent claim 11 are disclosed, taught, or suggested by Pasqualin in combination with Socwell, it is my opinion that Pasqualin in combination with Socwell does not render independent claim 11 obvious under 35 U.S.C. § 103.

2. Dependent claim 13 of the '169 patent is not obvious based on Socwell in combination with Pasqualin

497. Claim 13 recites "wherein the running belt comprises a plurality of laterally extending slats." As a dependent claim, claim 13 includes all of the limitations from the claim or claims from which they depend. Therefore, claim 13 includes the limitations of claim 11. As such, claim 13 is not obvious for at least the reasons explained above with respect to claim 11.

498. Further, as explained above, Socwell does not expressly or inherently disclose "wherein the running belt comprises a plurality of laterally extending slats" as in claim 13 of the '169 patent because the disclosed belt in Socwell is an endless belt.

499. Similarly, Pasqualin does not expressly or inherently disclose any slats for the running belt; rather, the running belt of Pasqualin is an endless belt. Further, Pasqualin does not appear to disclose anything that could be considered analogous to a slatted running belt. Moreover, Dr. Giachetti does not cite to Pasqualin as having a slatted belt.

500. Therefore, Socwell, in combination with Pasqualin does not disclose, teach, or suggest "wherein the running belt comprises a plurality of laterally extending slats" as in claim 13 of the '169 patent.

3. Dependent claim 14 of the '169 patent is not obvious based on Socwell in combination with Pasqualin

501. Claim 14 recites "the at least one bearing rail further comprises a second bearing rail having a plurality of bearings forming a top profile matching the top profile of the first of the at least one bearing rail." As a dependent claim, claim 14 includes all of the limitations from the claim or claims from which they depend. Therefore, claim 14 includes the limitations of claim 11. As such, claim 14 is not obvious for at least the reasons explained above with respect to claim 11.

502. As explained above, neither Pasqualin nor Socwell disclose, teach, or suggest the claimed "at least one bearing rail" of independent claim 11.

503. Therefore, Socwell and Pasqualin do not disclose, teach, or suggest the further narrowing limitation that "the at least one bearing rail further comprises a second bearing rail having a plurality of bearings forming a top profile matching the top profile of the first of the at least one bearing rail" as in claim 14 of the '169 patent.

4. Dependent claim 16 of the '169 patent is not obvious based on Socwell in combination with Pasqualin

504. Claim 16 recites "wherein the safety device comprises a one-way bearing."

505. As explained above, Socwell does not disclose a safety device within the scope of the '169 patent.

506. Further, Socwell does not appear to disclose anything that could be considered analogous to a one-way bearing.

507. Additionally, as explained above, Pasqualin does not disclose any safety device within the scope of the '169 patent.

508. Finally, Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 16. Thus, even if a safety device were disclosed by the combination, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation on said device required by claim 16 is met.

509. Therefore, Socwell does not disclose, teach, or suggest "wherein the safety device includes a one-way bearing" as in claim 16 of the '169 patent.

5. Dependent claims 12 and 15 of the '169 patent are not obvious based on Socwell in combination with Pasqualin

510. Claims 12 and 15 depend from independent claim 11. Thus, because Pasqualin in combination with Socwell does not disclose, teach, suggest, or render obvious at least one limitation in claim 11, Pasqualin in combination with Socwell cannot therefore disclose, teach, suggest, or render obvious claims 12 and 15 of the '169 patent.

511. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 15. Thus, even if all the limitations of the claims on which claim 15 depends were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 15 is met.

6. Lack of motivation to combine

512. In addition to the reasons I provided above that show a PHOSITA would not combine Pasqualin with Socwell, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Pasqualin in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to

combine Socwell and Pasqualin, in the above section, I have provided reasons why a PHOSITA would not combine these references.

C. Cutter in combination with Haber does not render obvious claims 11, 12, and 16 of the '169 patent under 35 U.S.C. § 103

513. Dr. Giachetti opines that Cutter in combination with Haber renders claims 11, 12, and 16 of the '169 patent obvious under 35 U.S.C. § 103. I disagree.

514. I understand that Cutter was considered during prosecution of the application that matured into the '169 patent but that Haber was not considered.

515. It is my opinion that Cutter in combination with Haber does not render claims 11, 12, and 16 of the '169 patent obvious under 35 U.S.C. § 103.

1. Independent claim 11 of the '169 patent is not obvious based on Haber in combination with Cutter

516. For the reasons explained above, a PHOSITA would understand the limitation of "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" in claim 1 of the '580 patent to be substantially similar to the limitation of "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in the '169 patent (*i.e.*, it is immaterial to the obviousness analysis regarding the relative position of the "safety device).

517. Therefore, and for the reasons explained above with respect to Haber and Cutter, it is my opinion that the combination of Haber and Cutter does not expressly or inherently disclose the limitation of "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in independent claim 11.

518. Additionally, and as explained above, it is my opinion that a PHOSITA would understand the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" of claim 1 of the '580 patent to be substantially similar (for the purposes of the issues discussed herein) to the limitation of "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" in claim 11 of the '169 patent. Therefore, as explained above, it is my opinion that Cutter does not explicitly or implicitly disclose the limitation of "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" in independent claim 11.

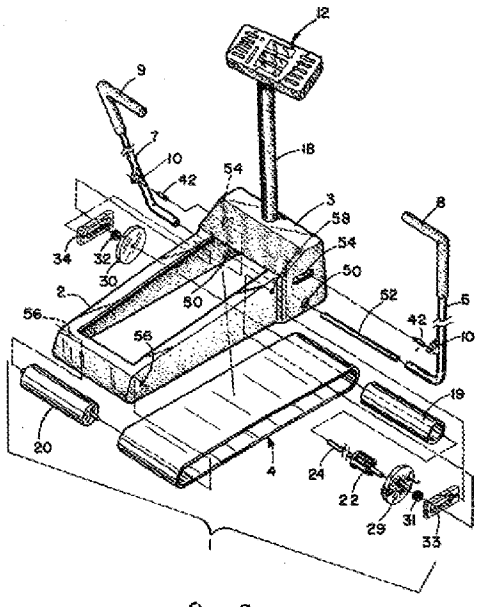


fig. 2

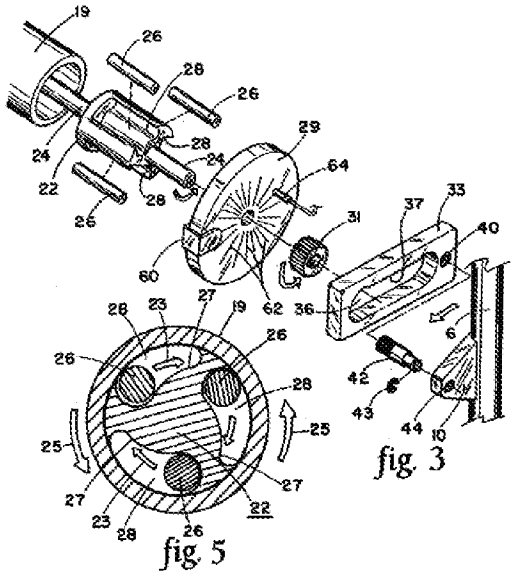
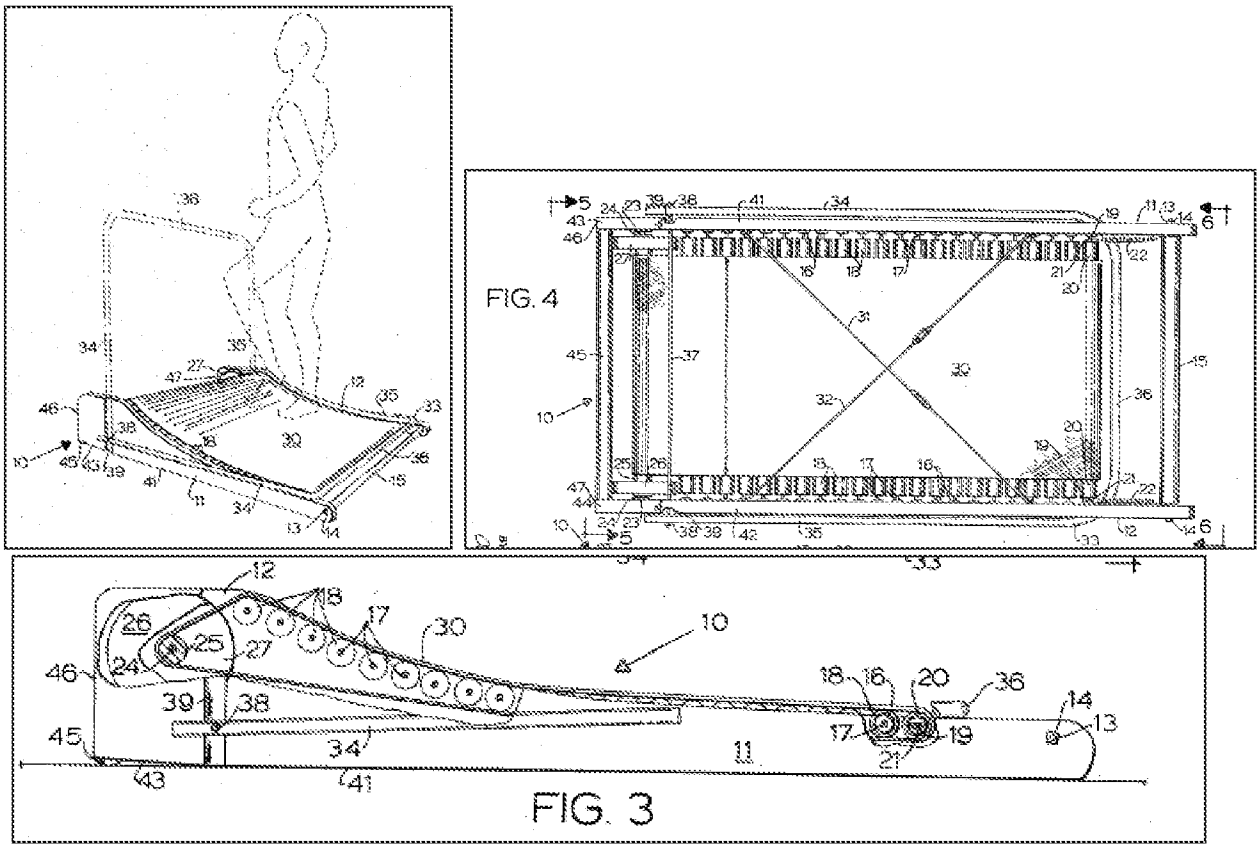


fig. 5

fig. 3

519. As also explained above, Haber does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the

running belt (4) is free to rotate in an intended direction, so that the running surface moves away from the display (12) and in an unintended direction so that the running surface moves toward the display (12). *See* Figures, 2, 3, and 5 of Haber above.



520. Additionally, as noted above, Cutter does not disclose any device, system, or component that could be considered analogous to the "safety device" in claim 1 let alone any device, system, or feature configured to enable the running belt (30) to rotate in only one rotational direction. Additionally and as also explained above, i) unintended rotation of the running belt (30) is likely to be of little to no concern in Cutter due to the rear portion of the belt being substantially flat, ii) Cutter does not disclose this potentially undesired/unwanted characteristic, and ii) Cutter does not provide any solutions for addressing this potentially undesired characteristic.

521. Further, the combination of Cutter and Haber fail to identify a potentially unwanted characteristic in a manually powered treadmill with a curved running surface having unexpected running belt rotation. With an unknown problem, neither Haber nor Cutter, or the combination of Haber and Cutter would provide a potential solution.

522. As I have been instructed, using hindsight is impermissible in making an obviousness determination under 35 U.S.C. § 103. Here, it appears that the only reason to combine Cutter and Haber is in light of Woodway's disclosures in the '169 patent where Mr. Nicholas Oblamski articulates the potentially unwanted characteristic of unintended reverse running belt rotation in a curved treadmill.[61]

523. Thus, it is my opinion that the combination of Haber and Cutter does not render obvious the limitation of a "manually operated treadmill" having "a running belt ... [that] form[s] a curved running surface upon which a user of the treadmill may walk or run" and "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in independent claim 11.

524. It is also my opinion that the combination of Haber and Cutter does not disclose, teach, or suggest "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11. My understanding is that the term "bearing rail" means a "rail with bearings whose top profile corresponds to the shape of the running surface." [62]

525. As explained above, a PHOSITA would consider the rollers disclosed in Cutter to be conventional "conveyor rollers." In these conventional conveyor rollers, the bearing is

[61] *See* Declaration of Mr. Nicholas Oblamski dated August 11, 2014 at paragraphs 11-13.
[62] Dkt. No. 76 at 28.

located and integrated into the roller and the part of the roller that is attached to the rail does not rotate not along a rail. Thus, Cutter does not disclose a rail **with** bearings.

526. Haber also does not add these missing elements to the disclosure of Cutter. As explained above, Haber does not disclose rails or any structure whatsoever for supporting the running belt "a running belt supported by the first bearing rail and the second bearing rail" as in claim 1. Referring to Figure 2 of Haber (above), there are no bearing rails whatsoever. Additionally, Dr. Giachetti does not assert that Haber teaches anything, with respect to the asserted claims, other than the clutch assembly (*i.e.*, no "bearing rails").

527. Thus, each of Haber and Cutter individually do not disclose "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11. As the running belt of Haber is flat, a PHOSITA would have no reason to combine the teachings of Haber and Cutter.

528. Therefore, it is my opinion that the combination of Haber and Cutter does not disclose, teach, or suggest "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11.

2. Dependent claim 16 of the '169 patent is not obvious based on Haber in combination with Cutter

529. Claim 16 recites "wherein the safety device comprises a one-way bearing." As a dependent claim, claim 16 includes all of the limitations from the claim or claims from which it depends. Therefore, claim 16 includes the limitations of claim 11. As such, claim 16 is not obvious for at least the reasons explained above with respect to claim 11.

530. Additionally, neither Haber nor Cutter disclose a "safety device" of the '169 patent.

531. Finally, Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 16. Thus, even if a safety device were disclosed by the combination, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation with respect to the safety device as required by claim 16 is met.

532. Therefore, Haber in combination with Cutter does not disclose, teach, or suggest "wherein the safety device includes a one-way bearing" as in claim 16 of the '169 patent.

3. Dependent claim 12 of the '169 patent is not obvious based on Haber in combination with Cutter

533. Claim 12 depends from independent claim 11. Thus, because Haber in combination with Cutter does not disclose, teach, suggest, or render obvious at least one limitation in claim 11, Haber in combination with Cutter cannot therefore disclose, teach, suggest, or render obvious claim 12 of the '169 patent.

4. Lack of motivation to combine

534. In addition to the reasons I provided above that show a PHOSITA would not combine Cutter with Haber, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Haber in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Socwell and Pasqualin, in the above section, I have provided reasons why a PHOSITA would not combine these references.

D. Schönenberger in combination with Haber does not render obvious claims 11-16 of the '169 patent under 35 U.S.C. § 103

535. Dr. Giachetti opines that Schönenberger in combination with Haber renders claims 11-16 of the '169 patent obvious under 35 U.S.C. § 103. I disagree.

536. I understand that Schönenberger was considered during prosecution of the application that matured into the '169 patent.

537. For the reasons set forth below, it is my opinion that Schönenberger in combination with Haber does not render claims 11-16 of the '169 patent obvious under 35 U.S.C. § 103.

1. Independent claim 11 of the '169 patent is not obvious based on Haber in combination with Schönenberger

538. It is my opinion that the combination of Haber and Schönenberger does not render obvious the limitation of a "manually operated treadmill" having "a running belt ... [that] form[s] a curved running surface upon which a user of the treadmill may walk or run" and "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in independent claim 11.

539. For the reasons explained above, Haber does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the running belt (4) is free to move in a rearward direction (away from the display (12)) and in a forward direction (toward the display (12)). Haber discloses a clutch that translates energy from the handlebars into one-way movement, but does not appear to restrict movement of the belt in any way, and certainly not as a "safety device."

540. Additionally, and as explained above regarding the '580 patent, Schönenberger does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the belt (133) of Schönenberger is free to move in a

rearward direction and in a forward direction. Moreover, Dr. Giachetti does not cite to Schönenberger to assert that any device could be considered analogous to the claimed "safety device."

541. Moreover, neither Haber nor Schönenberger contemplate a "curved running surface" and, as also explained above, i) unintended movement of the running belt is likely to be of little to no concern due to the rear portion of the belt being substantially flat, ii) neither Haber nor Schönenberger disclose this potentially undesired/unwanted characteristic, and ii) neither Haber nor Schönenberger provide any solutions for addressing this potentially undesired characteristic.

542. As a result, a PHOSITA reading Haber and Schönenberger would i) not be aware of potentially undesirable and unexpected rotation of the running belt on a treadmill with a curved running surface, and ii) not be made aware of a possible solution for addressing this potentially unwanted characteristic. With an unknown problem, neither Haber, nor Schönenberger, or the combination of the two provide a potential solution.

543. As I have been instructed, using hindsight is impermissible in making an obviousness determination under 35 U.S.C. § 103. Here, it appears that the only reason to combine Schönenberger and Haber is in light of the teachings in Woodway's disclosures of the '169 patent where Mr. Nicholas Oblamski articulates the potentially unwanted characteristic of unintended reverse running belt rotation in a curved treadmill.[63]

544. Thus, it is my opinion that the combination of Haber and Schönenberger does not render obvious the limitation of a "manually operated treadmill" having "a running belt ... [that] form[s] a curved running surface upon which a user of the treadmill may walk or run" and "a

[63] *See* Declaration of Mr. Nicholas Oblamski dated August 11, 2014 at paragraphs 11-13.

safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in independent claim 11.

2. Dependent claim 16 of the '169 patent is not obvious based on Haber in combination with Schönenberger

545. Claim 16 recites "wherein the safety device comprises a one-way bearing." As a dependent claim, claim 16 includes all of the limitations from the claim or claims from which it depends. Therefore, claim 16 includes the limitations of claim 11. As such, claim 16 is not obvious for at least the reasons explained above with respect to claim 11.

546. As explained above, neither Haber nor Schönenberger disclose a safety device of the '169 patent.

547. Finally, Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 16. Thus, even if a safety device were disclosed by the combination, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation regarding the safety device required by claim 16 is met.

548. Therefore, Haber in combination with Schönenberger does not disclose, teach, or suggest "wherein the safety device includes a one-way bearing" as in claim 16 of the '169 patent.

3. Dependent claims 12-15 of the '169 patent are not obvious based on Haber in combination with Schönenberger

549. Claims 12-15 depend from independent claim 11. Thus, because Haber in combination with Schönenberger does not disclose, teach, suggest, or render obvious at least one limitation in claim 11, Haber in combination with Schönenberger cannot therefore disclose, teach, suggest, or render obvious claims 12-15 of the '169 patent.

550. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 15. Thus, even if all the limitations of the claims on which claim 15

depends were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 15 is met.

4. Lack of motivation to combine

551. In addition to the reasons I provided above that show a PHOSITA would not combine Haber with Schönenberger, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Haber or Schönenberger in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Haber and Schönenberger, in the above section, I have provided reasons why a PHOSITA would not combine these references.

E. Schmidt does not anticipate claims 11-16 of the '169 patent under 35 U.S.C. § 102

552. Dr. Giachetti opines that Schmidt anticipates claims 11-16 of the '169 patent under 35 U.S.C. § 102. I disagree.

553. I understand that Schmidt was previously considered during prosecution of the application that matured into the '169 patent. As such, I have incorporated those considerations into my analysis of whether Dr. Giachetti clearly established his invalidity position.

554. After reviewing Schmidt, and for the reasons set out below, it is my opinion that Schmidt does not expressly or inherently disclose at least the following limitations of claims 11 and 16 of the '169 patent.

1. Independent claim 11 of the '169 patent is not anticipated by Schmidt

555. For the reasons explained above, a PHOSITA would understand the limitation of "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to substantially prevent rotation of at least one of the front shaft and the rear

shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" in claim 1 of the '580 patent to be substantially similar to the limitation of "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in the '169 patent (*i.e.*, it is immaterial to the obviousness analysis regarding the relative position of the "safety device).

556. Additionally and as explained above, it is my opinion that a PHOSITA would understand the limitations of "a first bearing rail having a plurality of bearings, the first bearing rail attached to a left side of the frame," "a second bearing rail having a plurality of bearings, the second bearing rail attached to a right side of the frame," and "a running belt supported by the first bearing rail and the second bearing rail" of claim 1 the '580 patent to be substantially similar to the limitation of "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" in claim 11 of the'169 patent.

557. Therefore, and for the reasons explained above regarding Schmidt, Schmidt does not expressly or inherently disclose "a running belt supported by the first bearing rail and the second bearing rail" as in claim 11.

2. Dependent claim 16 of the '169 patent is not anticipated by Schmidt

558. Claim 16 recites "wherein the safety device comprises a one-way bearing." As a dependent claim, claim 16 includes all of the limitations from the claim or claims from which it depends. Therefore, claim 16 includes the limitations of claim 11. As such, claim 16 is not obvious for at least the reasons explained above with respect to claim 11.

559. Additionally, as explained above regarding Schmidt, Schmidt does not expressly or inherently disclose any device, component, or system that could be considered analogous to

the "safety device" of claim 11. Further, Schmidt does not appear to disclose anything that could be considered analogous to a one-way bearing. Schmidt only discloses "rolls" that may be either stationary or rotatable, which does not teach or suggest any way to prevent rotation in any direction.[64]

560. Finally, Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 16. Thus, even if a safety device were disclosed by the combination, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation on said device required by claim 16 is met.

561. Therefore, Schmidt does not expressly or inherently disclose "wherein the safety device includes a one-way bearing" as in claim 16 of the '169 patent.

3. Dependent claims 12-15 of the '169 patent are not anticipated by Schmidt

562. Claims 12-15 depend from independent claim 11. Thus, because Schmidt does not disclose, teach, suggest, or render obvious at least one limitation in claim 11, Schmidt cannot therefore disclose, teach, suggest, or render obvious claims 12-15 of the '169 patent.

563. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 15. Thus, even if all the limitations of the claims on which claim 15 depends were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 15 is met.

F. Chickering in combination with Schmidt does not render obvious claims 11-16 of the '169 patent under 35 U.S.C. § 103

564. Dr. Giachetti opines that Chickering in combination with Schmidt renders claims 11-16 of the '169 patent obvious under 35 U.S.C. § 103. I disagree.

[64] Schmidt at col. 4 lines 116-20.

565. I understand that Chickering (like Schmidt) was considered during prosecution of the application that matured into the '169 patent.

1. Independent claim 11 of the '169 patent is not obvious based on Chickering in combination with Schmidt

566. It is my opinion that Schmidt does expressly or inherently disclose the limitation of a "manually operated treadmill" having "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in independent claim 11.

567. For the reasons stated above, Schmidt does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the belt (D) is free to move in a rearward direction and in a forward direction.

568. Additionally, Dr. Giachetti only identifies "rolls" that he considers analogous to the "safety device" of claim 11. However, Schmidt only discloses that these rolls may be either stationary or rotatable, which does not teach or suggest any way to prevent rotation in any direction.[65]

569. For the reasons stated above, a PHOSITA would consider the allegedly invalid limitations of claim 1 of the '580 patent to be substantially similar to the allegedly invalid limitations of claim 11 of the '169 patent. Therefore, based on my analysis regarding the '580 patent above, Chickering does not disclose any device, system, or component that could be considered analogous to the "safety device" in claim 11 let alone any device, system, or feature configured to enable the running belt to rotate in only one rotational direction. To the extent Schmidt or Chickering disclose a curved running belt surface, they both fail to recognize that i) users tend to mount a treadmill from the rear (*i.e.*, at or near the area where reference number (22) is placed in Figure 3 of Chickering above), and ii) that there is an increased chance of

[65] Schmidt at col. 4 lines 116-20.

unexpected running belt rotation in a reverse direction (*i.e.*, a running belt rotation in a direction that is opposite to that of the normal operating direction, which would be the forward direction). In contrast, claim 11 explicitly requires "a safety device cooperating with the rear shaft **to permit rotation of the rear shaft in only one direction**" as in independent claim 11 (emphasis added).

570. As a result, a PHOSITA reading Chickering would i) not be aware of potentially undesirable and unexpected running belt rotation on a treadmill with a curved running surface, and ii) not be made aware of any possible solutions for addressing this potentially unwanted characteristic. Therefore, Schmidt in combination with Chickering does not disclose, teach or suggest "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" as in independent claim 11.

571. As explained above, Schmidt does not expressly or inherently disclose a "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in claim 11 because no PHOSITA would consider a rod to be equivalent to a bearing based on the definition requiring friction reduction and rotation. Dr. Giachetti contends that there is no explicit indication of anti-friction in the '580 patent, but neglects to include the definition of bearing, which is a machine element that constrains relative motion and reduces friction between moving parts. Dr. Giachetti's equivocating rods with bearings directly contradicts this Court's construction as the Court expressly denied construing a bearing rail as any running belt retention system.[66]

572. Chickering does not cure the deficiencies of Schmidt. As explained above, Chickering does not disclose "at least one bearing rail having a plurality of bearings" and a

[66] Dkt. No. 76 at 8.

"running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in claim 11, because it discloses conveyor rollers, not a rail with bearings.

573. Therefore, Schmidt in combination with Chickering does not disclose, teach or suggest "a running belt supported by the first bearing rail and the second bearing rail" as in claim 11 in a way that would render the limitation obvious to a PHOSITA.

2. Dependent claim 16 of the '169 patent is not obvious based on Chickering in combination with Schmidt

574. Claim 16 recites "wherein the safety device comprises a one-way bearing." As a dependent claim, claim 16 includes all of the limitations from the claim or claims from which it depends. Therefore, claim 16 includes the limitations of claim 11. As such, claim 16 is not obvious for at least the reasons explained above with respect to claim 11.

575. Neither Schmidt nor Chickering expressly or inherently disclose "wherein the safety device comprises a one-way bearing" as in claim 16 of the '169 patent.

576. As explained above, Schmidt does not expressly or inherently disclose any device, component, or system that could be considered analogous to the "safety device" of claim 11. Further, Schmidt does not appear to disclose anything that could be considered analogous to a one-way bearing. Schmidt only discloses "rolls" that may be either stationary or rotatable, which does not teach or suggest any way to prevent rotation in any direction.[67]

577. Moreover, there is nothing in the specification of Chickering that discusses restriction of the rotation of the running belt to one-way rotation. Indeed, Dr. Giachetti does not cite to Chickering as disclosing any such limitation.

578. Finally, Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 16. Thus, even if a safety device were disclosed by the

[67] Schmidt at col. 4 lines 116-20.

combination, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation on said device required by claim 16 is met.

579. Therefore, Schmidt in combination with Chickering does not disclose, teach, or suggest "wherein the safety device comprises a one-way bearing" as in claim 16 of the '169 patent in a way that could render it obvious.

3. Dependent claims 12-15 of the '169 patent are not obvious based on Chickering in combination with Schmidt

580. Claims 12-15 depend from independent claim 11. Thus, because Chickering in combination with Schmidt does not disclose, teach, suggest, or render obvious at least one limitation in claim 11, Chickering in combination with Schmidt cannot therefore disclose, teach, suggest, or render obvious claims 12-15 of the '169 patent.

581. Additionally, Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 15. Thus, even if all the limitations of the claims on which claim 15 depends were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 15 is met.

4. Lack of motivation to combine

582. In addition to the reasons I provided above that show a PHOSITA would not combine Chickering with Schmidt, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Chickering and Schmidt, in the above section, I have provided reasons why a PHOSITA would not combine these references.

G. Schmidt in combination with Magid does not render obvious claims 11-16 of the '169 patent under 35 U.S.C. § 103

583. Dr. Giachetti opines that Schmidt in combination with Magid renders claims 11-16 of the '169 patent obvious under 35 U.S.C. § 103. I disagree.

584. I understand that Magid (like Schmidt) was considered during prosecution of the application that matured into the '169 patent.

585. It is my opinion that Schmidt in combination with Magid does not render claims 11-13 of the '169 patent obvious under 35 U.S.C. § 103.

1. Independent claim 11 of the '169 patent is not obvious based on Schmidt in combination with Magid

586. For the reasons explained above, Schmidt does not expressly or inherently disclose the limitation of a "manually operated treadmill" having "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" in independent claim 11 because the belt (D) is free to move in a rearward direction and in a forward direction and the disclosed rolls may be either stationary or rotatable, which does not teach or suggest any way to prevent rotation in any direction.[68].

587. In contrast, claim 1 explicitly requires "a safety device cooperating with the rear shaft **to permit rotation of the rear shaft in only one direction**" (emphasis added).

588. Magid does not cure the deficiencies of Schmidt. As explained above, Magid also fails to disclose, teach, or suggest a "safety device" like that in the '169 and '580 patents.

589. Additionally, as explained above, Schmidt does not expressly or inherently disclose a "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in claim 11, because Schmidt does not disclose any assembly that could be considered analogous to a

[68] Schmidt at col. 4 lines 116-20.

"bearing rail," as construed by this Court. Dr. Giachetti's equivocating rods with bearings directly contradicts this Court's construction as the Court expressly denied construing a bearing rail as any running belt retention system.[69]

590. As explained above in my analysis regarding Magid and the '580 patent, Magid does not disclose a "bearing rail." Therefore, Magid also expressly or inherently fails to disclose "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail."

591. Finally and for similar reasons as I mentioned above with respect to Socwell and Magid, a PHOSITA would not combine the teachings of Schmidt and Magid because i) Magid focuses on a two-belt treadmill and teaches away from using a single belt treadmill like in Eschenbach, and ii) the treadmill of Magid is specifically intended for use by "people with uncoordinated feet movements, such as small children, physical handicapped people and old people."[70] Implementation of a curved or non-planar running surface would be difficult for the users of Magid, which teaches away from implementing a curved or non-planar running surface (such as that which is allegedly shown in Schmidt) with treadmill of Magid.

592. Accordingly, the combination of Schmidt and Magid fails to disclose, teach, or suggest "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in independent claim 11.

593. Additionally, and as explained above in my analysis regarding the '580 patent, a PHOSITA would not combine the teachings of Magid with that of Schmidt. Magid is focused on a two-belt treadmill while Schmidt is focused on a single belt treadmill. In this regard, Magid

[69] Dkt. No. 76 at 8.
[70] Magid at col. 1, lines 30-35 and at col. 5, lines 52-55.

teaches two flat, parallel foot belts that "move independently when treaded by the left and right feet of the user, thereby preventing the action of the user's left foot from influencing the action of his right foot and vice-versa." Thus, an intent of Magid is to provide two independently moving treadmill belts. If a single treadmill belt were utilized, then "the action of the user's left foot from influencing the action of his right foot and vice-versa" would be lost. As such, it is my opinion that due to the explicit disclosure of Magid, there is a not a motivation to combine the teachings of Magid with the teachings of another, single-belt treadmill, such as Schmidt.

594. Moreover, the treadmill of Magid is specifically intended for therapeutic use by "people with uncoordinated feet movements, such as small children, physically handicapped people and old people."[71] With a flat or planar running/walking surface, the treadmill of Magid may be relatively easy to use for therapeutic purposes. A curved non-planar running surface would be difficult to adapt for therapeutic use. Therefore, it is my opinion that there is not a motivation to combine the curved running surface of Schmidt with the flat, planar treadmill of Magid because the thus-modified treadmill of Magid would be unfit for its intended purpose.

595. As I have been instructed, using hindsight is impermissible in making an obviousness determination under 35 U.S.C. § 103. Here, it appears that the only reason to combine Schmidt and Magid is in view of the teachings of Woodway's disclosures in the '580 patent where Mr. Nicholas Oblamski articulates the potentially unwanted characteristic of unexpected reverse belt rotation in a curved treadmill.[72]

596. In sum, it is my opinion that Schmidt in combination with Magid does not disclose, teach, suggest, or render obvious at least the limitation of "a safety device coupled to at least one of the front shaft and the rear shaft, wherein the safety device is structured to

[71] Magid at col. 1, lines 30-35 and at col. 5, lines 52-55.
[72] *See* Declaration of Mr. Nicholas Oblamski dated August 11, 2014 at paragraphs 11-13.

substantially prevent rotation of at least one of the front shaft and the rear shaft in a first rotational direction while permitting rotation of the at least one of the front shaft and the rear shaft in a second rotational direction opposite the first rotational direction" in independent claim 11.

2. Dependent claims 12-16 of the '169 patent are not obvious based on Schmidt in combination with Magid

597. Claims 12-15 depend from independent claim 11. Thus, because Schmidt in combination with Magid does not disclose, teach, suggest, or render obvious at least one limitation in claim 11, Schmidt in combination with Magid cannot therefore disclose, teach, suggest, or render obvious claims 12-16 of the '580 patent.

598. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claims 15 or 16. Thus, even if all the limitations of the claims on which claim 15 or 16 depends were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 15 or 16 is met.

3. Lack of motivation to combine

599. In addition to the reasons I provided above that show a PHOSITA would not combine Schmidt and Magid, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. Indeed, Dr. Giachetti does not mention Magid in his section regarding "Motivation to Combine References." While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Schmidt and Magid, I have provided reasons why a PHOSITA would not combine these references.

H. Ziebell in combination with Schmidt does not render obvious claims 11-16 of the '169 patent under 35 U.S.C. § 103

600. Dr. Giachetti opines that Ziebell in combination with Schmidt renders claims 11-16 of the '169 patent obvious under 35 U.S.C. § 103. I disagree.

601. I understand that Ziebell was not considered in the examination of the application that matured into the '169 patent .

602. It is my opinion that Ziebell in combination with Schmidt does not expressly or inherently disclose at least the following limitations of claims 11-13 of the '169 patent:

1. Independent claim 11 of the '169 patent is not obvious based on Ziebell in combination with Schmidt

603. As explained above, Schmidt does not disclose any device, component, or system that could be considered analogous to the claimed "safety device." In this regard, the belt (D) is free to rotate in a rearward direction and in a forward direction.

604. To the extent Schmidt discloses a curved running belt (D) surface, Schmidt appears to fail to recognize that i) users tend to mount a treadmill from the rear, and ii) that there is an increased chance of unexpected running belt rotation causing the running surface to move in a direction that is opposite to that of the normal operating direction. In contrast, claim 11 explicitly requires "a safety device cooperating with the rear shaft **to permit rotation of the rear shaft in only one direction**." (emphasis added).

605. Additionally and while Dr. Giachetti suggests that Schmidt anticipates independent claim 11 of the '169 patent, Dr. Giachetti only identifies "rolls" that he considers analogous to the "safety device" of claim 11. However, Schmidt only discloses that these rolls may be either stationary or rotatable, which does not teach or suggest any way to prevent rotation in any direction.[73]

[73] Schmidt at col. 4 lines 116-20.

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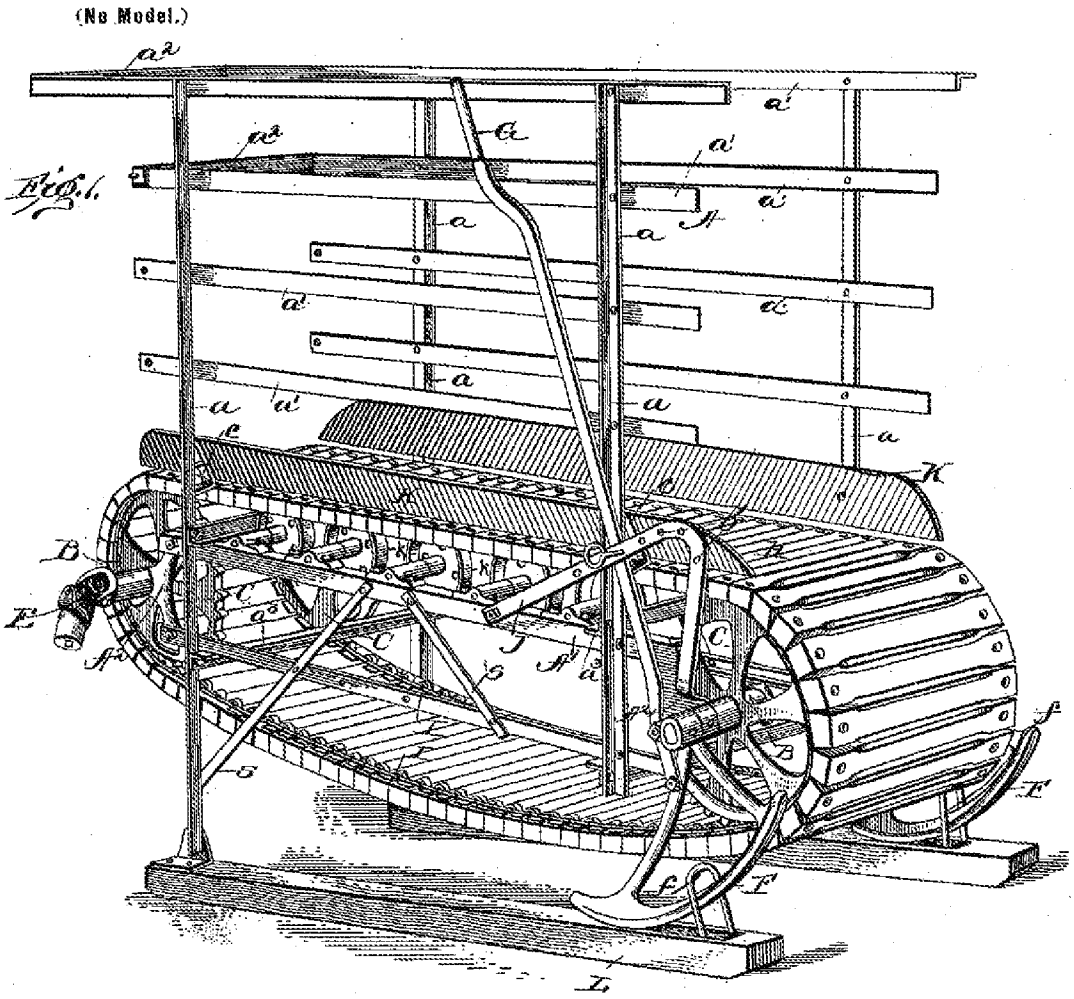


606. Additionally, and as explained above regarding Ziebell and the '580 patent, nothing in Ziebell teaches anything analogous to the claimed "safety device." The apron (H) is free to move in either direction. Indeed, Dr. Giachetti does not cite to Ziebell in the section of his expert report regarding safety devices.

607. Therefore, the combination of Ziebell and Schmidt does not disclose, teach, suggest, or render obvious a "manually operated treadmill" having "a safety device cooperating with the rear shaft to permit rotation of the rear shaft in only one direction" as in independent claim 11.

608. As noted above, Schmidt does not expressly or inherently disclose a "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in claim 11. With reference to Figure 3 of Schmidt above, Schmidt does not disclose any assembly that could be considered analogous to a "bearing rail," as construed by this Court because no PHOSITA would consider a rod to be equivalent to a bearing. Dr. Giachetti contends that there is no explicit indication of anti-friction in the '580 patent, but neglects to include the definition of bearing, which is a machine element that constrains relative motion and reduces friction between moving parts. Dr. Giachetti's equivocating rods with bearings directly contradicts this Court's construction as the Court expressly denied construing a bearing rail as any running belt retention system.[74]

609. As I explained above regarding the '580 patent, Ziebell cannot be used to cure this deficiency, as Ziebell does not disclose any assembly that could be considered analogous to a "bearing rail," as construed by this Court because no PHOSITA would consider a rod to be equivalent to a bearing. Dr. Giachetti asserts that Ziebell discloses a bearing rail as antifriction rolls that are supported by transverse rods. A PHOSITA would not combine transverse antifriction rolls of Ziebell with the lateral support rods of Schmidt to create a bearing rail. Given these logistical problems, the limitation in the '169 patent certainly would not be obvious to a PHOSITA reading Schmidt and Ziebell. As I have been instructed, using hindsight is impermissible in making an obviousness determination under 35 U.S.C. § 103. Here, it appears that the only reason to combine Schmidt and Ziebell is in light of the teaching of Woodway's disclosures in the '580 patent where Mr. Nicholas Oblamski articulates the potentially unwanted characteristic of unexpected running belt rotation in a curved treadmill.[75]

[74] Dkt. No. 76 at 8.
[75] *See* Declaration of Mr. Nicholas Oblamski dated August 11, 2014 at paragraphs 11-13.

610. In sum, it is my opinion that Schmidt in combination with Ziebell does not disclose, teach, suggest, or render obvious at least the limitation of "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" in independent claim 11.

611. Therefore, Schmidt in combination with Ziebell does not disclose, teach, or suggest "at least one bearing rail having a plurality of bearings" and a "running surface of the running belt [that] is supported by the top profile of the at least one bearing rail" as in claim 11 in a way that would render the limitation obvious to a PHOSITA.

2. Dependent claim 16 of the '169 patent is not obvious based on Ziebell in combination with Schmidt

612. Claim 16 recites "wherein the safety device comprises a one-way bearing." As a dependent claim, claim 16 includes all of the limitations from the claim or claims from which it depends. Therefore, claim 16 includes the limitations of claim 11. As such, claim 16 is not obvious for at least the reasons explained above with respect to claim 11.

613. Neither Schmidt nor Ziebell expressly or inherently disclose "wherein the safety device comprises a one-way bearing" as in claim 16 of the '169 patent.

614. Finally, Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 16. Thus, even if a safety device were disclosed by the combination, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation on said device required by claim 16 is met.

615. Therefore, it is my opinion Schmidt in combination with Ziebell does not disclose, teach, or suggest "wherein the safety device comprises a one-way bearing" as in claim 16 of the '169 patent.

3. Dependent claims 12-15 of the '169 patent are not obvious based on Ziebell in combination with Schmidt

616. Claims 12-15 depend from independent claim 11. Thus, because Schmidt in combination with Ziebell does not disclose, teach, suggest, or render obvious at least one limitation in claim 11, Schmidt in combination with Ziebell cannot therefore disclose, teach, suggest, or render obvious claims 12-15 of the '169 patent.

617. Dr. Giachetti does not provide any analysis in his "Dependent Claim Limitations" section regarding claim 15. Thus, even if all the limitations of the claims on which claim 15 depends were met, it does not necessarily follow (and Dr. Giachetti has not offered any evidence) that the further limitation required by claim 15 is met.

4. Lack of motivation to combine

618. In addition to the reasons I provided above that show a PHOSITA would not combine Ziebell with Schmidt, I note that Dr. Giachetti does not provide any motivation to combine this specific combination of references. While it is unclear what specific evidence Dr. Giachetti relies on to show a PHOSITA would be motivated to combine Schmidt and Ziebell, I have provided reasons why a PHOSITA would not combine these references.

VIII. SECONDARY CONSIDERATIONS

619. While not needed to support my opinions of non-obviousness for the patents-in-suit, the so-called "secondary considerations" further support my opinions that the asserted claims are not obvious.

620. As discussed in the March 30, 2017 Disclosure of Eric A. Weber Pursuant to Fed. R. Civ. P. 26(a)(2)(C), there is credible evidence that the Woodway curved, manual treadmills, including its CURVE and CURVE Trainer treadmills that practice various aspects of the '169 and '580 patents, are commercially successful.

621. Based on evidence I reviewed and as substantiated by Mr. Weber, it appears that Woodway first introduced what became known as its CURVE treadmill at the International Health, Racquet and Sportsclub Association ("IHRSA") trade show in San Francisco, California in March 2009. Following IHRSA 2009, Woodway began manufacturing and selling the CURVE treadmill and a line of curved, manual treadmills in various models and sizes world-wide. Woodway continues to manufacture and sell its line of curved, manual treadmills world-wide today.

622. As I understand it, in 2009, Woodway's first fiscal year in which the curved, manual treadmill was introduced, this treadmill amounted to approximately $25,000 worth of sales. Year over year, Woodway's sales of its line of curved, manual treadmills have grown to more than $7 million at the close of Woodway's fiscal year 2016. From introduction in March 2009 through January 2017, Woodway has sold and placed more than 7,000 curved, manual treadmills, which have a sales value of nearly $35 million.

623. According to Mr. Weber, Woodway's improvements to a curved, manual treadmill as commercially embodied in the Woodway products brought to market, have created, cultivated, and established the current market for curved, manual treadmills.

624. As Mr. Weber opined, one factor that contributes to the commercial success of Woodway's line of curved, manual treadmills is the use of a safety mechanism to control the running belt such that the running surface cannot both move toward the front of the unit and toward the back of the unit. Mr. Weber states "I am of the belief that others in the industry share that sentiment [that Woodway's line of curved, manual treadmills are commercially successful] and are attempting to copy Woodway's curved, manual products to capitalize on this success."

625. Also according to Mr. Weber, the CURVE treadmill has received numerous awards, including the 2010 FIBO Innovation Award, and it has been dubbed one of the "5 Best Cardio Machines on the Planet" by Men's Health. More recently, Woodway's CURVE Trainer was highlighted as a "Best New Treadmill for Runners" by Runner's World, the largest publication dedicated to running.

626. The fact that the inventions are commercially successful, praised by the industry as well as copied and/or closely emulated by others further supports my opinion that the asserted claims are not obvious.

IX. ANALYSIS OF THE GIACHETTI INDEFINITENESS ALLEGATIONS DIRECTED TO THE PATENTS-IN-SUIT

627. Dr. Giachetti opines that the term "support" – and its variants – in the asserted claims of both the '169 and '580 patents renders the claims invalid as indefinite. I disagree.

628. "Support" (and its variants) is commonly used in the claims of patents in the treadmill art according to its ordinary meaning. A search of the PTO website as of the date of this report for patents where both the words "treadmill" and "support" appear in the claims returned 413 patents (this is an incomplete count since patents prior to 1975 are not word-searchable on the PTO website).[76] Examples of such patents include many of the patents relied on by Chapco and Samsara in their invalidity contentions (*e.g.*, Socwell, Eschenbach, and Haber). The fact that so many treadmill patents use "support" in the claims shows to me that person skilled in the art consider "support" (and its variants) to be sufficiently definite for the purposes of defining the scope of a treadmill invention.

629. To a person of ordinary skill in the art, the plain and ordinary meaning of "support" and its related terms indicate some type of weight-bearing relationship, where the

[76] This likely also is a low estimate as many patents in the treadmill art do not use the term "treadmill" in the claims, but instead refer to, for example, "an exercise device" (*e.g.*, Abelbeck) or "apparatus" (*e.g.*, Magid, Schönenberger).

support may be provided directly, may be provided indirectly, may bear some of the weight of another component, and/or may bear all of the weight of another component. The ordinary meaning of "support" (and its variants) is sufficient to inform with reasonable certainty those skilled in the art about the scope of Woodway's inventions. *See* Weber's New World College Dictionary ("to carry or bear the weight of; keep from falling, slipping or sinking; hold up"); The American Heritage College Dictionary ("To bear the weight of, esp. from below…to be capable of bearing; withstand").

630. In my opinion, it is apparent from a review of the claims and the specifications of both of the '169 and '580 patents, Woodway's use of "support" comports with plain and ordinary meaning and clearly indicates the scope of the claims. Woodway purposefully used the term "support" as an adjective (*e.g.*, support member, support structure) and as a verb (*e.g.*, supported). As an adjective, the term "support" designates a characteristic of the modified noun. For example, a person of ordinary skill in the art would readily understand that "support structure" or "support member" refer to a structure or component capable of holding all or part of the weight of an object. As a verb, the term "support" designates a function of an element. For example, a "rear shaft assembly supported by the frame," ('169 patent, claim 11), refers to the frame being capable of holding all or part of the weight of the rear shaft assembly.

631. The prosecution histories further bolster my opinion. Neither the prosecution history of the '169 patent nor the prosecution history of the '580 patent includes any indefiniteness rejection with respect to the term "support." The PTO did not find any reason to conclude that the "support-related" terms were indefinite; I agree.

632. Dr. Giachetti's indefiniteness analysis is flawed and should not supersede the findings of the PTO. As an initial matter, Dr. Giachetti examines the "support-related" terms for

indefiniteness in isolation and divorced from their entirety of the relevant claim. It is my understanding that in reviewing a claim for indefiniteness, the claim as a whole must be considered to determine whether the claim apprises one of ordinary skill in the art of its scope.

633. Contrary to Dr. Giachetti's suggestion, for a patent to avoid a finding of indefiniteness, absolute precision or mathematical precision is not required. Instead, as I understand it, for a patent to be indefinite, its claims, read in light of the specification and the prosecution history, must fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention. Here, the claims, when read in light of the specification and the prosecution history, provide objective boundaries for those of skill in the art. Based on the disclosures in the patents-in-suit, it is my opinion that a person of ordinary skill in the art can translate the definition of "support" (and its variants) into meaningfully precise claim scope. It is my belief that a person of ordinary skill in the art would understand Woodway's use of the term "support" (and its variants) to mean "holding all or part of the weight of an object."

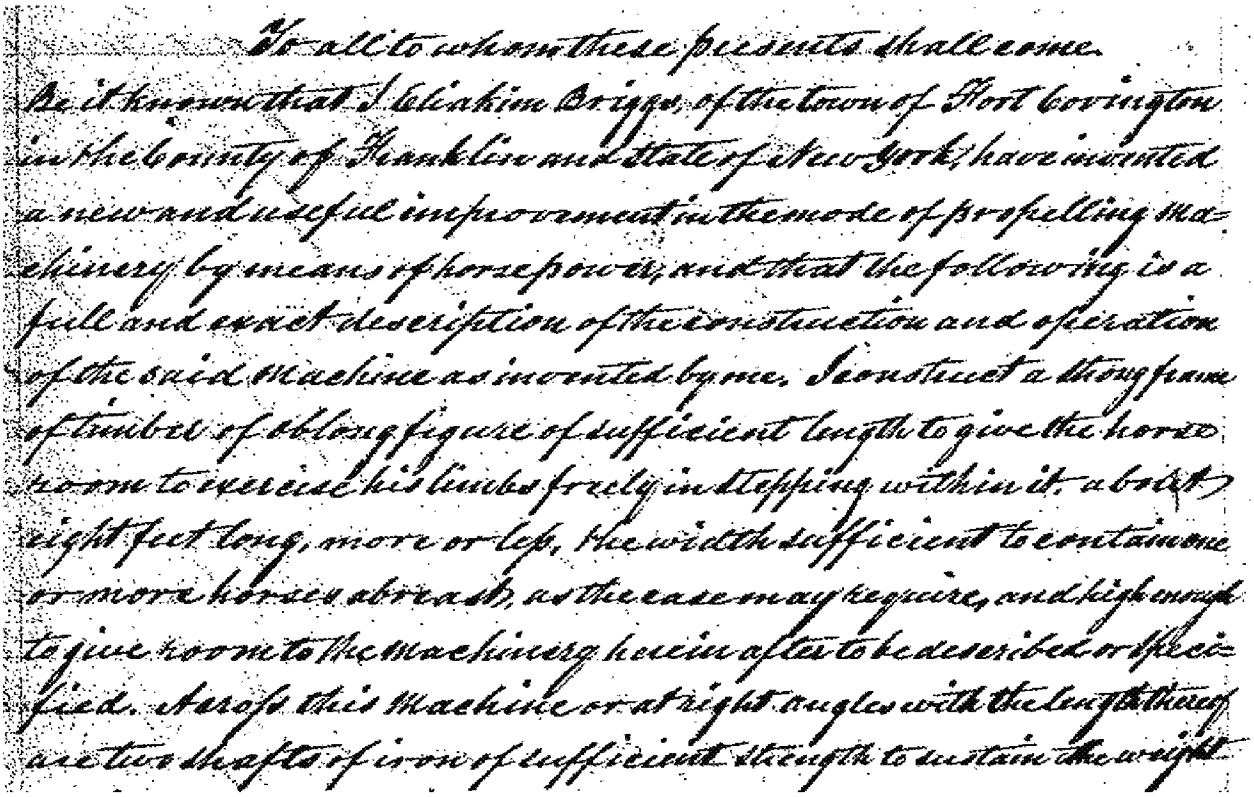
X. ADDITIONAL REFERENCES IN THE GIACHETTI OPENING REPORT

634. In addition to the references and combinations of references that were alleged as either anticipating or rendering obvious certain asserted claims, the Giachetti Opening Report cites to a number of other references seemingly for the general proposition that these references disclose certain treadmill components. While I am not certain what opinions, if any, Dr. Giachetti is offering with respect to these references, as discussed below, my review and consideration of these references does not change my opinions that the asserted claims of the patents-in-suit are neither anticipated nor rendered obviousness.

A. U.S. Pat. No. X8308 ("Briggs")

635. As a preliminary matter, Dr. Giachetti relies on Briggs despite the fact that there is no printed specification available corresponding to this patent. I have based my analysis on

the handwritten specification that is provided by the PTO, and my analysis has been limited accordingly. An example of the incomprehensible specification is provided below.



To all to whom these presents shall come.
Be it known that I Eliakim Briggs, of the town of Port Covington
in the County of Franklin and State of New York, have invented
a new and useful improvement in the mode of propelling ma-
chinery by means of horse power, and that the following is a
full and exact description of the construction and operation
of the said Machine as invented by me. I construct a strong frame
of timber of oblong figure of sufficient length to give the horse
room to exercise his limbs freely in stepping within it, about
eight feet long, more or less, the width sufficient to contain one
or more horses abreast, as the case may require, and high enough
to give room to the machinery herein after to be described or speci-
fied. Across this Machine or at right angles with the length thereof
are two shafts of iron of sufficient strength to sustain the weight

Briggs, at p. 1.

636. Dr. Giachetti cites to Briggs in his section regarding "at least one bearing rail having a plurality of bearings, a running belt supported by the bearing rail and at least partially disposed about the front and rear shafts."

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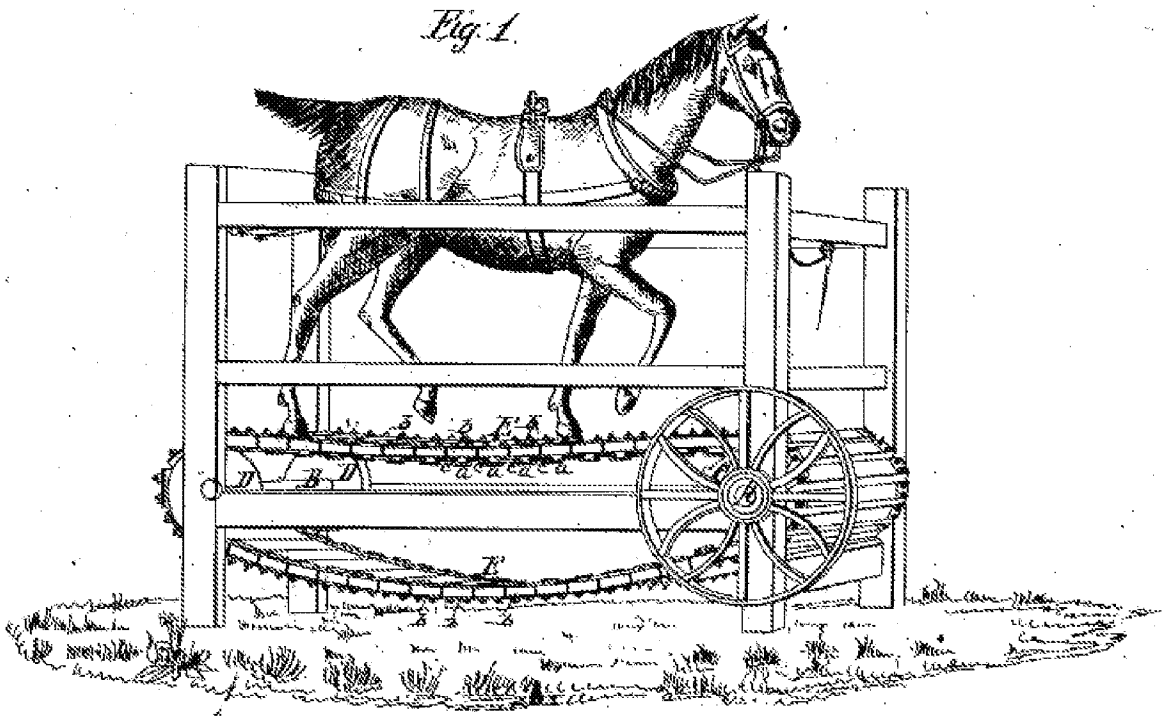

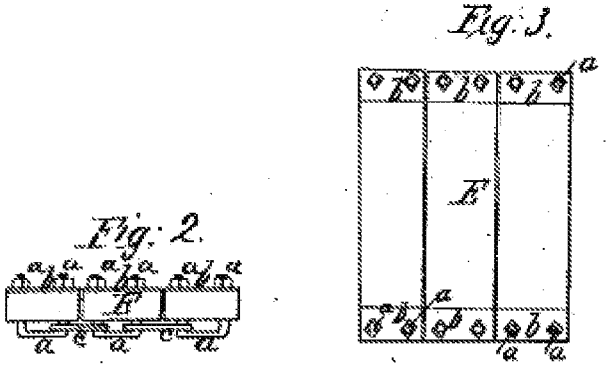

637. However, it is apparent from Fig. 1 that there is no bearing rail and that the belt is supported by its own linking apparatus. Fig. 2 discloses this linking apparatus (a & c), which from what I can discern, prevents the belt from bending.

638. Additionally, in his section regarding "a device to ensure unidirectional movement of the belt," Dr. Giachetti cites to Briggs as disclosing a flywheel "to ensure consistent and expected movement of the belt." However, a PHOSITA would not understand a flywheel to be analogous to a one-way bearing. As Dr. Giachetti himself notes, a flywheel is

designed to ensure consistent movement of the belt. However, a heavy inertia-based component such as a flywheel does not ensure unidirectional movement. It does not prevent movement in either direction, and instead resists changes in velocity based on the direction the wheel is turning. The belt in Briggs is free to move in either direction.

639. Finally, Dr. Giachetti neither provides any evidence regarding why a PHOSITA would combine a handwritten description to an animal powered machine for translating mechanical energy with any other cited patent nor does he suggest any specific combination that would render any asserted claim obvious. In this regard, Briggs appears to be non-analogous art to the claims of the '169 and '580 patents. The field of the '169 and '580 patents is treadmills for human use. A focus of at least some of the claims of these patents is on a safety device for a manual powered treadmill having a curved running surface. A problem addressed by these patents is how to provide safety to a user as he/she mounts the treadmill. Briggs, like Ziebell (discussed above), is neither related to the field of the patents-in-suit(Treadmills for Human Use vs. Animal Power Extraction)) nor reasonably pertinent to a problem addressed by the patents-in-suit(providing safety to a user as he/she mounts the treadmill vs. a belt for supporting the horse while extracting power from the horse).

640. Therefore, it is my opinion that Briggs is non-analogous art to the '580 and '169 patents.

B. U.S. Pat. No. 411,986 ("Frazeur")

641. Dr. Giachetti cites to Frazeur in his section regarding "at least one bearing rail having a plurality of bearings, a running belt supported by the bearing rail and at least partially disposed about the front and rear shafts."

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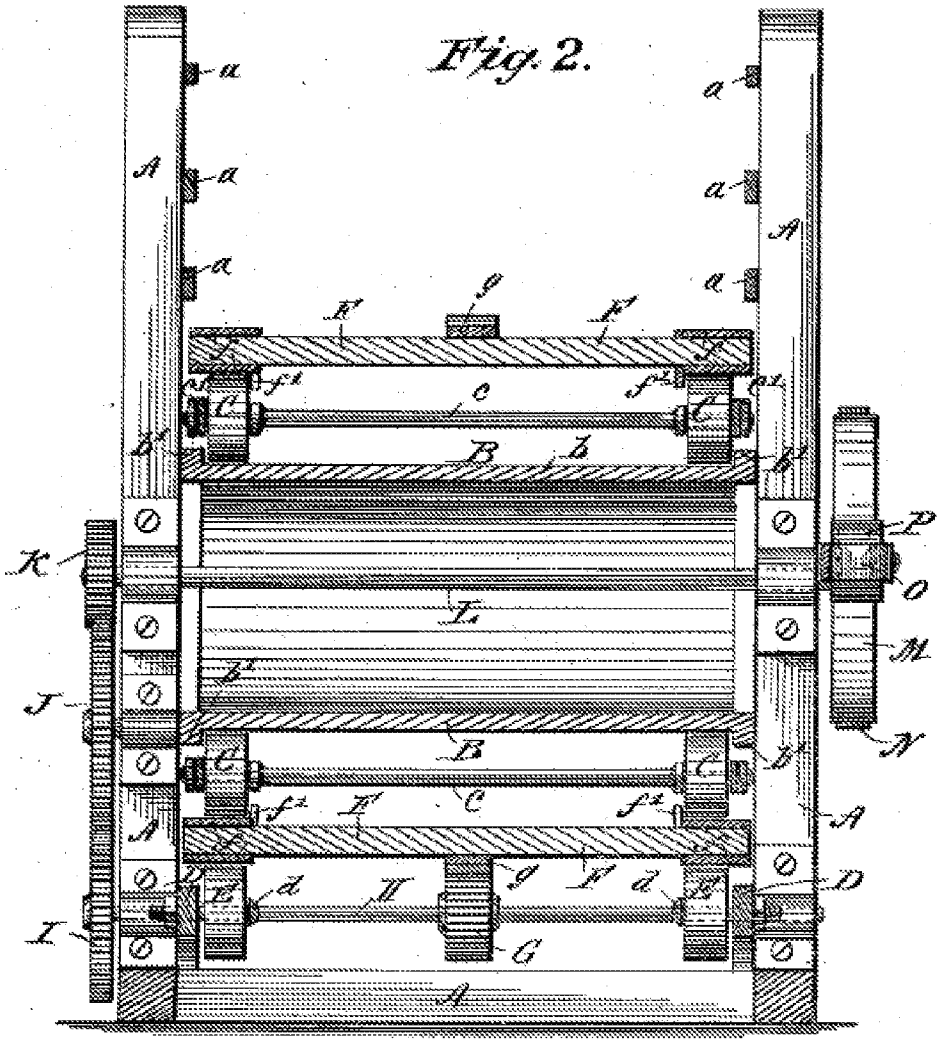

642. However, it is apparent from Fig. 2 that there is no bearing rail because the alleged bearings (C) are not attached to the surface (B). As Dr. Giachetti admits, the alleged bearings move around the track. Therefore, a PHOSITA would not understand component B to be a bearing rail "having a plurality of bearings."

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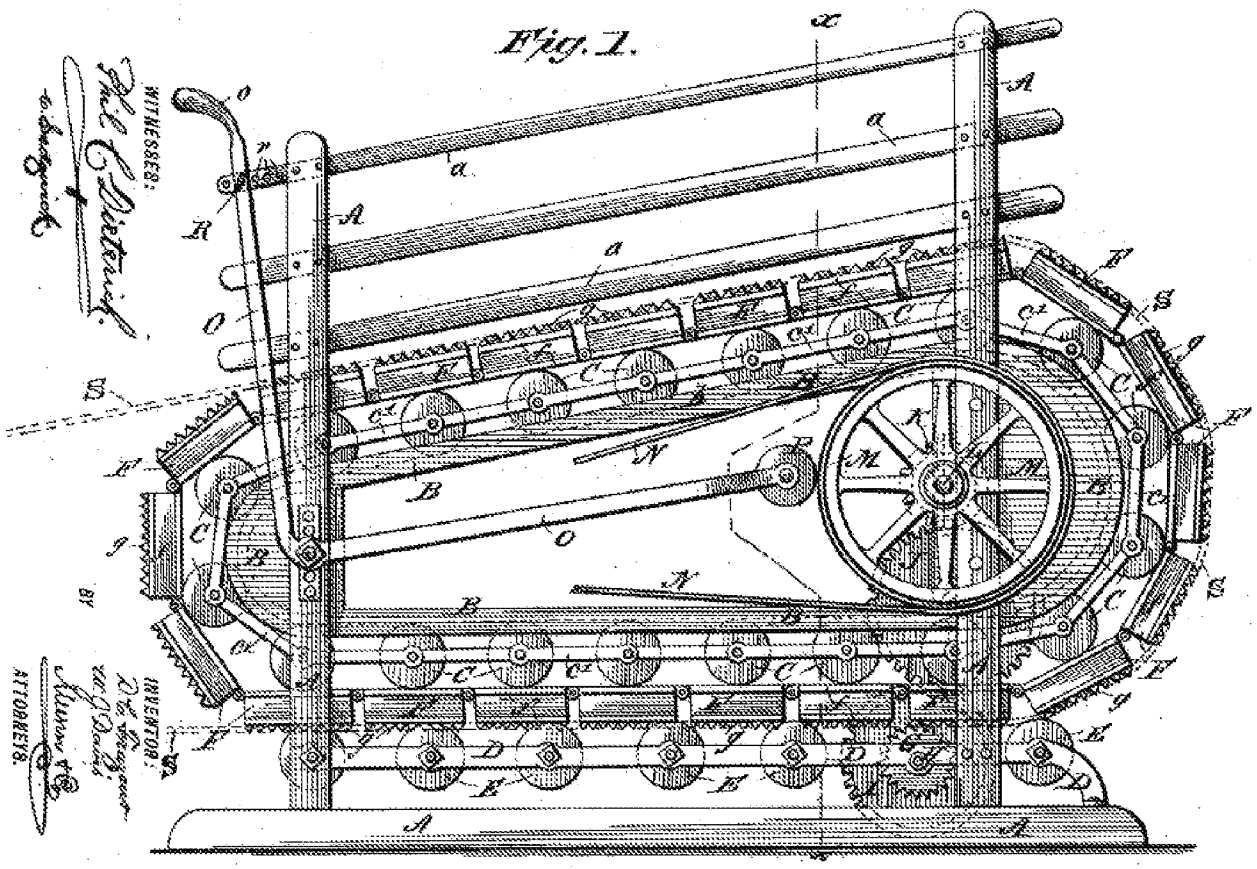


643. Additionally, in his section regarding "a device to ensure unidirectional movement of the belt," Giachetti cites to Frazeur as disclosing a brake-wheel (P) and handbrake (O) to "stop the running belt from moving." However, a PHOSITA would not understand a brake to be analogous to a one-way bearing. The disclosed brake-wheel was designed for an attendant to regulate pressure directly to the fly-wheel (M), to accommodate the work being done or the strength of the animal operating the machine. The brake-wheel may be in constant contact with the fly-wheel or entirely clear from it, in order to regulate the speed of the machine. Importantly, Frazeur does not contemplate any means for preventing the track from moving in more than one direction. When engaged, the brake-wheel will either restrict the maximum speed that the track can achieve, in either direction, or will prevent the track from moving at all, in

either direction. Frazeur does not allow rotation of the track in one direction while prohibiting rotation in the other.

644. Dr. Giachetti notes that Frazeur teaches a brake, but fails to describe how the brake works. The brake-wheel employs friction in order to regulate the speed of the track, rather than prevent it from rotating in one direction while allowing rotation in the other direction. Therefore, based on my review of Frazeur, Frazeur does not include any teachings or suggestions that would be applicable to one-way bearings. A PHOSITA would not have any instruction from Frazeur that would address restricting a running belt to one-way movement. A focus of the '169 and '580 patents is how to restrict the rotation of the running belt and the resulting movement of the running surface to one direction. The '169 and '580 patents disclose a solution to this problem.

645. Moreover, the brake-wheel disclosed in Frazeur was not designed to be a safety mechanism, but instead a means for regulating the power transferred from the fly-wheel to the coupled machine. In contrast, with curved exercise treadmills for humans, there is an increased chance of unexpected running belt rotation in reverse direction when people mount the treadmill from the rear. The '169 and '580 patents provide a solution in the form of a safety device that may be coupled to one of the front and rear shafts to prevent rotation of the running belt in one direction. In this regard, Frazeur does not teach or suggest any feature that could be considered analogous to the "safety device" of the'169 and '580 patents.

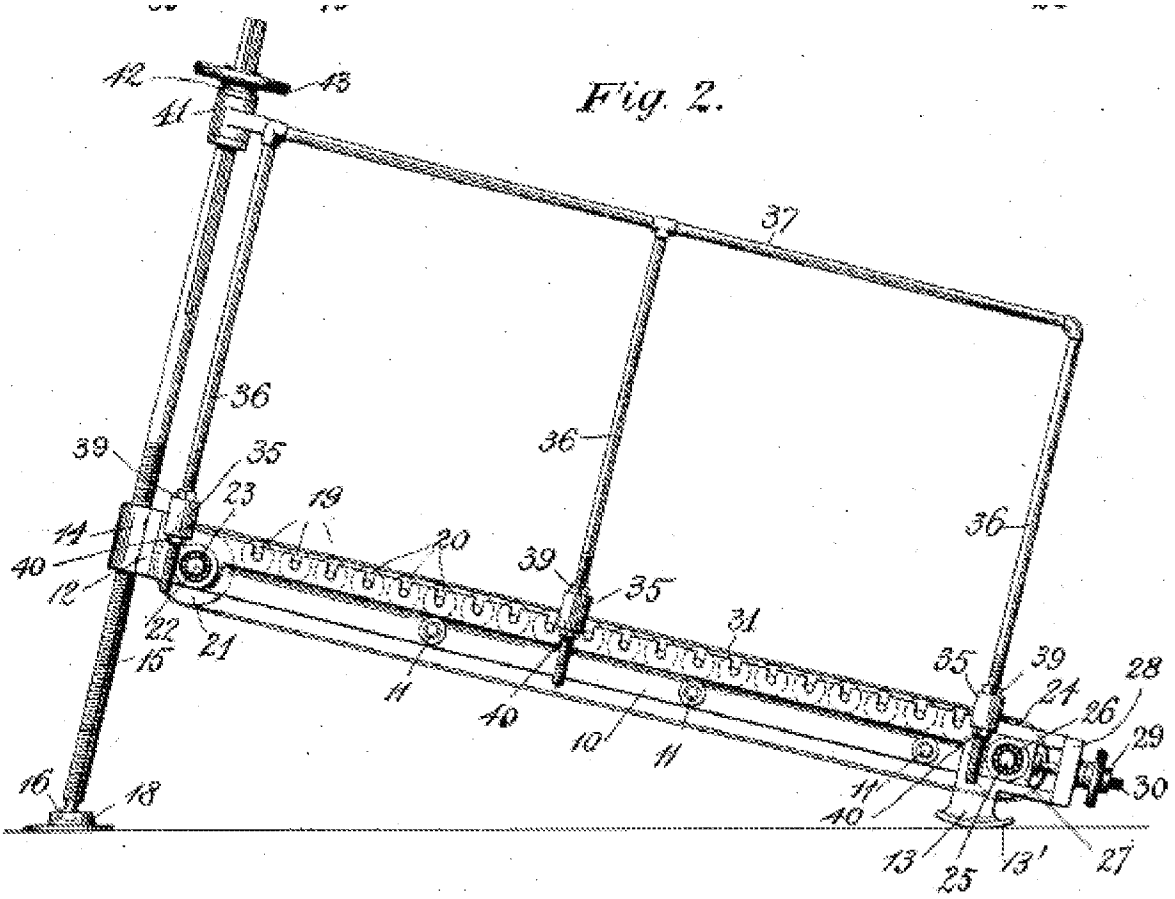
646. Finally, Dr. Giachetti neither provides any evidence regarding why a PHOSITA would combine a patent to an animal powered machine for translating mechanical energy with any other cited patent nor does he suggest any specific combination that would render any asserted claim obvious.

C. U.S. Pat. No. 5,669,856 ("Liu")

647. In his section regarding "a device to ensure unidirectional movement of the belt," Dr. Giachetti cites to Liu. However, Dr. Giachetti neither provides any evidence regarding why a PHOSITA would combine a split-surface stepping exercise machine with any other cited patent nor does he suggest any specific combination that would render any asserted claim obvious. Indeed, a PHOSITA would not combine the unidirectional mechanism disclosed in Liu with any other asserted prior art reference because, as noted above, there would be no motivation to combine where Liu is a flat surface. Therefore, without evidence regarding how Liu discloses each and every limitation of the asserted patents, or without evidence pointing to any combination that would do the same, a PHOSITA would not conclude that the patents-in-suit are either anticipated or obvious.

D. U.S. Pat. No. 759,296 ("Morairty")

648. Dr. Giachetti cites to Morairty regarding dependent claim 14 and independent claim 19 of the '580 patent.



649. However, Dr. Giachetti neither provides any evidence regarding why a PHOSITA would combine a planar treadmill with any other cited patent nor does he suggest any specific combination that would render any asserted claim obvious. Therefore, without evidence regarding how Morairty discloses each and every limitation of the asserted patents, or without evidence pointing to any combination that would do the same, a PHOSITA would not conclude that the patents-in-suit are either anticipated or obvious.

E. U.S. Pat. No. 4,389,047 ("Hall")

650. Dr. Giachetti cites to Hall in his section regarding "Motivation to Combine References." However, Dr. Giachetti neither provides any evidence regarding why a PHOSITA would combine a cylindrical mill-wheel with any other cited patent nor does he suggest any specific combination that would render any asserted claim obvious. Moreover, he does not cite

to Hall regarding any of the limitation subsections in the "Comparison of the Prior Art to the Asserted Claims" section. Therefore, without evidence regarding how Hall discloses each and every limitation of the asserted patents, or without evidence pointing to any combination that would do the same, a PHOSITA would not conclude that the patents-in-suit are either anticipated or obvious.

XI. RESERVATIONS

651. Just as with my initial report, I have been advised by counsel for Woodway that the parties in the litigation are under a continuing obligation to supplement any discovery that has been provided during this litigation. Therefore, because new materials or information may become available which could further support or modify the conclusions that I have reached to date, I expressly reserve the right to amend, expand, add, supplement, change, alter, or otherwise modify my opinions disclosed herein. Any changes or necessary amplification of my opinions and conclusions will be addressed in supplemental reports or testimony, which I reserve the right to provide.

652. If requested, I will provide a supplemental expert report to address areas of rebuttal testimony raised by expert opinions and reports of Chapco and/or Samsara.

653. Further, I reserve the right to consider and comment on any supplemental expert reports or statements and testimony of any Chapco and/or Samsara expert(s) in this matter.

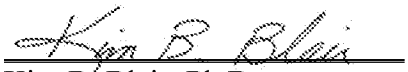
654. As provided in my initial report, if I am called to testify, I expect and intend to use exhibits and demonstratives relating to the subject matter of my testimony. These exhibits and demonstratives may include portions of the materials included in this report as well as diagrams, models, photographs, or physical samples of the structures described in those items. Portions of these documents may be enlarged, colored, or otherwise adapted to illustrate my

opinions. I may also rely on demonstrative exhibits, and summaries that have not yet been prepared.

XII. SIGNATURE

I hereby certify under the penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Date: March 30, 2017



Kim B. Blair, Ph.D.

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC,	)	
Plaintiff,	)	
vs.	)	Case No. 3:15-CV-01665-JCH
WOODWAY USA, INC.,	)	
Defendant.	)	

WOODWAY USA, INC.'S OPPOSITION TO PLAINTIFFS' MOTION FOR PARTIAL RECONSIDERATION

4822-6568-7141

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Plaintiffs' Motion for Partial Reconsideration regarding the exclusion of the Schmidt reference[1] should be denied for at least four reasons. To rule to the contrary, **first**, Woodway USA, Inc. ("Woodway") will be unfairly prejudiced. Woodway has relied on the Court's September 26, 2017 rulings on summary judgment and the Motions to Strike Dr. Giachetti, which Plaintiffs did not question at the time.[2] The last minute, nearly six month adjournment of the trial date cannot eliminate the significant expenditure of Woodway's time and resources and the strategic decisions that were made to streamline the case. Plaintiffs' addition of Schmidt now contemplates more expert discovery and motion practice at further cost to Woodway. Permitting Plaintiffs a redo of expert discovery and another bite at summary judgment is not only unfairly prejudicial to Woodway, but a waste of the Court's and the parties' resources.

Second, Plaintiffs' Motion requires unpacking the Court's summary judgment and Motion to Strike decision. The Court will need to revisit a host of issues that have been settled since September 2017. Because Schmidt was excluded, the Court did not take up the substance of Woodway's *Daubert* challenge that Dr. Giachetti failed to provide opinions

[1] U.S. Patent No. 1,211,765 ("Schmidt").

[2] More than two hundred days after the Court entered its ruling regarding the parties' cross-motions for summary judgment and Woodway's Motion to Strike Portions of Dr. Giachetti's Expert Report and Declaration submitted in connection with Plaintiffs' motion for summary judgment of invalidity, (Dkt. No. 144), Plaintiffs request that the Court reconsider its decision and allow Dr. Giachetti to provide an invalidity opinion based on Schmidt. This District's Local Rule regarding motions for reconsideration requires such motions "be filed within seven (7) days of the filing of the decision or order . . . and shall be accompanied by a memorandum setting forth concisely the controlling decisions or data the Court overlooked." D. Conn. L. Civ. R. 7(c)(1). Plaintiffs' Motion for Partial Reconsideration is 216 days past that deadline and contains neither controlling decisions nor data the Court overlooked.

regarding Schmidt on a claim-element by claim-element basis.[3] In addition, the exclusion of Schmidt as untimely guided the Court's decision to preclude Woodway from advancing an indirect infringement theory against Chapco, Inc. ("Chapco"). (Dkt. No. 144 at 8-10.) Should the Court permit Schmidt, the equities that Plaintiffs are focused on demand that Woodway be given an opportunity to assert its indirect infringement theory against Chapco.

Third, Plaintiffs' Motion endorses a continued violation of the Scheduling Order and allowance of Plaintiffs' shifting sands approach to their invalidity challenge of the '580 patent. Plaintiffs' Motion is an improper attempt to advance new theories of invalidity for the '580 patent by adding two Schmidt obviousness combinations that were never before detailed or disclosed prior to the filing of Plaintiffs' Motion – Schmidt plus Chickering and/or Schmidt plus Magid.[4] (Dkt. No. 248 at 1.) Woodway does not have any claim by claim explanation from Plaintiffs or Dr. Giachetti that provides how any of these references purportedly combine or why a person of ordinary skill in the art would be motivated to combine. Because these obviousness combinations were not detailed in Plaintiffs' Initial or Supplemental Invalidity Contentions or in Dr. Giachetti's March 2, 2017 report regarding the '580 patent, (Ex. A at 2; Ex. B at 2; Ex. C at 3-4), they should be rejected. *See SPGGC, Inc. v. Blumenthal*, 408 F. Supp. 2d 87, 91 (D. Conn.

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[3] Plaintiffs' motion for summary judgment that all of the asserted claims of U.S. Patent No. 9,039,580 ("the '580 patent") are invalid as obvious in light of Socwell combined with Chickering, Magid, and/or Schmidt will **not** need to be revisited. (Dkt. No. 144 at 36-37.) "[T]he court cannot conclude that the plaintiffs have shown, by clear and convincing evidence, that the patents were obvious in light of the prior art because they have not demonstrated that a person having ordinary skill in the art would be properly motivated to combine the disparate references." (*Id.* at 37.) "The court also cannot make a determination of the validity of the patent[] where there exists a material dispute as to who qualifies as a person or ordinary skill in the art." (*Id.*) These issues are not implicated by Plaintiffs' Motion.

[4] These two theories are in addition to the Schmidt plus Zeibell combination that was struck on summary judgment as untimely and also subject to this Motion. (Dkt. No. 248 at 1.)

2006) ("A motion for reconsideration may not be used to plug gaps in an original argument or to argue in the alternative once a decision has been made.").

Fourth, there is no alleged parity that mandates reconsideration. The Court's application of the *Outley* factors in evaluating Plaintiffs' untimely and deficient disclosure of the Schmidt reference demands exclusion. The Court's application of *Outley* to different facts and circumstances on Woodway's Motion for Leave to Supplement its expert reports to timely address the development of new facts relevant to a narrow damages issue, however, is supported.

Plaintiffs' Motion tries to relitigate an issue that has already been decided, with which Plaintiffs disagree. But this falls far short of the strict standards for granting a motion for reconsideration. *See, e.g., Archibald v. City of Hartford*, 274 F.R.D. 371, 382-83 (D. Conn. 2011) ("The standard for granting a motion for reconsideration is strict. [] Such a motion 'will generally be denied unless the moving party can point to controlling decisions or data that the court overlooked – matters, in other words, that might reasonably be expected to alter the conclusion reached by the court.'") (quoting *Horsehead Res. Dev. Co., Inc. v. B. U.S. Envtl. Servs., Inc.*, 928 F. Supp. 287, 289 (S.D.N.Y.1996)). And, the other reasons Plaintiffs give – that circumstances have changed because Woodway has dismissed some claims against Plaintiffs, Plaintiffs' eve-of-trial introduction of the GenIII, and the Court's decision to adjourn the trial date to accommodate a criminal matter and discovery and summary judgment motions to address the GenIII – are not a basis for the Court to grant reconsideration. None of these issues were before the Court at the time of its decision and, therefore, do not justify reconsideration. *Connecticut Com'r of Labor v. Chubb Grp. of Ins. Companies,* No. 3:11CV00997 AWT, 2013 WL 836633, at *1 (D. Conn. Mar. 6, 2013), aff'd (Feb. 3, 2014) ("A motion for reconsideration

may not be used to advance new facts, issues or arguments not previously presented before the Court . . . .").

Plaintiffs' Motion for Partial Reconsideration should be denied. There is no manifest injustice in precluding Plaintiffs and Dr. Giachetti from relying on the Schmidt reference.[5] It is unnecessary for the Court to reconsider its ruling regarding Schmidt and to do so would result in unfair prejudice to Woodway and create additional problems and issues for the orderly resolution of the parties' dispute.

I. RECONSIDERATION IS UNFAIRLY PREJUDICIAL TO WOODWAY

The additional time to trial cannot cure the unfair prejudice to Woodway if Plaintiffs' Motion is indulged and Dr. Giachetti is permitted to offer opinions regarding Schmidt. (*See* Dkt. No. 249 at 6.) While more time would permit Woodway to take further discovery regarding Schmidt and Plaintiffs' newly-minted arguments, Plaintiffs fail to address the prejudice Woodway would suffer as a result of its reliance on the Court's September 26, 2017 Ruling precluding Schmidt. Woodway has proceeded for over 200 days preparing for trial with its witnesses and experts and in the preparation and submission of its pretrial disclosures based on the exclusion of Schmidt (and other summary judgment rulings).

Further, over the last seven months, Woodway has also made strategic decisions to streamline this case based on the Court's Ruling regarding Schmidt. Indeed, Woodway moved to dismiss certain infringement claims ***with prejudice*** based on the Court's Ruling, which the Court has granted. (Dkt. Nos. 244, 246.) It is difficult to understand, and Plaintiffs do not

[5] The sole grounds for Plaintiffs' Motion appear to be that reconsideration is warranted to prevent manifest injustice. (Dkt. No. 249 at 2.) Plaintiffs do not claim – likely because they cannot – that there is an intervening change of controlling law, the availability of new evidence, or the need to correct a clear error. (*Id.* citing *Roman v. Leibert*, No. 16-cv-1988 (JCH), 2017 WL 4286302, at *1 (D. Conn. Sept. 27, 2017) for the reconsideration standard).)

explain, how this purported change in the "substance of this case," (Dkt. No. 249 at 1), justifies introducing Schmidt back into the litigation to make the trial longer and more complicated.

Moreover, permitting Schmidt now forces Woodway into one of two undesirable choices. Option 1 is to take another deposition of Dr. Giachetti and ask questions that allow him to backfill the deficiencies in his report, explaining on a claim by claim basis how and why Schmidt in combination with either Chickering, Magid, or Ziebell renders particular claims of the '580 patent invalid. At this point, Dr. Giachetti has had Dr. Blair's rebuttal report in hand for more than a year with a clear roadmap to the problems with the proposed obviousness combinations, which is an issue on which Plaintiffs bear the burden of proof. Plaintiffs should have articulated this position first without the benefit of Dr. Blair's criticism of Schmidt. Option 2 is to stay in the dark about the bases for Dr. Giachetti's opinions so Plaintiffs cannot bolster the deficiencies. Going this route may result in a continued moving target regarding Schmidt. Both Options 1 and 2 are unfairly prejudicial to Woodway.

Dr. Giachetti's previous deposition testimony offers no cure to Woodway's prejudice. In deposition, Dr. Giachetti provided no illumination about the Schmidt reference, but merely exposed the insufficiencies of his opinions. This deposition testimony confirmed that Plaintiffs did not disclose Schmidt in their invalidity contentions and that there was no claim-element by claim-element analysis of this reference. (Ex. D at 199:16-201:13, 201:21-202:7, 204:24-205:17.) In deposition, Woodway also confirmed that Dr. Giachetti did not perform a proper analysis of the claim language with Schmidt, but rather applied his paraphrases of the limitations. (*Id.* at 286:12-287:16.) It was this deposition testimony combined with Dr. Giachetti's March 2, 2017 report that formed the bases for Woodway's Motion to Strike.

Woodway should not have to spend additional resources chasing down Plaintiffs' theories regarding Schmidt. To do so, is unfairly prejudicial. As the Court stated, "although it might be feasible to reopen discovery, it would lead to increased costs to both parties." (Dkt. No. 144 at 29.) The Court was clear – "Plaintiffs unexplained failure to disclose a known piece of prior art as a basis for invalidity should not cause additional costs to Woodway." (*Id.*) To this day, Plaintiffs have not offered any explanation for their failure to disclose Schmidt in the time required by the Court. Plaintiffs ignore this point entirely in their Motion. Their attempt to deflect blame to Woodway on this issue should be rejected.

Further, as the Court previously noted, it is of "no moment" that Woodway was aware of the Schmidt reference on March 2, 2017 when Plaintiffs first identified it as a bases for an invalidity argument. (Dkt. No. 144.) Of course Woodway knew about Schmidt. It was part of the prosecution history of the '580 patent and a reference the Examiner at the Patent Office considered in granting the '580 patent. (Dkt. No. 1-2 at cover.) In addition, Plaintiffs referenced Schmidt in their Complaint, (Dkt. No. 1 at ¶ 11), but they never identified why or how this 1917 reference was relevant to any invalidity argument until Dr. Giachetti's March 2, 2017 report, which has its substantive problems in its treatment of Schmidt. Dr. Blair's rebuttal report regarding Schmidt was limited to the meager disclosure by Dr. Giachetti; Dr. Blair did not have the benefit of any claim charts addressing Schmidt. Had Plaintiffs timely made their theories regarding Schmidt available at an earlier point, Woodway and Dr. Blair may have been able to prepare a more thorough analysis, which Dr. Blair acknowledged. (Ex. E at 196:24-197:11.) The Court previously agreed, stating "Dr. Blair's ability to write a rebuttal report does not speak to the cogency of that report, and whether he could have prepared a more thorough analysis if he had been aware of the plaintiffs' theories at an earlier point." (Dkt. No. 144 at 27.) Knowing

about Schmidt does not change the defects in Dr. Giachetti's opinions or otherwise provide sufficient information about the new Schmidt obviousness combinations Plaintiffs are now advancing.

Finally, Plaintiffs appear poised to use the re-introduction of Schmidt to justify an additional motion for summary judgment challenging the validity of the '580 patent. Plaintiffs contend that "invalidity will be a key focus of the upcoming summary judgment filing." (Dkt. No. 249 at 6.) Plaintiffs argue further that "Dr. Blair's infringement analysis of GenIII in the context of claim 25 brings the question of the validity of that method claim back to the forefront, and Plaintiffs should be permitted to offer invalidity positions that include Schmidt." (*Id.* at 7.) However, claim 25 has been part of this case since the beginning, and Plaintiffs have already moved for summary judgment that all asserted claims of the '580 patent are invalid, which the Court has denied. (Dkt. No. 144 at 2-3, 22-41.) Woodway should not have to bear the expense of opposing another motion on this issue.

The sole purpose of the upcoming summary judgment filings is to address infringement of claim 25 by Plaintiffs' GenIII treadmill that was introduced on the eve-of-trial. Infringement and invalidity are separate issues. While claim construction is a necessary part of both invalidity and infringement analyses, after the claims are properly construed, the two issues are completely unrelated. To determine infringement, "the ***properly construed claims are compared to the accused device*** to determine if all of the claim limitations are present." *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454 (Fed.Cir.1998) (*en banc*) (emphasis added). While invalidity "requires a ***comparison of the properly construed claim to the prior art*** . . . ." *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010) (emphasis added). In short, a comparison to the GenIII is not related to a comparison to the prior art and the issues of infringement and validity are separate issues and analyses unto themselves. Plaintiffs' introduction of a new infringing

treadmill should not open the door for Plaintiffs to relitigate the alleged invalidity of claim 25 of the '580 patent. *See Chubb*, 2013 WL 836633 at *1 ("It is also not appropriate to use a motion to reconsider solely to re-litigate an issue already decided.").

* * * * *

Plaintiffs' arguments regarding the purported lack of prejudice cannot be squared with the facts and circumstances of this case and should be given little weight. Plaintiffs' Motion should be denied for at least this reason.

II. RECONSIDERATION WOULD REQUIRE REVISITING ISSUES PREVIOUSLY ADDRESSED ON SUMMARY JUDGMENT

When Plaintiffs' raised the idea of reconsideration of the Ruling regarding summary judgment and Woodway's Motions to Strike, the Court asked of Plaintiffs' counsel "If I undid that ruling for purposes of trial, is it your position it would open up any aspect of the rulings I made on summary judgment?" (Apr. 30, 2018 Tr. at 414:9-11.) Plaintiffs' counsel unequivocally responded "No." (*Id.* at 414:12.) The present Motion suggests otherwise.

First, if the Schmidt reference is permitted, the Court will need to evaluate and rule on the merits of Woodway's *Daubert* motion challenging the sufficiency of Dr. Giachetti's opinions. In Woodway's Motion to Strike Portions of Dr. Giachetti's Expert Report, (Dkt. No. 91), Woodway argued that Dr. Giachetti's opinions were not adequately supported, not simply that Schmidt was untimely disclosed. The Court did not rule on Woodway's *Daubert* challenge as it was unnecessary to address it once Schmidt was excluded. If Schmidt becomes part of the case, these issues will have to be addressed.

Second, the exclusion of Schmidt appeared to motivate the Court's exclusion of Woodway's indirect infringement allegations against Chapco on summary judgment. (Dkt. No. 144 at 8-10.) Should the Court reconsider its decision regarding Schmidt, it would be unfairly

prejudicial for Woodway to continue to have its indirect infringement allegations against Chapco excluded. Prior to the close of fact discovery, Plaintiffs were on notice of Woodway's theory of indirect infringement through Woodway's interrogatory response even though inducement was not included in Woodway's infringement contentions. If Plaintiffs are allowed to advance an invalidity theory based on Schmidt that they did not timely disclose in their invalidity contentions, then Woodway should likewise be allowed to advance its theory of indirect infringement that was not included in Woodway's infringement contentions. This additional infringement claim will require a modest addition to the jury instructions, but not any more witness testimony or complexities not otherwise contemplated by the alter ego theory of liability against Chapco.

III. PLAINTIFFS ATTEMPT TO ADVANCE NEW INVALIDITY THEORIES PREMISED ON SCHMIDT

Invalidity will be an issue at trial, but it should be limited to the specific combinations of prior art references previously disclosed and subject to expert testimony. Plaintiffs are wrong that allowing Dr. Giachetti to offer expert testimony on Schmidt will not expand the scope of the trial. Through this Motion, Plaintiffs attempt to introduce two completely new theories of invalidity for the '580 patent. More specifically, Plaintiffs request reconsideration of the Court's preclusion of the "theories of obviousness based on combinations of Schmidt and Chickering, Schmidt and Magid, or Schmidt and Ziebell." (Dkt. No. 248 at 1.) This is the first time that Plaintiffs have alleged any invalidity theory for the '580 patent based on the combinations of Schmidt and Chickering or Schmidt and Magid. These are not combinations in either Plaintiffs' invalidity contentions or Dr. Giachetti's March 2, 2017 report for the '580 patent. (*See* Ex. A at 2; Ex. B at 2; Ex. C at 3-4.)

Adding new combinations now is unfairly prejudicial. It will require Woodway to prepare and serve another rebuttal report addressing Schmidt and Chickering or Schmidt and Magid. This is particularly troublesome because Plaintiffs have not even identified which claims of the '580 patent are implicated by these combinations or otherwise identified any motivation to combine. Regardless, even procedurally, this is improper. Plaintiffs' request to advance new theories is inappropriate on a motion for reconsideration and should be rejected at least on that basis. *See Chubb*, 2013 WL 836633 at *1 ("A motion for reconsideration may not be used to advance new facts, issues or arguments not previously presented before the Court . . . .")

IV. THERE IS NO PARITY THAT DEMANDS RECONSIDERATION OF THE DECISION TO EXCLUDE SCHMIDT

A. Woodway's Motion to Strike Portions of Dr. Giachetti's Report Was a Daubert Motion

Plaintiffs' entire premise for their Motion for Partial Reconsideration is grounded in what Plaintiffs contend should be the uniform application of the *Outley* factors. In making this Motion, Plaintiffs attempt to rewrite the procedural history. However, Woodway's Motion to Strike was based on insufficiency under *Daubert*, not a motion under Rules 26 and 37 requiring an evaluation of the *Outley* factors. To that end, in compliance with this Court's rules requiring the parties to file *Daubert* motions contemporaneously with dispositive motions, Woodway did just that. (Dkt. No. 91.) Woodway's opening brief in support of its Motion to Strike addressed the failure of Dr. Giachetti to perform a claim-element by claim-element analysis of Schmidt using the actual language of the claims. (*Id.* at 6.) Dr. Giachetti did no such analysis for Schmidt and did not otherwise incorporate any claim charts from the invalidity contentions because Plaintiffs omitted Schmidt from the contentions.

B. There Is No Equivalence in the Underlying Facts Between Woodway's Motion to Strike and Woodway's Motion for Leave to Supplement

Plaintiffs cite to no authority, nor can they, for their so-called "principles of parity." Plaintiffs argued that because they "mirrored" the *Outley* factor analysis the Court applied to Woodway's Motion to Strike in their opposition to Woodway's Motion for Leave to Supplement its Expert Reports, Plaintiffs are entitled to the same outcome. While the factors applied were the same, the facts those factors were applied to were markedly different and demand different results. There is no equivalence in the different circumstances Plaintiffs are relying on.

The Court precluded Plaintiffs from relying on Schmidt, applying the *Outley* factors, when Woodway moved to strike because Plaintiffs violated the Court's schedule, which is relevant to the first *Outley* factor. As the Court ruled, Plaintiffs were obligated to set forth their invalidity theories on the schedule set by the Court, yet they failed to do so. (Dkt. No. 144 at 25.) Specifically, the Court decided that the "new Schmidt theories should not be considered . . . **largely** because of the lack of reasonable excuse for their late addition to plaintiffs' case." (Dkt. No. 144 at 29.) "Plaintiffs' unexplained failure to disclose a known piece of prior art as a basis for invalidity[6] should not cause costs to Woodway,[7] nor delay the resolution of this matter.[8] (*Id.*) Fundamental to any analysis of *Outley* and the Schmidt reference is Plaintiffs' failure to abide by the Court's schedule. Plaintiffs ignore this point in its entirety, collapsing the *Outley*

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[6] "(1) the party's explanation for the failure to comply with the discovery order." *Softel, Inc. v. Dragon Med. & Scientific Comm., Inc.*, 118 F.3d 955, 961(2d Cir. 1997)

[7] "(3) the prejudice suffered by the opposing party as a result of having to prepare to meet the new testimony." *Softel,* 118 F.3d at 961.

[8] "(4) the possibility of a continuance." *Softel*, 118 F.3d at 961.

factors into an exercise that merely looks to the prejudice suffered by Woodway. This is not appropriate.

This should be contrasted to Woodway seeking leave to supplement its expert reports to reflect previously unavailable information, not new theories, regarding the market for curved manual treadmills relevant to its damages case. (Dkt. No. 184-1.) Woodway had not failed to comply with any discovery order and was instead offering its proposed supplemental expert reports consistent with the timing of Rule 26(e)(2) and 26(a)(3) – 30 days before trial.[9] As Woodway explained in its *Outley* analysis, the Assault AirRunner was not commercially available to Woodway until over six months after expert reports were due, which coincided with the parties' settlement discussions. Woodway was also attempting to secure the Speedboard. To avoid serial supplements and the subsequent depositions, when settlement discussions broke down and the deadline to supplement was imminent, Woodway filed its Motion for Leave.

Also distinguishing is the control and access Plaintiffs had regarding Schmidt contrasted to Woodway's control and access to a third party infringing Assault AirRunner. The untimely disclosed 1917 Schmidt reference was known by Plaintiffs since at least the date they filed their declaratory judgment Complaint premised on the alleged invalidity of the '580 patent, as they identify Schmidt in their allegations. (Dkt. No. 1 at ¶ 11.) Woodway, on the other hand, was subject to the timing of the introduction of the AirRunner and the Speedboard, which was dictated by third parties outside of Woodway's control.

[9] Plaintiffs' proposition that Woodway's supplemental expert reports were "admittedly late," is false. (Dkt. No. 249 at 2.) Rather, as explained to the Court, Woodway acknowledged that in hindsight, serial supplementation may have been the better course. (Apr. 10, 2018 Tr. at 209:16-210:5.)

Only the second *Outley* factor favored Plaintiffs in Woodway's Motion to Exclude, but as Plaintiffs had other invalidity references to rely on, the Court did not overstate the importance of Schmidt.[10] (Dkt. No. 144 at 27.) But the second *Outley* factor similarly weighed in Woodway's favor in its Motion for Leave to Supplement. Plaintiffs were poised to challenge the sufficiency of Mr. Green's damages opinions because his original report did not include the AirRunner in his analysis of the curved manual treadmill market. This may have elevated the importance of supplementing his report (and Dr. Blair's infringement report) regarding the AirRunner. Contrast this with the fact that even without Schmidt, Plaintiffs still have eight references combined in seven ways to support their invalidity theories. Schmidt is only one reference, which has already been considered and rejected by the Patent Office. Plaintiffs' suggestion that Schmidt's continued exclusion compromises the public interest favoring the judicial testing of patent validity falls flat. Different facts demand different outcomes.

As for the third *Outley* factor regarding potential prejudice to Plaintiffs in connection with Woodway's Motion for Leave to Supplement, this was mitigated by the new trial date, which was in part the result of Plaintiffs' own marking through their introduction of the GenIII. In addition, Woodway's experts were available for conveniently-located depositions to address the narrow scope of the new information in the supplemental reports (again, there were no new theories of infringement or new damages theories in the supplemental reports). The new trial date also impacted the evaluation of the fourth *Outley* factor as no additional continuance was necessary.

[10] "(2) the importance of the testimony of the precluded witness." *Softel*, 118 F.3d at 961.

As addressed above, Woodway was prejudiced in September 2017 and that prejudice is compounded by the passage of time since the Court's Ruling and Woodway's reliance on the same. In addition, Plaintiffs' laments of prejudice regarding the Motion for Leave to Supplement ring hollow, as they were equally capable of purchasing an Assault AirRunner to perform their own infringement analysis of that product. Nothing required Dr. Giachetti, who is located 90 miles away in Chicago, Illinois, to inspect the specific treadmill that Woodway purchased. And Plaintiffs ignore the prejudice to Woodway that has resulted from the introduction of the GenIII – an expedited inspection at Plaintiffs' facility and supplemental expert report, and another motion for summary judgment. Again, different facts – different outcome.

Finally, Plaintiffs perform a mash-up on the last *Outley* factor. The point that the Court made in the analysis on the Motion to Strike was to reopen discovery to let Schmidt in properly and to re-brief summary judgment was costly to the parties and the Court. The circumstances are different for Woodway's supplemental expert reports because of Plaintiffs' eve-of-trial introduction of the GenIII. Plaintiffs' decision to launch this product was a key motivation for the Court to adjourn trial five months. As the Court stated in the April 30, 2018 hearing "I keep reminding myself of a new product and going through this twice would be crazy. I have to say that entered greatly into my decision." (Apr. 30, 2018 Tr. at 367:18-21.)

The facts for precluding Plaintiffs' untimely disclosure of Schmidt and the facts for including Woodway's supplemental expert reports are not equivalent. There is no basis for Plaintiffs' argument that regardless of the facts, the Court's decisions arrived under the *Outley* factors should necessarily be the same for each situation. The different outcomes are not a reason to grant Plaintiffs' Motion for Reconsideration.

C. Plaintiffs Have Not Suffered Any Manifest Injustice To Warrant Reconsideration

Plaintiffs fail to identify what possible "manifest injustice" they would suffer if reconsideration is not granted. Plaintiffs' suggestion that because the Court ruled in Woodway's favor in an *Outley* factor analysis, the Court should likewise do so for Plaintiffs is unsupported. As discussed above, the facts to which the *Outley* factors were applied were different, and necessarily had different results. An outcome that Plaintiffs are unhappy with fails to rise to the level of manifest injustice. *See Marrero Pichardo v. Ashcroft,* 374 F.3d 46, 55-56 (2d Cir. 2004) (finding manifest injustice where a change in the law affected the very basis for petitioner's deportation).

V. CONCLUSION

For the reasons set forth above, Plaintiffs' Motion for Partial Reconsideration should be denied.

Dated: May 14, 2018

WOODWAY USA, INC.
By its Attorneys,

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CERTIFICATE OF SERVICE

I hereby certify that on May 14, 2018, a copy of the foregoing was filed electronically and served by mail on anyone unable to accept electronic filing. Notice of this filing will be sent by e-mail to all parties by operation of the Court's electronic filing system or by mail to anyone unable to accept electronic filing as indicated on the Notice of Electronic Filing. Parties may access this filing through the Court's CM/ECF System.

/s/Michelle A. Moran
Michelle A. Moran phv09205

EXHIBIT 22

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC,	)	
Plaintiffs,	)	3:15-CV-01665-JCH
v.	)	
WOODWAY USA, INC.,	)	Hon. Janet C. Hall
Defendant.	)	

DEFENDANT WOODWAY USA, INC.'S RESPONSES AND OBJECTIONS TO PLAINTIFFS' FIRST SET OF INTERROGATORIES

Pursuant to Fed. R. Civ. P. 26 and 33 and the Local Civil Rules of this District, Defendant Woodway USA, Inc. ("Woodway"), by and through its attorneys, hereby responds and objects to Plaintiffs Chapco, Inc.'s and Samsara Fitness, LLC's (collectively, "Plaintiffs") First Set of Interrogatories as follows:

GENERAL OBJECTIONS

1. Woodway objects to each and every interrogatory, definition, and instruction to the extent Plaintiffs seek to impose requirements or any burdens inconsistent with or in addition to Woodway's obligations under the applicable rules, including the Federal Rules of Civil Procedure and the Local Civil Rules for the District of Connecticut, any order of this Court, or any stipulation or agreement between the parties.

2. Woodway objects to each and every interrogatory, definition, and instruction to the extent Plaintiffs seeks information that is protected by the attorney-client privilege, the work product immunity doctrine, and/or any other applicable privilege, prohibition, limitation, or immunity from disclosure. Inadvertent production of such information shall not constitute the

waiver of any applicable privilege, doctrine, immunity, or objection, including, but not limited to, objections on the basis of competency, confidentiality, relevancy, materiality, work product, privilege, and/or admissibility as evidence.

3. Woodway objects to each and every interrogatory, definition, and instruction to the extent Plaintiffs seek information not in Woodway's possession, custody, or control, and/or not obtainable by means of a reasonably diligent search.

4. Woodway objects to each and every interrogatory, definition, and instruction to the extent Plaintiffs seek information that is already in their possession or available from a public source as to which the burden of Plaintiffs obtaining such information is the same as or less than it would be for Woodway.

5. Woodway objects to each and every interrogatory, definition, and instruction to the extent it is overly broad, unduly burdensome, oppressive, and/or irrelevant to the subject matter of this action. Woodway further objects to each and every interrogatory, definition, and instruction to the extent it is not proportional to the needs of the case, considering the importance of the issues at stake in the action, the amount in controversy, the parties' relative resources, the importance of the discovery in resolving the issues, and whether the burden or expense of the proposed discovery outweighs its likely benefit.

6. Woodway objects to each and every interrogatory, definition, and instruction to the extent it is vague, ambiguous, or confusing by failing to adequately define terms or failing to describe the information with reasonable particularity. Subject to the General and Specific Objections, Woodway will produce reasonably available, relevant, responsive, non-privileged information only to the extent that Woodway understands each request and to the extent such information is available after a reasonable search.

7. Woodway objects to each and every interrogatory to the extent it is unreasonably cumulative or duplicative, or is obtainable from some other source that is more convenient, less burdensome, or less costly. Woodway further objects to each and every interrogatory to the extent the burden of discovery sought outweighs its likely benefit.

8. Woodway objects to each and every interrogatory to the extent that it improperly contains multiple subparts in one interrogatory request.

9. Woodway objects to each and every interrogatory to the extent it requires Woodway to provide a legal determination, opinion, or conclusion.

10. Woodway objects to Plaintiffs' definitions of "you" and "your" to the extent that Plaintiffs seek to compel Woodway to collect or produce information or documents from parties from whom Woodway has no right or obligation to collect information or documents. Woodway also objects to these definitions insofar as they seek information that is (a) not within Woodway's possession, custody, or control, and/or (b) protected from discovery by the attorney-client privilege, work product doctrine, or any other applicable privilege, immunity, or protection. Woodway further objects to the definitions of the terms "you" and "yours" as being vague, overbroad, and unduly burdensome to the extent that Plaintiffs intend to impose discovery obligations on any person who is not a party to this litigation. Woodway further objects to the definitions to the extent Plaintiffs seek to impose obligations on Woodway beyond those required by the Federal Rules of Civil Procedure, the Local Civil Rules of this Court, and any applicable orders of this Court.

11. Woodway objects to Plaintiffs' instructions as to the preparation of a privilege log to the extent they exceed the requirements of the Federal Rules of Civil Procedure, the Local

Civil Rules of this Court, any applicable orders of this Court, or any stipulation or agreement between the parties.

By responding to Plaintiffs' First Set of Interrogatories, Woodway does not waive any objection that may be applicable to: (a) the use, for any purpose, by Plaintiffs of any information provided in response; or (b) the admissibility, relevance, or materiality of any of the information to any issue in this case. Moreover, a response stating that Woodway will provide information regarding an interrogatory does not constitute an admission that any information regarding that interrogatory exists or can be located after a reasonable search, or is known or reasonably available to Woodway.

Each and every General Objection shall be deemed to be incorporated in full into each of the individual responses set forth below. Any specific objections to an interrogatory are made in addition to the General Objections, not as a replacement for them.

Woodway's investigation into the parties' claims and defenses is continuing. Woodway's objections and responses to these interrogatories are based upon the information in its possession after diligent inquiry at the time of preparation of these responses. Woodway reserves the right to amend, supplement, modify, and/or correct its objections or responses as additional information becomes available to Woodway in the course of its investigation and as discovery in this case progresses.

SPECIFIC OBJECTIONS AND RESPONSES TO INTERROGATORIES

Subject to and without waiving the foregoing General Objections, Woodway objects and responds to Plaintiffs' First Set of Interrogatories as follows:

INTERROGATORY NO. 1:

Identify all persons whom Woodway believes or understands are knowledgeable about

the substance of, or the factual basis for the conception and reduction to practice of the alleged invention of the patents in suit.

RESPONSE TO INTERROGATORY NO. 1:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it is overly broad, unduly burdensome, and vague, and to the extent that it seeks information neither relevant to any party's claims or defenses, nor proportional to the needs of the case. Woodway further objects to this Interrogatory on the grounds that it is ambiguous and confusing to the extent that it is not clear what "substance" is being sought—the conception and reduction to practice or the alleged invention. Woodway further objects to this Interrogatory on the grounds that the phrase "substance of" is vague and ambiguous. Woodway interprets the Interrogatory as seeking identification of persons whom Woodway believes or understands are knowledgeable about "the conception and reduction to practice of the alleged invention of the patents in suit."

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: Woodway identifies current personnel, Douglas G. Bayerlein, Vance E. Emons, Scott D. Hoerig, Nicholas A. Oblamski, Matthew J. Zank, and Robert L. Zimpel, as well as former employee, Joel W. Richards, as persons whom Woodway believes or understands are knowledgeable about the conception and reduction to practice of the inventions disclosed in the patents in suit. By identifying these persons, Woodway does not consent to Plaintiffs contacting any of its current or former personnel directly. Instead, any such contact should be through Woodway's and Mr. Richard's counsel of record at Foley & Lardner LLP.

INTERROGATORY NO. 2:

Identify the persons at Woodway who were responsible for assessing the market for

motorless treadmills in the time period 2009-2015, including identification and assessment of competitors (whether actual or potential), and assessment of products and services competing or potentially competing with Woodway.

RESPONSE TO INTERROGATORY NO. 2:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it is overly broad, unduly burdensome, and vague, and to the extent that it seeks information neither relevant to any party's claims or defenses, nor proportional to the needs of the case. Woodway further objects to this Interrogatory on the grounds that the terms "assessing" and "assessment" as used are vague and ambiguous.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: Woodway identifies Douglas G. Bayerlein and Eric A. Weber as persons at Woodway who have knowledge and information regarding the market for motorless treadmills during the time period 2009-2015. By identifying these persons, Woodway does not consent to Plaintiffs contacting any of its current personnel directly. Instead, any such contact should be through Woodway's counsel of record at Foley & Lardner LLP.

INTERROGATORY NO. 3:

Separately, for each asserted claim of the patents in suit, state the date (day, month, and year), and describe in detail and with particularity, including the identities of any person involved, the circumstances under which the subject matter of the claim was: (i) conceived; (ii) first reduced to practice in the United States; (iii) first manufactured (a) in the United States and (b) outside the United States; (iv) first described in a printed publication in the United States or a foreign country; (v) first in public use or on sale in the United States; and (vi) first known or

used by others in the United States.

RESPONSE TO INTERROGATORY NO. 3:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it improperly contains multiple subparts in one interrogatory request. Woodway further objects to this Interrogatory on the grounds that it seeks communications that are protected by the attorney-client privilege and/or work product immunity.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: Woodway identifies current personnel, Douglas G. Bayerlein, Vance E. Emons, Scott D. Hoerig, Nicholas A. Oblamski, Matthew J. Zank, and Robert L. Zimpel, as well as former employee, Joel W. Richards, as persons involved in the conception and first reduction to practice of each asserted claim of the patents in suit. By identifying these persons, Woodway does not consent to Plaintiffs contacting any of its current or former personnel directly. Instead, any such contact should be through Woodway's and Mr. Richard's counsel of record at Foley & Lardner LLP.

The subject matter of Woodway's claimed inventions originated from Woodway's conception and design of improvements and enhancements to the publicly known, basic concept of a manually operated curved treadmill. The innovations claimed in the patents in suit were conceived of, designed, developed, and reduced to practice at Woodway's facility in Waukesha, Wisconsin beginning as early as December 2008. After filing U.S. Provisional Application No. 61/161,027 with the United States Patent Office on March 17, 2009, Woodway introduced what is now known as its Curve treadmill at the International Health, Racquet and Sportsclub Association trade show, which was held in San Francisco, California. Woodway first

manufactured what is now known as its Curve treadmill in the United States in April 2009. Woodway's first U.S. sale of its curved, manual treadmill was in May 2009.

Pursuant to Rule 33(d) of the Federal Rules of Civil Procedure, Woodway will produce and identify documents and/or communications in response to this Interrogatory.

INTERROGATORY NO. 4:

Identify by name, part number, and any other internal or other designation, any product, including every type and variation thereof, made, used, sold, or offered for sale by or on behalf of Woodway or others that embodies the alleged invention(s) claimed in the patents in suit patent, and identify the specific claim(s) of the patents in suit patent whose subject matter Woodway contends is embodied in each such product.

RESPONSE TO INTERROGATORY NO. 4:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it improperly contains multiple subparts in one interrogatory request.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: Woodway identifies its current as well as its legacy line of curved, manual treadmills, including the Curve, Curve Trainer, Curve XL, and Ecomill treadmills, as products made, used, sold, or offered for sale by or on behalf of Woodway that embody the asserted claims of the patents in suit.

INTERROGATORY NO. 5:

For the patents in suit, state whether Woodway contends there is any objective indicia or evidence of non-obviousness, and if answered affirmatively, identify in detail any such evidence.

RESPONSE TO INTERROGATORY NO. 5:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it is premature in light of the Court's scheduling order in that it purports to seek the early disclosure of expert opinions.

INTERROGATORY NO. 6:

If you contend that Plaintiffs indirectly infringe any claim of the patents in suit, identify whether the alleged indirect infringement is induced infringement, contributory infringement, or both, and specify in the response which claim or claims is/are allegedly infringed through either induced infringement, contributory infringement, or both.

RESPONSE TO INTERROGATORY NO. 6:

Woodway objects to this Interrogatory on the grounds that it is premature in light of the Court's scheduling order in that it purports to seek the early disclosure of expert opinions.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: Plaintiffs induce infringement of claims 11-16 of the '169 patent and claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent.

INTERROGATORY NO. 7:

Identify each preliminary, novelty, validity, infringement, prior art, or other search concerning the subject matter of the patents in suit.

RESPONSE TO INTERROGATORY NO. 7:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it is overly broad, unduly burdensome, and vague, and to the extent that it seeks information neither relevant to any party's claims or defenses nor proportional to the needs of the case. Woodway further objects to this

Interrogatory on the grounds that it seeks communications that are protected by the attorney-client privilege and/or work product immunity.. Woodway further objects to this Interrogatory on the grounds that the terms "preliminary" and "subject matter" as used are vague and ambiguous.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: To the extent any non-privileged searches exist, pursuant to Rule 33(d) of the Federal Rules of Civil Procedure, Woodway will produce and identify documents and/or communications in response to this Interrogatory.

INTERROGATORY NO. 8:

State the factual basis for any contention asserted by Woodway that the patents in suit are not invalid under one or more subsections of 35 U.S.C. §§ 102, 103, and 112. If Woodway contends that any prior art identified by Plaintiffs in the present lawsuit does not anticipate or render obvious any claim of the patents in suit, specify which limitation(s) are absent from such reference and/or why such reference is not relevant to the obviousness inquiry.

RESPONSE TO INTERROGATORY NO. 8:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it seeks communications that are protected by the attorney-client privilege and/or work product immunity. Woodway further objects to this Interrogatory on the grounds that it improperly contains multiple subparts in one interrogatory request. Woodway further objects to this Interrogatory on the grounds that it is premature in light of the Court's scheduling order in that it purports to seek the early disclosure of expert opinions.

INTERROGATORY NO. 9:

Identify all lawsuits, negotiations and claims, regardless of whether reduced to litigation,

concerning the patents in suit.

RESPONSE TO INTERROGATORY NO. 9:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it is overly broad, unduly burdensome, and vague, and to the extent that it seeks information neither relevant to any party's claims or defenses nor proportional to the needs of the case. Woodway further objects to this Interrogatory on the grounds that it seeks information that is protected by the attorney-client privilege and/or work product immunity. Woodway further objects to this Interrogatory to the extent it calls for the disclosure of third party confidential information that Woodway is under a legal duty not to disclose.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: Woodway identifies the following lawsuits: *Woodway USA, Inc. v. Samsara Fitness, LLC and Chapco, Inc.*, No. 2:15-CV-00956-PP (E.D. Wis.); *Woodway USA, Inc. v. Aurel A. Astilean*, No. 2:13-CV-00681 (E.D. Wis.); and *Speedfit LLC and Aurel A. Astilean v. Woodway USA, Inc. and Douglas G. Bayerlein*, No. 2013 Civ. 01276 (E.D.N.Y.).

INTERROGATORY NO. 10:

Identify all communications between Woodway and any third party concerning the patents in suit. Include in your response the communications referenced in the Declaration of Eric A. Weber dated January 4, 2016.

RESPONSE TO INTERROGATORY NO. 10:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory to the extent it seeks communications that are protected by the attorney-client privilege and/or work product immunity.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: Woodway will produce and identify communications in response to this Interrogatory pursuant to Rule 33(d) of the Federal Rules of Civil Procedure.

INTERROGATORY NO. 11:

Identify all communications between Woodway and any third party concerning Plaintiffs, or either of them.

RESPONSE TO INTERROGATORY NO. 11:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it seeks communications that are protected by the attorney-client privilege and/or work product immunity. Woodway further objects to this Interrogatory on the grounds that it seeks production of "all" communications between Woodway and any third party concerning the Plaintiffs on the grounds of overbreadth, undue burden, and expense. Woodway further objects to this Interrogatory on the grounds that it seeks communications not relevant to any parties' claims or defenses and that are not proportional to the needs of the case.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: To the extent any non-privileged communications exist, pursuant to Rule 33(d) of the Federal Rules of Civil Procedure, Woodway will produce and identify these communications in response to this Interrogatory.

INTERROGATORY NO. 12:

Identify each category of damages that Woodway seeks as a result of the alleged infringement of the patents in suit patent, and for each such category, set forth an estimate of damage in dollars and all bases therefore, identify all persons with knowledge of such damage

and each document that supports such estimate or may support variation from such estimate.

RESPONSE TO INTERROGATORY NO. 12:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it improperly contains multiple subparts in one interrogatory request. Woodway further objects to this Interrogatory on the grounds that the phrases "category of damages," "each such category," and "variation from such estimate" are vague and ambiguous. Woodway further objects to this Interrogatory on the grounds that it is premature in light of the Court's scheduling order in that it purports to seek the early disclosure of expert opinions.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: In accordance with the relief requested in Woodway's Answer to Plaintiffs' Complaint (Dkt. No. 54), Woodway reserves the right to pursue damages adequate to compensate it for Plaintiffs' infringement of the patents in suit, including lost profits and/or reasonable royalty.

INTERROGATORY NO. 13:

Detail the pre-suit investigation Woodway undertook before it accused Plaintiffs of infringement. Include in your response the identities of the persons involved, the details of the investigation, the date(s) of the investigation(s), the serial number of the product used for the investigation.

RESPONSE TO INTERROGATORY NO. 13:

In addition to its General Objections, which are incorporated herein by reference, Woodway objects to this Interrogatory on the grounds that it seeks information that is protected by the attorney-client privilege and/or work product immunity.

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: At the direction of Woodway's counsel, Woodway personal, including Nicholas A. Oblamski and Jose Bernal, disassembled (1) the Original TrueForm Runner (Serial No. 100106), which is the same as or materially similar to TrueForm Runners manufactured and sold after March 24, 2015, and (2) the Redesigned TrueForm Runner (Serial No. 100950). Disassembly of the Original TrueForm Runner occurred prior to Woodway sending Plaintiffs a cease and desist letter on March 24, 2015. Disassembly of the Redesigned TrueForm Runner occurred on or around July 8, 2016.

INTERROGATORY NO. 14:

Identify each transfer, assignment and license of the patents in suit, or any rights in either of them, and include in your response the date of the transfer, the rights transferred and the persons involved.

RESPONSE TO INTERROGATORY NO. 14:

Subject to and without waiving its General and Specific Objections, Woodway responds as follows: On September 15, 2011, inventors Douglas G. Bayerlein, Vance E. Emons, Nicholas A. Oblamski, Scott D. Hoerig, Matthew J. Zank, Robert L. Zimpel, and Joel W. Richards assigned all right, title, and interest in the patents in suit to Woodway.

AS TO OBJECTIONS

Dated: August 22, 2016

WOODWAY USA, INC.
By its Attorneys,

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Attorneys for Woodway USA, Inc.

CERTIFICATE OF SERVICE

I hereby certify that I caused a true and correct copy of the foregoing WOODWAY USA, INC.'S RESPONSES AND OBJECTIONS TO PLAINTIFFS' FIRST SET OF INTERROGATORIES to be served on counsel of record via electronic mail on August 22, 2016.

/s/Kadie M. Jelenchick
Kadie M. Jelenchick phv07857

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC,	)	
	)	3:15-cv-01665-JCH
Plaintiffs,	)	
vs.	)	
WOODWAY USA, INC.,	)	
Defendant.	)	June 8, 2018

WOODWAY USA, INC.'S MOTION FOR SUMMARY JUDGMENT OF INFRINGEMENT OF U.S. PATENT NO. 9,039,580

Pursuant to Fed. R. Civ. P. 56, Woodway USA, Inc. respectfully moves the Court for summary judgment of infringement of claim 25 of U.S. Patent No. 9,039,580.

This Motion is based upon the accompanying Memorandum of Law in support, Local Rule 56(a)1 Statement of Undisputed Material Facts, accompanying exhibits, all pleadings and papers on file in this action, such other evidence and arguments as may be presented to the Court, and such other matters of which this Court may take judicial notice.

ORAL ARGUMENT REQUESTED
4817-7804-3240

Dated: June 8, 2018

WOODWAY USA, INC.
By its Attorneys,

/s/ *Kadie M. Jelenchick*
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Attorneys for Woodway USA, Inc.

CERTIFICATE OF SERVICE

I hereby certify that on June 8, 2018, a copy of the foregoing was filed electronically and served by mail on anyone unable to accept electronic filing. Notice of this filing will be sent by e-mail to all parties by operation of the Court's electronic filing system or by mail to anyone unable to accept electronic filing as indicated on the Notice of Electronic Filing. Parties may access this filing through the Court's CM/ECF System.

/s/ Matthew W. Peters
Matthew W. Peters, phv09498

THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC,	)	
Plaintiffs,	)	Civil Action No. 3:15-cv-1665 (JCH)
vs.	)	
	)	June 8, 2018
WOODWAY USA, INC.,	)	
Defendant.	)	

WOODWAY USA, INC.'S MEMORANDUM OF LAW IN SUPPORT OF ITS MOTION FOR SUMMARY JUDGMENT OF INFRINGEMENT OF U.S. PATENT NO. 9,039,580

ORAL ARGUMENT REQUESTED

4853-2609-2391.2

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I. INTRODUCTION

Plaintiffs Chapco, Inc. ("Chapco") and Samsara Fitness, LLC ("Samsara") have manufactured and sold three iterations of the TrueForm Runner – the Original, the "Redesigned" or Gen II, and now, the Gen III.[1] The Gen III TrueForm Runner was born out of Plaintiffs' attempt to cut-off infringement damages relating to the Gen II treadmill. (Pretrial Hearing Tr., April 10, 2018, at 4:14-5:20.) On September 26, 2017, the Court granted Woodway USA, Inc.'s ("Woodway") motion for summary judgment that the Gen II TrueForm Runner treadmill meets each and every claim limitation of claims 1, 6, 19, and 20 of U.S. Patent No. 9,039,580 ("the '580 patent"). (Dkt. No. 144 at 19.) Notwithstanding this ruling, Plaintiffs continued to manufacture and sell the infringing Gen II treadmill. (Pretrial Hearing Tr., April 12, 2018, at 289:21-290:1.) Nearly eight months after this finding, during the parties' first pre-trial conference, Plaintiffs announced their impending introduction of the Gen III and touted it as a "design-around" of the "asserted claims."[2] (See Pretrial Hearing Tr., April 12, 2018, at 286:20-287:5.) But Plaintiffs' claim that they designed around the '580 patent with the Gen III must be

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[1] The original base of the TrueForm Runner included a one-way bearing safety device on the rear shaft of the treadmill to restrict the unexpected movement of the running belt ("the Original TrueForm Runner"). (Dkt. No. 101 at 7.) After Plaintiffs were put on notice of U.S. Patent No. 8,986,169 ("the '169 patent"), the TrueForm Runner was redesigned to relocate the safety device to the front shaft of the treadmill ("the Redesigned TrueForm Runner" or "Gen II"). (*Id.*) During the April 10, 2018 Pre-Trial Conference, Plaintiffs' counsel represented that the Gen II would be replaced with the Gen III TrueForm Runner treadmill – "It is going to swap out entirely mid-May [2018]. Generation 2 will be over, Generation 3 will begin." (Pretrial Hearing Tr., April 10, 2018, at 4:14-5:8.)

[2] Plaintiffs appeared to limit their assessment of whether the Gen III was a design-around to claims 1, 6, 19, and 20 of the '580 patent, contending that these are the only claims of consequence. (Dkt. No. 211 at 25 "[T]he Generation III TrueForm Runner does not infringe any of the four remaining asserted claims of the '580 patent.") Woodway asserted claim 25 against the Gen II until April 24, 2018, when Woodway voluntarily moved to dismiss it in an effort streamline issues for trial. (Dkt. No. 244 at 2.) But Plaintiffs focused only on the four claims that the Court determined were infringed and took direction from that in making the two changes to the Gen II. (Pretrial Hearing Tr., April 10, 2018, at 6:21-7:17) Plaintiffs acknowledge, as they must, that Woodway can assert that the Gen III infringes any claim of the '580 patent and is not limited to claims 1, 6, 19, and 20. (Pretrial Hearing Tr., April 10, 2018, at 10:22-11:9; Pretrial Hearing Tr., April 12, 2018, at 286:4-18)

rejected. Through this Motion Woodway seeks a ruling that the ***assembly***[3] of the recently available Gen III TrueForm Runner treadmill literally infringes claim 25 of the '580 patent.

Resolution of Woodway's Motion turns on a straightforward application of the Court's Claim Construction Ruling, particularly in the face of the Court's previous summary judgment decision regarding the Gen II TrueForm Runner and Plaintiffs' admissions regarding the assembly and structure of the Gen II relative to the Gen III. Plaintiffs admit and Woodway's technical expert, Dr. Blair, confirms that the Gen III is identical to the infringing Gen II TrueForm Runner except in two respects – (1) the wheels' location when the treadmill is in use and (2) the configuration of the rear shaft assembly. (Woodway's Local Rule 56(a)1 Statement of Undisputed Material Facts ("56(a)1"), ¶ 1.) These two changes are irrelevant to any infringement analysis of claim 25, which does not include these claim limitations. (56(a)1 ¶ 2.) Plaintiffs' modifications to the Gen II treadmill are insufficient to overcome a finding of summary judgment as to the Gen III.

In an effort to avoid infringement, Woodway anticipates that Plaintiffs will argue for another shot at claim construction under the auspices that claim 25 is somehow new to this case.[4] But fatal to Plaintiffs' strategy is that claim 25 of the '580 patent has been part of this

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[3] Plaintiffs do not dispute nor could they that the hourly workers assembling the Gen III are Chapco employees. (Dkt. No. 144 at 7-8.) Dr. Giachetti's May 7, 2018 report confirms this fact by referencing the very same timed build used for the assembly of the Gen III as was used for the Gen II, further demonstrating the similarity between the products. (56(a)1 ¶ 10) Plaintiffs are likely to contend that Samsara's "leasing" of these Chapco employees eliminates any potential liability for Chapco. This issue was briefed at length in the parties' original cross-motions for summary judgment and is a matter for resolution at trial. (Dkt. No. 88-1 at 4-8; Dkt. No. 100 at 6-7; Dkt. No. 111 at 13-19; Dkt. No. 144 at 8, 12.) Which entity – Chapco or Samsara – is ultimately responsible for the hourly employees' assembly activities is of no moment to resolution of this Motion.

[4] During the April 12, 2018 Pre-Trial Conference, Plaintiffs' counsel suggested that they intended to move for summary judgment that claim 25 of the '580 patent is invalid (and therefore not infringed). (Pretrial Hearing Tr., April 12, 2018, at 284:8-12.) The validity of a patent is evaluated on a claim-by-claim basis. *Nat'l Steel Car, Ltd., v. Canadian Pac. Ry., Ltd.*, 357 F.3d 1319, 1334 (Fed. Cir. 2004); *Ortho Pharma. Corp. v. Smith*, 959 F.2d 936, 942 (Fed. Cir. 1992) ("a party challenging the validity of a claim . . . must submit evidence supporting a conclusion of

case since the beginning. (Dkt. No. 54 at 10 ¶ 22.) Significantly, the Court has already construed the relevant terms. (Dkt. No. 76 at 28-29.) Claim 25 was under consideration during claim construction briefing, (*e.g.* Dkt. No. 55 at 1 n.2; Dkt. No. 59 at 11; Dkt. No. 64 at 3), and implicated by the Court's December 8, 2016 Claim Construction Ruling. (Dkt. No. 76 at 2.) Indeed, at Plaintiffs' insistence, the Court addressed the construction of nine claim terms, three of which are found in claim 25 of the '580 patent. (*Id.* at 5-13, 21-23, and 28-29.) Now it is likely that Plaintiffs will press for constructions of "providing" and "disposing." But at no point in time did Plaintiffs ever challenge or offer a construction of "providing" or "disposing." (56(a)1 ¶ 12.) Plaintiffs should not be permitted to advance newly minted claim construction arguments regarding these terms through their technical expert, Dr. Giachetti, to escape an infringement finding for Plaintiffs' newly-introduced Gen III TrueForm Runner.

Plaintiffs' contemplated strategy is particularly troublesome for at least two reasons. First, neither Plaintiffs nor Dr. Giachetti ever questioned these terms' constructions or otherwise contested that the Gen II did not meet these limitations. (56(a)1 ¶ 12; Dkt. No. 144 at 14.) Second, the two limitations Plaintiffs appear poised to challenge have nothing to do with Plaintiffs' modifications to the Gen II that resulted in the Gen III treadmill. (56(a)1 ¶¶ 2, 9, and 30.) Claim construction is not a moving target. Plaintiffs' new claim construction theories come

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invalidity of each claim the challenger seeks to destroy"). Plaintiffs already tried to challenge the validity of claim 25 on summary judgment and were unsuccessful. (Dkt. No. 88-1 at 1, 3.) The Court denied Plaintiffs' motion for summary judgment that claim 25 (and other asserted claims) were invalid as obviousness. (Dkt. No. 144 at 39.) And, on Woodway's cross-motion for summary judgment regarding the validity of the '580 patent, the Court ruled that neither the Schmidt nor Socwell references anticipate claim 25 (or any other of the asserted claims). (Dkt. No. 144 at 39-40.) To the extent Plaintiffs try to make a second motion for summary judgment regarding the validity of claim 25 in light of Woodway's infringement allegations directed to the Gen III, Woodway will oppose this motion. (*See* Pretrial Hearing Tr., April 30, 2018, at 376:7-377:21 ("I would think it is kind of a waste of time to raise it again unless there's new evidence or something like that.")

far too late; they should be precluded. It is unfairly prejudicial to Woodway to allow Plaintiffs a claim construction do-over to address arguments it could have made long ago.

As the Court did in its first ruling on summary judgment, it should reject Plaintiffs' attempt to reargue the Court's claim construction or otherwise advance its new claim constructions. Under proper application of the Court's Claim Construction Ruling and the plain and ordinary meaning of those claim limitations that were not construed, there is no dispute of material fact that the assembly of the Gen III treadmill meets each and every claim limitation of claim 25 of the '580 patent.

II. RELEVANT BACKGROUND

A. The '580 Patent

The'580 patent is directed to a curved, manual non-motorized treadmill with an improved design that uses safety devices to prevent unintended movement of the running belt when a user steps onto the concave running surface and the method of assembling such a treadmill. When a user mounts the curved, manual treadmill from the rear, the user's weight may cause the running surface of the running belt to unexpectedly move toward the front of the unit (which is the reverse of the normal operating direction of the running surface). Depending on how quickly and where the user mounts the treadmill, the running belt may move in the forward or backward direction, creating an extreme safety hazard. The unpredictable belt movement may startle the user, create a temporary feeling of loss of control, or even cause a user to fall.

The '580 patent is entitled "Manual Treadmill and Methods of Operating the Same" and issued on May 26, 2015, from U.S. Patent Application No. 14/656,942, which was filed on March 13, 2015. (Dkt. No. 101 at 2.) The named inventors are Woodway personnel

Douglas G. Bayerlein, Vance E. Emons, Nicholas A. Oblamski, Scott D. Hoerig, Matthew J. Zank, Robert L. Zimpel, and Joel W. Richards. (Dkt. No. 101 at 3.) This patent is assigned to Woodway. (*Id.*)

The '580 patent contains 25 claims, only one of which is relevant to this Motion and the Gen III's infringement – claim 25. Claim 25 is a method claim. Claims 1-24, certain of which were addressed in the parties' prior summary judgment submissions, are apparatus claims.[5]

B. Claim 25 Has Been Part of this Case Since the Beginning

Plaintiffs initiated this declaratory judgment action against Woodway after Woodway sued Plaintiffs for patent infringement of the '169 and '580 patents in the United States District Court for the Eastern District of Wisconsin. (*See* Dkt. Nos. 22, 23.) In Counts I and III of their Amended Complaint filed on December 29, 2015,[6] Plaintiffs alleged that they do not infringe either the '169 or '580 patents, respectively. (Dkt. Nos. 27 at ¶¶ 25-28, 33-36.) In Counts II and IV, Plaintiffs broadly allege that the '169 and '580 patents are invalid under one or more of 35 U.S.C. §§ 102, 103 and/or 112. (Dkt. No. 27 at ¶¶ 29-32, 37-40.) Woodway filed its Answer and Counterclaims to the Amended Complaint on July 25, 2016, and specifically

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[5] Both new and useful apparatuses and methods may be patented. 35 U.S.C. § 101 ("Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor . . . ."). Apparatus claims are generally directed toward novel machines, manufactures, or compositions of matter. *See Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980) (defining the terms "manufacture" and "composition of matter"). In contrast, method claims are directed toward novel processes and describe a step-by-step method for accomplishing the transformation of an article. *See Diamond v. Diehr*, 450 U.S. 175, 182-83 (1981) ("That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery.") (quoting *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1877)).

[6] Plaintiffs amended their original Complaint filed on November 16, 2015, to correct the improper caption and their client's name. (Dkt. No. 25.)

asserted claim 25 of the '580 patent, among others, against the Original and Gen II TrueForm Runner treadmills. (Dkt. No. 54.) In Count I and II of its Counterclaims, Woodway accused Plaintiffs of infringing claims 11-16 of the '169 patent and claims 1, 4-6, 10-14, 18-20 , and **25** of the '580 patent, respectively.[7] (Dkt. No. 54 at ¶¶ 13, 23.)

The Court entered a Scheduling Order on February 22, 2016, (Dkt. No. 40), setting dates for, among other things, Woodway to serve its infringement contentions and Plaintiffs to serve their preliminary non-infringement and invalidity contentions.[8] Pursuant to the Scheduling Order, Woodway served its Preliminary Infringement Contentions on April 18, 2016 directed to the Original TrueForm Runner treadmill, and Plaintiffs served Preliminary Non-infringement and Invalidity Contentions on May 27, 2016.[9] (Dkt. No 101 at 7-8.) Pursuant to the modified Scheduling Order entered on June 22, 2016, (Dkt. No. 51), Woodway served its Supplemental Infringement Contentions directed to Plaintiffs' newly-identified Redesigned or Gen II TrueForm Runner on July 18, 2016, and Plaintiffs served their Supplemental Non-Infringement and Invalidity Contentions on August 8, 2016. (Dkt. No. 101 at 8.) Both Woodway and Plaintiffs addressed claim 25 in their Supplemental Contentions relating to the Gen II TrueForm Runner Treadmill. (56(a)1 ¶¶ 3 and 4.)

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[7] Pursuant to the Court's Order granting Woodway's Motion for Leave to File a Supplemental Counterclaim of Copyright Infringement, (Dkt. No. 84), Woodway filed Supplemental Counterclaims on April 13, 2017. (Dkt. No. 85.) Woodway's Count I of infringement of the '169 patent and Count II of infringement of the '580 patent were not altered from its original Answer and Counterclaims.

[8] Note that the Scheduling Order misidentified the parties due to the declaratory judgment nature of the action. Thus in this case, Plaintiffs, not Woodway, would challenge the validity of the patents. Woodway and Plaintiffs have proceeded under the proper presumption that Plaintiffs had the burden to prove invalidity, and Woodway had the burden to prove infringement; the parties served their respective contentions accordingly.

[9] Woodway first detailed the bases for its infringement allegations against the Gen II in its Supplemental Infringement Contentions. (56(a)1 ¶ 3.)

C. The Gen II TrueForm Runner Meets All Claim Limitations of Claim 25

Plaintiffs conceded in their Supplemental Non-Infringement Contentions that the **only** claim limitations that the Gen II TrueForm Runner treadmill was missing was the "bearing rail" and "running belt" limitations. (56(a)1 ¶ 5.) Thereafter, during expert discovery, Plaintiffs withdrew their challenge to the "running belt" limitation and focused solely on the purported lack of "bearing rail" in the Gen II TrueForm Runner treadmill. Specifically, Dr. Giachetti stated the following:

> **2. The Accused Products Do Not Infringe the Asserted Claims of the '580 Patent**
>
> . . .
>
> **m) Claim 25. The accused products do not have a bearing rail. The element Dr. Blair accuses of being a frame is not a frame, and the element Dr. Blair accuses of being a bearing rail is a frame for only 1 reason.**

(56(a)1 ¶ 6.) Dr. Giachetti offered no other opinions with regards to any purported missing claim limitations in the Gen II treadmill. Dr. Giachetti confirmed in deposition that the entirety of his opinions regarding non-infringement were included in his March 30, 2017 report. (56(a)1 ¶ 7.)

Plaintiffs moved for summary judgment that the Gen II TrueForm Runner treadmill did not infringe claim 25 of the '580 patent. (Dkt. No. 88-1 at 1-2.) Plaintiffs' sole argument was that the Gen II did not include the "frame" and "bearing rail" elements required by the claim. (*See* Dkt. No. 144 at 14.) Plaintiffs did not raise any other challenges with respect to claim 25, conceding that all other limitations are satisfied. (*Id.*) In fact, Plaintiffs admitted that the Gen II TrueForm Runner would infringe as a matter of law if the Court determined that it included the "frame" and "bearing rail" elements. (56(a)1 ¶ 8; *see also* Dkt. No. 144 at 15 ("[T]he court concludes that the evidence supports a finding that, if the components identified by

Woodway to be the "frame" and "bearing rail" satisfy the limitations as defined in the court's Claim Construction Ruling, then a judgment of infringement as to the Accused Products should enter").)

Plaintiffs must be bound by these admissions. *See Hoodho v. Holder*, 558 F.3d 184, 192 (2d Cir. 2009) (noting that all parties to litigation "are bound by the concessions of freely retained counsel"); *Mims v. United States*, No. 08-cv-1400(JCH), 2009 WL 1992943, at *4 (D. Conn. July 9, 2009) ("Facts admitted by a party are judicial admissions that bind that party throughout the litigation.").[10] Plaintiffs' failure to challenge any other missing limitations constitutes waiver. (Summary Judgment Tr., September 17, 2017, at 17:21-23 ("We have a Local Rule that says a party shall be deemed to have waived any argument in support of an objection that such party doesn't include in their memo.").)

D. The Changes to the Gen II Are Irrelevant to Claim 25 and the Gen III TrueForm Runner Treadmill's Infringement

Plaintiffs concede that the Gen III is different from the Gen II TrueForm Runner in only two respects. Plaintiffs confirmed that the two changes were to "**put[] the wheels on the ground and remov[e] the rear shaft. That's it.**" (56(a)1 ¶ 1, *quoting* April 10, 2018 Pretrial Hearing Tr., at 7:10-17 (emphasis added); *see also* Dkt. No. 211 at 25-26 (noting that the redesigned parts are "**the wheel assembly and the rear pulley assembly**") (emphasis added).) Chapco's internal engineering documents confirm no other changes were made to create the Gen III. (56(a)1 ¶ 1.) Dr. Blair concurs. (Dkt. No. 236 at ¶ 15 and Exhibit A at 1-12.)

As is clear from a review of claim 25, these two modifications to the Gen II to create the Gen III are irrelevant to claim 25. Claim 25 of the '580 patent contains no claim

[10] A copy of this decision is attached as Exhibit 1.

limitation that relates to wheels and their relative location to the ground or the presence or absence of a rear shaft.

> 25. A method, comprising:
> providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and rear end;
> providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile;
> disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails;
> permitting movement of the running belt in a first direction; and
> substantially preventing movement of the running belt in a second direction opposite the first direction.

(56(a)1 ¶ 2.) Plaintiffs cannot argue otherwise. Plaintiffs' expert, Dr. Giachetti, omits any reference to or discussion of either of these modifications in his report addressing the purported non-infringement of Gen III. (56(a)1¶ 30.)

E. The Court Has Already Construed Claim 25

During claim construction, Woodway argued that the Court adopt the plain and ordinary meaning for all terms in the asserted claims of the '169 and '580 patents except for the term "coupled," which Woodway acted as its own lexicographer in defining. (Dkt. No. 55 at 7-8.) The claim terms in the '169 and '580 patents are not technical and employ common place words. (*Id.* at 1.) From Woodway's perspective, claim construction was largely unnecessary

because the plain and ordinary meaning for the claim terms is apparent. (*Id.*) Plaintiffs, on the other hand, identified eight terms for construction.[11] (Dkt. No. 68 at 2.)

Claim construction was a hotly contested issue in this case and included claim limitations found in claim 25. At no point during the parties' exchange of terms for construction did Plaintiffs identify that "providing" and/or "disposing" needed to be construed. (56(a)1 ¶ 12.) Plaintiffs have been on notice that claim 25 of the '580 patent was being asserted against the Gen II TrueForm Runner treadmill since at least July 18, 2016. The parties fully briefed their arguments regarding the disputed claim terms, (*see* Dkt. Nos. 55, 59, 64, 66, and 72), and submitted 9 claim terms to the Court to be construed. (Dkt. No. 68 at 2.) The parties conducted a two and a half hour *Markman* hearing before the Court on November 28, 2016. (*See* Dkt. No. 72.)

The Court issued its Claim Construction Ruling on December 8, 2016. (Dkt. No. 76.) The Court adopted Woodway's proposed construction of "coupled," and construed the remaining eight terms in dispute. Below is a summary of the terms and phrases construed by the Court with those three terms from claim 25 highlighted in green.

Disputed Term/Phrase	**Chapco's and Samsara's Construction**	**Woodway's Construction**	**Court's Construction**
frame	A structure distinct from the bearing rails.	Plain and ordinary meaning.	No further construction necessary.

[11] Plaintiffs originally sought a construction of certain support-related terms – "support," "supported by," and "support member," contending that these terms were indefinite. (Dkt. No. 59 at 18-22.) The parties deferred their dispute regarding these terms until summary judgment, (Dkt. No. 68 at 2). On summary judgment, the Court granted Woodway's motion that these terms were not indefinite. (Dkt. No. 144 at 40-41.)

Disputed Term/Phrase	Chapco's and Samsara's Construction	Woodway's Construction	Court's Construction
Bearing Rail	A running belt retention system that is a structure distinct from the frame and configured to help achieve the desired shape of the running surface.	Plain and ordinary meaning.	A rail with bearings whose top profile corresponds to the shape of the running surface.
A safety device cooperating with the rear shaft	A safety device mechanically connected to the rear shaft.	Plain and ordinary meaning.	A safety device adjoined to the rear shaft.
Coupled	The joining of two members directly or indirectly.	The joining of two members directly or indirectly.	The joining of two members directly or indirectly.
Rotatably coupled	Each part is connected in such a way to permit rotation of one entire element relative to the other element.	Plain and ordinary meaning.	No further construction necessary.
A bearing rail having a plurality of bearings rotatably coupled to the at least one bearing rail	At least one bearing rail having more than one bearing connected to the bearing rail in such a way that each bearing can rotate relative to the bearing rail.	Plain and ordinary meaning.	No further construction necessary.
Running belt	A structure different from the endless belts that follows the profile of the bearing rails.	Plain and ordinary meaning.	No further construction necessary.

Disputed Term/Phrase	Chapco's and Samsara's Construction	Woodway's Construction	Court's Construction
Running Surface	Section of the running belt in between the front and rear shafts intended for contact with the user's foot.	Plain and ordinary meaning.	The portion of the running belt upon which a user could place their foot during normal operation. or The portion of the running belt upon which a user could place part of their foot.
Left side member and right side member	The left side of the frame and the right side of the frame.	Should not be construed.	The court declines to construe this term.

III. APPLICABLE SUMMARY JUDGMENT LEGAL STANDARDS

As explained by the Court in its Ruling on the parties' cross-motions for summary judgment, Woodway, as the moving party, "bears the burden of establishing the absence of any genuine issue of material fact." *Zalaski v. City of Bridgeport Police Dep't*, 619 F.3d 336, 340 (2d Cir. 2010). "For summary judgment purposes, a 'genuine issue' exists where the evidence is such that a reasonable jury could decide in the non-moving party's favor." *Cambridge Realty Co., LLC v. St. Paul Fire & Marine Ins. Co.*, 421 F. App'x 52, 53 (2d Cir. 2011); *see also Rojas v. Roman Catholic Diocese of Rochester*, 660 F.3d 98, 104 (2d Cir. 2011) (citing *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 252 (1986)) (holding that the non-moving party must demonstrate more than a mere "scintilla" of evidence in its favor). "[U]nsupported allegations do not create a material issue of fact." *Weinstock v. Columbia Univ.*, 224 F.3d 33, 41 (2d Cir. 2000).

Here, there are no material issues of fact that the assembly of the Gen III TrueForm Runner meets each and every claim limitation of claim 25 of the '580 patent. Where there is no factual dispute that the assembled accused product satisfies all of the elements of an asserted claim, then summary judgment of infringement may be entered. *Revolution Eyewear, Inc. v. Aspex Eyewear, Inc.*, 563 F.3d 1358, 1370 (Fed. Cir. 2009). In determining whether a patent has been infringed, the Court must conduct a two-step analysis. First, the court determines the scope and meaning of the patent claims asserted, and then the properly construed claims are compared to the accused device to determine if all of the claim limitations are present. *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454 (Fed.Cir.1998) (*en banc*).

With respect to method patents, direct infringement occurs where all steps of a claimed method are performed by or attributable to a single entity. *Akamai Techs., Inc. v. Limelight Networks, Inc.*, 797 F.3d 1020, 1022 (Fed. Cir. 2015). The performance of claimed steps can be attributable to a single entity where that entity "directs or controls" others' performance, or when the actors "form a joint enterprise." *Eli Lilly and Co. v. Teva Parenteral Meds., Inc.*, 845 F.3d 1357, 1364 (Fed. Cir. 2017). While courts should consider all the particular facts presented in determining whether an entity directs or controls another, courts have considered whether an actor: "(1) conditions participation in an activity or receipt of a benefit" upon others' performance of one or more steps of a patented method, and (2) "establishes the manner or timing of that performance." *Id.* at 1365. Additionally, a joint enterprise may be found where there is: (1) an agreement, express or implied, among the members of the group; (2) a common purpose to be carried out by the group; (3) a community of pecuniary interest in that purpose, among the members; and (4) an equal right to a voice in

the direction of the enterprise, which gives an equal right of control. *Akamai Techs.*, 797 F.3d at 1023.

"Where the parties do not dispute any relevant facts regarding the accused product, … but disagree over possible claim interpretations, the question of literal infringement collapses into claim construction and is amenable to summary judgment." *General Mills, Inc. v. Hunt-Wesson, Inc.*, 103 F.3d 978, 983 (Fed. Cir. 1997). As a result, courts often grant summary judgment of infringement where there are no true factual disputes regarding the accused product, which is the case with the assembly of the Gen III TrueForm Runner. *See, e.g.*, *Mikkelsen Graphic Eng'g, Inc. v. Zund Am., Inc.*, 541 F. App'x 964, 971 (Fed. Cir. 2013) (affirming district court's grant of summary judgment with respect to infringement); *Innovention Toys, LLC v. MGA Entm't, Inc.*, 637 F.3d 1314, 1319-20 (Fed. Cir. 2011) (affirming district court's grant of summary judgment with respect to infringement based on the application of the district court's claim construction ruling); *Revolution Eyewear,* 563 F.3d at 1370 (affirming district court's grant of summary judgment of infringement where alleged infringer only attempted to make a distinction on the construction of claim terms); *Hay & Forage Indus. v. New Holland N. Am., Inc.*, 25 F. Supp. 2d 1195, 1199-1200 (D. Kan. 1998) (granting summary judgment before the claim construction ruling was made where the court ruled out any construction that would encompass the construction argued by defendant); *Lexion Med., LLC v. Northgate Techs., Inc.*, 618 F. Supp. 2d 896, 903 (N.D. Ill. 2009) (granting patentee's motion for summary judgment on infringement of method claim); *Philips Elecs. N.A. Corp. v. Contec Corp.*, 411 F. Supp. 2d 470, 477 (D. Del. 2006) (granting summary judgment of indirect infringement of method patent).

IV. AS A MATTER OF LAW CLAIM 25 OF THE '580 PATENT IS LITERALLY INFRINGED UNDER 35 U.S.C. § 271(a)

Plaintiffs have already admitted that the Gen II infringes the asserted claims (which included claim 25) if the "frame and bearing limitations were met." (56(a)1 ¶ 8.) Plaintiffs have also admitted that the only changes from the Gen II to the Gen III involved the location of the wheels and the rear shaft, which are not required by claim 25. (56(a)1 ¶ 1.) In light of these admissions, it is clear that the Gen III infringes claim 25 as a matter of law. To find otherwise opens the door to reargument of the Court's Claim Construction Ruling and the prior summary judgment decision.

But even if the claim limitations in claim 25 are evaluated, by a preponderance of the evidence, the assembly of the Gen III meets each and every claim limitation. All that is required at this stage is a comparison of the properly construed claims to the accused device to determine if all of the claim limitations are present. *Cybor Corp.*, 138 F.3d at 1454. Because the Court has construed the claim terms, and the parties do not dispute any material facts regarding the assembly of the Gen III, summary judgment is warranted. Dr. Giachetti's disagreement regarding claim construction cannot create a factual dispute. *See General Mills,* 103 F.3d at 983; *Rambus Inc. v. Hynix Semiconductor Inc.*, 642 F. Supp. 2d 970, 977 (N.D. Cal. 2008) ("[W]here two experts disagree about infringement, but do not dispute the facts regarding the accused device or method, the question of infringement is more appropriately viewed as a legal question of claim construction."); *see also Quality Edge, Inc. v. Rollex Corp.*, No. 1:10-cv-278, 2013 WL 3283639, at *8 (W.D. Mich. June 28, 2013) ("[I]t appears that [the alleged infringer] has reinvented its entire infringement argument in the proverbial attempt 'to have another bite at the

apple,' for which this Court finds no justification given the proceedings to date"), *vacated in part on other grounds*, 709 Fed. App'x 1000.[12]

As illustrated below, the Gen III is compared to each element of claim 25. (56(a)1 ¶ 11.) As is plain from Dr. Blair's assessment, each and every claim limitation of claim 25 is literally met by the assembly of the Gen III TrueForm Runner. Dr. Giachetti's opinions to the contrary can be rejected. Just as Dr. Giachetti did in his prior opinions regarding the Gen II, he attempts to avoid Dr. Blair's element-by-element analysis by presenting new arguments of how the claims should be construed, rather than pointing out how a limitation is not literally met. Because this Court has already construed the claims, arguments now with respect to claim construction are insufficient to rebut Woodway's showing that each limitation of claim 25, as properly construed by the Court, is literally present in the Gen III.

A. Claim 25: A method comprising

It is undisputed that Chapco employees (purportedly "leased" to Samsara) assemble the Gen III. (Dkt. No. 144 at 7-8.) While Dr. Giachetti now offers arguments regarding which of Plaintiffs (either Chapco or Samsara) carry out the claimed method,[13] (*See, e.g.,* Exhibit 3, May 7, 2018 Supplemental Rebuttal Expert Report of Dr. Robert Giachetti ("Giachetti Rpt."), at ¶¶ 43, 62, and 65), he does not opine that the preamble limits claim 25 in any way or that the assembly of the Gen III cannot in and of itself be claimed as a method. Tellingly, Dr. Giachetti did not raise any such argument with respect to claim 25 and the Gen II.

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[12] A copy of this decision is attached as Exhibit 2.

[13] Dr. Giachetti is silent as to Samsara's activities with respect to the assembly of the Gen III except with respect to the "disposing a running belt" limitation. (*See, e.g.,* Exhibit 3, May 7, 2018 Giachetti Rpt. at ¶¶ 30, 43, 59, 62, and 65.)

(56(a)1 ¶ 6.) Therefore, the assembly of the Gen III, which is the same whether the employees carrying out the method are classified as Chapco or Samsara employees, is a covered method.

B. Providing a Manually Powered Treadmill

With the Gen II, Plaintiffs neither challenged whether it met this claim limitation, nor did they request construction of the term "providing." (56(a)1 ¶ 12.) In fact, Plaintiffs admitted this element was satisfied in their Supplemental Non-infringement Contentions. (56(a)1 ¶ 16.) As plainly shown, and as Plaintiffs must admit, the Gen III, just like the Gen II, is a manually powered treadmill. (56(a)1 ¶¶ 13, 14, and 15.)

Plaintiffs ignore these admissions by now arguing that the element "providing" is not met by assembling the Gen III. (Exhibit 3, Giachetti Rpt. at ¶¶ 20-23). This argument and Plaintiffs' strained interpretation of "providing" are easily rejected.

The term "providing" is a commonplace term which does not require construction. The term "providing" has often been given its plain and ordinary meaning in other cases involving method patents. *See, e.g.*, *Uniloc USA, Inc. v. AVG Techs. USA, Inc.*, No. 2:16-CV-00741, 2017 WL 3498496, at *33 (E.D. Tex. Aug. 16, 2017) (giving the term "providing" its plain and ordinary meaning where there is nothing confusing or ambiguous in the claim language about the term 'providing'");[14] *Insituform Techs., Inc. v. AMerik Supplies, Inc.*, No. 1:08-CV-0333-TCB, 2009 WL 10664201, at *13 (N.D. Ga. Oct. 8, 2009) (declining to construe "providing").[15] There is nothing that suggests that "assembly" of the Gen III would not be included in the plain and ordinary meaning of "providing."

Even where the term "providing" is construed, it is often given a broad construction consistent with its use as a common introductory verb to describe a step of a method patent. *See, e.g., LEGO Sys. A/S v. Rubicon Commc'ns, LP*, No. 3:15-cv-000823(VLB), 2017 WL 4280866, at *15 (D. Conn. Sept. 27, 2017) ("the Court construes the term "providing" as "to supply what is needed for sustenance or support," . . . **which is synonymous in its function with "having."**) (emphasis added).[16] There can be no dispute of material fact that the employees who assemble the Gen III supply the treadmill with the claimed elements, including, for example, a first and second bearing rail, such that the treadmill contains or has these elements. By assembling the Gen III, Plaintiffs' employees are making it available for use.

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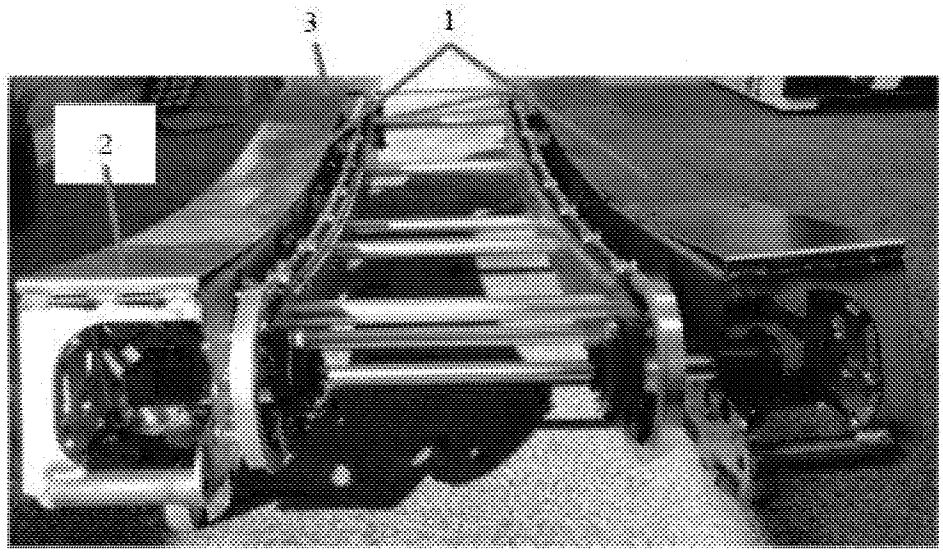
[14] A copy of this decision is attached as Exhibit 4.

[15] A copy of this decision is attached as Exhibit 5.

[16] A copy of this decision is attached as Exhibit 6.

C. The Manually Powered Treadmill Having a Frame with a Front End and Rear End



Again, Plaintiffs must admit that this claim limitation is met. (*See* (56(a)1 ¶ 18.) As shown above, to a person of ordinary skill in the art, the frame [1] has a front end [2] and a rear end [3]. (56(a)1 ¶ 17.) While Dr. Giachetti disagrees with this Court's prior summary judgment ruling regarding the "frame" limitation, he does not argue (nor could he) that the structure Dr. Blair identifies as a "frame" lacks a front and rear end. (Exhibit 3, Giachetti Rpt. at ¶¶ 31-34.)

The Court has already determined that the Gen II has a "frame." (Dkt. No. 144 at 17-19.) The two changes made in the attempted Gen II redesign, (56(a)1 ¶ 1), do not relate to this frame element. Therefore, Gen III has a frame with a front end and a rear end.

Plaintiffs and Dr. Giachetti should not be permitted to resurrect the argument that the TrueForm Runner does not have a "frame." Yet this argument is advanced again in Dr. Giachetti's May 7, 2018 report relating to the Gen III. It is contrary to the Court's claim construction ruling, (Dkt. No. 76 at 5-7), and was previously rejected by the Court. (Dkt. No. 144 at 17-19.) That Dr. Giachetti continues to disagree with the Court regarding this element,

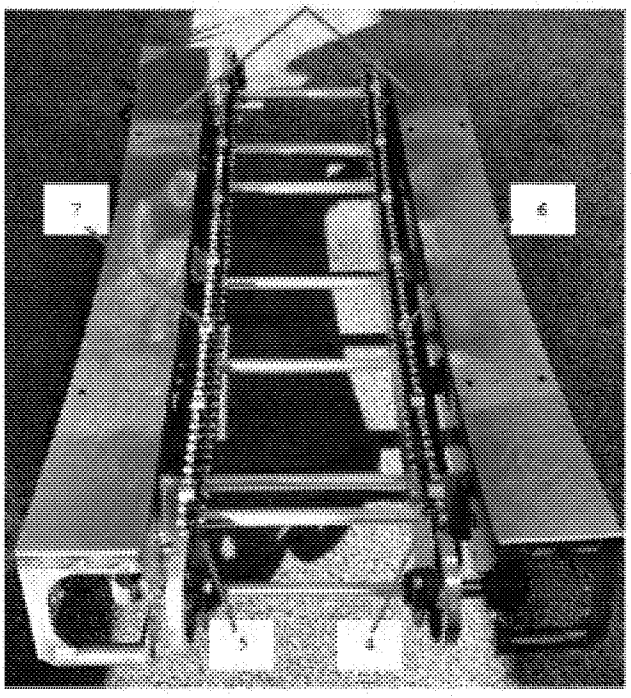
(Exhibit 3, May 7, 2018 Giachetti Rpt. at ¶¶ 31-34 and 39), or believes another construction is more appropriate, is not a basis to deny summary judgment. Plaintiffs' attempt to revive these claim construction positions cannot be used to create a genuine issue of material fact now. *Telcordia Techs., Inc. v. Lucent Techs., Inc.*, 514 F. Supp. 2d 598, 606 (D. Del. 2007); *see also Lufthansa Technik AG v. Astronics Advanced Elec. Systems Corp.*, 196 F. Supp. 3d 1190, 1195 (W.D. Wash. 2016) (noting that parties may not use summary judgment proceedings as stealth weapons for reconsideration of claim construction). Dr. Giachetti's arguments regarding the meaning of "frame" should again be rejected. *See Cerner Corp. v. Visicu, Inc.*, 667 F. Supp. 2d 1062, 1074 (W.D. Mo. 2009) ("[Plaintiff's] remaining arguments merely rehash issues decided during claim construction and the Court will not entertain them any further").

The Court determined that the term "frame" required no additional construction because its meaning was unambiguous to a person of ordinary skill in the art. (Dkt. No. 144 at 18.) While the specification of the '580 patent states that "the frame may have substantially any configuration suitable for providing structure and support for the manual treadmill," (Dkt. No. 100 at 28), this does not require – nor did the Court's Claim Construction Ruling suggest – that testing to evaluate structure and support is mandated. (Dkt. No. 144 at 18.) Dr. Giachetti is again attempting to import a limitation into the term "frame." Just as Dr. Giachetti's addition of new feet and other components to a deconstruction of the Gen II and his claims that it still operated were deemed a "distraction" and irrelevant to an infringement finding as to the Gen II, (*id.*), Dr. Giachetti's insistence that Dr. Blair should have conducted testing to measure the "structure and support" should similarly be rejected. Nothing about the plain and ordinary meaning of "frame" requires the analysis that Plaintiffs contemplate. This limitation is satisfied in the assembly of the Gen III TrueForm Runner treadmill.

D. Providing a First Bearing Rail and a Second Bearing Rail, the First and Second Bearing Rails Each Comprising a Plurality of Bearings and Extending Longitudinally on the Frame, Wherein the First and Second Bearing Rails Define a Curved Top Profile

The assembly of the Gen III satisfies this claim limitation. (56(a)1 ¶¶ 19-22.) As noted above, Plaintiffs neither argued previously that "providing" needed to be construed by the Court, nor that claim 25 was not infringed with respect to the Gen II other than with respect to the "frame" and "bearing rail" limitations. (56(a)1 ¶ 12; Dkt. No. 144 at 14.) Plaintiffs only argued that the Gen II lacks a bearing rail. (Dkt. No. 144 at 14.) The Court has already determined that the Gen II – and by extension, the Gen III – contains bearing rails. (Dkt. No. 144 at 17.) Plaintiffs' retread of their "bearing rail" position with regards to the Gen III is equally unavailing now.

As shown below, to a person of ordinary skill in the art, a first bearing rail [4] extends longitudinally on one side of the frame [1] (*i.e.*, the left side), while a second bearing rail [5] extends longitudinally on the other side of the frame [1] (*i.e.*, the right side). (56(a)1 ¶ 22) The first bearing rail [4] includes a plurality of bearings [6]. The second bearing rail [5] includes a plurality of bearings [7]. The first and second bearing rails [4] and [5] define a curved top profile [8]. (*Id.*)



Plaintiffs are likely to rely on Dr. Giachetti to challenge this claim limitation in two respects. First, Dr. Giachetti contests the presence of a frame and bearing rails, (Exhibit 3, Giachetti Rpt. at ¶¶ 39-40), arguments which have already been rejected by the Court. (Dkt. No. 144 at 15-19.) Second, Dr. Giachetti challenges that the assembly "provides" a first and second bearing rail. (Exhibit 3, Giachetti Rpt. at ¶¶ 36-38.) However, as noted above, there is nothing in the plain and ordinary meaning of this term to indicate that assembly of the Gen III does not meet the element of providing bearing rails. It is clear that the Gen III contains two bearing rails, *i.e.*, rails with bearings whose top profiles correspond to the shape of the running surface, (56(a)1 21), and that the "leased" Chapco employees are the only ones who assemble the Gen III, (Dkt. No. 144 at 7-8). Therefore, this claim limitation is satisfied as a matter of law.

E. Disposing a Running Belt on the Plurality of Bearings of the First Bearing Rail and the Second Bearing Rail Such that the Running Belt Follows a Top Curved Running Surface Corresponding to the Curved Top Profile of the First and Second Bearing Rails

As seen below, the assembly of the Gen III satisfies this limitation. An installed running belt [9] follows a curved running surface [10]. The running belt [9] is disposed on the pluralities of bearings [6] and [7] of first bearing rail [4] and the second bearing rail [5], respectively. Because the curved top profile [8] is proximate the curved running surface [10], the curved running surface [10] corresponds to the curved top profile [8]. (56(a)1 ¶¶ 23-26.)

Just as with the other claim limitations in claim 25, before the introduction of the Gen III, Plaintiffs did not contest that this limitation was satisfied by the Gen II. (Dkt. No. 144 at 15-16.) And Plaintiffs did not otherwise advance any claim construction arguments regarding "disposing." (56(a)1 ¶ 12.) Plaintiffs' failure to seek any construction of this term at the appropriate time constitutes waiver. *See Central Admixture Pharma. Servs., Inc. v. Advanced Cardiac Solutions, P.C.*, 482 F.3d 1347, 1356 (Fed. Cir. 2007) (affirming district court finding that claim construction argument not raised during claim construction phase is waived). Plaintiffs should not now be permitted to inject new claim construction arguments into the summary judgment analysis. (*See, e.g.*, Dkt. No. 144 at 17.)

Claim construction having been concluded, at this stage, the proper analysis need only compare the construed claims (including the plain and ordinary meaning of any terms that were not construed)[17] to the Gen III. (*See* Dkt. No. 144 at 15 ("Having construed the terms, the

[17] Where claim terms are not requested to be construed, they should be given their plain and ordinary meaning. S*ee Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) ("We have frequently stated that the words of a claim are generally given their ordinary and customary meaning.").

only analysis left to be done is a comparison between the terms, as construed, and the Accused Products.") (citing *Cybor Corp.*, 138 F.3d at 1454).) Dr. Giachetti does not do this analysis. Instead, Plaintiffs rely on new claim construction arguments based entirely on the Gen III and with the goal of excluding specific features of the claimed process. (Exhibit 3, May 7, 2018 Giachetti Rpt. at ¶¶ 23-27, 36-38 and 46-49.) This is inappropriate. *See Wilson Sporting Goods Co. v. Hillerich & Bradsby Co.*, 442 F.3d 1322, 1331-32 (Fed. Cir. 2006) (noting that Federal Circuit precedent "forbids biasing the claim construction process to exclude or include specific features of the accused product or process"). As the Court noted during the parties' *Markman* hearing, claim construction should be done without regard to the accused infringing product's configuration. (*Markman* Hearing Tr., November 28, 2016, at 15:18-17:14.)

The term "disposing" is a common term that does not require construction. As Dr. Giachetti admits, a dictionary definition of "dispose" is "to put in place: set in readiness." (Exhibit 3, Giachetti Rpt. at ¶ 48.) There is nothing in the plain and ordinary meaning to indicate that assembly of the Gen III does not meet the element of "disposing" the running belt. Similarly, courts have noted that "disposing" is a commonly used word that generally means placing or attaching something. *See Regents of Univ. of Cal. v. Micro Therapeutics, Inc.*, No. C 03-05669, 2007 WL 2580594, at *5 (N.D. Cal. Aug. 17, 2007) (construing "disposing" to mean "a manipulative step in which an object is placed in a particular location or position");[18] *Kwench Sys. Int'l LLC v. Uponor Wirsbo Co.*, No. 1:07-CV-221-JM, 2008 WL 7084432, at *1 (D.N.H. Sept. 16, 2008) (construing "disposing . . . upon a structure" to mean "attaching to the

[18] A copy of this decision is attached as Exhibit 7.

structure").[19] Just as the assemblers provide bearing rails during the assembly process, it is clear that the employees place the running belt in position on the bearings of the bearing rails. (56(a)1 ¶ 24-25.)

Nevertheless, Dr. Giachetti suggests that "disposing a running belt on the plurality of bearings" requires direct contact – and no intervening structures – between the running belt and the plurality of bearings. (Exhibit 3, Giachetti Rpt. at ¶¶ 47-59.) This is of course because Dr. Giachetti believes that the Gen III has intervening structure between the running belt and the bearings. But Dr. Giachetti should not be allowed to import limitations that exclude the assembly of the Gen III under the guise of his "understanding" of the plain and ordinary meaning. (*See* Dkt. No. 76 at 4 (noting that claim construction should not be reargued to the jury)*; see also YETI Coolers, LLC v. RTIC Coolers, LLC*, No. A-15-CV-597-RP, 2017 WL 404519, at *2-3 (W.D. Tex. Jan. 27, 2017) (excluding expert opinions that attempted to argue claim construction of the plain and ordinary meaning)).[20] Moreover, Dr. Giachetti's reliance on different words used in the apparatus claims in support for this theory is misplaced. (Exhibit 3, Giachetti Rpt. at ¶¶ 55-57.) It is improper to import limitations from apparatus claims into method claims where the claim language is unambiguous. *DSW, Inc. v. Shoe Pavilion, Inc.*, 537 F.3d 1342, 1348 (Fed. Cir. 2008). Even if this were somehow true, and it is not, Plaintiffs never advanced this purported non-infringement theory in its motion for summary judgment of non-infringement of claim 25 as to the Gen II, and it is too late to raise it now with regards to the Gen III especially as the changes to the Gen III have nothing to do with the running belt or bearings.

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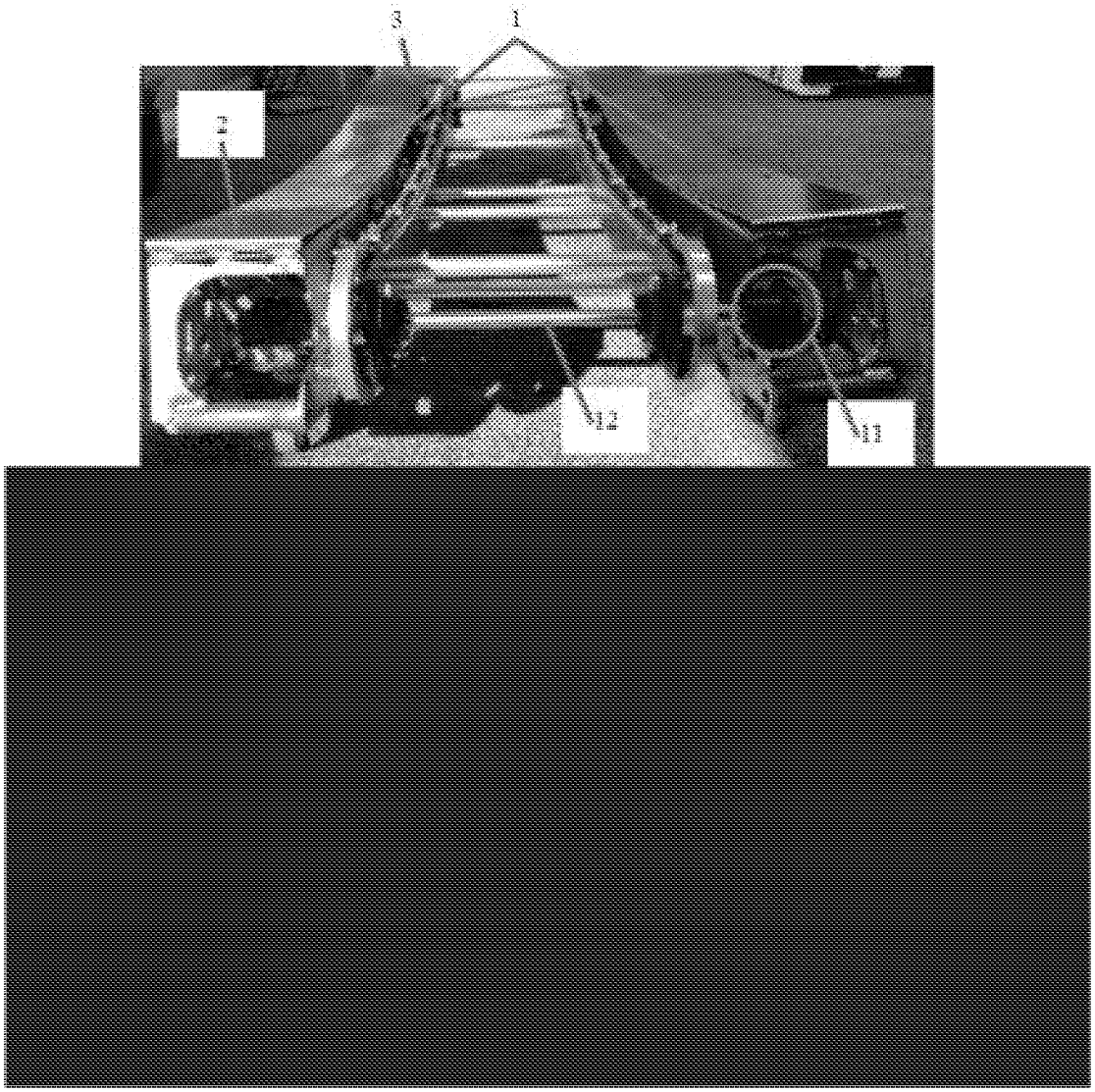
[19] A copy of this decision is attached as Exhibit 8.

[20] A copy of this decision is attached as Exhibit 9.

F. Permitting Movement of the Running Belt in a First Direction and Substantially Preventing Movement of the Running Belt in a Second Direction Opposite the First Direction



Plaintiffs previously admitted that the Infringing Product met this claim limitation in their Supplemental Non-Infringement Contentions. (56(a)1 ¶ 28.) In addition, like the previous limitations, Plaintiffs did not contest this limitation in connection with summary judgment. And as illustrated above, Plaintiffs now cannot credibly challenge that a person of ordinary skill in the art would conclude that this claim limitation is satisfied.

A running belt [8] follows a curved running surface [9]. (56(a)1 ¶¶ 26, 25, 29.) A safety device [11] is coupled to a shaft [12]. (Id.) As also shown, the safety device [11] has a model number of RCB- 162117, which corresponds with a Koyo brand. (*Id.*) This model number corresponds with a "regular clutch and bearing assembly" that "transmits torque between [the] shaft and housing in one direction and allows free overrun in the opposite direction." (*Id.*) Because the safety device [11] is coupled to the shaft [12] and because the safety device [11] "allows free overrun" in one rotational direction, the safety device [11] is structured to substantially prevent rotation of the shaft [12] in a first rotational direction while permitting rotation of the shaft [12] in a second rotational direction opposite the first rotational direction.

(*Id.*) Because the running belt [9] is disposed about the shaft [12], rotational movement of the running belt [9] is affected/constrained by movement of the shaft [12]. (*Id.*) Thus, the safety device [11] is structured to substantially prevent movement of the running belt [9] in a first direction and permit movement of the running belt [9] in a second direction that is opposite the first direction. (56(a)1 ¶ 29.)

V. FOR THIS MOTION IT IS THE *ASSEMBLY* OF THE GEN III THAT IS RELEVANT NOT WHETHER IT IS CHAPCO AND/OR SAMSARA THAT BEARS RESPONSIBILITY

Dr. Giachetti's opinions regarding whether Chapco and/or Samsara is the proper infringer are beyond the scope of his knowledge and expertise, and such a factual determination is not relevant to this Motion. Plaintiffs argue that Chapco does not perform the steps of claim 25 and thus cannot be infringers.[21] However, this argument is not pertinent because through this Motion, Woodway simply seeks a finding that the ***assembly*** of the Gen III infringes claim 25. Woodway has not moved for summary judgment that either Samsara or Chapco in particular are responsible for this infringement.

Moreover, Plaintiffs are incorrect as a matter of law. Liability for direct infringement of a method patent claim can be found where the alleged infringer: (1) directs or controls another's performance or (2) where the actors form a joint enterprise. *Akamai Techs.*, 797 F.3d at 1022-23 (Fed. Cir. 2015). Here, there is ample evidence to be presented at trial that Chapco controls Samsara's actions through shared directors and employees, or at the very least, that the companies are involved in a joint enterprise. In addition, a finding that Samsara is the

[21] Woodway disputes Plaintiffs arguments regarding whether Chapco infringes. However, Dr. Giachetti admits that at least Samsara performs all steps except for the "disposing a running belt on the plurality of bearings…" element. Because there is no issue of material fact whether the running belt is disposed on the plurality of bearings, (*see infra*), at least Samsara is responsible for the infringing activity.

alter ego of Chapco or Brian Weinstein would also give rise to Chapco's liability for infringement, either under the "direct or control" theory or through traditional agency principles.

This Court has already denied Plaintiffs' motion for summary judgment of non-infringement with respect to claim 25 of the '580 patent due to the issues of fact surrounding the relationship between Chapco and Samsara. (*See* Dkt. No. 144 at 12.) "[The Chapco/Samsara relationship] does not insulate Chapco from a claim that its employees infringe the ['580 patent] while making the Accused Products on behalf of Samsara, because there is a genuine issue of material fact as to whether Chapco, whose employees are being used to assemble the Accused Products, is making those products by leasing its employees to Samsara, designing the Accused Products, and sourcing the components not made by Chapco itself." (Dkt. No. 144 at 8.) Therefore, it is appropriate to find that the assembly of the Gen III infringes claim 25, while leaving which entity is responsible for the assembly as an issue for trial.

A comparison between the properly construed claims and the steps of assembly for the Gen III compels a finding of infringement as a matter of law. Plaintiffs' new claim construction arguments should be rejected. The jury will hear evidence regarding the relationship between Chapco and Samsara regarding infringement and the Gen II, and it is not unreasonable to also task the jury to determine whether one or both of Chapco and Samsara are responsible for infringement regarding the Gen III based on the same facts.

VI. CONCLUSION

For the reasons set forth above, Woodway's Motion for Summary Judgment should be granted.

Dated: June 8, 2018

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on June 8, 2018, a copy of the foregoing was filed electronically and served by mail on anyone unable to accept electronic filing. Notice of this filing will be sent by e-mail to all parties by operation of the Court's electronic filing system or by mail to anyone unable to accept electronic filing as indicated on the Notice of Electronic Filing. Parties may access this filing through the Court's CM/ECF System.

/s/ Matthew W. Peters
Matthew W. Peters, phv09498

ORAL ARGUMENT REQUESTED

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC, Plaintiffs, v. WOODWAY USA, INC., Defendant.	)	3:15-CV-01665-JCH June 8, 2018

WOODWAY USA, INC.'S LOCAL RULE 56(a)1 STATEMENT OF UNDISPUTED MATERIAL FACTS IN SUPPORT OF ITS MOTION SUMMARY JUDGMENT OF INFRINGEMENT OF U.S. PATENT NO. 9,039,580

4825-3734-9992

Pursuant to Local Rule 56(a)1, Woodway USA, Inc. ("Woodway") respectfully submits this Statement of Undisputed Material Facts in support of its Motion for Summary Judgment of Infringement of U.S. Patent No. 9,039,580. Specifically, Woodway identifies the following material facts as to which there is no genuine dispute, citing as necessary to the exhibits to this Local Rule 56(a)1 Statement of Undisputed Material Facts and documents already of record in the current case.

1. The only changes made between the Gen II TrueForm Runner treadmill and the Gen III relate to the wheels' location when the treadmill is in use, and the rear shaft assembly and its attachment to the frame. (Ex. A, Pretrial Hearing Tr., April 10, 2018, at 4:23-5:3, 7:10-17; Dkt. No. 211 at 25-26.)

2. Claim 25 of the '580 patent does not require the elements of "wheels" or a "rear shaft." (Ex. B, '580 patent, at 36:1-18.)

3. Claim 25 of the '580 patent was asserted in Woodway's original counterclaims and included in Woodway's Supplemental Infringement Contentions against the Gen II TrueForm Runner treadmill. (Dkt. No. 54 at ¶ 22; Ex. C, Woodway's Supplemental Infringement Contentions, at Appendix B, 48-56.)

4. Plaintiffs addressed claim 25 of the '580 patent in their Supplemental Non-Infringement Contentions. (Ex. D, Plaintiffs' Supplemental Non-Infringement Contentions, at Exhibit B, 49-57.)

5. Plaintiffs conceded that, with respect to claim 25 of the '580 patent, in their Supplemental Non-Infringement Contentions that the only claim limitations missing were the "bearing rail" and "running belt" limitations. (Ex. D, Plaintiffs' Supplemental Non-Infringement Contentions, at Exhibit B, 49-57.)

6. In his March 30, 2017 report, regarding claim 25 of the ''580 patent, Dr. Giachetti stated the following:

> **"The accused products do not have a bearing rail. The element Dr. Blair accuses of being a frame is not a frame, and the element Dr. Blair accuses of being a bearing rail is a frame."**

Dr. Giachetti did not offer any other opinions regarding any purported missing claim limitations in the Gen II TrueForm Runner Treadmill with respect to claim 25. (Ex. E, March 30, 2017 Giachetti Report, at 18.)

7. Dr. Giachetti confirmed in deposition that the entirety of his opinions regarding non-infringement were included in his March 30, 2017 report. (Ex. F, Giachetti Tr., at 170:12-173:19.)

8. The Gen II TrueForm Runner treadmill infringes claim 25 of the '580 patent if found to have a "frame" and "bearing rails." (Ex. G, Summary Judgment Hearing Tr., September 17, 2017, at 14:24-15:12, 17:8-25; Dkt. No. 144 at 15.)

9. Chapco's internal engineering documents do not reflect any changes, other than the wheels' location when the treadmill is in use, and the rear shaft assembly and its attachment to the frame, between the Gen II and Gen III TrueForm Runner Treadmill. (*See, e.g.*, Ex. H, Gen III Cad Drawings, at SAM0014284.)

10. Dr. Giachetti's May 7, 2018 report references the same timed build for the Gen III as he did in his March 30, 2017 report regarding the Gen I and Gen II TrueForm Runner treadmills. (*Compare* "Timed Build," Dkt. No. 90-11 at 1, *with* May 7, 2018 Giachetti Report, at ¶ 42 and 10, Figure 1.)

11. The expert report of Woodway's technical expert, Kim Blair, sets forth a claim-by-claim analysis comparing the assembly of the Gen III to each element of claim 25. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 1-12.)

12. Plaintiffs never sought or offered a construction of the terms "providing" or "disposing on" during claim construction. (*See* Dkt. No. 68 at 2.)

13. Claim 25 of the '580 patent requires, among other things, "providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and a rear end." (*E.g.*, Ex. B, '580 patent, at 36:1-4.)

14. "Providing a manually powered treadmill" is achieved by assembling the Gen III TrueForm Runner treadmill. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 1.)

15. The Gen III TrueForm Runner is a manually powered treadmill. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 1; Dkt. No. 27 at ¶ 2; Dkt. No. 101 at 25.)

16. Plaintiffs admitted that the limitation described in Paragraph 13 above is satisfied regarding the Gen II TrueForm Runner treadmill. (Ex. D, Plaintiffs' Supplemental Non-Infringement Contentions, at Exhibit B, 49.)

17. The Gen III TrueForm Runner treadmill has a frame with a front end and a rear end. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 2-3.)

18. Plaintiffs admitted that the Gen II TrueForm Runner treadmill includes a frame having a front end and a rear end. (Ex. D, Plaintiffs' Supplemental Non-Infringement Contentions, at Exhibit B, 50.)

19. Claim 25 of the '580 patent requires, among other things, "providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a

plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile." (Ex. B, '580 patent, at 36:5-9.)

20. Chapco employees place two bearing rails on the Gen III during assembly. (TrueForm Runner "Timed Build", Dkt. No. 90-11 at 1; Dkt. No. 144 at 7-8.)

21. The assembly of the Gen III TrueForm Runner treadmill includes providing two bearing rails to the assembly. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 4-6.)

22. The Gen III TrueForm Runner has a first bearing rail which extends longitudinally on one side of the frame and a second bearing rail which extends longitudinally on the other side of the frame. Both bearing rails include a plurality of bearings and define a curved top profile. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 4-6.)

23. Claim 25 of the '580 patent requires, among other things, "disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails." (Ex. B, '580 patent, at 36:10-14.)

24. Chapco employees place a running belt on top of the bearings of the bearing rails in assembling the Gen III. (TrueForm Runner "Timed Build", Dkt. No. 90-11 at 6; Dkt. No. 144 at 7-8.)

25. The assembly of the Gen III TrueForm Runner treadmill includes disposing a running belt on the bearing rails. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 6-9.)

26. The running belt of the Gen III TrueForm Runner treadmill follows a top curved running surface which corresponds to the curved top profile of the bearing rails. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 6-9.)

27. Claim 25 of the '580 patent requires, among other things, "permitting movement of the running belt in a first direction and substantially preventing movement of the running belt in a second direction opposite the first direction." (Ex. B, '580 patent, at 36:15-18.)

28. Plaintiffs admitted that the limitation described above in Paragraph 27 is satisfied regarding the Gen II TrueForm Runner treadmill. (Ex. D, Plaintiffs' Supplemental Non-Infringement Contentions, at Exhibit B, 53.)

29. The safety device that is installed during the assembly of the Gen III TrueForm Runner permits the running belt to move in a first direction and substantially prevents the running belt form moving in a second direction opposite the first direction. (Blair Suppl. Rpt., Dkt. No. 236 at Exhibit A, 10-12.)

30. Dr. Giachetti's May 7, 2018 report does not reference the wheels' location when the treadmill is in use or the rear shaft assembly and its attachment to the frame. (May 7, 2018 Giachetti Report, at ¶¶ 19-65.)

Dated: June 8, 2018

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By its Attorneys,

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CERTIFICATE OF SERVICE

I hereby certify that on June 8, 2018, a copy of the foregoing was filed electronically and served by mail on anyone unable to accept electronic filing. Notice of this filing will be sent by e-mail to all parties by operation of the Court's electronic filing system or by mail to anyone unable to accept electronic filing as indicated on the Notice of Electronic Filing. Parties may access this filing through the Court's CM/ECF System.

/s/ *Matthew W. Peters*
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THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC,	)	
Plaintiffs,	)	Civil Action No. 3:15-cv-1665 (JCH)
vs.	)	
WOODWAY USA, INC.,	)	
Defendant.	)	

WOODWAY USA, INC.'S MEMORANDUM OF LAW IN OPPOSITION TO PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT OF NON-INFRINGEMENT AND INVALIDITY OF CLAIM 25 OF U.S. PATENT NO. 9,039,580

ORAL ARGUMENT REQUESTED

4834-4767-9339.2

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Plaintiffs Chapco, Inc. ("Chapco") and Samsara Fitness, LLC ("Samsara") (collectively, "Plaintiffs") are attempting to leverage their recent introduction of the Gen III TrueForm Runner treadmill[1] to revisit issues that have already been addressed and decided.

To support a non-infringement position for both Chapco and Samsara, Plaintiffs advance a new claim construction position for the phrase "disposing a running belt on." But Plaintiffs overlook that claim 25 of U.S. Patent No. 9,039,580 ("the '580 patent") has been part of this case since the beginning and already construed by the Court. (Dkt. No. 54 at ¶ 22; Dkt. No. 76 at 2.) Plaintiffs never identified this phrase as one that is in need of construction or otherwise challenged that the TrueForm Runner met this claim limitation, facts which they fail to address in their briefing. (*See* Dkt. No. 68.) Plaintiffs' newly-minted claim construction argument relating to "disposing" has long been waived. Even if the Court is inclined to revisit claim construction, the proper construction of "disposing" is not as narrow as Plaintiffs contend.

In an attempt to further insulate Chapco from infringement liability, Plaintiffs want to undo the Court's determination that there is a material issue of fact regarding the Chapco assemblers. Conceding Samsara's involvement in the assembly of the Gen III, Plaintiffs contend

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[1] Plaintiffs have manufactured and sold three versions of the TrueForm Runner: the Original, the Redesigned or Gen II, and the Gen III, each of which comes in three models. (Dkt. No. 101 at 7; Pretrial Hearing Tr., April 10, 2018, at 4:14-5:8.) By Plaintiffs' admission, the only difference between these models is their relative size, shape, and arrangement of the handrails; the size and dimensions of the treadmill base are the same for each model. (56(a)2 ¶ 1.) The original base of the TrueForm Runner included a one-way bearing safety mechanism on the rear shaft of the treadmill to restrict the unexpected movement of the running belt ("the Original TrueForm Runner"). (Dkt. No. 101 at 7.) After Plaintiffs were put on notice of U.S. Patent No. 8,986,169 ("the '169 patent"), Chapco redesigned the TrueForm Runner to relocate the safety mechanism to the front shaft of the treadmill ("Gen II TrueForm Runner"). (*Id.*) The Court determined as a matter of law that Samsara's sale of the Gen II TrueForm Runner infringes claims 1, 6, 19, and 20 of the '580 patent. (Dkt. No. 144 at 19.) As explained in Woodway USA, Inc. ("Woodway's) Memorandum in Support of its Motion for Summary Judgment, Plaintiffs concede that the Gen III is different from the Gen II TrueForm Runner in only two respects. (Dkt. No. 258 at 8-9.) Plaintiffs confirmed that the two changes were to "put[] the wheels on the ground and remov[e] the rear shaft. That's it." (Dkt. No. 257, ("56(a)1") ¶ 1, *quoting* Pretrial Hearing Tr., April 10, 2018, at 7:10-17); *see also* Dkt. No. 211 at 25-26 (noting that the redesigned parts are "the wheel assembly and the rear pulley assembly").) Chapco's internal engineering documents confirm no other changes were made to create the Gen III. (56(a)1 ¶ 1.) Dr. Blair concurs. (Dkt. No. 236 at ¶ 15 and Exhibit A at 1-12.)

that Chapco has nothing to do with putting the treadmill together. Which entity – Chapco or Samsara or both – is responsible for the infringement of claim 25 turns on the same evidence that created a fact issue that precluded Plaintiffs' original motion for summary judgment regarding the Original and Gen II treadmills. (*See* Dkt. No. 144 at 7-8, 10-12.) The Court has already determined that Plaintiffs' "rental" arrangement "does not insulate Chapco from a claim that is employees infringe the patents-in-suit while making the [Original and Gen II] on behalf of Samsara, because there is a genuine issue of material fact as to whether Chapco, whose employees are being used to assemble the [Original and Gen II], is making those products by leasing its employees to Samsara, designing the [Original and Gen II], and sourcing the components not made by Chapco itself." (Dkt. No. 144 at 8.) Just as there was a fact issue regarding who is responsible for the activities associated with the Original and Gen II treadmills, Plaintiffs' efforts to arbitrarily divide responsibility for the activities of the Gen III treadmill assemblers also fail to stand up. Chapco is responsible for the design of the Gen III, and the Gen III assembly is done using the same procedure by the identical assemblers that Plaintiffs have admitted are Chapco employees that put together the Original and Gen II treadmills. (Woodway's Local Rule 56(a)2 Statement of Additional Material Facts ("56(a)2") ¶¶ 10, 11, 45.) The assembly of the Gen III meets all the claim limitations of claim 25 of the '580 patent. The jury should decide whether Chapco or Samsara or both entities are responsible.

With respect to Plaintiffs' validity challenge to claim 25, again Plaintiffs ignore their prior admissions and the Court's Ruling on Summary Judgment. Plaintiffs previously moved for summary judgment attacking claim 25 as obvious, (*See* Dkt. No. 88-1 at 1-3, 27), and were unsuccessful. (*See* Dkt. No. 144 at 37-41.) The eve of trial introduction of the Gen III has no bearing on the validity of this claim or any other claims in the '580 patent. Validity and

infringement are separate inquiries, with the former analysis divorced from the particular products accused of infringement.

In addition, even if the Court is inclined to take up the substance of Plaintiffs' validity arguments, Plaintiffs cannot circumvent at least two significant issues of material fact – whether a person having ordinary skill in the art would be properly motivated to combine the disparate references Plaintiffs rely on and the presence of secondary indicia of non-obviousness.

The parties continue to dispute who constitutes a person of ordinary skill, which the Court, correctly, assessed precludes a determination of the validity of the '580 patent. (Dkt. No. 144 at 37-38.) Plaintiffs cannot simply adopt Dr. Blair's definition of a person of ordinary skill to circumvent this issue. Dr. Giachetti's opinions regarding obviousness and the motivation to combine were tied to his definition of a person of ordinary skill in the art. Dr. Giachetti never opined on the prior art through the prism of Dr. Blair's definition or why Dr. Blair's person of ordinary skill in the art would be inclined (or not) to combine certain references. Dr. Giachetti must be confined to his original opinions that were timely disclosed. Plaintiffs should not be allowed to bolster Dr. Giachetti's previous opinions through attorney argument. The Court should also not permit Plaintiffs to reintroduce opinions that have been struck or otherwise allow Dr. Giachetti to provide new opinions now.

With respect to secondary indicia of non-obviousness, binding Federal Circuit precedent requires that a fact-finder evaluate these indicia, negating summary judgment. Woodway offered evidence that its CURVE line of treadmills that practice the inventions in the '580 patent are commercially successful, these treadmills are praised within the industry, and they are copied by others. (Dkt. No. 111 at 34-35.) Plaintiffs cannot simply avoid the opinions

of Dr. Blair and Mr. Weber, Woodway's Director of Sales and Marketing, merely because Plaintiffs disagree with their assessments.

Plaintiffs' Motion for Summary Judgment of Non-Infringement and Invalidity on [sic] Claim 25 of U.S. Patent No. 9,039,580, (Dkt. No. 252), should be denied.

I. PLAINTIFFS' CROSS-MOTION FOR SUMMARY JUDGMENT OF NON-INFRINGEMENT MUST BE DENIED

Plaintiffs seek a determination that, as a matter of law, they do not infringe claim 25 of the '580 patent. However, Plaintiffs' non-infringement defenses are not credible. Plaintiffs cannot meet their burden to establish that summary judgment should be granted in their favor.

In connection with Woodway's Motion for Summary Judgment of Infringement, Woodway successfully anticipated the arguments Plaintiffs were likely to raise in support of their cross-motion of non-infringement. In lieu of repeating those points here and unnecessarily burdening the Court with duplicative submissions, Woodway incorporates by reference its Memorandum in Support of its Motion for Summary Judgment as its opposition to Plaintiffs' Motion. (Dkt. No. 256.) In addition, Woodway offers the following three points in opposition.

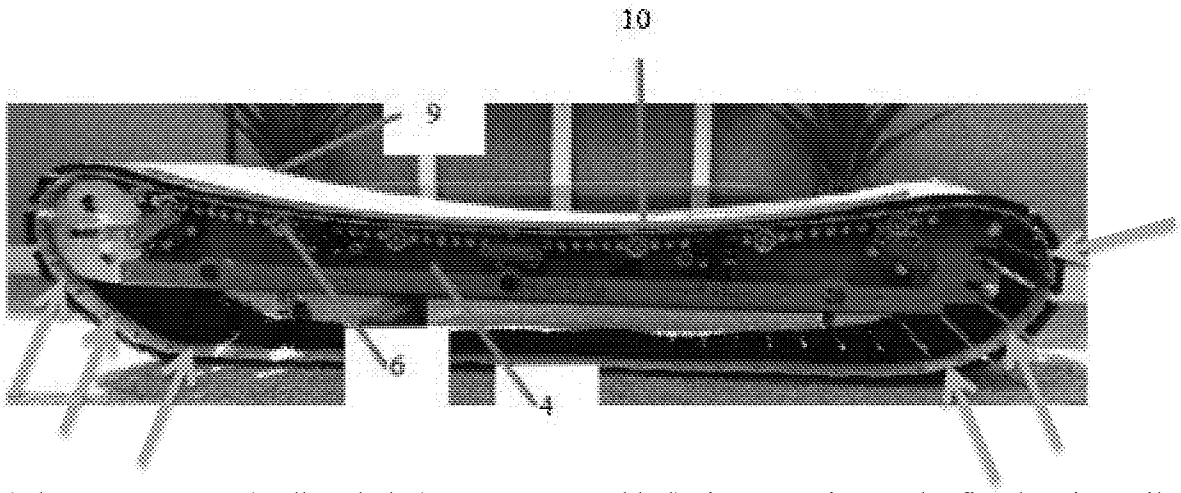
A. Plaintiffs' construction of "disposing" cannot survive scrutiny

Crediting Plaintiffs' theory regarding Samsara's alleged leasing of Chapco assemblers, Plaintiffs concede that Samsara's infringement liability turns on the construction of "disposing." (Dkt. No. 253 ("Plaintiffs' MOL") at 9-12.) As explained in Woodway's Memorandum, (Dkt. No. 258 at 23-26), the plain and ordinary meaning of this claim limitation does not comport with Plaintiffs' unnecessarily narrow construction that the running belt must be in direct contact with the bearings on the bearing rail. There is no support to import such a limitation into claim 25.

Dr. Blair opined that to meet the "disposing a running belt on a plurality of bearings . . ." claim limitation, the assembler merely has to provide a running belt and locate it above the bearing rails **such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails**. (56(a)2 ¶ 3.) The plain and ordinary meaning of this claim limitation does not require that the running belt and the bearings on the bearing rail be physically touching to ensure that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails. In some situations, "disposing a running belt on the plurality of bearings" *may* mean that the running belt and bearings are touching, but it is not required. The plain and ordinary meaning of this claim limitation, which Plaintiffs never asked the Court to construe until now, does not necessitate direct contact so long as the running belt is positioned such as it is in the Gen III: to follow a top curved running surface corresponding to the curved top profile of the first and second bearing rails.

Plaintiffs cannot reasonably dispute that even with the intervening endless belts, in the Gen III, the running belt is situated on the "plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails as is required by claim 25." As illustrated below, the presence of the endless belts layered between the running belt and the plurality of bearings does not compromise or impede the running belt from following a top curved running surface corresponding to the curved top profile of the first and second bearing rails. This is likely why Plaintiffs admitted that this claim limitation was satisfied by the Original and Gen II treadmills. (56(a)2 ¶ 4.)

[redacted]



(Dkt. No. 236 at 8 (endless belt (green arrows added) circumnavigates the first bearing rail, [4]).)

Plaintiffs attempt to draw some distinction between the use of "supported by" in claim 1 of the '580 patent, which is an apparatus claim, and "disposing on" in the method claim to sustain their newly-minted claim construction argument that purportedly precludes indirect support by the bearings. (Plaintiffs' MOL at 10.) But there is nothing that requires these claim terms to have different meanings, especially in this case, where it is readily apparent that Woodway intended these terms to have similar meanings. Where two distinct terms are very similar in meaning, it is appropriate to assign them the same or similar meanings. *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1120 (Fed. Cir. 2004) ("[T]he

context does not show that 'connected' and 'associated' should be differentiated into the definitions proposed by [defendant], and we must conclude that this is simply a case where the patentee used different words to express similar concepts, even though it may be confusing drafting practice"); *Bancorp Servs., L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1373 (Fed. Cir. 2004) ("[I]t is not unknown for different words to be used to express similar concepts . . . ."); *see also Travel Sentry, Inc. v. Tropp*, 661 F. Supp. 2d 280, 290-91 (E.D.N.Y. 2009) (finding the terms "luggage" and "baggage" to be synonymous as used in separate, related patents).[2]

The plain and ordinary meaning of "disposing on" is consistent with the Court's guidance to the parties during claim construction regarding the term "running belt" and its connection to the bearing rail.[3] During claim construction, Plaintiffs pushed for the Court to construe "running belt" to mean "a structure different from the endless belts that follows the profile of the bearing rails." (*See* Dkt. No. 76 at 22.) But the Court rejected Plaintiffs' argument and concluded that "running belt" did not require any construction. (*Id.* at 21-23.) In reaching its decision, the Court noted that "defining the term 'running belt' to include a requirement that the belt be defined by the bearing rail would be superfluous in every claim that uses the term 'running belt' in the '580 Patent. All four independent claims of the '580 Patent[4] require the running belt to be supported, at least partially, by the bearing rail, in order to provide the running

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[2] Plaintiffs citation to *CAE Screen Plates, Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000) is inapposite. In *CAE*, at issue was the patent holder's use of different terms in an independent and dependent apparatus claims. *Id.* at 1317. The court in that circumstance, which is not the case here, presumed that "the use . . . of different terms in the claims connotes different meanings." *Id.*

[3] The Court construed "bearing rail" to mean "a rail with bearings whose top profile corresponds to the shape of the running surface." (Dkt. No. 76 at 8.)

[4] Claim 25 is one of the four independent claims in the '580 patent.

belt with its curved surface. See, e.g., col. 32, ll. 57-60." (*Id.* at 23.) The Court equates "disposing on" with at least partial support; Plaintiffs' proposed construction must be rejected.

B. Which Entity Is Responsible for the Chapco Assemblers Is a Genuine Issue of Disputed Fact

Chapco has previously admitted that its employees assemble the TrueForm Runner. (56(a)2 ¶ 4; Dkt. No. 144 at 7.) There can be no dispute that a single actor[5] – *i.e.*, a Chapco assembler – pieces together the sub-assembly bearing rails provided by Chapco with components that are sourced by Gerardo Aristi, another Chapco employee. (56(a)2 ¶¶ 10, 30.) According to the sworn deposition testimony of Brian Weinstein, the 30(b)(6) designee for Chapco, Chapco either manufactures or sources all the components for the TrueForm Runner, which would include the running belt and its corresponding pieces. (56(a)2 ¶ 30.)

At the time this deposition testimony was elicited, the Gen III was not being assembled. However, even if Chapco has in some way modified how it does business as to sourcing and supplying sub-assemblies and components for the TrueForm Runner,[6] Plaintiffs cannot escape the fact that Chapco assemblers still put the Gen III together. And it is this assembly that meets each and every claim limitation of claim 25 of the '580 patent as detailed in Woodway's Memorandum. (56(a)2 ¶ 2.)

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[5] Plaintiffs spend much of their briefing on the "single entity rule" or "single actor rule," which indisputably is met in this case. The Chapco employee assembler putting together the Gen III is the single actor. The question of fact that precludes summary judgment on Plaintiffs' Motion is which entity is ultimately responsible for the assembler's activities.

[6] Brian Weinstein's June 8, 2018 Declaration submitted in support of Plaintiffs' Motion for Summary Judgment indicates that "Chapco does not make or source the endless belts, the bearings, the treads, or the hardware for the running belt of the Gen III." (Dkt. No. 254-6 at ¶ 8.) This statement is belied by Mr. Weinstein's sworn deposition testimony in this case to the contrary. (56(a)2 ¶¶ 5-58.) Tellingly, Mr. Weinstein provides no dates as to when this alleged sourcing change became the case. Mr. Weinstein also fails to provide any statements negating any of the evidence that gave rise to the issue of disputed material fact regarding Chapco's role in making the TrueForm Runner. (*Id.*)

As Woodway predicted and already briefed in its Memorandum in Support of its Motion for Summary Judgment of Infringement, Plaintiffs non-infringement theory focuses on deflecting liability away from Chapco. These arguments must be rejected. Plaintiffs cannot escape their prior admission that Chapco employees assemble the TrueForm Runner, including the Gen III. While Plaintiffs want the purported "leasing" of Chapco employees to carry the non-infringement day, it cannot. The Court has already concluded that "Woodway has come forward with sufficient evidence to create a genuine issue of material fact as to whether Chapco makes the [TrueForm Runner]." (Dkt. No. 144 at 8.) This was an issue that was briefed at length in the parties' original cross-motions for summary judgment and is a matter for resolution at trial. (Dkt. No. 88-1 at 4-8; Dkt. No. 100 at 6-7; Dkt. No. 111 at 13-19; Dkt. No. 144 at 8, 12.) On this record, which entity – Chapco or Samsara or both – is ultimately responsible for the hourly employees' assembly activities is a genuine issue of material fact that precludes Plaintiffs' Motion. Summary judgment that Chapco does not perform any infringing acts should be denied. Just as there are genuine disputed material facts regarding Chapco's involvement with the Original and Gen II treadmills, these same fact issues persist with respect to the Gen III.

C. Plaintiffs' Focus on Woodway's Allegations Regarding Joint Infringement Is Irrelevant

Plaintiffs have long known about Woodway's infringement position with respect to claim 25. It was set forth in Woodway's Preliminary Infringement Contentions on April 18, 2016 with respect to the Original TrueForm Runner and on July 18, 2016 with respect to the Gen II. (*See* Dkt. No. 254-2 at Appendix B pg. 48-56.) Yet, Plaintiffs never challenged that Woodway adequately plead infringement as to claim 25. To the extent they do so now, these arguments have been waived.

In the event the Court considers their complaints and gives credence to Plaintiffs' insistence on form over substance, Woodway's respectfully requests that its counterclaims be supplemented to conform to the evidence pursuant to Fed. R. Civ. P. 15(b)(2), because Plaintiffs have acquiesced, at least impliedly, to Woodway's infringement claim against the Gen III. Plaintiffs affirmatively consented to defending against this counterclaim where they represented to the Court during Pretrial proceedings that they would take on the Gen III claim. (April 12, 2018 Pretrial Tr., at 284:5-12.) Even if found to have not affirmatively consented, courts have found consent to be implied in situations where a claim is introduced outside the complaint and then treated by the opposing party as having being pleaded, "either through his effective engagement of the claim or through his silent acquiescence." *Silverstein v. Penguin Putnam, Inc.*, 522 F. Supp. 2d 579, 604 (S.D.N.Y. 2007) ("[T]he essential questions are whether the new issues were tried by the parties' express or implied consent and whether the defendant would be prejudiced by the implied amendment, i.e., whether he had a fair opportunity to defend and whether he could offer any additional evidence if the case were to be retried on a different theory.") (internal quotes omitted); *see also Clomon v. Jackson*, 988 F.2d 1314, 1323 (2d Cir. 1993) ("[T]he undisputed facts as presented on the summary judgment motion served as a basis to deem the complaint amended to conform with the proof pursuant to Fed. R. Civ. P. 15(b).").

Here, Plaintiffs brought Woodway's infringement charge against the Gen III upon themselves. Plaintiffs introduced a new product on the eve of trial, did not challenge the introduction of Woodway's counterclaim, and have had an opportunity to defend against Woodway's charge by preparing and serving an expert report and moving for summary judgment of no-infringement. *See Timex Licensing Corp. v. Advance Watch Co., Ltd.*, No. 3:07-cv-01731

(VLB), 2010 WL 3169345, at *3 (D. Conn. Aug. 10, 2010) (finding implied consent where defendant silently acquiesced to the inclusion of a claim that was present in a pre-trial memorandum jointly presented to the court and the facts relevant to the newly raised claim were significantly similar to a previous claim argued before the court); *see also Isik Jewelry v. Mars Media, Inc.*, 418 F. Supp. 2d 112, 131 (E.D.N.Y.2005) ("By engaging a theory of liability in a pretrial memorandum, [a party] impliedly consents to this Court's consideration of [the unpleaded issue].").

II. PLAINTIFFS' VALIDITY CHALLENGE IS UNTIMELY AND SHOULD NOT BE CONSIDERED

A. Plaintiffs' Second Motion for Summary Judgment Is Not Justified

1. Plaintiffs' obviousness arguments in this Motion were available at the time they made their first Motion for Summary Judgment of Invalidity of claim 25 and Plaintiffs chose not to raise them

Plaintiffs previously moved for summary judgment that claim 25 of the '580 patent was invalid. Specifically, Plaintiffs argued in support of their May 1, 2017 Motion for Summary Judgment that "Socwell alone, or in combination with Chickering, Magid and/or Schmidt render obvious claim[] 25 of the '580 patent." (Dkt. No. 88-1, Pls.' MFSJ Mem. at 27.) In the May 1, 2017 Motion, in a calculated decision, Plaintiffs selected a subset of the prior art Dr. Giachetti relies on for his invalidity opinions and moved for a determination that all of the asserted claims of the '580 patent[7] were invalid as obvious based on Socwell, Chickering, Magid, and/or Schmidt references. (*Id.* at 27-37.)

[7] At the time of the parties' original summary judgment briefing, Woodway was asserting that Chapco and Samsara infringe claims 1, 4-6, 10-14, 18-20, and 25 of the '580 patent and claims 11-16 of the '169 patent as well as infringement of the '886 and '776 design patents. (Dkt. No. 54 at 13, 22, 31, and 40.) Through their first motion for summary judgment, Chapco and Samsara challenged the validity of each and every asserted claim of the utility patents, which included claim 25 of the '580 patent. (Dkt. No. 88-1 at 1-3, 27.)

In its September 26, 2017 Ruling on Summary Judgment, the Court rejected Plaintiffs' validity challenge and denied Plaintiffs' Motion on this issue.[8] (Dkt. No. 144 at 36-37.) The Court's Ruling discusses at least two reasons motivating its decision. First, "the court cannot conclude that the plaintiffs have shown, by clear and convincing evidence, that the patents were obvious in light of the prior art because they have not demonstrated that a person having ordinary skill in the art would be properly motivated to combine the disparate references. (Dkt. No. 144 at 37.) Second, the Court stated that it "cannot make a determination of the validity of the patents where there exists a material dispute as to who qualifies as a person or ordinary skill in the art." (*Id.,* citing *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 427 (2000).) Because the parties' have disparate views on the relevant person of ordinary skill in the art, the Court concluded that there "exists a genuine dispute as to the person of ordinary skill, a dispute whose resolution is best left to the fact finder." (*Id.* at 38.) Plaintiffs' June 8, 2018 Motion for Summary Judgment seeks to rewrite history and merely glosses over the fact that the Court has already considered the validity of claim 25 of the '580 patent. Simply because Plaintiffs wish they would have raised additional prior art combinations or more fully briefed their arguments regarding claim 25 in particular does not justify a summary judgment do-over.

Plaintiffs' justifications for its second summary judgment motion are unsupported. Plaintiffs state in their Memorandum, "the Court did not reach all of the invalidity references specific to claim 25." (Plaintiffs' MOL at 15.) Plaintiffs are wrong and advance an incorrect reading of the Court's September 26, 2017 Ruling on Summary Judgment. The Court

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[8] The Court granted Woodway's cross-motion regarding the validity of the '580 patent as it related to precluding any Schmidt obviousness combinations, anticipation arguments based on the Socwell and Schmidt references, and § 112 defenses. (Dkt. No. 144 at 38-41.)

addressed each and every prior art reference that Plaintiffs **chose** to raise in their first motion for summary judgment. Plaintiffs made a strategic choice to seek summary judgment regarding claim 25 and advanced those references they saw fit. To the extent Plaintiffs want to press these arguments at trial, they may. Having failed to prevail as a matter of law does not prevent Plaintiffs from advancing their timely disclosed obvious combinations at trial.

Woodway has been asserting claim 25 since the beginning of the case, and this claim was part of Plaintiffs' May 1, 2017 Motion for Summary Judgment regarding invalidity. Woodway sought to correct Plaintiffs' misunderstanding of this point during the parties' April 30, 2018 Pretrial Hearing:

> MS. JELENCHICK: Your Honor, if I can make one more point with respect to the motions for summary judgment. I believe plaintiffs have previously moved to invalidate Claim 25 of the 580 patent and that was addressed in summary judgment. You denied that motion. To the extent that they're trying to revisit that in these cross motions, we would have an objection to that and would seek your counsel on that issue. . . .
>
> THE COURT: Attorney Bush, any of this sound familiar to you? Had you not remembered it; therefore, you would raise that? I don't know how to put it.
>
> MS. BUSH: My memory of the Court's decision on the summary judgment was -- I'm looking at page 22. The Court restricted its decision to the four claims asserted by Woodway 1, 6, 19, 20. I could be wrong.

(Pretrial Hearing Tr., April 30, 2018, at 376:7-377:7.)

Plaintiffs **are** wrong but nevertheless press their second motion for summary judgment of invalidity. The September 26, 2017 Ruling on Summary Judgment clearly addresses and considers Plaintiffs' Motion and its application to all of the asserted claims, of which claim 25 was part. For example at page 22 of the Ruling, the Court states: "The plaintiffs

assert that the Asserted Claims of both patents are invalid because they are rendered obvious by Socwell combined with Chickering, Magid and/or Schmidt. See Pls.' MFSJ Mem. at 27-35." (Dkt. No. 144 at 22.) In addition, at page 36, the Court reiterates that its Ruling is relevant to claim 25: "The plaintiffs argue that all of the Asserted Claims are obvious in light of Socwell, combined with Chickering, Magid, and/or Schmidt. See Pls.' MFSJ Mem. at 27-36." (*Id.* at 36.) In the Ruling, the Court defined "Asserted Claims" to mean those claims that Woodway asserted in its Counterclaims. (*See id.* at 4.) Pursuant to the Court's Order granting Woodway's Motion for Leave to File a Supplemental Counterclaim of Copyright Infringement, (Dkt. No. 84), Woodway filed Supplemental Counterclaims on April 13, 2017. (Dkt. No. 85.) Woodway's Count II of infringement of the '580 patent was not altered from its original Answer and Counterclaims. (*Compare* Dkt. No. 85 at ¶¶ 23-24 *with* Dkt. No. 54 at ¶¶ 13-14.) In both the original and Supplemental Counterclaims, Woodway asserted that Chapco and Samsara infringe claims 1, 4-6, 10-14, 18-20, and **25**.

Plaintiffs' choice to provide minimal briefing regarding claim 25 or to otherwise focus their invalidity arguments on certain references and not others does not mean that the Court's denial of Plaintiffs' May 1, 2017 Motion was limited to something less than all of the asserted claims. A plain reading of the Court's September 26, 2017 Ruling on Summary Judgment is to the contrary. The Court should not indulge Plaintiffs' serial motion practice particularly when Plaintiffs made a strategic choice to handle their prior Summary Judgment Motion the way they did.

2. The Gen III is irrelevant to validity

There has been no "landscape change" in the last year as Plaintiffs contend. (*See* Plaintiffs' MOL at 15.) Plaintiffs' recent decision to introduce the Gen III and Woodway's

infringement charge have no bearing on any validity analysis of claim 25. Validity is evaluated on a claim-by-claim basis **regardless** of the product accused of infringement. *Nat'l Steel Car, Ltd., v. Canadian Pac. Ry., Ltd.*, 357 F.3d 1319, 1334 (Fed. Cir. 2004) (ruling that accused infringers' arguments regarding invalidity in a second summary judgment motion were waived where they "made a tactical decision to forego raising this argument at the required time because they believed it would prejudice a different argument they preferred to push"). That Woodway is now accusing the newly released Gen III is immaterial to the issue of validity where Plaintiffs long knew claim 25 was asserted and knew of the prior art upon which they now rely. Issues of validity are not tied to the product accused of infringement. *See id.*; *see also Golden Trade S.R.L. v. Lee Apparel Co.*, No. 90 CIV. 6291(JSR), 1997 WL 373715, at *1 (S.D.N.Y. June. 25, 1997) ("After construing the claims, a court must compare the prior art to claims as one of ordinary skill of art at the time of the invention would have done."). Infringement, on the other hand, is based on a comparison of the properly accused claims to the accused product.[9] *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454 (Fed.Cir.1998) (en banc).

B. Plaintiffs Fail to Offer Any Good Reason for the Court to Evaluate the Validity of Claim 25 Again

Plaintiffs offer no good reason why the Court should revisit the validity of claim 25 of the '580 patent on summary judgment or otherwise explain why now this issue should be taken from the jury. While district courts enjoy considerable discretion in entertaining successive dispositive motions, as the Court has previously noted, such motions should only be considered for good reason. *Singleton v. Grade A Market, Inc.*, No. 08-cv-1385 (JCH), 2009 WL

[9] Unlike Plaintiffs' present Motion for Summary Judgment of Invalidity, Woodway could not have brought its Motion for Summary Judgment of Infringement earlier because the Gen III was not released until at least May 15, 2018. (Pretrial Hearing Tr., April 10, 2018, at 4:21-5:3.)

10689210, at *2 (D. Conn. Sept. 21, 2009) (noting that a renewed or successive summary judgment motion is appropriate if one of the following grounds exists: (1) an intervening change in controlling law; (2) the availability of new evidence or an expanded factual record; and (3) need to correct a clear error or prevent manifest injustice.); *see also Ramos v. SimplexGrinnell LP*, No. 07-CV-981 (SMG), 2011 WL 4710814, at *2 (E.D.N.Y. Oct. 4, 2011) (finding a successive motion for summary judgment inappropriate where it was not "supported by additional facts that were not available at the time of the first motion"). Indeed, the Court has already noted that a second summary judgment motion on invalidity would be a "waste of time" "unless there is new evidence or something like that." (Pretrail Hearing Tr., April 30, 2018, at 376:7-23.) The Court went further suggesting that a retread of a validity challenge "will make [Woodway's] opposition . . . fairly easy." (*Id.*)

Plaintiffs did not and cannot identify any intervening change in controlling law that warrants a second look on summary judgment regarding the validity of claim 25.[10] The controlling precedent regarding obviousness has not changed since September 2017, and Plaintiffs do not suggest otherwise. As they must, Plaintiffs rely on some of the same legal authorities in support of their obviousness challenge.

There is also no new relevant evidence. Here, the prior art references and combinations that Plaintiffs advance now are the same references that Plaintiffs identified in their Preliminary Invalidity Contentions, which could have been raised in the first motion for

[10] Plaintiffs did not even try to argue "clear error" or "manifest injustice," but merely state that "the Court has discretion to revise any ruling before entry of judgment." (Plaintiffs' MOL at 15.) Plaintiffs provide no reason for the Court to exercise such discretion.

summary judgment.[11] Plaintiffs already attempted to challenge the validity of claim 25 in their first summary judgment motion, and they do not offer arguments or combinations that were unavailable before. (*Compare* Dkt. No. 93-1 at 1, 3, and 21-39 (arguing that at least the Socwell reference, alone or in combination with the Chickering, Magid, and/or Schmidt references, invalidated claim 25) *with* Plaintiffs' MOL at 18-38 (arguing that Schmidt, alone or in combination with Magid, invalidates claim 25, and referencing combinations of Magid with Socwell, Cutter, Chickering, or Eschenbach) and/or Socwell with Haber.) Because Plaintiffs already moved for summary judgment of invalidity of claim 25 on numerous, largely overlapping grounds already, and their new arguments could have and should have been brought in their first motion, Plaintiffs' Motion should be denied on these bases alone.

Plaintiffs' tactical choice to argue something less than the entirety of their invalidity theories should not be considered new evidence. Good reason does not exist where an argument could have been raised in a previous summary judgment motion, but it was voluntarily waived. *See Singleton*, 2009 WL 10689210, at *2 (declining to entertain a second motion for summary judgment where movant did not argue that they could not have pursued their claim earlier); *Golden Trade S.R.L.*, 1997 WL 373715, at *1 (noting that, where a party was fully aware, at the time of its first summary judgment motion, of the prior art upon which it based its second summary judgment motion for invalidity, "[i]t would make a mockery of the orderly resolution of disputes if parties could willy-nilly disregard the consequences of such tactical choices in favor of never-ending resurrection of previously abandoned claims"); *Campers'*

[11] In this Motion, Plaintiffs attempt to re-urge consideration of the Schmidt reference either alone or in combination with Magid. (Plaintiffs' MOL at 35-38.) The Court's June 20, 2018 Rule re: Motion for Reconsideration (Doc. No. 248) moots these arguments. (*See* Dkt. No. 263 at 12; *see also* Dkt. No. 144 at 38, 40.) Section H (pages 35-38) in support of Plaintiffs' Motion for Summary Judgment, which is directed to the Schmidt reference, should be stricken.

World Int'l, Inc. v. Perry Ellis Int'l, Inc., 221 F.R.D. 409, 409 (S.D.N.Y. 2004) ("[I]t is improper for a party to file a successive motion for summary judgment which is not based upon new facts and which seeks to raise arguments it could have raised in its original motion."); *Siemens Westinghouse Power Corp. v. Dick Corp.*, 219 F.R.D. 552, 554 (S.D.N.Y. 2004) (declining to consider a subsequent summary judgment motion where the movant "has not raised any new facts or arguments which it could not have raised in the first round of briefing"); *see also Int'l Bus. Machs. Corp. v. Johnson*, No. 90 Civ. 4826(SCR), 2009 WL 2356430, at *2 (S.D.N.Y. Jul. 30, 2009) (regarding a second motion for preliminary injunction, "The Court shall not allow [plaintiff] to litigate this matter through piecemeal, seriatim motions requesting the same relief, especially when the information that is the basis for the successive motion was in [plaintiff's] possession at the time of the filing of its first motion . . ."). Plaintiffs offer no authority to the contrary.

There is no good reason for this Court to consider Plaintiffs' new invalidity arguments, and the Court should exercise its discretion to disregard them. Should Plaintiffs want to challenge the validity of claim 25, the appropriate forum is the October 2018 trial.

III. ISSUES OF MATERIAL FACT PRECLUDE PLAINTIFFS' OBVIOUSNESS CHALLENGE

Material disputes of fact exist that preclude summary judgment. Plaintiffs' Memorandum tries to imply that the content of the prior art, the level of ordinary skill in the art, the motivation to combine, and secondary indicia of non-obviousness are not in material dispute. Plaintiffs are wrong. In fact, these issues are squarely in dispute. In particular, Woodway disagrees with Plaintiffs' contention of what is disclosed in the prior art and whether there would have been any motivation to combine certain prior art references – which Plaintiffs are aware of from Woodway's Rebuttal Expert Report of Dr. Kim. B. Blair addressing invalidity. The level

of ordinary skill in the art is similarly in dispute, a fact the Court has already decided. While Woodway's proffered secondary indicia of non-obviousness is not in dispute; Plaintiffs never challenged or otherwise rebutted this evidence. These secondary considerations cannot be ignored because they sink Plaintiffs' obviousness arguments; they create a genuine issue of fact. To ignore them is clear error.

A. The Court Has Already Determined that the Parties' Competing Persons of Ordinary Skill in the Art Precludes Summary Judgment

During expert discovery, the parties' technical experts offered their respective views of the relevant person of ordinary skill in the art and provided their obviousness opinions through that particular lens. Dr. Giachetti's opinions were **entirely** based on his proffered definition of a person of ordinary skill – "a person with at least one year of machine design experience related to power transmission equipment and a demonstrated understanding of the biomechanics of exercise, including knowledge in the field of anthropometry (i.e. the study of human proportion)." (56(a)2 ¶ 59.) Dr. Giachetti's definition of a person of ordinary skill in the art is largely focused on power transmission technology and familiarity with common mechanical power transmission elements. (56(a)2 ¶¶ 59-61.) According to Dr. Giachetti, because of the common usages of these elements across diverse types of machinery, terminology has been standardized, and their utility and limitations are well understood by a person of ordinary skill in the art. (56(a)2 ¶ 60.) Dr. Giachetti states that a person of ordinary skill in the art "recognizes the relative merits of differing components, by virtue of education and/or design experience" and "understand[s] which components can be used in place of one another; selection of a suitable structure or mechanism may account for other selection factors such as durability, cost, reliability and other considerations that are not performance driven." (56(a)2 ¶ 61.) Dr. Giachetti's "person of ordinary skill in the art" is fundamental to his assessment and description

of the prior art, his comparison of the prior art to the asserted claims, and his purported motivation to combine various prior art references for his obviousness opinions.

Dr. Blair's opinions rely on a less stringent definition for a person of ordinary skill in the art, the perspective of whom is similarly fundamental to his analysis regarding the scope of the prior art and any motivations to combine. Dr. Blair addressed the validity of the claims from the perspective of "a person with a bachelor of science degree in mechanical engineering or at least two years of experience in the treadmill industry, including experience and knowledge of the design, construction, testing, and operation of manual treadmills." (Dkt. No. 254-15 at ¶¶ 31-33.)

Dr. Giachetti criticized Dr. Blair's definition, stating that "Dr. Blair's definition of a person having ordinary skill in the art is a person who is underqualified." (56(a)2 ¶ 62.) Dr. Giachetti went further and dismissed Dr. Blair's person of ordinary skill flat out, claiming that Dr. Blair's definition "is incorrect." (56(a)2 ¶ 63.) In doing so, Dr. Giachetti did not evaluate any of the prior art references or discuss any purported motivation to combine certain references through the perspective of Dr. Blair's person of ordinary skill. In fact, Dr. Giachetti did not comment in any way as to how his obviousness analysis would be the same as or different in view of Dr. Blair's person of ordinary skill. (56(a)2 ¶ 64.)

In view of these competing expert opinions on the level of ordinary skill in the art, the Court denied Plaintiffs' first Motion for Summary judgment challenging the obviousness of the asserted claims in the '580 patent. (Dkt. No. 144 at 37-38.) In its denial, the Court stated that it "cannot make a determination of the validity of the patents where there exists a material dispute as to who qualifies as a person or ordinary skill in the art. . . . [***T]here exists a genuine dispute as to the person of ordinary skill***, a dispute whose resolution is best left to the fact

finder." (*Id.*, citing *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1996) for the proposition that while patent validity is a question of law, it relies on **factual inquiries including the level of ordinary skill in the pertinent art** (emphasis added).) The parties' dispute and the experts' opinions on this issue have not changed. This same dispute precludes Plaintiffs second Motion for Summary Judgment regarding the alleged obviousness of claim 25 of the '580 patent.

1. Plaintiffs Cannot Simply Adopt Dr. Blair's Person of Ordinary Skill to Avoid the Disputed Issue of Material Fact on this Issue

Despite the prior unequivocal rejection of Dr. Blair's person of ordinary skill, Plaintiffs' now seek to apply Dr. Blair's definition in an attempt to circumvent the Court's determination that a genuine dispute of material fact exists on this issue. (Plaintiffs' MOL at 30.) This is inappropriate and should not be allowed.

As a threshold matter, Dr. Giachetti's definition of who constitutes the relevant person of ordinary skill in the art and the level of expertise that he/she brings to bear on the prior art is fundamental to Dr. Giachetti's opinions. Plaintiffs and Dr. Giachetti cannot now simply adopt a completely different definition of a person of ordinary skill and advance the identical arguments with regards to the prior art. **Dr. Giachetti never offered the opinion that even under Dr. Blair's definition of a person of ordinary skill, he would still reach the same conclusions regarding the scope and content of the prior art, the comparison of this art to claim 25, and motivation to combine.** But that is exactly what Plaintiffs seek to do in their Memorandum.

For example, Plaintiffs contend that "the use of a device (like a ratchet and pawl) to ensure unidirectional movement of the belt was well-known before the priority date of the '580 Patent, consistent with the existing industry standards." (*Id.* at 17.) In support for this statement, Plaintiffs rely on Dr. Giachetti's opinions from his March 2, 2017 report, which was

grounded in Dr. Giachetti's definition of a person of ordinary skill in the art, not Dr. Blair's definition. (Dkt. No. 254 at ¶ 25.)

Plaintiffs' arguments regarding the extent of the disclosure of Cutter are also suspect. "[T]he first and second bearing rail structures with a plurality of bearings (or rollers) extend longitudinally on the frame and define a curved top profile. The running belt follows a top curved running surface corresponding to the curved top profile of the bearing rails, on either side of the apparatus." (Plaintiffs' MOL at 20-21.) Plaintiffs again cite to Dr. Giachetti's March 2, 2017 report for part of this proposition, and again, Dr. Giachetti's opinion on this point was based on the perspective of his person of ordinary skill in the art, not Dr. Blair's person of ordinary skill. (Dkt. No. 254 at ¶ 39.)

Similarly, Plaintiffs rely on Dr. Giachetti to argue that "Eschenbach also discloses first and second bearing rails (the 'flexible linking' (part 8) with a plurality of bearing (described as idlers – part 34))." (Plaintiffs' MOL at 24; Dkt. No. 254 at ¶ 54.) Plaintiffs also point to Dr. Giachetti and his May 2, 2017 report for interpretation of the Magid reference. (Plaintiffs' MOL at 26; Dkt. No. 254 at ¶¶ 62-63.) Dr. Giachetti's reading of Eschenbach and Magid, like Cutter, is premised on the perspective of his person of ordinary skill in the art, not Dr. Blair's.

Plaintiffs offer no support for their theory that it is acceptable to have a shifting view of who constitutes a person of ordinary skill in the art in an obviousness analysis.[12] This is likely because there is none, particularly in the context of a motion for summary judgment of

[12] Plaintiffs similarly fail to acknowledge that even if the Court accepts this pivot in Dr. Giachetti's testimony regarding who constitutes a person of ordinary skill, even if the experts agree on this point, Dr. Blair's opinions contradict Dr. Giachetti regarding the scope and content of the prior art, how the art is different from claim 25, and whether (or not) there is sufficient motivation to combine these references. (56(a)2 ¶¶ 65-69.) The role of the Court on summary judgment is not to weigh the evidence or to resolve factual disputes regarding competing expert opinions. *See In re Gabapentin Pat. Litig.*, 503 F.3d 1254, 1259-60 (Fed. Cir. 2007) (reversing finding of summary judgment where non-movant adduced expert evidence that created an issue of material fact.)

invalidity. Under the circumstances, to permit Plaintiffs to advance such a significant pivot in position amounts to new expert opinions. This is reason enough to deny Plaintiffs' Motion. *See O2 Micro Int'l, Ltd. v. Monolithic Power Sys.*, 467 F.3d 1355, 1368-69 (Fed. Cir. 2006) (finding no abuse of discretion where the district court excluded experts' new theory because it was not contained in their reports as required by Fed. R. Civ. P. 26(a)(a)).

2. Attorney characterizations of the prior art and whether these references meet the claim limitations are irrelevant

Equally problematic is Plaintiffs' attempt to sustain their invalidity position relying on attorney argument. This is not evidence. *Invitrogen Corp. v. Clontech Labs., Inc.*, 429 F.3d 1052, 1068 (Fed. Cir. 2005) ("Unsubstantiated attorney argument regarding the meaning of technical evidence is no substitute for competent, substantiated expert testimony. It does not, and cannot, support [movant's] burden on summary judgment."); *Elcommerce.com, Inc. v. SAP AG*, 745 F.3d 490, 506 (Fed. Cir. 2014) ("The burden was on [movant] to prove its case, and in the absence of evidence provided by technical experts who meet the *Daubert* criteria there is a failure of proof. Attorney argument is not evidence."), *vacated on other grounds*, 564 Fed. App'x 599; *see also Hubbell, Inc. v. Pass & Seymour, Inc.*, 781 F. Supp. 2d 67, 91 (D. Conn. 2011) (finding attorney argument that characterized structural disclosures in a patent to be insufficient to defeat a motion for summary judgment of infringement); *Paone v. Microsoft Corp.*, 881 F. Supp. 2d 386, 415 (E.D.N.Y. 2012) ("[W]e think it an unnatural, if not virtually impossible, task for counsel, in his own case, to drop his garments of advocacy and take on the somber garb of an objective fact-stater") (internal quotations omitted).

For example, Plaintiffs spend ten pages in their Memorandum discussing the Socwell, Cutter, Chickering, Eschenbach, Haber, and Magid references and what these references purportedly teach. (Plaintiffs' MOL at 17-27.) A close study of this "Scope and

Content of the Prior Art" section reveals that this discussion of the prior art is largely untethered to any expert evaluation or other competent evidence. Rather, Plaintiffs' recitation of these references focuses on cherry-picked excerpts from each of the prior art patents and Plaintiffs' counsel's characterization of these snippets. There is little, if any, reference to Dr. Giachetti, and it is unclear whether he too espouses Plaintiffs' interpretations of the art.

Worse yet, Plaintiffs' Memorandum then attempts to compare claim 25 to the prior art and advance unsubstantiated arguments regarding the novelty of this claim by interpreting the specification of the '580 and '169 patents and certain patent prosecution activities. (Plaintiffs' MOL at 27-28.) Again, Plaintiffs offer no evidence in support of these positions, just self-serving attorney argument.

Most egregious, particularly given Plaintiffs' and Dr. Giachetti's history, Plaintiffs unfairly try to backfill the deficiencies in Dr. Giachetti's opinions regarding claim 25. Plaintiffs should not be permitted to expand their position regarding this claim.

First, Plaintiffs set forth the claim limitations of claim 25 and cite prior references that allegedly disclose the limitations found in the claim. Plaintiffs, without any citation, claim that "all six prior art references (Socwell, Cutter, Chickering, Eschenbach, Haber, and Magid (and in one instance industry standards) disclose . . . ." (Plaintiffs' MOL at 29-30.) Dr. Giachetti never performed this analysis himself, and this information is **not** included in his March 2, 2017 report. Indeed, to the extent that Plaintiffs are pressing an obviousness combination for claim 25 that involves industry standards, that was neither disclosed in any invalidity contentions nor Dr. Giachetti's March 2, 2017 Report. (Dkt. No. 254-12 at 2-4; Dkt. No. 254-16 at 2; Dkt. No. 91-2 at 2.)

Second, in the "Motivation to Combine References" section of Plaintiffs' Memorandum, Plaintiffs state "all of the cited prior art references expressly disclose a manually powered treadmill from the same field of endeavor and are reasonably pertinent to the particular problem involved, and thus are analogous art." (Plaintiffs' MOL at 32.) Plaintiffs offer no evidence in support of this conclusion, again, just attorney argument. Plaintiffs go even further and advance specific rationales as to why a person of ordinary skill would combine Socwell and Haber, Socwell and Magid, Magid and Cutter, Magid and Chickering, and Magid and Eschenbach. (Plaintiffs' MOL at 33-34.) None of the bases for these combinations are discussed in Dr. Giachetti's March 2, 2017 Report. (Dkt. No. 254-12 at ¶¶ 145-149.) And significantly, the Court has already struck Plaintiffs' attempt to bolster their motivation to combine theories through the May 1, 2017 Giachetti Declaration. (*Compare* Dkt. No. 144 at 33 *with* Dkt. No. 88-2 at ¶¶ 73-77.) Just as the Court rejected Dr. Giachetti's backdoor attempt during the first round of summary judgment briefing,[13] the Court should similarly find this portion of Plaintiffs' Memorandum objectionable and refuse to consider it. (*See* Dkt. No. 144 at 32-35.)

B. The Parties Dispute Whether There Is a Motivation to Combine

While Plaintiffs allege that various references should be combined to render claim 25 of the '580 obvious, they fail to provide clear and convincing evidence to support their allegations. Putting aside Dr. Giachetti's new opinions and the overall lack of evidence

[13] For example, Plaintiffs now contend that Socwell discloses the need for a method to prevent a user "from falling off the back of the treadmills." (Plaintiffs' MOL at 19.) There is no basis for this opinion. The Court has already decided that Dr. Giachetti did not offer any opinion in his March 2, 2017 report regarding Socwell and its so-called disclosure of a safety device to ensure unidirectional movement of the running belt. (Dkt. No. 144 at 39-40.) This opinion was struck from his May, 2, 2017 Declaration. (*Compare* Dkt. No. 144 at 33 *with* Dkt. No. 88-2 at ¶¶ 28 and 30-34.) Plaintiffs' efforts to revive their theory by characterizing this claim limitation as a way to prevent a user from falling off the back of the treadmill should be rejected.

discussed above, it is not clear which limitations they assert from one reference would be combined with which limitations from another reference since Plaintiffs contend that all six references disclose all five of the relevant claim limitations. Plaintiffs also fail to provide any credible analysis of why these combinations would be made through either the perspective of Dr. Giachetti's or Dr. Blair's person of ordinary skill in the art. Dr. Blair is clear – the relevant person of ordinary skill in the art would not combine the references as Dr. Giachetti contends. (Dkt. No. 254-15 at ¶¶ 96-97, 136, 146, 192, 205, 238, 302-03, 333, 424, and 458; 56(a)2 ¶¶ 65-69.)

Obviousness requires clear and convincing evidence that the differences between a claim and the prior art are such that the claim would have been obvious to a person of ordinary skill in the art at the time of the claimed invention. 35 U.S.C. § 103; *Cheese Sys., Inc. v. Tetra Pak Cheese and Powder Sys., Inc.*, 725 F.3d 1341, 1352 (Fed. Cir. 2013). Obviousness "cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention." *Cheese Sys.* 725 F.3d at 1352 (citing *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998)). "The Court has recognized the distortion caused by hindsight bias and arguments reliant upon ex post reasoning in determining obviousness." *Zoltek Corp. v. United States*, 815 F.3d 1302, 1313 (Fed. Cir. 2016 (reversing ruling as to obviousness) (citing *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 421 (2007)); *InTouch Technologies, Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327 (Fed. Cir. 2014) ("It appears that [the expert] relied on the . . . patent itself as her roadmap for putting what she referred to as pieces of a 'jigsaw puzzle' together."). It is not clear or convincing evidence to pick and choose disclosures of the Plaintiffs' paraphrased limitations in the prior art. *See Cheese Sys., Inc.*, 725 F.3d at 1352; *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir.

2012) (quoting *KSR Int'l Co.*, 550 U.S. at 418) ("a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art").

The standard for an obviousness analysis is what a person of ordinary skill would have done. Making an obviousness determination requires a "step backward in time and into the shoes worn by the person having ordinary skill in the art when the invention was unknown and [and] then determine whether the patent challenger has convincingly established . . . that the claimed invention as a whole would have been obvious at that time **to that person**." *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566 (Fed. Cir. 1987) (emphasis added). Plaintiffs' hindsight-based and unsupported assertion that "[e]xperience and common sense dictates that the POSITA would be motivated to combine the identified prior art references to address the known and obvious liability and safety issue of a treadmill belt moving backwards in the manner identified in claim 25," (Plaintiffs' MOL at 37), does not make the claimed invention obvious.

At a minimum, the factual disputes between the experts as to what is disclosed in the art Plaintiffs rely upon, and whether it is appropriate to combine that art, warrant denial of summary judgment.

> When the issue is patent invalidity due to obviousness, 35 U.S.C. § 103, the movant must overcome the statutory presumption of validity, 35 U.S.C. § 282, by proving obviousness by clear and convincing evidence based on undisputed facts. All factual inferences must be drawn in favor of the opponent of the motion … Although patent issues are as amenable to summary resolution as other matters, where material facts are disputed, and testimonial, documentary, and expert evidence are needed for their resolution, summary adjudication is not indicated.

Quad Envtl. Techs. Corp. v. Union Sanitary Dist., 946 F.2d 870, 872 (Fed. Cir. 1991) (reversing a grant of summary judgment of obviousness). Whether there is a rational reason to combine

prior art references is a genuine issue of material fact, and Plaintiffs' Motion for Summary Judgment should be denied.

C. Plaintiffs Ignore Woodway's Secondary Indicia of Non-Obviousness

It constitutes clear error to fail to consider objective indicia of nonobviousness. *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1378 (Fed. Cir. 2012). "Failure to give proper consideration to such evidence, as in this case, can be fatal because 'common sense' may not be so apparent in view of objective evidence of nonobviousness (e.g., commercial success and copying), particularly when all reasonable inferences are drawn in favor of the patentee." *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1355 (Fed. Cir. 2013). Objective indicia "may often be the most probative and cogent evidence of nonobviousness in the record." *Ortho-McNeil Pharm. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1365 (Fed. Cir. 2008); *see also Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 306 (Fed. Cir. 1985) (objective indicia "may be the most pertinent, probative, and revealing evidence available to the decision maker in reaching a conclusion on the obviousness/nonobviousness issue."). Such evidence "may often establish that an invention appearing to have been obvious in light of the prior art was not." *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575 (Fed. Cir. 1984). Courts routinely reject motions for summary judgment of obviousness where there is a dispute regarding secondary indicia of non-obviousness. *See, e.g., DePuy Orthopaedics, Inc. v. Orthopaedic Hosp.*, No. 3:12-CV-299-JVB-MGG, 2017 WL 6345397, at *15-16 (N.D. Ind. July 19, 2017) (recommending denial of plaintiff's motion for summary judgment of invalidity because of a genuine dispute of material fact created by opposing experts' disagreement regarding objective evidence of commercial success and unexpected results raised in defendant's

response brief);[14] *Skedco, Inc. v. Strategic Operations, Inc.*, 287 F. Supp. 3d 1100, 1131-36 (D. Or. 2018) (denying defendant's motion for summary judgment of invalidity in part because of plaintiffs' showing of secondary indicia of non-obviousness, namely industry praise, "minimal evidence of commercial success," commercial desirability of the product, long-felt need, failure of others, and copying).

Woodway presented extensive evidence of objective indicia of nonobviousness. (56(a)2 ¶¶ 70-76.) Through the sworn Disclosure of Eric A. Weber, Woodway's Director of Sales and Marketing, Woodway has illustrated the commercial success of Woodway's CURVE and CURVE Trainer treadmills that are assembled by the method claimed in claim 25 of the '580 patent. (56(a)2 ¶ 71.) The safety mechanism to control the running belt such that the running surface cannot both move toward the front of the treadmill and toward the back of the treadmill contributes to the products' commercial success. (56(a)2 ¶ 73.) Woodway's sales from its introduction of the CURVE treadmill in 2009 through 2016 have grown at a significant rate and have accumulated a sales value in the eight figures. (56(a)2 ¶ 72.) According to Mr. Weber, the CURVE treadmill was the first of its kind, and Woodway created, cultivated, and established the current market for curved, manual treadmills. (56(a)2 ¶ 76.) In Mr. Weber's opinion, based on his experience in the market, others in the industry are attempting to capitalize on Woodway's success and are copying the Woodway CURVE treadmill.[15] (56(a)2 ¶ 75.)

Additionally, Woodway has presented evidence of praise for Woodway's invention. The CURVE treadmill has received numerous awards, including the 2010 FIBO

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[14] A copy of this decision is attached as Exhibit 1.

[15] At trial, through the testimony of Woodway witnesses, including Mr. Weber, and Mr. Green, Woodway's damages expert, the jury will hear about additional infringers – *e.g.*, the SkillMill, Green Jog, Speedboard, and Assault – and Woodway's assessment of the same. (Dkt. No. 183-2 at 2-5.)

Innovation Award, and it has been identified as one of the "5 Best Cardio Machines on the Planet" by *Men's Health*. (56(a)2 ¶ 74.) Woodway's CURVE Trainer was highlighted as a "Best New Treadmill for Runners" by *Runner's World*, the largest publication dedicated to running. (*Id.*)

Despite having knowledge of Woodway's positions on objective indicia of non-obviousness, Plaintiffs state that Dr. Blair did not consider this issue in his validity analysis. (Plaintiffs' MOL at 35.) Plaintiffs are wrong. It is Plaintiffs' expert, Dr. Giachetti, who fails to address secondary indicia of non-obviousness. (*See, e.g.*, Dkt. No. 254-12 at 1.) Dr. Blair, on the other hand, specifically discusses this issue at ¶¶ 619-626 of his March 30, 2017 Report and references his reliance on Mr. Weber's Disclosure. (Dkt. No. 254-15 at ¶¶ 619-626.) Technical experts like Dr. Blair typically rely on information they receive from witnesses, like Mr. Weber, whose business is to know the market and the success of products in that market. (*See, e.g., Carnegie Mellon Univ. v. Marvell Tech. Group, Ltd.*, 807 F.3d 1283, 1303 (Fed. Cir. 2015) (noting the district court did not abuse its discretion in allowing expert testimony that relied on other experts regarding details unique to a particular industry); *see also* Pretrial Tr., April 30, 2018, at 378:19-380:1 ("The general rule is an expert can rely on information, quote, if experts in a particular field would reasonably rely on those kinds of facts or data in forming an opinion on the subject.").)

Plaintiffs' other criticism of Woodway's position – that Mr. Weber's Disclosure is conclusory and not specific to claim 25 – is belied by the Disclosure itself.[16] Mr. Weber fully explains the bases for his assessment that the Woodway line of CURVE treadmills is

[16] Before now, Plaintiffs never raised any objection to Mr. Weber's Disclosure, which is telling since it was just as relevant to Woodway's Opposition to Plaintiffs' first Motion for Summary Judgment. (Dkt. No. 254-15 at ¶ 620.)

commercially successful and that others are attempting to copy the CURVE treadmill. (56(a)2 ¶ 75; Dkt. No. 254-24 at 3-18, and 21-23.) Mr. Weber also details his support and references to the industry praise he relies on. (*Id.* at 22-23.) Mr. Weber specifically identifies Woodway's patent marking website, which informs Woodway's competitors, customers, and potential customers that the CURVE line of treadmills practices the '580 patent, which includes claim 25. (*Id.* at 16.)

The jury is entitled to hear Woodway's evidence relating to the secondary indicia of non-obviousness and evaluate its significance relative to any appropriate contrary evidence Plaintiffs muster. Plaintiffs' disagreement regarding Woodway's evidence of commercial success, industry praise, and copying must go to the fact finder and is fatal to Plaintiffs' obviousness attack. *Plantronics,* 724 F.3d at 1355 (Fed. Cir. 2013). This is further reason to deny summary judgment of invalidity of claim 25.

IV. PLAINTIFFS' ATTEMPTS TO BACKFILL DR. GIACHETTI'S DEFICIENT REPORT SHOULD BE REJECTED

It is far too late for Dr. Giachetti and Plaintiffs to be offering new invalidity opinions.[17] Expert discovery regarding the validity of claim 25 is long over, and Plaintiffs' introduction of the Gen III should not open the door to supplemental expert reports. Rule 37(c) and the *Outley* factors[18] demand that the Court ignore Dr. Giachetti's and Plaintiffs' efforts to adopt a new person of ordinary skill in art.

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[17] During Dr. Giachetti's deposition on April 11, 2017, Dr. Giachetti testified that the entirety of the opinions he intended to offer with respect to the validity of the '580 patent were included in his March 2, 2017 report. (Exhibit 2, Giachetti Tr, at 170:25-173:19.) Claim 25 of the '580 patent and Dr. Giachetti's opinions regarding this claim were included in that report. (*See* Dkt. No. 254-12 at 3-4.)

[18] The parties and the Court are extremely familiar with these factors, identified in *Outley v. City of New York*, 837 F.2d 587, 590-91 (2d Cir.1988), and their application, particularly in view of the extensive briefing, including

The first *Outley* factor – "the party's explanation for the failure to comply with the discovery order" – weighs in favor of striking any new Dr. Giachetti's opinions premised on a change in the person of ordinary skill in the art, the scope of the prior art and any motivation to combine, and detailed arguments regarding claim 25. Plaintiffs have not and cannot offer any explanation for failing to comply with the scheduling order regarding expert disclosures or why these arguments were not raised earlier. Plaintiffs bear the burden of proof on invalidity, which was one of the bases for Plaintiffs' bringing this declaratory judgment action in this District. (*See* Dkt. No. 1, Counts II, IV.) After filing their declaratory judgment complaint on November 16, 2015, Plaintiffs served invalidity contentions on May 27, 2016, which were then supplemented on August 8, 2016. Dr. Giachetti incorporated certain of these contentions in his March 2, 2017 report. (Dkt. No. 254-12 at ¶ 87, n.36 (incorporating by reference Plaintiffs' initial invalidity contentions); Exhibit 2, Giachetti Tr 194:8-199:15.)

Plaintiffs were aware of Dr. Blair's contemplated definition of a person of ordinary skill in the art, which was offered in his March 2, 2017 report regarding infringement. (Dkt. No. 96-14 at ¶¶ 39-40.) Dr. Giachetti took the opportunity to criticize Dr. Blair's definition in his March 30, 3017 report. (56(a)2 ¶¶ 62-63.) Had Dr. Giachetti wanted to offer his alternate opinions or otherwise evaluate the prior art under Dr. Blair's definition, the time to do so was more than a year ago.

Similarly, claim 25 has been part of this case since the beginning. There is no excuse for Dr. Giachetti's complete failure to even discuss this claim in his March 2, 2017 report. Indeed, Woodway raised this exact argument in its *Daubert* motion challenging Dr.

Plaintiffs' Motion for Reconsideration, regarding experts and supplemental expert reports. (*See, e.g.*, Dkt. Nos. 103, 121, 122, 144, 184-1, 205, 249, 250, and 263.)

Giachetti's opinions. (Dkt. No. 91 at 5 n.3, 6 n.4, and 8.) Plaintiffs never requested leave from the Court to submit expert opinion after expert discovery closed; the Court should not give leave now.

The second *Outley* factor is the "importance of the testimony of the precluded witness." The sole basis for offering the new Dr. Giachetti opinions is to support Plaintiffs' second Motion for Summary Judgment of Invalidity and to backfill the deficiencies in Dr. Giachetti's March 2, 2017 report regarding claim 25 in light of the inevitable infringement determination. Given that Plaintiffs' Motion never should have been filed and the validity of claim 25 has been relevant to this case for more than 2.5 years and subject to a prior Motion for Summary Judgment of invalidity, this factor strongly favors Woodway. Plaintiffs have had ample opportunity to develop their position on invalidity regarding claim 25 and should not have the benefit of crafting alternate opinions in an attempt to prevail on summary judgment. This is particularly true as it relates to the motivation to combine arguments Plaintiffs again try to raise. The Court already struck Plaintiffs' attempts through the May 1, 2017 Giachetti Declaration to bolster Dr. Giachetti's opinions in this area. (*Compare* Dkt. No. 144 at 33 *with* Dkt. No. 88-2 at ¶¶ 73-77.)

The third *Outley* factor – prejudice to Woodway – weighs heavily in favor of precluding Plaintiffs' new positions. Expert discovery is closed. The parties are in the middle of briefing the second round of dispositive motions which became necessary upon Plaintiffs' introduction of the Gen III. Woodway has had no opportunity to depose Dr. Giachetti to challenge his new theories. Woodway also has not been given the opportunity to provide any rebuttal expert opinion identifying the limitations in Dr. Giachetti's uniform reading of the prior art regardless of who is considered the person of ordinary skill in the art. This gives Plaintiffs an

unfair, tactical advantage. To reopen expert discovery will be both expensive and will delay resolution of the parties' dispute. Trial has already been postponed once. Postponing the resolution of Plaintiffs' second bite at the invalidity apple unfairly rewards Plaintiffs for their behavior.

Finally, the fourth *Outley* factor is the possibility of a continuance. Just as with the third *Outley* factor, reopening expert discovery to allow Dr. Giachetti's new opinions, to permit Woodway to offer rebuttal opinions, and further depositions of the parties' experts will delay the proceedings unnecessarily. This factor, like the other three, weighs in favor of rejecting Plaintiffs' latest efforts to backfill Dr. Giachetti's deficient report.

V. CONCLUSION

For the reasons set forth above, Woodway's Motion for Summary Judgment should be granted.

Dated: June 29, 2018

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on June 29, 2018, a copy of the foregoing was filed electronically and served by mail on anyone unable to accept electronic filing. Notice of this filing will be sent by e-mail to all parties by operation of the Court's electronic filing system or by mail to anyone unable to accept electronic filing as indicated on the Notice of Electronic Filing. Parties may access this filing through the Court's CM/ECF System.

/s/ Matthew W. Peters
Matthew W. Peters, phv09498

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC,,	
Plaintiff,	Case No. 3:15-CV-1665 (JCH)
vs.	
WOODWAY USA, INC.,	June 29, 2018
Defendant.	

WOODWAY USA, INC.'S LOCAL RULE 56(a)2 STATEMENT OF FACTS IN OPPOSITION TO PLAINTIFFS' MOTION FOR SUMMARY JUDGMENT

In compliance with Local Civil Rule 56(a)2, and in support of its concurrently-filed Opposition to Motion for Summary Judgment, Defendant Woodway USA, Inc. ("Woodway") hereby sets forth its response to Plaintiffs' Local Rule 56(a)1 Statement and its Statement of Disputed Issues of Material Fact.

I. WOODWAY'S RESPONSES TO PLAINTIFFS' LOCAL RULE 56(a)1 STATEMENT

1. U.S. Patent No. 9,039,580 (the "'580 Patent") has four independent claims: claims 1, 11, 19, and 25. (A true copy of the '580 Patent is attached hereto as Exhibit 1.) **Admitted.**

2. Woodway served Supplemental Preliminary Infringement Contentions claiming that the Original and Redesigned TrueForm Runner treadmills infringe claim 25. Exhibit 2 (excerpted portion of Woodway USA, Inc.'s Supplemental Preliminary Infringement Contentions) at Appendix B, pp. 48-56. **Admitted.**

3. On April 11, 2018, Dr. Blair inspected Gen III and issued a second supplemental expert report on April 13, 2018. Exhibit 3 (Second Supplemental Expert Report of Kim B. Blair, Ph.D., "Supplemental Blair Report"). **Admitted.**

4. In the Supplemental Blair Report, Dr. Blair opines that Gen III infringes claim 25 of the '580 Patent. Ex. 3. **Admitted. Dr. Blair opines that the assembly of the Gen III infringes claim 25**.

5. Claim 25 of the '580 Patent recites:

> A method, comprising:
>
> [element a] providing a manually powered treadmill, the manually powered treadmill having a frame with a front end and rear end;
>
> [element b] providing a first bearing rail and a second bearing rail, the first and second bearing rails each comprising a plurality of bearings and extending longitudinally on the frame, wherein the first and second bearing rails define a curved top profile;
>
> [element c] disposing a running belt on the plurality of bearings of the first bearing rail and the second bearing rail such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails;
>
> [element d] permitting movement of the running belt in a first direction; and
>
> [element e] substantially preventing movement of the running belt in a second direction opposite the first direction.

Ex. 1 (element annotations added). **Denied that Plaintiffs' bracketed insertions are recited by claim 25. Disregarding the bracketed portions of Plaintiffs' Statement No. 5, admitted.**

6. On May 7, 2018, Plaintiffs' expert, Dr. Robert Giachetti, issued a rebuttal report to the Supplemental Blair Report. Exhibit 4 ("Giachetti Rebuttal Rep."). **Admitted.**

7. Woodway, through Dr. Blair, asserts that "the assembly of the Gen III literally infringes claim 25 of the '580 Patent." Ex. 3 at ¶ 18. **Admitted.**

8. The Supplemental Blair Report does not differentiate between Plaintiffs nor does Dr. Blair identify any entity or which of the Plaintiffs allegedly performs each step of the method claim. Ex. 3 at ¶ 18 and Ex. A. **Denied that this statement is a material fact for the purposes**

of Plaintiffs' motion. Dr. Blair is a technical expert who, as he did in his previous infringement report, opined on the technical elements of the claims. (*See* Dkt. No. 96-14 at 1-4 and Exhibit F at 48-57) Which of Plaintiffs are responsible for the employees who perform the steps of the claimed method is a question of fact based on the relationship between the Plaintiffs, (*see* Dkt. No. 144 at 6-8 and 10-13), and does not require technical expertise.

9. Woodway no longer asserts claim 25 against the two earlier versions of the TrueForm Runner. Dkt. No. 244. **Denied that this statement is a material fact for the purposes of Plaintiffs' motion as Plaintiffs fail to rely on this statement in their motion. (Plaintiffs' MOL.)**

10. Plaintiffs produced a document titled "Samsara Timed Build," which reflects the status of the subassembly when Chapco delivers it to Samsara's facility. Exhibit 5 (SAM0006695); Exhibit 6, Declaration of Brian Weinstein ("Weinstein Decl."), at ¶10. **Denied. Plaintiffs' previous testimony stated that the "Samsara Timed Build" was [redacted]. (Chapco Tr., Dkt. No. 106-21, at 146:19-147:12.) Plaintiffs point to no documentary evidence or prior deposition testimony that shows "the status of the subassembly when Chapco delivers it to Samsara's facility."**

11. Chapco does not furnish or supply the running belt for Gen III or the components for the running belt. Ex. 6, Weinstein Decl., at ¶¶ 8, 10-11. **Denied. It is an issue of fact whether and when Chapco is responsible for the employees who assemble the Gen III. (*See* Dkt. No. 144 at 6-8, 10-12; Dkt. No. 236 at Exhibit A pg. 6-9; Dkt. No. 254-5 at SAM0006698-SAM0006700.)**

12. Chapco does not assemble the running belt. Ex. 4 at ¶ 26; Ex. 6 at ¶¶ 10-11. **Denied. It is an issue of fact whether and when Chapco is responsible for the employees who assemble the Gen III. (*See* Dkt. No. 144 at 6-8, 10-12; Dkt. No. 236 at Exhibit A pg. 6-9; Dkt. No. 254-5 at SAM0006698-SAM0006700.)**

13. Chapco does not furnish, supply, make available or prepare the bearings on the part that Woodway identifies as the bearing rail. Ex. 4 at ¶ 41; Ex. 6 at ¶ 14. **Denied. It is an issue of fact whether and when Chapco is responsible for the employees who assemble the Gen III. (*See* Dkt. No. 144 at 6-8, 10-12; Dkt. No. 236 at Exhibit A pg. 4-6; Dkt. No. 254-5 at SAM0006696-SAM0006697.)**

14. Samsara's "Timed Build" document reflects that the sub-assembly, which Dr. Blair identifies as the bearing rail, arrives at Samsara without a plurality of bearings. Ex. 5; Ex. 6 at ¶¶ 14-15. **Denied. The "Timed Build" does not necessarily reflect how the bearing rail arrives at the Samsara facility. (*See generally* Dkt. No. 254-5.)**

15. Dr. Blair combines his analysis of the limitations of claim 25 that include "permitting movement . . ." and "substantially preventing . . .," by contending that the safety device "coupled" to the shaft is structured "to substantially prevent movement of the running belt [9] in a first direction and permit movement of the running belt [9] in a second direction that is opposite the first direction." Ex. 3 at Ex. A, pp. 10-12. **Denied because this statement misstates the record. The cited evidence speaks for itself. (Dkt. No. 254-3 at Ex. A, pp. 10-12.)**

16. Chapco does not install, or couple, the safety device. Ex. 4 at ¶ 62; Ex. 6 at ¶ 18. **Denied. It is an issue of fact whether and when Chapco is responsible for the employees**

who assemble the Gen III. (*See* Dkt. No. 144 at 6-8, 10-12; Dkt. No. 236 at Exhibit A pg. 10-12; Dkt. No. 254-5 at SAM0006700.)

17. Throughout the Supplemental Blair Report, Dr. Blair contends that "assembly" of a treadmill meets the limitations of claim 25 of the '580 Patent. Ex. 3 at ¶¶ 16, 18, Ex. A. **Denied because this statement misstates the record. Dr. Blair demonstrated how the assembly of the Gen III meets the limitations of claim 25; he did not opine that the assembly of any treadmill in the abstract infringes claim 25. The cited evidence speaks for itself. (Dkt. No. 254-3 at ¶¶ 16, 18, and Ex. A.)**

18. Dr. Blair opines that Gen III meets the limitation of claim 25 of the '580 Patent of "disposing a running belt on . . ." because "[t]he assembly . . . includes providing a running belt and locating it above the bearing rails[.]" Ex. 3 at Ex. A, pp. 6-7. **Denied because this statement misstates the record. The cited evidence speaks for itself. (Dkt. No. 254-3 at ¶¶ 16, 18, and Ex. A.)**

19. Chapco does not "locate" a running belt on Gen III. Ex. 5; Ex. 6 at ¶ 11. **Denied. It is an issue of fact whether and when Chapco is responsible for the employees who assemble the Gen III. (*See* Dkt. No. 144 at 6-8, 10-12.)**

20. Dr. Blair opined in his first expert report regarding infringement that:

> The plain and ordinary meaning of "support" does not require that components must be directly or physically connected or touching. "Support" may be provided directly, may be provided indirectly via an intermediary component or series of components, may bear some of the weight of another component or a series of components, and/or may bear all of the weight of another component or series of components.

Exhibit 7 (excerpted portion of the initial Expert Report of Kim B. Blair, Ph.D), at Ex. F, pp. 8-9. **Denied that this is a material fact for the purposes of Plaintiffs' motion. "Support" is not**

found in claim 25 and is thus irrelevant to an infringement analysis. (Dkt. No. 254-1 at col. 36 ll. 1-18.)

21. The endless belt of the Gen III treadmill is between the running belt and the plurality of bearings. Ex. 3 at Ex. A, p. 9; Ex. 4 at ¶¶ 53-54. **Denied that this statement is material for the purposes of Plaintiffs' motion. Dr. Blair demonstrated how the assemblers of the Gen III "dispos[e] a running belt on the plurality of bearings . . . ." (Dkt. 254-3, at Exhibit A pg. 6-9; Dkt. No. 254-5 at SAM0006698-SAM0006699.)**

22. Chapco is not a member of Samsara. Ex. 6 at ¶ 3. **Denied. The closeness and nature of the relationship between Chapco and Samsara and its legal implications are issues of fact and law. (*See* Dkt. No. 144 at 10-12.)**

23. Woodway acknowledges that "the basic idea" of a non-motorized treadmill having a "convex running surface has been around for awhile" before Woodway's alleged conception of the invention claimed in the '580 Patent. Exhibit 8 (excerpted portion of the prosecution history of the '169 Patent, ¶¶ 5-7 of the Decl. of Nicholas Oblamski at WW000755); Exhibit 9 (excerpted portions of the deposition of Mr. Oblamski) at 161:21-162:10; Exhibit 10 (excerpted portions of the deposition of Douglas Bayerlein at 97:25-98:19). **Denied to the extent that this statement suggests that the '580 patent is not novel. The '580 patent does not claim "the basic idea" of a non-motorized treadmill having a convex running surface, but claims specific improvements to treadmills. Denied because this statement misstates the record. The cited testimony speaks for itself. (Dkt. No. 254-8 at WW000755; Dkt. No. 254-9 at 161:21-162:10; Dkt. No. 10 at 97:25-98:19.)**

24. Prior to the claimed invention, the International Standards Organization in 2005 defined a treadmill as "training equipment with a unidirectional moving surface on which a

walking or running activity can take place, where the feet are free to leave the moving surface." Exhibit 11 (ISO 20957-6:2005/ EN 957-6:2001) at § 3.1. **Denied that this statement is a material fact for the purposes of this motion. Claim construction is complete in this matter and "treadmill" was not a term that was proposed to be construed. (See Dkt. No. 76 at 2.) Moreover, Plaintiffs point to no expert testimony explaining how this definition is relevant to a person of ordinary skill in the art or any validity analysis relating to the '580 patent, which is directed to a curved manual treadmill. A third-party's definition of "treadmill" is irrelevant for the purposes of the infringement analysis at this stage.** ***Cybor Corp. v. FAS Techs., Inc.*****, 138 F.3d 1448, 1454 (Fed. Cir. 1998) (*****en banc*****).**

25. Before the priority date of the '580 Patent, industry standards disclosed the need for a device to ensure unidirectional movement of the belt. Ex. 11 at § 3.1; Exhibit 12 (Opening Expert Report of Dr. Robert Giachetti, the "Giachetti Inval. Report") at ¶¶ 36, 129-130. **Denied. The cited portions of the Giachetti Invalidity Report do not state that industry standards disclosed the need for a device to ensure unidirectional movement of the belt. (Dkt. No. 254-12 at ¶¶ 36, 129-130.)**

26. On January 20, 1998, the U.S. Patent and Trademark Office ("PTO") issued U.S. Patent No. 5,709,632 to Socwell, entitled "Curved Deck Treadmill." Exhibit 13 (Socwell). **For the purposes of this motion, admitted.**

27. The Brief Summary of the Invention in Socwell describes the invention: (i) a curved deck treadmill which substantially prevents the user from falling off the back; (ii) a curved deck treadmill which is capable of providing meaningful walking, jogging, or running control in relation to the physiology of the user; (iii) a curved deck treadmill which provides a continuous, smooth exercising motion. Ex. 13 at Col. 3, ln.24-Col. 4, ln.17. **Denied. Plaintiffs**

point to no expert testimony which describes the import of the "Brief Summary of the Invention" from Socwell and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the "Brief Summary of the Invention" in his Invalidity Report, and his citation to this section in his Declaration was rejected in this Court's First Summary Judgment Order. (See Dkt. No. 144 at 33; Dkt. No. 88-2 at ¶¶ 28, 72.)

28. An alternative embodiment of Socwell is not motorized. Ex. 13 at Col. 11, ll. 25-27 ("[i]n an alternative embodiment… the present invention may be implemented without a driving means . . ."). **Denied. Plaintiffs point to no expert testimony which describes the import of an "alternative embodiment" from Socwell and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited "alternative embodiment" in his Invalidity Report. (*See generally* Dkt. No. 254-12.)**

29. Dr. Blair testified that Socwell "disclose[s] a running belt that follows the top curved running surface." Exhibit 14 (portions of the deposition of Dr. Blair) at 186:13-16. **For the purposes of this motion, admitted.**

30. The only element of claim 25 that Dr. Blair opined was not disclosed in Socwell was a device permitting the running belt of Socwell to move in only one rotational direction. Exhibit 15 (Rebuttal Expert Report of Kim B. Blair, Ph. D.) at ¶¶ 39-43, 79. **Denied because this statement misstates Dr. Blair's opinions. The cited evidence speaks for itself. (Dkt. No. 254-15 at ¶¶ 37-44, 77-82.)**

31. Socwell expressly warns that "if the rollers … are so easily moveable, the user may potentially lose his equilibrium or balance and fall from the exercise treadmill resulting in possible injuries." Ex. 13 at Col. 1, ll. 23-32. **Denied. Plaintiffs point to no expert testimony**

which describes the import of the quoted language from Socwell and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the "Brief Summary of the Invention" in his Invalidity Report, and his citation to this section in his Declaration was rejected in this Court's First Summary Judgment Order. (See Dkt. No. 144 at 33; Dkt. No. 88-2 at ¶¶ 33, 72.)

32. Socwell discloses the need for a device to prevent a user "from falling off the back of the treadmill." Exhibit 16 (Plaintiffs' Preliminary Invalidity Contentions excerpted) at Ex. E, p. 4 (citing Socwell, Col. 11, ll. 25-34; Col. 12, ln. 67-Col. 13, ln. 4). **Denied. Invalidity Contentions are not evidence. Plaintiffs point to no expert testimony which describes the import of the quoted language from Socwell and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited language in his Invalidity Report, and his citation to this section in his Declaration was rejected in this Court's First Summary Judgment Order. (See Dkt. No. 144 at 33; Dkt. No. 88-2 at ¶¶ 28, 72.)**

33. Socwell teaches calibration of the rollers in relation to the belt to enable the user to safely walk, jog or run. Ex. 13 at Col. 11, ll. 28-34. **Denied. Plaintiffs point to no expert testimony which describes the import of an "alternative embodiment" which purportedly teaches "calibration of the rollers" from Socwell and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited "alternative embodiment" in his Invalidity Report. (*See generally* Dkt. No. 254-12.)**

34. On February 15, 1972, the PTO issued U.S. Patent No. 3,642,279 to Cutter, entitled "Treadmill Jogger." Exhibit 17 (Cutter). **For the purposes of this motion, admitted.**

35. Dr. Blair does not dispute that the treadmill in Cutter is manually powered and has a frame with a front and a rear end. Ex. 15 at § VI.D; Ex. 16 at Ex. H, claim 1. **Denied. The cited evidence does not support that Dr. Blair opined on whether Cutter disclosed a treadmill that is manually powered. (Dkt. No. 254-15 at § VI.D.)**

36. Dr. Blair acknowledges that "Cutter discloses a treadmill (10) with a running belt (30) that has a curved surface proximate the front of the treadmill . . ." Ex. 15 at ¶ 199. **Denied because this statement omits part of Dr. Blair's opinion. Dr. Blair stated that "Cutter discloses a treadmill (10) with a running belt (30) that has a curved surface proximate the front of the treadmill (10) and a substantially flat or planar surface proximate the rear of the treadmill (10)." (Dkt. No. 254-15 at ¶ 199.)**

37. Cutter discloses bearing rail structures with "rollers (18) extend[ing] between the left side member (11) and the right side member (12)." Ex. 15 at ¶ 210. **Denied. The cited evidence misstates Dr. Blair's opinions. Dr. Blair explicitly stated that Cutter does not disclose any structure that is analogous to a rail with bearings. (Dkt. No. 254-15 at ¶¶ 209-212.)**

38. Dr. Blair attempted to distinguish the rollers of Cutter from the claimed bearings, arguing that they are not "attached to the rail or connected to the rail." Ex. 14 at 194:22-195:16. **Denied. This statement misstates Dr. Blair's opinions. Dr. Blair explained why conventional conveyor rollers are not analogous to a rail with bearings. (Dkt. No. 254-14 at 194:22-195:16; Dkt. No. 254-15 at ¶¶ 209-212.)**

39. The running belt Cutter discloses follows a top curved running surface corresponding to the curved top profile of the bearing rail structures, on either side of the device. Ex. 12 at ¶¶ 53, 121, Fig. 8; Ex. 16 at Ex. H, claim 25; Ex. 17 at Fig. 2. **Denied. Dr. Blair**

explained why Cutter does not disclose any feature analogous to a curved running surface or rails with bearings. (Dkt. No. 254-15 at ¶¶ 202-04, 211-12.)

40. Dr. Blair acknowledged that "Cutter does appear to recognize the need for a safety in a treadmill" including "that a 'principal problem has been that of how to restrain the user from walking off or running off or falling off the end of the machine and possibly injuring himself[.]'" Ex. 15 at ¶ 200. **Denied because this statement mischaracterizes Dr. Blair's opinions. Dr. Blair explained that Cutter taught away from the safety solutions listed. (Dkt. No. 254-15 at ¶¶ 200-01.)**

41. In 1972, U.S. Patent No. 3,637, 206 issued to Chickering for "Endless Belt Exerciser With Accelerating and Decelerating Tread Surfaces." Exhibit 18 (Chickering). **For the purposes of this motion, admitted.**

42. Chickering includes a frame (10) with front and rear ends. Ex. 18 at Col. 1, ll. 65-68. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Chickering and its impact on the validity analysis to a person of ordinary skill in the art.**

43. Chickering includes a first bearing rail and a second bearing rail (part 14) that comprise a plurality of bearings (parts 13, 18) and the bearing rails extend longitudinally on the frame. Ex. 18 at Col. 2, ll. 2-6; 13-15. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Chickering and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report regarding the "bearing rail" limitation. (Dkt. No. 254-12 at ¶ 122.)**

44. Chickering also includes a running belt (28) on the plurality of bearings (13, 18) of the bearing rails such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails. Ex. 18 at Fig. 3; Col. 3, ll. 6-9. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Chickering and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report purporting to summarize Chickering. (Dkt. No. 254-12 at ¶ 54.)**

45. Dr. Blair acknowledged that Chickering:

> discloses a treadmill having a base (10) where a single endless belt (28) forms both an accelerating and a decelerating area. Rollers (29) are provided in the base (10) such that "when the endless belt 28 is placed over the rollers, it follows their contour and provides a forward accelerating area and a rear decelerating area."

Ex. 15 at ¶ 417 (citing Chickering, col. 3, ll. 6-9.) **For the purposes of this motion, admitted.**

46. Dr. Blair acknowledged that Chickering recognizes the need for a safety device in a treadmill as follows:

> This invention relates to a new type of treadmill exercising device, and
>
> more particularly to an exercising device on which the user can
>
> simulate the acts of walking, jogging and running without relying on
>
> handles, belts or other external supports for maintaining his balance.

Ex. 15 at ¶ 420 (citing Chickering, col. 1, ll. 3-7). **Denied. This statement mischaracterizes Dr. Blair's opinions. Dr. Blair explicitly opined that Chickering does not disclose any safety mechanism for restricting movement of the running belt to one direction. (*E.g.* Dkt. No. 254-15 at ¶¶ 422-43.)**

47. Chickering teaches that a person using a treadmill "is likely to lose his balance because the frictionless surface offers no resistance to the movement of his feet, and he is therefore unable to obtain the leverage necessary for proper balance." Ex. 18 at Col. 1, ll. 31-33. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Chickering and its impact on the validity analysis to a person of ordinary skill in the art.**

48. On April 25, 2000, the PTO issued U.S. Patent No. 6,053,848 to Eschenbach, entitled "Treadmill Deck Suspension." Exhibit 19 (Eschenbach). **For the purposes of this motion, admitted.**

49. In the Background of the Invention, Eschenbach explains that

> [a] treadmill is an exercise device which permits walking or running by moving a
>
> continuous belt along the length of a chassis. The belt slides over a supporting deck with
>
> speed controlled by motor with appropriate controls or load resistance, as in the case of a
>
> manual treadmill.

Ex. 19 at Col. 1, ll. 16-20. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Eschenbach and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report regarding Eschenbach. (*See generally* Dkt. No. 254-12.)**

50. Eschenbach cites the Socwell patent, explaining that Socwell "shows a curved deck having the center of curvature above the deck wherein the deck is rigidly supported with stationary cross members." Ex. 19 at Col. 2, ll. 2-5. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Eschenbach and its impact**

on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report regarding Eschenbach. (*See generally* Dkt. No. 254-12.)

51. Eschenbach claims that its invention is directed to:

> an exercise treadmill including a frame, first and second roller assemblies
>
> rotatably mounted on the frame, and an endless belt trained about the first and
>
> second roller assemblies. The exercise treadmill also includes a deck disposed
>
> between the frame and an upper run of the belt. The deck is semi-rigid, able to
>
> conform to a predetermined curve…

Ex. 19 at Col. 2, ll. 17-23. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Eschenbach and its impact on the validity analysis to a person of ordinary skill in the art.**

52. Eschenbach teaches a non-motorized embodiment of a curved treadmill that can be self-powered. Ex. 19 at Col. 2, ll. 56-60. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Eschenbach and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report regarding Eschenbach. (*See generally* Dkt. No. 254-12.)**

53. Dr. Blair testified that Eschenbach teaches a curved surface. Ex. 14 at 196:21-23. **Denied because it misstates Dr. Blair's testimony. Dr. Blair's testimony speaks for itself. (Dkt. No. 254-14 at 195:23-196:23.)**

54. Eschenbach discloses first and second bearing rails (or the "flexible linking" (part 8) with a plurality of bearings (described as idlers – part 34)). Ex. 12 at ¶ 128 (citing Eschenbach (Ex. 19) Col. 2, ll. 26-38, 48-55). **Denied. Dr. Blair explained that Eschenbach does not disclose any device that could be analogous to "bearings." *E.g.* Dkt. No. 254-15 at 307-309.**

55. Dr. Blair argued that Eschenbach does not teach a running belt supported by the bearings because there is an intervening deck. Ex. 15 at ¶¶ 308, 330. **Denied because this statement misstates Dr. Blair's opinions. The cited evidence speaks for itself. (Dkt. No. 254-15 at ¶¶ 308, 330.)**

56. In 1995, U.S. Patent No. 5,411,455 issued to Haber for "User Propelled Treadmill." Exhibit 20 (Haber). **For the purposes of this motion, admitted.**

57. Haber includes a one-way clutch (part 22) of "conventional design" joined to the front drum. Ex. 20 at Col. 3, ll. 21-22. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Haber and its impact on the validity analysis to a person of ordinary skill in the art.**

58. The one-way clutch disclosed in Haber forces the front drum and the tread of the running belt to rotate in the same direction as the one-way clutch and thus substantially prevents movement of the belt in a second direction. Ex. 16 at Ex. F, claim 25 (citing Haber Col. 1, l. 59-Col. 2, l. 3; Col. 3, ll. 20-25). **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Haber and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report regarding Haber. (*See generally* Dkt. No. 254-12.)**

59. Dr. Blair testified that the one-way clutch disclosed in Haber would affect the running belt. Ex. 14 at 184:16-185:23. **Denied. Dr. Blair opined that the one-way clutch would have no effect on the operation of the treadmill belt. Dkt. No. 254-15 at ¶¶ 93-95.**

60. In 1996, the PTO issued U.S. Patent No. 5,538,489 to Magid, entitled "Walker Apparatus With Left And Right Foot Belts." Exhibit 21 (Magid). **For the purposes of this motion, admitted.**

61. Magid teaches a non-motorized treadmill comprised of a continuous belt disposed around a front and rear shaft. Ex. 16 at Ex. G (citing Magid Fig. 8). **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from Magid and its impact on the validity analysis to a person of ordinary skill in the art. (*See, e.g.* Dkt. No. 254-15 at ¶¶ 144-46.)**

62. Magid discloses a support frame. Ex. 12 at ¶ 65. **For the purposes of this motion, admitted.**

63. Magid includes a Figure 8 which shows the rollers/bearings, and a first and second rail (24) that extend longitudinally on the frame. Ex. 12 at ¶ 65; Ex. 16 at Ex. H. **Denied. Dr. Blair opined that Magid does not disclose any component that could be considered analogous to the claimed "bearing rail." (*See, e.g.* Dkt. No. 254-15 at ¶¶ 154-55.)**

64. Dr. Blair agrees that part 24 disclosed in Magid is a rail. Ex. 14 at 193:11-19. **Denied because this statement misstates Dr. Blair's testimony. (Dkt. No. 254-14 at 193:11-19.) Dr. Blair opined that Magid does not disclose any component that could be considered analogous to the claimed "bearing rail." (*See, e.g.* Dkt. No. 254-15 at ¶¶ 154-55.)**

65. Dr. Blair contended in his rebuttal report that the disclosure in Magid is a "roller." Ex. 15 at ¶ 154. Dr. Blair contends the "roller" system in Magid is the same as that disclosed in

Cutter and Chickering. Ex. 15 at ¶¶ 210, 430. **Denied because this statement misrepresents Dr. Blair's opinion. The cited evidence speaks for itself. (Dkt. No. 254-15 at ¶¶ 210, 430.)**

66. Dr. Blair acknowledges that Magid discloses a "unidirectional control" mechanism designed to "permit only unidirectional movement of the left and right foot belts." Ex. 15 at ¶ 143 (quoting Magid (Ex. 21) at Col. 4, ll. 46-48). **For the purposes of this motion, admitted.**

67. The unidirectional control mechanism of Magid "includes a pair of ratchet gears (61) attached to outer ends of the front rollers (41) . . . thereby preventing bidirectional movement of the foot belts." Ex. 15 at ¶ 143 (quoting Magid (Ex. 21) at Col. 4, ll. 59-60). **Denied because this statement omits parts of Dr. Blair's opinion. The cited evidence speaks for itself. (Dkt. No. 254-15 at ¶ 143.)**

68. Magid's ratchet and pawl "unidirectional control mechanism" restricts the treadmill belts to movement in a single direction of travel. Ex. 12 at p. 32, Fig. 13. **Denied that this statement is material to Plaintiffs' motion. Dr. Giachetti did not opine on the cited language with respect to any anticipatory or obviousness analysis in a claim by claim manner. (Dkt. No. 254-12 at p. 32, Fig. 13.)**

69. When asked to identify the invention claimed, Douglas Bayerlein, a named inventor, identified a timing belt used to synchronize shafts, a one-way safety bearing, and a size variation between front and rear pulleys. Ex. 10 at 99:22-101:11. **Denied because this statement misstates the record. The testimony of Mr. Bayerlein speaks for itself. (Dkt. No. 254-10 at 99:22-101:11.) Denied to the extent this statement suggests a legal conclusion.**

70. The running belt is generally responsive to the weight of the user mounting, dismounting and running on the treadmill. Ex. 1 at Col. 26, ll. 62-64. **Denied. Plaintiffs point**

to no expert testimony which describes the import of the cited section from the '580 patent and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report. (*See generally* Dkt. No. 254-12.) Denied because this statement is ambiguous as to which "running belt" and "treadmill" the evidence is referring to.

71. The '580 Patent specification states that if a user were to mount the treadmill by placing her weight bearing foot at a location near the back, the running belt might move in the opposite direction and cause the user to lose their footing. Ex. 1 at Col. 27, ll. 1-3. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from the '580 patent and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited section in his Invalidity Report. (*See generally* Dkt. No. 254-12.)**

72. Dr. Blair testified that when a user steps on the rear of a treadmill with a curved running surface without a unidirectional safety device, the user's weight may cause the belt to move in the unintended direction which would be immediately obvious to the user. Ex. 14 at 191:18-192:14. **Denied because this statement misstates the record. The testimony of Dr. Blair speaks for itself. (Dkt. No. 254-14 at 191:18-192:14.)**

73. The specification of the '580 Patent identifies other pre-existing devices to prevent unwanted rotation of the running belt including the one-way bearing assembly, "cam locking systems," taper locks," and "band brake system with a lever." Ex. 1 at Col. 27, ll. 7-9, Col. 29, ll. 23-28.. **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from the '580 patent and its impact on the validity analysis to a**

person of ordinary skill in the art. Denied to the extent "pre-existing devices" implies a legal conclusion regarding novelty.

74. The Occupational Health and Safety Administration identifies standard mechanical power transmission elements including sprag clutches, ratchets and pawls. Ex. 12 at ¶¶ 34-35. **Denied that this statement is material with respect to Plaintiffs' motion. Dr. Giachetti did not offer an invalidity opinion (neither anticipation nor obviousness) regarding OSHA disclosures, instead only commenting on such disclosures with regard to the definition of a PHOSITA. (Dkt. No. 254-12 at ¶¶ 34-35.)**

75. U.S. Patent No. 8,986,169 is the parent of the '580 Patent. Ex. 1. **Admitted.**

76. During prosecution of the application for the '169 Patent, the Patent Examiner rejected pending claims under 35 U.S.C. § 103(a) as obvious over Pasqualin (2006/0287165) in view of Cutter and further in view of Magid. Ex. 8 (October 17, 2014, Final Rejection at WW000582, WW0000775-776). **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from the '580 patent's prosecution history and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited evidence in his Invalidity Report. (*See generally* Dkt. No. 254-12.)**

77. The Examiner wrote that "Magid teaches a human-powered treadmill comprising a one-way bearing assembly [] mounted to the front shaft (by way of the belt) to provide unidirectional movement of the belt." Ex. 8 (WW000776). **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from the '580 patent's prosecution history and its impact on the validity analysis to a person of ordinary skill in**

the art. In fact, Dr. Giachetti did not opine on the cited evidence in his Invalidity Report. (*See generally* Dkt. No. 254-12.)

78. The Examiner wrote:

> It would have been obvious to one of ordinary skill in the art before the effective filing
>
> date of the claimed invention to modify Pasqualin/Cuttter's treadmill with Magid's
>
> unidirectional bearing assembly in order to prevent the user from accidentally propelling
>
> the belt in the wrong direction.

Ex. 8 (WW000776-777). **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from the '580 patent's prosecution history and its impact on the validity analysis to a person of ordinary skill in the art. In fact, Dr. Giachetti did not opine on the cited evidence in his Invalidity Report. (*See generally* Dkt. No. 254-12.)**

79. Woodway overcame the rejection by arguing that a one-way bearing assembly located on the rear shaft was distinguishable from, and preferable to, the front shaft location disclosed in Magid. Ex. 8 (WW000757-759, Oblamski Decl. ¶¶ 16-17; 27-32). **Denied. Plaintiffs point to no expert testimony which describes the import of the cited section from the '580 patent's prosecution history and its impact on the validity analysis to a person of ordinary skill in the art. The cited evidence does not demonstrate that the Oblamski Declaration was the reason any rejected claims were allowed. (Dkt. No. 254-8 at WW000757-759, Oblamski Decl. ¶¶ 16-17; 27-32.)**

80. Dr. Blair testified that a treadmill without the safety device to ensure unidirectional movement of the belt would be less safe – increasing the risk of liability – and all curved manual treadmills should have safety devices because otherwise, a user could be hurt.

Ex. 14 at 92:8-13, 98:4-11. **Denied because this statement misstates the record. The cited testimony speaks for itself. (Dkt. No. 254-14 at 92:8-13, 98:4-11.)**

81. Plaintiffs served an interrogatory requesting that Woodway "state whether [it] contend[s] there is any objective indicia or evidence of non-obviousness" and, if so, to detail such evidence. Exhibit 22 (Woodway's Response to First Set of Interrogatories, Interrogatory No. 5). **Admitted.**

82. Woodway objected that the interrogatory was "premature . . . in that it purports to seek the early disclosure of expert opinions." Ex. 22 (Response No. 5). **Admitted.**

83. Dr. Blair did not identify any objective indicia or evidence of non-obviousness in his report responding to Plaintiffs' invalidity analysis. Ex. 15. **Denied. (Dkt. No. 254-15 at ¶¶ 619-626.)**

84. In 1917, the PTO granted U.S. Patent No. 1,211,765 to Schmidt for a selfpowered "Health Exerciser" Treadmill. Exhibit 23 (Schmidt).[1] **Denied as moot.**

85. Dr. Blair acknowledged that Schmidt discloses a curved running belt surface. Ex. 15 at ¶ 342. **Denied as moot.**

86. Component (d) disclosed in Schmidt provides a similar friction and wear reduction function as the bearing claimed in the '580 Patent, reducing friction with the running belt. Ex. 12 at ¶ 119 (citing the '580 Patent at Col. 13, ll. 1-12). **Denied as moot.**

[1] Plaintiffs' Statement Nos. 84–87 and 89–95 relate to the Schmidt reference, which was struck on summary judgment (including in combination with the Magid reference). (Dkt. No. 144 at 29, 38.) Because such invalidity theories were previously disregarded, Plaintiffs' inclusion of these statements turned on resolution of their motion for reconsideration. (Dkt. No. 248.) The Court confirmed the exclusion of this reference in its ruling denying Plaintiffs' Motion for Reconsideration. (Dkt. No. 263.) In light of the Court's ruling, no response to these statements is required as the statements are immaterial and moot.

87. Dr. Blair's sole argument that Schmidt does not disclose a bearing rail is that a POSITA would not recognize the element d of Schmidt to be the equivalent of a bearing. Ex. 15 at ¶ 349. **Denied as moot.**

88. Dr. Blair defined bearings as a mechanical device allowing rotational motion between two objects and reducing friction in that motion. Ex. 14 at 148:7-11; 179:12-20. **Denied because this statement misstates the record. The cited testimony speaks for itself. (Dkt. No. 254-14 at 148:7-11; 179:12-20.)**

89. During prosecution of the '169 Patent, the Examiner found Schmidt disclosed the bearing rail as identified in then-numbered claims 16 and 17. Ex. 8 (WW000713). **Denied as moot.**

90. Parts (d) disclosed in Schmidt extend longitudinally and define a curved profile that the running belt follows. Ex. 12 at ¶ 49. **Denied as moot.**

91. The running surface disclosed in Schmidt allows a user to exercise and "exert a push at the end of a step without rendering him liable to slip off the rear end of the apparatus." Ex. 23, p. 2, Col. 2, ll. 108-112. **Denied as moot.**

92. In his Rebuttal Report, Dr. Blair acknowledged that Schmidt discloses the need for a safety device on a treadmill as follows:

> When the flexible tread is laid over the frame, it will engage with rolls F
>
> F', but will sag at the after part of the apparatus just forwardly of rolls F.
>
> This construction is preferable for the reason that, when the operator is
>
> exercising on the device, he cannot slip off the back of the apparatus.

Ex. 15 at ¶ 343 (citing Schmidt (Ex. 23), Col. 4, ll. 96-102). **Denied as moot.**

93. Dr. Blair acknowledged that the disclosure in Schmidt was, like Cutter, "focused on keeping a user on the treadmill during usage of the treadmill." Ex. 15 at ¶ 343. **Denied as moot.**

94. Schmidt teaches an option for a stationary roller. Ex. 23 at p. 1, Col. 2, ll. 69-75; p. 2, Col. 2, ll. 79-84; Ex. 12 at ¶ 50. **Denied as moot.**

95. Dr. Giachetti opined that a POSITA would understand that the roller could be made moveable or stationary by deploying common power transmission elements to the shaft, like the ratchet and pawl taught in Magid, which would enforce the single direction of the shaft rotation. Ex. 12 at ¶ 134; Ex. 23 at p. 1, Col. 2, ll. 69-75. **Denied as moot.**

96. On March 30, 2017, Woodway served the Disclosure of Eric A. Weber. Exhibit 24 (Disclosure of Eric A. Weber Pursuant to Fed. R. Civ. P. 26(a)(2)(C)). **Admitted.**

II. WOODWAY'S STATEMENT OF ADDITONAL MATERIAL FACTS

A. Facts Relating to Plaintiffs' Infringement

1. [redacted]

2. Dr. Blair's Expert Report set forth a detailed claim-by-claim analysis that compared the assembly of the accused products by Chapco employees to each element of claim 25. (Supplemental Expert Report of Dr. Blair, Dkt. No. 254-15 at Exhibit A pg. 1-12.)

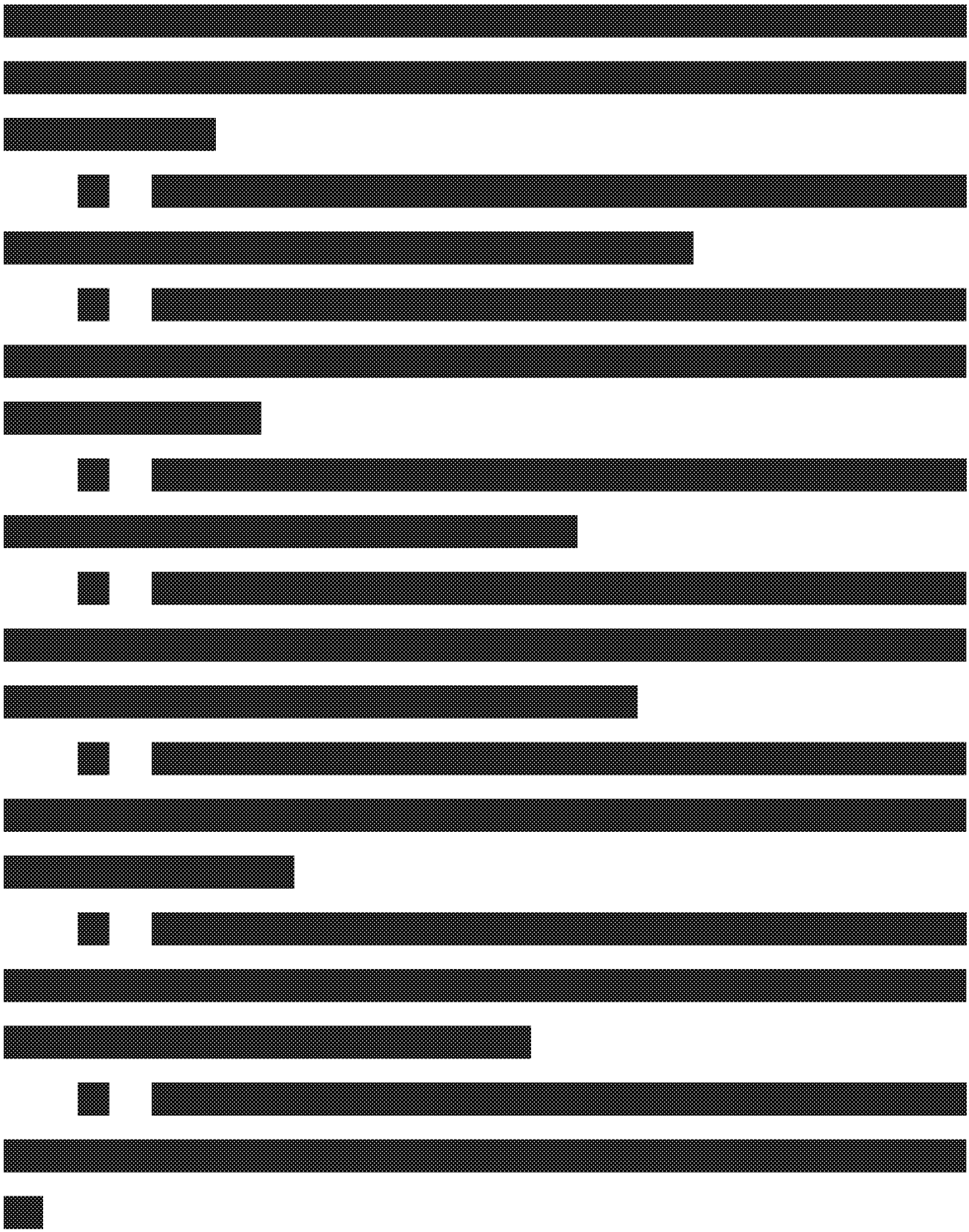
3. Dr. Blair opined that to meet the "disposing a running belt on a plurality of bearings . . ." claim limitation, the assembler has to provide a running belt and locate it above the bearing rails such that the running belt follows a top curved running surface corresponding to the curved top profile of the first and second bearing rails. (Dkt. No. 236 at Exhibit A pg. 6-9.)

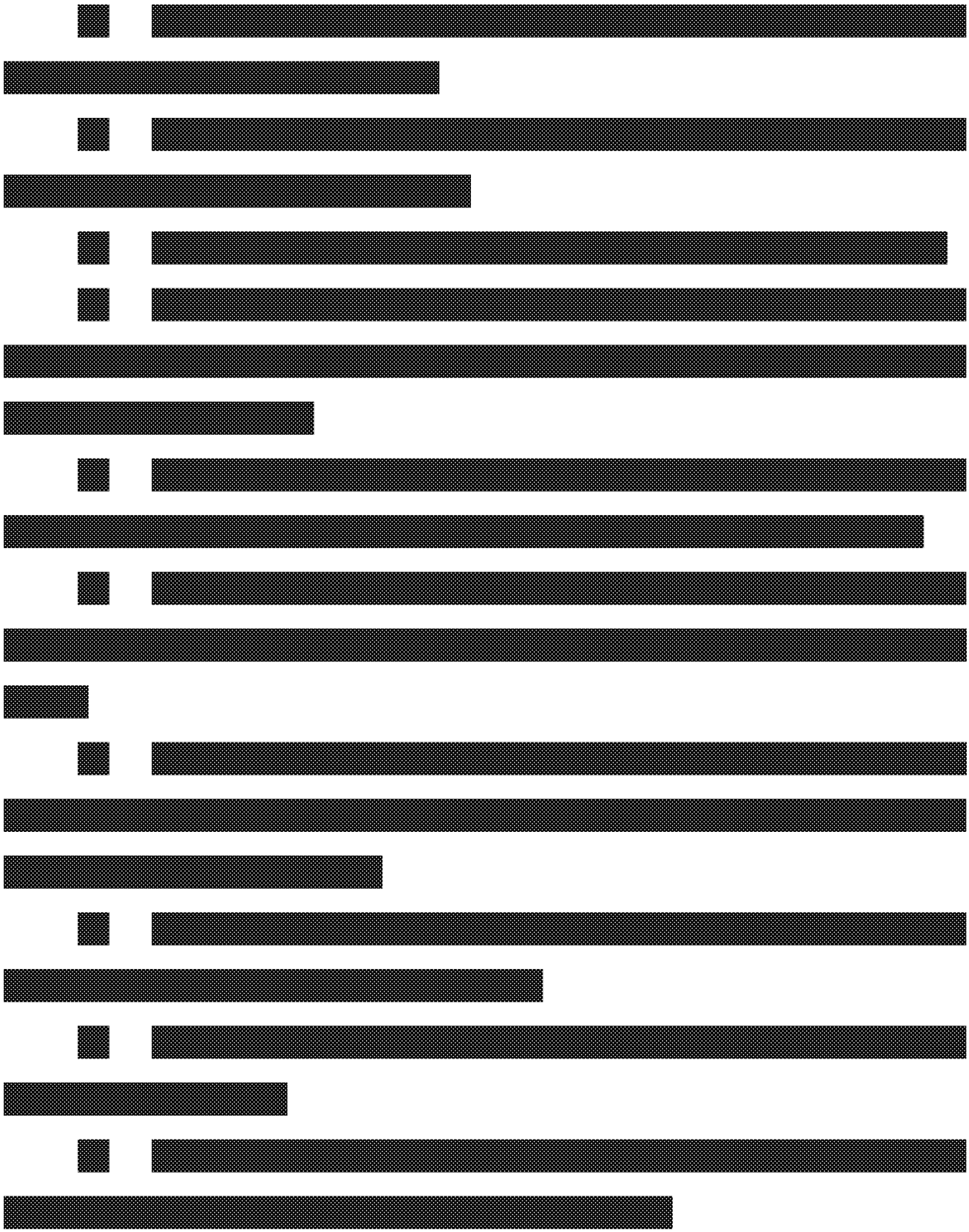
4. Plaintiffs originally did not contest that the assembly of the Original or Gen II TruForm Runners met the "disposing on" element. (Dkt. No. 257-4 at Exhibit B pg. 52.)

B. Facts Relating to Chapco's Infringement

5. [redacted]

14. Chapco's truck depicts a TrueForm Runner treadmill along with the logo for Samsara Fitness. (Photographs of Chapco Truck, Exhibit A.)





C. Facts Relating to Validity of the Utility Patents

59. Dr. Giachetti opined that the proper person of ordinary skill in the art was "a person with at least one year of machine design experience related to power transmission equipment and a demonstrated understanding of the biomechanics of exercise, including knowledge in the field of anthropometry (i.e. the study of human proportion)." (Dkt. No. 254-12 at ¶ 6.)

60. According to Dr. Giachetti, because of the common usages of these elements across diverse types of machinery, terminology has been standardized, and their utility and limitations are well understood by a person of ordinary skill in the art. (Dkt. No. 254-12 at ¶ 35.)

61. Dr. Giachetti states that a person of ordinary skill in the art "recognizes the relative merits of differing components, by virtue of education and/or design experience" and "understand[s] which components can be used in place of one another; selection of a suitable structure or mechanism may account for other selection factors such as durability, cost, reliability and other considerations that are not performance driven." (Dkt. No. 254-12 at ¶ 35.)

62. Dr. Giachetti stated that "Dr. Blair's definition of a person having ordinary skill in the art is a person who is underqualified." (Dkt. No. 257-5 at 9.)

63. Dr. Giachetti stated that Dr. Blair's definition of a person having ordinary skill in the art "is incorrect." (Dkt. No. 257-5 at 10.)

64. Dr. Giachetti did not comment in any way as to how his obviousness analysis would be the same as or different in view of Dr. Blair's person of ordinary skill. (*See* Dkt. No. 254-12 at ¶¶ 6, 34, 35, and 86-149.)

65. A person of ordinary skill in the art would not combine U.S. Patent No. 5,709,832 ("Socwell") with U.S. Patent No. 5,411,455 ("Haber"). (Dkt. No. 254-15 at ¶¶ 96-97 and 136.)

66. A person of ordinary skill in the art would not combine Socwell with U.S. Patent No. 5,538,489 ("Magid"). (Dkt. No. 254-15 at ¶¶ 146 and 192.)

67. A person of ordinary skill in the art would not combine Magid with U.S. Patent No. 3,6421,279 ("Cutter"). (Dkt. No. 254-15 at ¶¶ 205 and 238.)

68. A person of ordinary skill in the art would not combine Magid with U.S. Patent No. 6,053,848 ("Eschenbach"). (Dkt. No. 254-15 at ¶¶ 302-03 and 333.)

69. A person of ordinary skill in the art would not combine Magid with U.S. Patent No. 3,637,206 ("Chickering"). (Dkt. No. 254-15 at ¶¶ 424 and 458.)

70. Dr. Blair considered extensive evidence of objective indicia of nonobviousness in his Rebuttal Report. (Dkt. No. 254-15 at ¶¶ 620-626.)

71. Commercial success of Woodway's invention is established by Woodway's curved, manual treadmills, including the CURVE and CURVE Trainer treadmills, which practice various aspects of the patents-in-suit. (Dkt. No. 254-15 at ¶ 622.)

72. Woodway's sales from its introduction of the curve treadmill in 2009 through 2016 have grown at a significant rate and have accumulated a sales value in the eight figures. (Dkt. No. 254-15 at ¶ 622.)

73. The safety mechanism to control the running belt such that the running surface cannot both move toward the front of the treadmill and toward the back of the treadmill contributes to the product's commercial success. (Dkt. No. 254-15 at ¶ 624.)

74. Woodway received much praise for its invention. The CURVE treadmill has received numerous awards, including the 2010 FIBO Innovation Award, and it has been identified as one of the "5 Best Cardio Machines on the Planet" by Men's Health. Woodway's CURVE Trainer was highlighted as a "Best New Treadmill for Runners" by Runner's World, the largest publication dedicated to running. (Dkt. No. 254-15 at ¶ 625.)

75. In Mr. Weber's opinion, based on his experience in the market, others in the industry are attempting to capitalize on Woodway's success and are copying the Woodway CURVE treadmill. (Dkt. No. 254-24 at ¶ 21.)

76. According to Mr. Weber, the CURVE treadmill was the first of its kind, and Woodway created, cultivated, and established the current market for curved, manual treadmills. (Dkt. No. 254-24 at ¶ 22.)

Dated: June 29, 2018

Respectfully submitted,

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Attorneys for Woodway USA, Inc.

CERTIFICATE OF SERVICE

I hereby certify that on June 29, 2018 (CST), a copy of the foregoing was filed electronically and served by mail on anyone unable to accept electronic filing. Notice of this filing will be sent by e-mail to all parties by operation of the Court's electronic filing system or by mail to anyone unable to accept electronic filing as indicated on the Notice of Electronic Filing. Parties may access this filing through the Court's CM/ECF System.

/s/*Kadie M. Jelenchick*
Kadie M. Jelenchick phv07857

UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

CHAPCO, INC. and SAMSARA FITNESS, LLC, Plaintiffs, v. WOODWAY USA, INC., Defendant.	)	3:15-CV-01665-JCH September 14, 2018

WOODWAY USA, INC.'S AMENDED SUPPLEMENTAL COUNTERCLAIMS

Woodway USA, Inc. ("Woodway"), for its Amended Supplemental Counterclaims against Plaintiffs Chapco, Inc. ("Chapco") and Samsara Fitness, LLC ("Samsara"), states as follows:

PARTIES

1. Woodway is a company organized and existing under the laws of the State of Wisconsin, with a principal place of business located at W229 N591 Foster Court, Waukesha, Wisconsin 53186.

2. Chapco is a corporation organized and existing under the laws of the State of Connecticut, with a principal place of business located at 10 Denlar Drive, Chester, Connecticut 06412. Chapco, individually, under an alter ego theory, and/or jointly with Samsara, has manufactured and continues to manufacture the infringing products as described herein.

3. Samsara is a limited liability company organized and existing under the laws of the State of Connecticut, with a principal place of business located at 8 Inspiration Lane, Chester, Connecticut 06412. Samsara, individually, under an alter ego theory, and/or jointly with Chapco, has manufactured and continues to manufacture the infringing products as described

herein. Samsara has sold and offered for sale and continues to sell and offer for sale the infringing products as described herein.

JURISDICTION

4. This is an action for patent infringement arising out of Chapco's and Samsara's unauthorized manufacturing, offering for sale, and selling of certain manual treadmills in violation of Woodway's patent rights. Because this is an action for infringement under the patent laws of the United States, 35 U.S.C. § 271, *et seq.*, this Court has subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5. In addition, this is an action for copyright infringement, and this Court has subject matter jurisdiction pursuant to 28 U.S.C. § 1338(a).

6. This Court has personal jurisdiction over Chapco and Samsara in that, at all times pertinent hereto, Chapco and Samsara are corporations organized and existing under the laws of the State of Connecticut, with principal places of business located in this District. Chapco and Samsara are also committing infringing acts in this District.

VENUE

7. Venue properly lies in this District pursuant to 28 U.S.C. §§ 1391(b) and (c) and 1400(b) because each of Chapco and Samsara have committed acts of infringement and have a regular and established place of business in this District.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 9,039,580 – CLAIMS 1, 6, 19 & 20

8. Woodway repeats and realleges each and every allegation contained in Paragraphs 1-7, inclusive, as though fully set forth herein.

9. Woodway is the assignee and owner of the '580 patent.

10. The '580 patent, entitled "Manual Treadmill and Methods of Operating the Same," was duly and legally issued by the United States Patent and Trademark Office ("PTO") on May 26, 2015. A true and correct copy of the '580 patent is attached hereto as Exhibit A.

11. The '580 patent is valid and enforceable.

Chapco Infringes Claims 1, 6, 19 & 20

12. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as early as May 26, 2015, Chapco made and continues to make in this District and elsewhere in the United States certain manual treadmills, including, but not limited to, the Gen II TrueForm Runner manual treadmill, that infringe claims 1, 6, 19, and 20 of the '580 patent.

13. At least as early as May 26, 2015, Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, have assembled or made and continue to assemble or make the Gen II TrueForm Runner manual treadmill, which meets each and every claim limitation of claims 1, 6, 19, and 20 of the '580 patent.

14. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Chapco of its infringement of the '580 patent by May 26, 2015, the issue date of the '580 patent.

15. Chapco's infringement of the '580 patent has been and continues to be willful and deliberate.

16. Chapco's conduct has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Chapco is enjoined from infringing the '580 patent.

Samsara Infringes Claims 1, 6, 19 & 20

17. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as early as May 26, 2015, Samsara made, sold, and offered for sale and continues to make, sell, and offer for sale in this District and elsewhere in the United States certain manual treadmills, including, but not limited to, the Gen II TrueForm Runner manual treadmill, that infringe claims 1, 6, 19, and 20 of the '580 patent. The Court previously granted summary judgment of Samsara's infringement of these claims for selling the Gen II TrueForm Runner manual treadmill. (*See* Dkt. No. 144 at 19.)

18. At least as early as May 26, 2015, Samsara, without any employees of its own, used and continues to use Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, to assemble or make the Gen II TrueForm Runner manual treadmill, which meets each and every claim limitation of claims 1, 6, 19, and 20 of the '580 patent.

19. At least as early as May 26, 2015, Samsara has offered for sale and sold and continues to offer for sale and sell the Gen II TrueForm Runner manual treadmill, which meets each and every claim limitation of claims 1, 6, 19, and 20 of the '580 patent. The Court previously granted summary judgment of Samsara's infringement of these claims for selling the Gen II TrueForm Runner manual treadmill. (*See* Dkt. No. 144 at 19.)

20. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Samsara of its infringement of the '580 patent by May 26, 2015, the issue date of the '580 patent.

21. Samsara's infringement of the '580 patent has been and continues to be willful and deliberate.

22. Samsara's conduct has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Samsara is enjoined from infringing the '580 patent.

Chapco And Samsara Are Alter Egos Of Each Other And/Or Brian Weinstein And Infringe Claims 1, 6, 19 & 20

23. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as early as May 26, 2015, Chapco and Samsara as the alter-egos of each other and/or Chapco and/or Samsara as the alter-egos of Brian Weinstein made and continue to make in this District and elsewhere in the United States certain manual treadmills, including, but not limited to, the Gen II TrueForm Runner manual treadmill, that infringe claims 1, 6, 19, and 20 of the '580 patent.

24. At least as early as May 26, 2015, Chapco employee(s), including at least Jeremiah Rabe, have provided and continue to provide product development, design, engineering, testing, quality control, and repair services related to the Gen II TrueForm Runner manual treadmill.

25. For example, with respect to the Gen II TrueForm Runner manual treadmill, Chapco employee(s) developed, engineered, tested, and implemented the location change for the safety device from the rear shaft in the Gen I TrueForm Runner manual treadmill to the front

shaft in the Gen II TrueForm Runner manual treadmill. Brian Weinstein, President of Chapco, directed the Chapco employees to modify the location of the safety device, providing instruction that the safety device must be moved from the rear shaft in the Gen I TrueForm Runner manual treadmill to the front shaft, thus creating the Gen II TrueForm Runner manual treadmill.

26. At least as early as May 26, 2015, Chapco's engineering department has specified and continues to specify the components, parts, and assemblies required for the Gen II TrueForm Runner manual treadmill.

27. At least as early as May 26, 2015, Chapco manufactured and continues to manufacture components, parts, and assemblies for use in the Gen II TrueForm Runner manual treadmill.

28. At least as early as May 26, 2015, Chapco employee, Gerardo Aristi, has identified suppliers and priced and sourced and continues to identify suppliers and to price and source those components, parts, and assemblies that Chapco does not manufacture for use in the Gen II TrueForm Runner manual treadmill. Chapco does not charge any price mark-up for the components, parts, and assemblies that it sources for the Gen II TrueForm Runner manual treadmill. Samsara provides no compensation to Chapco for these services.

29. At least as early as May 26, 2015, Chapco employee, Gerardo Aristi, has maintained and continues to maintain business records reflecting Chapco's purchase and costing of components, parts, and assemblies for use in the Gen II TrueForm Runner manual treadmill on behalf of Samsara. Mr. Aristi has received no compensation from Samsara for his services.

30. At least as early as May 26, 2015, Chapco employee(s) have directed and continue to direct the production and assembly of the Gen II TrueForm Runner manual treadmill.

31. At least as early as May 26, 2015, Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, leased by Samsara, have assembled or made and continue to assemble or make the Gen II TrueForm Runner manual treadmill from the components, parts, and assemblies that are either made or sourced by Chapco. Internal Samsara documentation, including the "Timed Build" document that Chapco employees use to assemble a TrueForm Runner, depicts a Chapco employee assembling the Gen II TrueForm Runner manual treadmill.

32. At least as early as May 26, 2015, Samsara is merely the instrumentality of Chapco and/or Chapco and Samsara have such a unity of interest and ownership that their independence from each other never began with respect to the Gen II TrueForm Runner manual treadmill.

33. At least as early as May 26, 2015, Chapco has complete domination, not only of the finances of Samsara, but of Samsara's policies and business practices regarding the Gen II TrueForm Runner manual treadmill and the assembly and manufacture of the same in violation of Woodway's patent rights.

34. At least as early as May 26, 2015, Brian Weinstein was and continues to be the President of Chapco and the managing member of Samsara. Mr. Weinstein controls Chapco and Samsara and has complete domination, not only of the finances of Chapco and Samsara, but of each entities' policies and business practices regarding the Gen II TrueForm Runner manual treadmill and the assembly and manufacture of the same in violation of Woodway's patent rights.

35. At least as early as May 26, 2015, Brian Weinstein owned and continues to own 100 percent of the common shares and 60 percent of the preferred shares of Chapco.

36. At least as early as May 26, 2015, Chapco had and continues to have no directors.

37. At least as early as May 26, 2015, Chapco's officers were and continue to be Brian Weinstein's parents, Robert and Roslyn Weinstein.

38. At least as early as May 26, 2015, Chapco has not held any annual meetings.

39. At least as early as May 26, 2015, Brian Weinstein has personally guaranteed debts of both Chapco and Samsara.

40. At least as early as May 26, 2015, Brian Weinstein uses his "Chapco" email account to conduct business, including Samsara business, related to the Gen II TrueForm Runner manual treadmill.

41. Prior to the initiation of this litigation, Chapco and Samsara were co-located in the same office space, which is owned by Robert Weinstein. By May 26, 2015, Samsara relocated to a Chapco-owned property.

42. At least as early as May 26, 2015, Chapco employee, Sandra Smith, had and continues to have overlapping responsibilities for accounts payable and accounts receivable for Chapco and Samsara. Ms. Smith has received no compensation from Samsara for her services.

43. At least as early as May 26, 2015, Chapco advertised and continues to advertise the Gen II TrueForm Runner treadmill on a Chapco truck with the Chapco logo.

44. At least as early as May 26, 2015, Chapco permitted and continues to permit Samsara to use the Chapco Ford Excursion for deliveries of the Gen II TrueForm Runner manual treadmill.

45. Chapco and Samsara use the same accountant for the purposes of filing taxes.

46. At least as early as May 26, 2015, Samsara had and continues to have no directors.

47. At least as early as May 26, 2015, Samsara had and continues to have no officers.

48. At least as early as May 26, 2015, Samsara had and continues to have no employees.

49. At least as early as May 26, 2015, Samsara has not held any annual meetings.

50. Since at least May 26, 2015, Samsara has been inadequately capitalized. For example, Samsara had a year-to-date loss of approximately $340,000 as of December 2016. (*See* Dkt. No. 144 at 12.)

51. As of September 2017, Samsara owed Chapco approximately $800,000 with no payment plan in place. (*See id.*)

52. At least as early as May 26, 2015, due to the unity of interest in the enterprise, ownership, and level of control exercised by Chapco and/or Brian Weinstein over Samsara, Chapco and Samsara as the alter-egos of each other and/or Chapco and/or Samsara as the alter-egos of Brian Weinstein have assembled or made and continue to assemble or make the Gen II TrueForm Runner manual treadmill, which meets each and every claim limitation of claims 1, 6, 19, and 20 of the '580 patent.

53. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Chapco and Samsara of the '580 patent.

54. The infringement of the '580 patent by Chapco and Samsara as the alter-egos of each other and/or by Chapco and/or Samsara as the alter-egos of Brian Weinstein has been and continues to be willful and deliberate.

55. The conduct by Chapco and Samsara as the alter-egos of each other and/or by Chapco and/or Samsara as the alter-egos of Brian Weinstein has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no

adequate remedy at law, unless and until Chapco and Samsara are enjoined from infringing the '580 patent.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 9,039,580 – CLAIM 25

56. Woodway repeats and realleges each and every allegation contained in Paragraphs 1-55, inclusive, as though fully set forth herein.

Chapco Infringes Claim 25

57. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as of April 11, 2018, Chapco made and continues to make in this District and elsewhere in the United States certain manual treadmills, including, but not limited to, the Gen III TrueForm Runner manual treadmill, that infringe claim 25 of the '580 patent.

58. At least as of April 11, 2018, Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, have assembled or made and continue to assemble or make the Gen III TrueForm Runner manual treadmill, which meets each and every claim limitation of claim 25 of the '580 patent.

59. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Chapco of its infringement of the '580 patent by April 13, 2018.

60. Chapco's infringement of the '580 patent has been and continues to be willful and deliberate.

61. Chapco's conduct has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Chapco is enjoined from infringing the '580 patent.

Samsara Infringes Claim 25

62. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as of April 11, 2018, Samsara made and continues to make in this District and elsewhere in the United States certain manual treadmills, including, but not limited to, the Gen III TrueForm Runner manual treadmill, that infringe claim 25 of the '580 patent.

63. At least as of April 11, 2018, Samsara, without any employees of its own, used and continues to use Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, to assemble or make the Gen III TrueForm Runner manual treadmill, which meets each and every claim limitation of claim 25 of the '580 patent.

64. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Samsara of its infringement of the '580 patent by April 13, 2018.

65. Samsara's infringement of the '580 patent has been and continues to be willful and deliberate.

66. Samsara's conduct has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Samsara is enjoined from infringing the '580 patent.

Chapco And Samsara Jointly Infringe Claim 25

67. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as of April 11, 2018, Chapco and Samsara together made and continue to make in this District and elsewhere in the United States certain manual treadmills, including, but not limited to, the Gen III TrueForm Runner manual treadmill, that infringe claim 25 of the '580 patent.

68. At least as of April 11, 2018, Chapco employee(s), including at least Jeremiah Rabe, have provided and continue to provide product development, design, engineering, testing, quality control, and repair services related to the Gen III TrueForm Runner manual treadmill.

69. For example, with respect to the Gen III TrueForm Runner manual treadmill, Chapco employee(s) had responsibility for the development, design, engineering, testing, and implementation of the modifications to the wheel locations and the rear shaft attachment to the treadmill frame in the Gen II TrueForm Runner manual treadmill. Brian Weinstein, President of Chapco, directed the Chapco employees to make these modifications, thus creating the Gen III TrueForm Runner manual treadmill.

70. At least as of April 11, Chapco's engineering department has specified and continues to specify the components, parts, and assemblies required for the Gen III TrueForm Runner manual treadmill.

71. At least as of April 11, 2018, Chapco manufactured and continues to manufacture components, parts, and assemblies for use in the Gen III TrueForm Runner manual treadmill.

72. At least as of April 11, Chapco employee, Gerardo Aristi, has identified suppliers and priced and sourced and continues to identify suppliers and to price and source those components, parts, and assemblies that Chapco does not manufacture for use in the Gen III TrueForm Runner manual treadmill. Chapco does not charge any price mark-up for the components, parts, and assemblies that it sources for the Gen III TrueForm Runner manual treadmill. Samsara provides no compensation to Chapco for these services.

73. At least as of April 11, 2018, Chapco employee, Gerardo Aristi, has maintained and continues to maintain business records reflecting Chapco's purchase and costing of

components, parts, and assemblies for use in the Gen III TrueForm Runner manual treadmill on behalf of Samsara. Mr. Aristi has received no compensation from Samsara for his services.

74. At least as of April 11, 2018, Chapco employee(s) have directed and continue to direct the production and assembly of the Gen III TrueForm Runner manual treadmill. Through Chapco's and/or Brian Weinstein's direction and control, the Gen III TrueForm Runner manual treadmill is assembled or made.

75. At least as of April 11, 2018, Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, leased by Samsara, have assembled or made and continue to assemble or make the Gen III TrueForm Runner manual treadmill from the components, parts, and assemblies that are either made or sourced by Chapco. Internal Samsara documentation, including the "Timed Build" document that Chapco employees use to assemble a TrueForm Runner, depicts a Chapco employee assembling the Gen III TrueForm Runner manual treadmill.

76. At least as of April 11, 2018, through the "leasing" arrangement of Chapco's employees to complete assembly of the Gen III TrueForm Runner manual treadmill, Chapco and Samsara contract with each other to perform all steps of claim 25 of the '580 patent.

77. At least as of April 11, 2018, through the relationship with the Chapco engineering department and its role in the development, design, engineering, testing, and implementation of the modifications to the Gen II TrueForm Runner manual treadmill to create the Gen III TrueForm Runner manual treadmill as well as the Chapco engineering department's responsibility for specifying the components, parts, and assemblies required for the Gen III TrueForm Runner manual treadmill and manufacturing and sourcing of those same components, part, and assemblies, Chapco establishes the manner and timing of the performance of all steps of claim 25 of the '580 patent.

78. At least as of April 11, 2018, Chapco has the right and ability to stop and/or limit the infringement at least by ceasing to lease its employees to Samsara, ceasing the engineering department's activities regarding the Gen III TrueForm Runner manual treadmill, and/or denying Samsara access to the know-how relating to the assembly of the Gen III TrueForm Runner manual treadmill.

79. At least as of April 11, 2018, Samsara acts as Chapco's agent in the assembly and sale of the Gen III TrueForm Runner manual treadmill.

80. At least as of April 11, 2018, Chapco and Samsara, whose actions are attributable as a single entity either through Chapco's direction and control of Samsara, or through Samsara acting as Chapco's agent, assembled or made and continue to assemble or make the Gen III TrueForm Runner manual treadmill, which meets each and every claim limitation of claim 25 of the '580 patent.

81. At least as of April 11, 2018, Chapco and Samsara, through a joint enterprise, assembled or made and continue to assemble or make the Gen III TrueForm Runner manual treadmill, which meets each and every claim limitation of claim 25 of the '580 patent.

82. At least as of April 11, 2018, Chapco and Samsara have at least an implied contract to form a joint enterprise for the purposes of manufacture, assembly, and sale of the Gen III TrueForm Runner manual treadmill.

83. At least as of April 11, 2018, Samsara's past debts to Chapco, as well as Brian Weinstein's controlling financial interest in both companies, demonstrate a community of pecuniary interest in the joint enterprise.

84. At least as of April 11, 2018, to the extent Samsara's actions are not attributable to Chapco, the companies had an equal right to a voice in the direction of the joint enterprise

through their respective roles in the manufacture, assembly, and sale of the Gen III TrueForm Runner manual treadmill, or alternatively, Brian Weinstein's domination of both Chapco and Samsara make their votes one-in-the-same, and thus equal.

85. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Chapco and Samsara of their infringement of the '580 patent by April 13, 2018.

86. Chapco's and Samsara's infringement of the '580 patent has been and continues to be willful and deliberate.

87. Chapco's and Samsara's conduct has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Chapco and Samsara are enjoined from infringing the '580 patent.

COUNT III

INFRINGEMENT OF U.S. DESIGN PATENT NO. D736,866 – CLAIM 1

88. Woodway repeats and realleges each and every allegation contained in Paragraphs 1-87, inclusive, as though fully set forth herein.

89. Woodway is the assignee and owner of United States Design Patent No. D736,866 ("the '866 patent") and the designs covered therein.

90. The '866 patent, entitled "Treadmill," was duly and legally issued by the PTO on August 18, 2015. A true and correct copy of the '866 patent is attached hereto as Exhibit B.

91. The '866 patent is valid and enforceable.

Chapco Infringes Claim 1

92. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as early as August 18, 2015, Chapco made and continues to make in this District and elsewhere in the United States certain manual treadmills, including, but not limited to, the Gen II and Gen III TrueForm Runner manual treadmills, that infringe claim 1 of the '866 patent.

93. At least as early as August 18, 2015, Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, have assembled or made and continue to assemble or make the Gen II and Gen III TrueForm Runner manual treadmills, which meet each and every claim limitation of claim 1 of the '866 patent.

94. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Chapco of its infringement of the '866 patent.

95. Chapco's infringement of the '866 patent has been and continues to be willful and deliberate.

96. Chapco's conduct has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Chapco is enjoined from infringing the '866 patent.

Samsara Infringes Claim 1

97. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as early as August 18, 2015, Samsara made, sold, and offered for sale and continues to make, sell, and offer for sale in this District and elsewhere in the United States

certain manual treadmills, including, but not limited to, the Gen II and Gen III TrueForm Runner manual treadmill, that infringe claim 1 of the '866 patent.

98. At least as early as August 18, 2015, Samsara, without any employees of its own, used and continues to use Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, to assemble or make the Gen II and Gen III TrueForm Runner manual treadmill, which meet each and every claim limitation of claim 1 of the '866 patent.

99. At least as early as August 18, 2015, Samsara has offered for sale and sold and continues to offer for sale and sell the Gen II and Gen III TrueForm Runner manual treadmills, which meet each and every claim limitation of claim 1 of the '866 patent.

100. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Samsara of its infringement of the '866 patent by August 18, 2015.

101. Samsara's infringement of the '866 patent has been and continues to be willful and deliberate.

102. Samsara's conduct has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Samsara is enjoined from infringing the '866 patent.

Chapco And Samsara Are Alter Egos Of Each Other And/Or Brian Weinstein And Infringe Claim 1

103. Without permission or authorization from Woodway and in violation of 35 U.S.C. § 271(a), at least as early as August 18, 2015, Chapco and Samsara as the alter-egos of each other and/or Chapco and/or Samsara as the alter-egos of Brian Weinstein made and continue to make in this District and elsewhere in the United States certain manual treadmills, including, but

not limited to, the Gen II and Gen III TrueForm Runner manual treadmills, that infringe claim 1 of the '866 patent.

104. At least as early as August 18, 2015, Chapco employee(s), including at least Jeremiah Rabe, have provided and continue to provide product development, design, engineering, testing, quality control, and repair services related to the Gen II and Gen III TrueForm Runner manual treadmills.

105. For example, with respect to the Gen II TrueForm Runner manual treadmill, Chapco employee(s) developed, engineered, tested, and implemented the location change for the safety device from the rear shaft in the Gen I TrueForm Runner manual treadmill to the front shaft in the Gen II TrueForm Runner manual treadmill. Brian Weinstein, President of Chapco, directed the Chapco employees to modify the location of the safety device, providing instruction that the safety device must be moved from the rear shaft in the Gen I TrueForm Runner manual treadmill to the front shaft, thus creating the Gen II TrueForm Runner manual treadmill.

106. As another example, with respect to the Gen III TrueForm Runner manual treadmill, Chapco employee(s) had responsibility for the development, design, engineering, testing, and implementation of the modifications to the wheel locations and the rear shaft attachment to the treadmill frame in the Gen II TrueForm Runner manual treadmill. Brian Weinstein, President of Chapco, directed the Chapco employees to make these modifications, thus creating the Gen III TrueForm Runner manual treadmill.

107. At least as early as August 18, 2015, Chapco's engineering department has specified and continues to specify the components, parts, and assemblies required for the Gen II and Gen III TrueForm Runner manual treadmills.

108. At least as early as August 18, 2015, Chapco manufactured and continues to manufacture components, parts, and assemblies for use in the Gen II and Gen III TrueForm Runner manual treadmills.

109. At least as early as August 18, 2015, Chapco employee, Gerardo Aristi, has identified suppliers and priced and sourced and continues to identify suppliers and to price and source those components, parts, and assemblies that Chapco does not manufacture for use in the Gen II and Gen III TrueForm Runner manual treadmills. Chapco does not charge any price mark-up for the components, parts, and assemblies that it sources for the Gen II and Gen III TrueForm Runner manual treadmills. Samsara provides no compensation to Chapco for these services.

110. At least as early as August 18, 2015, Chapco employee, Gerardo Aristi, has maintained and continues to maintain business records reflecting Chapco's purchase and costing of components, parts, and assemblies for use in the Gen II and Gen III TrueForm Runner manual treadmills on behalf of Samsara. Mr. Aristi has received no compensation from Samsara for his services.

111. At least as early as August 18, 2015, Chapco employee(s) have directed and continue to direct the production and assembly of the Gen II and Gen III TrueForm Runner manual treadmills.

112. At least as early as August 18, 2015, Chapco employees, including at least Evielo, Mbarissa, Rafa, and Ventura, leased by Samsara, have assembled or made and continue to assemble or make the Gen II and Gen III TrueForm Runner manual treadmills from the components, parts, and assemblies that are either made or sourced by Chapco. Internal Samsara documentation, including the "Timed Build" document that Chapco employees use to assemble a

TrueForm Runner, depicts a Chapco employee assembling the Gen II and Gen III TrueForm Runner manual treadmills.

113. At least as early as August 18, 2015, Samsara is merely the instrumentality of Chapco and/or Chapco and Samsara have such a unity of interest and ownership that their independence from each other never began with respect to the Gen II and Gen III TrueForm Runner manual treadmills.

114. At least as early as August 18, 2015, Chapco has complete domination, not only of the finances of Samsara, but of Samsara's policies and business practices regarding the Gen II and Gen III TrueForm Runner manual treadmills and the assembly and manufacture of the same in violation of Woodway's patent rights.

115. At least as early as August 18, 2015, Brian Weinstein was and continues to be the President of Chapco and the managing member of Samsara. Mr. Weinstein controls Chapco and Samsara and has complete domination, not only of the finances of Chapco and Samsara, but of each entities' policies and business practices regarding the Gen II and Gen III TrueForm Runner manual treadmills and the assembly and manufacture of the same in violation of Woodway's patent rights.

116. At least as early as August 18, 2015, Brian Weinstein owned and continues to own 100 percent of the common shares and 60 percent of the preferred shares of Chapco.

117. At least as early as August 18, 2015, Chapco had and continues to have no directors.

118. At least as early as August 18, 2015, Chapco's officers were and continue to be Brian Weinstein's parents, Robert and Roslyn Weinstein.

119. At least as early as August 18, 2015, Chapco has not held any annual meetings.

120. At least as early as August 18, 2015, Brian Weinstein has personally guaranteed debts of both Chapco and Samsara.

121. At least as early as August 18, 2015, Brian Weinstein uses his "Chapco" email account to conduct business, including Samsara business related to the Gen II and Gen III TrueForm Runner manual treadmills.

122. Prior to the initiation of this litigation, Chapco and Samsara were co-located in the same office space, which is owned by Robert Weinstein. By August 18, 2015, Samsara relocated to a Chapco-owned property.

123. At least as early as August 18, 2015, Chapco employee, Sandra Smith, had and continues to have overlapping responsibilities for accounts payable and accounts receivable for Chapco and Samsara. Ms. Smith has received no compensation from Samsara for her services.

124. At least as early as August 18, 2015, Chapco advertised and continues to advertise the Gen II TrueForm Runner treadmill on a Chapco truck with the Chapco logo.

125. At least as early as August 18, 2015, Chapco permitted and continues to permit Samsara to use the Chapco Ford Excursion for deliveries of the Gen II and Gen III TrueForm Runner manual treadmills.

126. Chapco and Samsara use the same accountant for the purposes of filing taxes.

127. At least as early as August 18, 2015, Samsara had and continues to have no directors.

128. At least as early as August 18, 2015, Samsara had and continues to have no officers.

129. At least as early as August 18, 2015, Samsara had and continues to have no employees.

130. At least as early as August 18, 2015, Samsara has not held any annual meetings.

131. Since at least August 18, 2015, Samsara has been inadequately capitalized. For example, Samsara had a year-to-date loss of approximately $340,000 as of December 2016. (*See* Dkt. No. 144 at 12.)

132. As of September 2017, Samsara owed Chapco approximately $800,000 with no payment plan in place. (*See id.*)

133. At least as early as August 18, 2015, due to the unity of interest in the enterprise, ownership, and level of control exercised by Chapco and/or Brian Weinstein over Samsara, Chapco and Samsara as the alter-egos of each other and/or Chapco and/or Samsara as the alter-egos of Brian Weinstein have assembled or made and continue to assemble or make the Gen II and Gen III TrueForm Runner manual treadmills, which meet each and every claim limitation of claim 1 of the '866 patent.

134. To the extent that any marking or notice was required by 35 U.S.C. § 287, Woodway has complied with the requirements of that statute by providing actual and/or constructive notice to Chapco and Samsara of the '866 patent by August 18, 2015.

135. The infringement of the '866 patent by Chapco and Samsara as the alter-egos of each other and/or by Chapco and/or Samsara as the alter-egos of Brian Weinstein has been and continues to be willful and deliberate.

136. The conduct by Chapco and Samsara as the alter-egos of each other and/or by Chapco and/or Samsara as the alter-egos of Brian Weinstein has caused and will continue to cause Woodway substantial damage, including irreparable harm, for which Woodway has no adequate remedy at law, unless and until Chapco and Samsara are enjoined from infringing the '866 patent.

COUNT IV

VIOLATION OF THE COPYRIGHT ACT, 17 U.S.C. § 501, *et seq.*

137. Woodway repeats and realleges each and every allegation contained in Paragraphs 1-136, inclusive, as though fully set forth herein.

138. For more than 25 years, Woodway has been designing, developing, manufacturing, and selling fitness and exercise products, including motorized and non-motorized treadmills. With respect to certain of its non-motorized treadmills, Woodway has developed, written, and published Owner's Manuals for each of its curved, manual treadmills since at least 2009.

139. Attached as Exhibit C is a true and correct copy of a Woodway Owner's Manual - CURVE Owner's Manual Rev 080409 - that was first published on August 4, 2009, in the United States. This manual is an original work of authorship and copyrightable subject matter under the laws of the United States, 17 U.S.C. § 101, *et seq*. Woodway filed for and secured a Certificate of Registration from the U.S. Copyright Office for this manual. A true and correct copy of Registration No. TX 8-291-083, which has an effective date of registration of January 23, 2017, is attached as Exhibit CC, and incorporated herein by reference. Woodway is the legal and beneficial owner of this Registration.

140. Attached as Exhibit D is a true and correct copy of a Woodway Owner's Manual - CURVE Owner's Manual REV 7-12-10 - that was first published on July 12, 2010, in the United States. This manual is an original work of authorship and copyrightable subject matter under the laws of the United States, 17 U.S.C. § 101, *et seq*. Woodway filed for and secured a Certificate of Registration from the U.S. Copyright Office for this manual. A true and correct copy of Registration No. TX 8-283-635, which has an effective date of registration of January 3, 2017, is

attached as Exhibit DD, and incorporated herein by reference. Woodway is the legal and beneficial owner of this Registration.

141. Woodway is informed and believes that Chapco and Samsara had access to and obtained versions of the Woodway copyrighted Owner's Manuals and derived the TrueForm Runner Manual from Woodway's Manuals. A true and correct copy of the offending published TrueForm Runner Manual is attached hereto as Exhibit E and is incorporated herein by reference. Representative charts showing each and every instance of Chapco's and Samsara's copying of Woodway's copyrighted material are attached as Exhibits F-G and are incorporated herein by reference.

142. Woodway is informed and believes that Chapco and Samsara have distributed the derived TrueForm Runner Manual with each TrueForm Runner treadmill. Without Woodway's authorization, Chapco and Samsara have provided the TrueForm Runner Manual with each TrueForm Runner treadmill that Chapco and Samsara made, sold, offered for sale, and used.

143. Chapco's and Samsara's use, copying, and/or sale of Woodway's copyrighted Owner's Manuals constitute direct violations of the exclusive reproduction and distribution rights conferred on Woodway by 17 U.S.C. § 106, and thus constitute infringement of Woodway's copyrights under 17 U.S.C. § 501(a).

144. Woodway has been and continues to be irreparably damaged by Chapco's and Samsara's acts of infringement and is entitled to a preliminary and permanent injunction under 17 U.S.C. § 502.

PRAYER FOR RELIEF

Wherefore, Woodway respectfully prays for entry of a judgment:

A. That Chapco and Samsara have infringed the '580 and '866 patents;

B. That Chapco and Samsara and their respective agents, servants, officers, directors, employees and all persons in privity or active concert or participation with them, directly or indirectly, be preliminarily and permanently enjoined from infringing the '580 and '866 patents;

C. That Chapco and Samsara are the alter egos of each other;

D. That Brian Weinstein is the alter ego of Chapco and/or Samsara with regards to the Gen II and Gen III TrueForm Runner manual treadmills;

E. That Chapco and Samsara be ordered to account for and pay to Woodway damages adequate to compensate for their infringement of the'580 and '866 patents, including lost profits and/or reasonable royalty, together with prejudgment and postjudgment interest in accordance with 35 U.S.C. § 284 and 28 U.S.C. § 1961;

F. That a post-judgment equitable accounting of damages be ordered for the period of infringement of the'580 and '866 patents following the period of damages established by Woodway at trial;

G. For an award of Chapco's and Samsara's total profits in an amount subject to proof at trial, pursuant to 35 U.S.C. § 289;

H. That damages be trebled for the willful, deliberate, and intentional infringement by Chapco and Samsara as alleged herein in accordance with 35 U.S.C. § 284;

I. That this case be adjudged an exceptional case under 35 U.S.C. § 285 and that Woodway be awarded its costs, expenses, and disbursements incurred in this action, including reasonable attorneys' fees as available by law to be paid by Chapco and Samsara;

J. That the TrueForm Runner Manual is a derivative work of each of Woodway's Owner's Manuals;

K. That Chapco and Samsara have infringed Woodway's Copyright Registrations: TX 8-291-083 and TX 8-283-635;

L. That Chapco and Samsara and their respective agents, servants, officers, directors, employees and all persons in privity or active concert or participation with them, directly or indirectly, be preliminarily and permanently enjoined from infringing, inducing others to infringe, or contributing to the infringement of the Woodway's Copyright Registrations: TX 8-291-083 and TX 8-283-635; and

M. For such other relief to Woodway as this Court deems just and proper.

DEMAND FOR JURY TRIAL

Woodway demands a trial by jury on all issues so triable.

Dated: September 14, 2018

WOODWAY USA, INC.
By its Attorneys,

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CERTIFICATE OF SERVICE

I hereby certify that on September 14, 2018, a copy of the foregoing was filed electronically and served by mail on anyone unable to accept electronic filing. Notice of this filing will be sent by e-mail to all parties by operation of the Court's electronic filing system or by mail to anyone unable to accept electronic filing as indicated on the Notice of Electronic Filing. Parties may access this filing through the Court's CM/ECF System.

/s/ Matthew W. Peters
Matthew W. Peters, phv09498

UNITED STATES DISTRICT COURT
DISTRICT OF CONNECTICUT

CHAPCO, INC. AND SAMSARA FITNESS, LLC, Plaintiffs, v. WOODWAY USA, INC., Defendant.	Civil Action No. 3-15-CV-1665(JCH) May 7, 2018

PLAINTIFFS' MOTION FOR PARTIAL RECONSIDERATION

Plaintiffs Chapco, Inc. and Samsara Fitness, LLC ("Plaintiffs") request that the Court reconsider a portion of its September 26, 2017 Order on the parties' Motions For Summary Judgment, Woodway's Motion To Strike Portions of the Opening Expert Report of Dr. Robert Giachetti, and Woodway's Motion to Strike Portions of the Declaration Of Robert Giachetti (Dkt. No. 144) (the "Order") because there has been a change in the facts and procedural posture of this case that Plaintiffs respectfully suggest warrant reconsideration.

Specifically, Plaintiffs request the Court reconsider that portion of the Order that did not consider the Schmidt reference at summary judgment (Dkt. No. 144, at 29) and, further, request reconsideration of that portion of the Order that granted Woodway Summary Judgment on Obviousness "to the extent that plaintiffs allege a theory of obviousness based on the combinations of Schmidt and Chickering, Schmidt and Magid, or Schmidt and Ziebell" (Dkt. No. 144, at 39). Plaintiffs are not asking that the Court re-start the prior summary judgment proceedings; instead, Plaintiffs request that Plaintiffs and their expert, Dr. Robert Giachetti, be permitted to offer theories of obviousness that include Schmidt as part of the combination going forward in this case, either in the context of the summary judgment proceedings on the Gen III

TrueForm Runner and/or at trial.

As grounds for this Motion, Plaintiffs rely on the supporting Memorandum of Law filed concurrently herewith.

CHAPCO, INC. and SAMSARA FITNESS, LLC
By Their Attorneys,

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Dated: May 7, 2018

CERTIFICATION OF SERVICE

I hereby certify that on May 7, 2018, the foregoing document was filed through the ECF system and will be sent electronically to the registered participants identified on the Notice of Electronic Filing.

/s/ Christine K. Bush

UNITED STATES DISTRICT COURT
DISTRICT OF CONNECTICUT

CHAPCO, INC. AND SAMSARA FITNESS, LLC,

Plaintiffs,

v.

WOODWAY USA, INC.,

Defendant.

Civil Action No. 3-15-CV-1665(JCH)

May 7, 2018

PLAINTIFFS' MEMORANDUM OF LAW
IN SUPPORT OF THEIR MOTION FOR PARTIAL RECONSIDERATION

Trial is now set for mid-October. The second round of summary judgment begins June 8, 2018. Woodway USA, Inc. ("Woodway") was permitted to serve two supplemental expert reports relating to the Air Runner, despite months of delay in disclosing those opinions or seeking that relief.[1] The procedural posture, trial schedule and substance of this case have changed since the Court issued its Order[2] following the parties' Motions for Summary Judgment and Woodway's Motion to Strike Portions of the Opening Report of Dr. Robert Giachetti[3] and Woodway's Motion to Strike the Declaration of Dr. Robert Giachetti. Based on those changes, principles of parity, and the importance of Plaintiffs' invalidity positions to their case, Plaintiffs respectfully request that the Court reconsider its Order and permit Plaintiffs and their expert, Dr. Robert Giachetti, to offer invalidity theories that include Schmidt[4] going forward in this case, either in the context of the summary judgment proceedings on the Gen III TrueForm Runner and/or at trial.

[1] Dkt. No. 246, referencing grant of Dkt. No. 184.
[2] Dkt. No. 144.
[3] Hereinafter, "Motion to Strike," Dkt. Nos. 89, 91.
[4] U.S. Patent No. 1,211,765 ("Schmidt").