

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIFECORE FITNESS, INC.
d/b/a ASSAULT FITNESS
Petitioner,

v.

WOODWAY USA, INC.
Patent Owner.

U.S. Patent No. 11,465,005 to Bayerlein et al.

Case No.: IPR2024-00083

DECLARATION OF ROBERT GIACHETTI, Ph.D.

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List of Exhibits

Exhibit #	Description
1001	U.S. Patent No. 11,465,005 (“the ‘005 Patent”)
1002	U.S. Patent No. 11,465,005 File History (“the ‘005 Patent File History”)
1003	Declaration of Robert Giachetti, Ph.D. P.E. (“Giachetti”)
1004	Robert Giachetti, Ph.D. P.E. Curriculum Vitae (“Giachetti CV”)
1005	Complaint, <i>Woodway USA, Inc., v. LifeCORE Fitness, Inc. d/b/a Assault Fitness</i> , Case No. 3:22-cv-00492-JO-BLM, Southern District of California, Filed April 11, 2022 (“Complaint”) (Ex. 1005 at 1-8)
1006	Amended Complaint, <i>Woodway USA, Inc., v. LifeCORE Fitness, Inc. d/b/a Assault Fitness</i> , Case No. 3:22-cv-00492-JO-BLM, Southern District of California, Filed October 24, 2022 (“Amended Complaint”)
1007	Treadmills: Supplier Guide © 2010. Trade Practices (Consumer Product Safety Standard) (Treadmills) Regulations 2009 (“ACCC Product Safety Supplier Guide”)
1008	U.S. Patent No. 641,424 to Ziebell (“Ziebell”)
1009	U.S. Patent No. 1,211,765 to Schmidt (“Schmidt”)
1010	U.S. Patent No. 4,614,337 to Schonenberger (“Schoenenberger”)
1011	U.S. Patent No. 5,897,461 to Socwell (“Socwell”)
1012	U.S. Patent No. 5,538,489 to Magid (“Magid”)
1013	U.S. Patent No. 3,637,206 to Chickering (“Chickering”)
1014	U.S. Patent No. 3,642,279 to Cutter (“Cutter”)
1015	U.S. Patent No. 6,042,514 to Abelbeck (“Abelbeck”)
1016	Power Transmission Handbook, (Power Transmission Distributors Association 1993) (“PT Handbook”) (available at https://cod.on.worldcat.org/oclc/49571648)
1017	Neil Sclater and Nicholas P. Chironis, Mechanisms & Mechanical Devices Sourcebook, Third Ed., (McGraw-Hill 2001) (“Sclater”) (available at https://catalog.loc.gov/vwebv/holdingsInfo?searchId=26&recCount=25&recPointer=0&bibId=12308523)
1018	Mechanical Clutches and Torque Overload Devices, (Emerson Industrial Automation, 2001) (“Emerson”)
1019	Standard Specification for Motorized Treadmills, (ASTM, 2005) (“ASTM Standard”)

Exhibit #	Description
1020	Stationary Training Equipment – Part 6: Treadmills, additional specific safety requirements and test methods. (ISO, 2005) (“ISO Standard”)
1021	U.S. Patent No. 8,986,169 File History (“the ‘169 Patent File History”)
1022	Responsive Claim Constructions, <i>Woodway USA, Inc., v. LifeCORE Fitness, Inc. d/b/a Assault Fitness</i> , Case No. 3:22-cv-00492-JO-BLM, Southern District of California, Filed January 5, 2022
1023	United States District Courts – National Judicial Caseload Profile, December 2022
1024	Inhabitat, “HUMAN-POWERED GYMS in Hong Kong” (March 8, 2007) (available at https://inhabitat.com/human-powered-gyms-in-hong-kong/)
1025	Minute Order, <i>Woodway USA, Inc., v. LifeCORE Fitness, Inc. d/b/a Assault Fitness</i> , Case No. 3:22-cv-00492-JO-BLM, Southern District of California, March 30, 2023.
1026	U.S. Patent No. 10,561,884 File History (“the ‘884 File History”)
1027	Claim Construction Brief, <i>Woodway USA, Inc., v. LifeCORE Fitness, Inc. d/b/a Assault Fitness</i> , Case No. 3:22-cv-00492-JO-BLM, Southern District of California, March 1, 2023
1028	Responsive Claim Construction Brief, <i>Woodway USA, Inc., v. LifeCORE Fitness, Inc. d/b/a Assault Fitness</i> , Case No. 3:22-cv-00492-JO-BLM, Southern District of California, March 14, 2023
1029	U.S. Patent No. 4,635,771 to Shoji (“Shoji”)
1030	Intentionally left blank
1031	English Translation of German Patent DE 199 22 822 B4 to Tollkien (“Tollkien”)
1032	U.S. Provisional Patent Application No. 61/161027 File History

I, Robert Giachetti, Ph.D., P.E., hereby declare as follows:

1. I am making this declaration at the request of LifeCORE Fitness, Inc. (“LifeCORE”) in the matter of *Inter Partes* Review of U.S. Patent No. 11,465,005 (“the ’005 Patent”) to Bayerlein et al.

2. In preparation of this declaration, I have studied the exhibits as listed in the Exhibit List shown above in my report.

3. In forming the opinions expressed below, I have considered:

- a. The documents listed above as well as additional patents and documents referenced herein;
- b. The relevant legal standards, including the standard for obviousness provided in *KSR International Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007), and any additional documents cited in the body of this declaration; and
- c. My knowledge and experience based upon my work and study in this area as described below.

I. Qualifications and Professional Experience

4. I am a Licensed Professional Engineer in Illinois and Oklahoma, with over 20 years of experience in Mechanical Engineering. My experience in machinery and mechanisms spans numerous industries; I have worked directly designing mechanical systems and machinery, and I have consulted on the

operation of machinery in various fields including consumer products, rail, linear motion systems, conveyor systems, gear systems, wire rope, and exercise equipment.

5. I am employed by Fusion Engineering, LLC, where I have worked since November of 2020. Fusion is an engineering firm that provides multidisciplinary engineering consulting services.

6. I am currently the Director of Mechanical Engineering at Fusion and I am a Licensed Professional Engineer in Illinois and Oklahoma. In this role, I am responsible for providing engineering consulting services in Mechanical and Biomechanical engineering, coordinating client outreach, coordinating marketing materials, and recruiting.

7. Prior to joining Fusion as the Director of Mechanical Engineering I was a Senior Managing Engineer at Exponent, Inc., where I had been employed since 2008. In my positions there I worked on Biomechanical and Mechanical Engineering projects that frequently related to consumer product design, machinery design, product and machinery performance, and human interaction with consumer products or industrial equipment. In these roles I performed experimental studies where I built custom test fixtures that were comprised of typical mechanical power transmission components (e.g., linear actuators, belts, gears, conveyors, springs, bearings, etc.), measured forces and movements

generated by humans, and I was involved in several consulting matters that specifically involved exercise equipment.

8. I am currently a Member of ASTM and ASME where I sit on a number of committees, including ASTM's F15 Consumer Product Committee and ASTM's F08 Sports Equipment, Playing Surfaces, and Facilities Committee, that oversees treadmills. I have been an active participant in both of these committees.

9. I hold a Bachelor's, Master's and Ph.D. degree in Mechanical engineering. I have Minors in Physics as an undergraduate and Mechanics and Aeronautics as a graduate student. I have taught courses in Physics, Mechanical Engineering, and Biomechanics across three universities. My research in graduate school focused on two areas: 1) forces within the knee joint during daily activities, and 2) human balance and the coordination of limb musculature during walking, standing, running, etc.

10. As part of my work in human balance I was employed in the University of Wisconsin-Madison's Biomechanics laboratory in the Department of Kinesiology where I was also a teaching assistant in Biomechanics. While there, my research responsibilities included designing, developing and constructing equipment used to harness participants in efforts to analyze and characterize their lower limb force capabilities during every-day balancing and locomotive tasks. These research responsibilities also involved the use and disassembly of treadmills

to characterize force and balance capabilities of participants. As part of these research responsibilities, I reviewed studies focused on using treadmills and similar devices as rehabilitation devices (e.g. the “Locomat”). During this time, I also assisted in the preliminary development of a force measuring treadmill intended to dissociate the foot forces used in walking from the requirements imposed by upright posture.

11. Prior to attending graduate school, I worked as a project engineer, designing industrial machinery at Braner USA. In this position, I selected mechanical power transmission components, such as bearings and bearing plates in the design of machinery that uncoils sheet metal, conveys it, tensions it, processes it, recoils it and then deposits the coil into a coil car which transports the processed coil away. Prior to Braner USA I worked as an estimator and designer at Alloy Sling Chain, IND. LTD where I designed non-standard items as well as quoted new orders and repairs for lifting equipment.

12. I have been recognized as an expert in mechanical power transmission equipment and serve on the American Society of Mechanical Engineers (ASME) Power Transmission and Gearing Committee. I have also participated, by invitation, in the National Council of Examiners for Engineering and Surveying (NCEES) Mechanical Professional Activities and Knowledge Studies (PAKS) committee. This committee reviews and evaluates the problems and problem types

that appear on the Mechanical Engineering Professional Engineering exam for licensure as a Professional Engineer.

13. For nearly 25 years, I have been involved in the area of machine design and applications of machine design. These machines and products have ranged from children's mattresses to garden hoses, to pressure cookers, electronic tire/raft inflators, and industrial equipment including conveyors.

14. As briefly mentioned above, I have had experience using treadmills in a research environment while studying human balance and gait, and I have assisted with the preliminary design of a unique treadmill. In using treadmills for research purposes, I have disassembled them and am familiar with the common, well known and understood, mechanical power transmission components inside them.

15. In a consulting capacity I have also reviewed exercise equipment in pre-market analysis revolving around mechanical performance. These investigations included exercise equipment such as exercise bikes. In post-accident investigations, I have also reviewed exercise equipment in general on several occasions and these investigations involved many different types of exercise equipment. As part of my work in ASTM's F08 committee I also participate in the development of ASTM's standard both regarding exercise equipment in general, and in treadmills specifically.

16. I have provided my full background in the curriculum vitae that is attached as Exhibit 1004.

II. Compensation and Prior Testimony

17. Fusion engineering is being compensated for my work in this matter at a rate of \$390/hour for my time. I am a salaried employee of Fusion and my compensation in no way depends on my participation in this proceeding or the outcome of this proceeding.

18. I have previously provided expert testimony in at least three intellectual property related matters. My Curriculum Vitae identifies some of the areas in which I have previously provided expert testimony. (Giachetti CV, Ex. 1004.)

III. Materials and Information Considered

19. My findings, as explained below, are based on my years of education, research, experience, and background in the fields discussed above, as well as my investigation and study of relevant materials. In forming my opinions, I have studied and considered the materials identified in the Exhibit List shown at the beginning of my report. Each of the exhibits listed are true and accurate copies. The Exhibit List includes citations for each exhibit I have reviewed including a weblink where appropriate or applicable.

20. Additionally, I am aware of information generally available to, and relied upon by, persons of ordinary skill in the art at the relevant times, including technical dictionaries and technical reference materials (including textbooks, manuals, technical papers and articles); some of my statements below are expressly based on such awareness.

21. Due to procedural limitations for *inter partes* reviews, the grounds of unpatentability discussed herein are based solely on prior patents and other printed publications. I understand that Petitioner reserves all rights to assert other grounds for unpatentability or invalidity, not addressed herein, at a later time. Thus, the absence of discussion of such matters here should not be taken as indicating that there are no such additional grounds for unpatentability and invalidity of the ‘005 Patent.

IV. Relevant Legal Standards

A. General

22. I have been asked to provide opinions on the claims of the ‘005 Patent in light of the prior art.

23. It is my understanding that a claimed invention is unpatentable under 35 USC § 102 if a prior art reference teaches every element of the claim. Further, it is my understanding that a claimed invention is unpatentable under 35 U.S.C. § 103 if the differences between the invention and the prior art are such that the

subject matter as a whole would have been obvious at the time the alleged invention was made to a person having ordinary skill in the art to which the subject matter pertains. I also understand that an obviousness analysis takes into factual inquiries including the level of ordinary skill in the art, the scope and content of the prior art, and the differences between the prior art and the claimed subject matter.

24. It is my understanding that the Supreme Court has recognized several rationales for combining references or modifying a reference to show obviousness of the claimed subject matter. Some of these rationales include the following: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to obtain predictable results; a predictable use of prior art elements according to their established functions; applying a known technique to a known device to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

B. Priority Dates for Claimed Subject Matter

25. I understand that in order to be considered “prior art,” patents or printed publications must predate the pertinent priority dates for the subject matter claimed in the ‘005 Patent.

26. I have been informed that a patent is only entitled to a priority date based on an earlier filed application if the earlier filed application meets the requirements of 35 U.S.C. §112. Specifically, I have been informed that 35 U.S.C. § 112, ¶1 requires that the specification of a patent or patent application must “contain a written description of the invention, and the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the [invention]” I understand that the requirements of this provision are commonly called the written description requirement and the enablement requirement.

27. I have been informed that compliance with both the written description requirement and enablement requirement must be determined as of the effective filing date of the application for which priority is sought.

28. I have been informed that to satisfy the written description requirement a patent’s specification should reasonably convey to a person of skill

in the art that the inventor had possession of the claimed invention as of the effective filing date of the application.

C. Claim Construction Standard

29. In order to properly evaluate these claims, I understand that the terms of the claims must first be construed.

30. I understand that in this proceeding, the claims are construed consistent with the specification and using the same construction as that used in litigation. I have been informed that the claims, after being construed in this manner, are then to be compared to the information in the prior art, which for this proceeding is limited to patents and printed publications. I also understand that, at the same time, absent some reason to the contrary, claim terms are typically given their ordinary and accustomed meaning as would be understood by one of ordinary skill in the art.

31. I understand that a claim that includes functional language without sufficient structural limitations may be construed as a “means for” or “means plus” claim. Such a claim may be interpreted as requiring structural limitations disclosed in the specification.

32. I also understand that a means for / means plus claim may or may not include the term “means.”

D. Anticipation

33. I understand that the following standards govern the determination of whether a patent claim is “anticipated” by the prior art.

34. I understand that, for a patent to be “anticipated” by the prior art, each and every limitation of the claim must be found, expressly, implicitly or inherently, in a single prior art reference. I further understand that the requirement of strict identity between the claim and the reference is not met if a single element or limitation required by the claim is missing from the applied reference.

35. I understand that claim limitations that are not expressly described in a prior art reference may still be there if they are implicit or inherent to the thing or process being described in the prior art. I have been informed that to establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference and that it would be so recognized by persons of ordinary skill in the art. I have been informed that inherency cannot be established just because a certain thing may result from a given set of circumstances.

36. I understand that it is acceptable to consider evidence other than the information in a particular prior art document to determine if a feature is necessarily present in or inherently described by that reference.

E. Obviousness

37. I understand that for a single reference or a combination of references to render obvious a claimed invention, a POSA must have been able to arrive at the claimed invention by altering or combining the applied references.

38. I have been informed that a patent claim can be found unpatentable as obvious where the differences between the subject matter taught 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 of ordinary skill in the relevant field. Specifically, I understand that the obviousness question involves a consideration of:

- a) the scope and content of the prior art;
- b) the differences between the prior art and the claims at issue;
- c) the knowledge of a person of ordinary skill in the pertinent art; and
- d) whatever objective factors indicating obviousness or non-obviousness may be present in any particular case – referred to as “secondary considerations.”

39. I have been informed that such secondary considerations include: (a) commercial success of a product due to the merits of the claimed invention; (b) a long-felt, but unmet need for the invention; (c) failure of others to find the solution provided by the claimed invention; (d) deliberate copying of the invention by

others; (e) unexpected results achieved by the invention; (f) praise of the invention by others skilled in the art; (g) the taking of licenses under the patent by others and (h) the patentee proceeded contrary to the accepted wisdom of the prior art. I understand that secondary considerations are relevant where there is a connection, or nexus, between the evidence and the claimed invention.

40. In addition, I understand that the obviousness inquiry should not be done in hindsight, but must be done using the perspective of a person of ordinary skill in the relevant art as of the effective filing date of the patent claim.

41. I understand that in order for a claimed invention to be considered obvious, there must be some rationale for combining cited references as proposed.

42. I understand that obviousness may also be shown by demonstrating that it would have been obvious to modify what is taught in a single piece of prior art to create the patented invention. I understand that obviousness may be shown by establishing that it would have been obvious to combine the teachings of more than one item of prior art. In determining whether a piece of prior art could have been combined with other prior art or with other information within the knowledge of one of ordinary skill in the art, I have been informed the following are examples of approaches and rationales that may be considered:

- a) Combining prior art elements according to known methods to yield predictable results;

- b) Simple substitution of one known element for another to obtain predictable results;
- c) Use of a known technique to improve similar devices (methods, or products) in the same way;
- d) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;
- e) Applying a technique or approach that would have been “obvious to try” (i.e., choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success);
- f) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art; or
- g) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. I also understand that this suggestion or motivation may come from such sources as explicit statements in the prior art, or from the knowledge or common sense of one of ordinary skill in the art.

43. I understand that an invention that might be considered an obvious variation or modification of the prior art may be considered non-obvious if one or more prior art references discourages or lead away from the line of inquiry disclosed in the reference(s). I understand a reference does not “teach away” from an invention simply because the reference suggests that another embodiment of the invention is better or preferred. My understanding of the doctrine of teaching away requires a clear indication that the combination should not be attempted (e.g., because it would not work or explicit statement saying the combination should not be made).

V. Qualifications of one of ordinary skill in the art

44. Based on my review of these materials, I believe that the relevant field for purposes of the '005 Patent includes exercise apparatuses and methods for developing or strengthening the muscles or joints of the body by working against gravity, a counterforce or countermovement, such as the field of treadmills, including manual treadmills. (*See* Ex. 1001, 1:22-24.)

45. As described in Section I above, I have extensive experience in the relevant field, including experience relating to treadmill design. Based on my experience, I have an established understanding of the relevant field.

46. I understand that a “person of ordinary skill in the art” (POSA) or a “skilled artisan” is one who is presumed to be aware of all pertinent art as of the

relevant timeframe, thinks along conventional wisdom in the art, and is a person of ordinary creativity. I understand that the level of skill in the art is evidenced by the prior art references. It is my understanding that the '005 Patent is to be interpreted based on how it would be read by a POSA. It is my understanding that factors such as the education level of those working in the field, the sophistication of the technology, the types of problems encountered in the art, the prior art solutions to those problems, and the speed at which innovations are made may help establish the level of skill in the art. I understand that a POSA is not a specific real individual, but rather is a hypothetical individual having the qualities reflected by the factors above.

47. I understand the relevant timeframe for evaluating a claim is at the time of the invention, which is based on the effective filing date of each claim, or the date at which the subject matter of the claim was first disclosed in an application in such full, clear, concise, and exact terms as to enable the person skilled in the art to make and use the claimed invention. For reasons not addressed in detail in this Declaration or the Petition it accompanies, the effective filing date of certain claims of the '005 Patent is March 16, 2010. However, I have assumed a March 17, 2009 priority date for purposes of my analysis below, as the priority date is not relevant to the specific grounds of unpatentability forming the basis of this challenge.

48. In my opinion, given the relevant field and relevant timeframe of the ‘005 Patent, a POSA would have a bachelor’s degree in mechanical engineering and at least one year of machine design experience related to power transmission equipment and a demonstrated understanding of exercise biomechanics, including anthropometry (*i.e.*, the study of human proportion).

49. Based on my experience, I have an understanding of the capabilities of a person of ordinary skill in the relevant field as of March 2009.

VI. State of the art

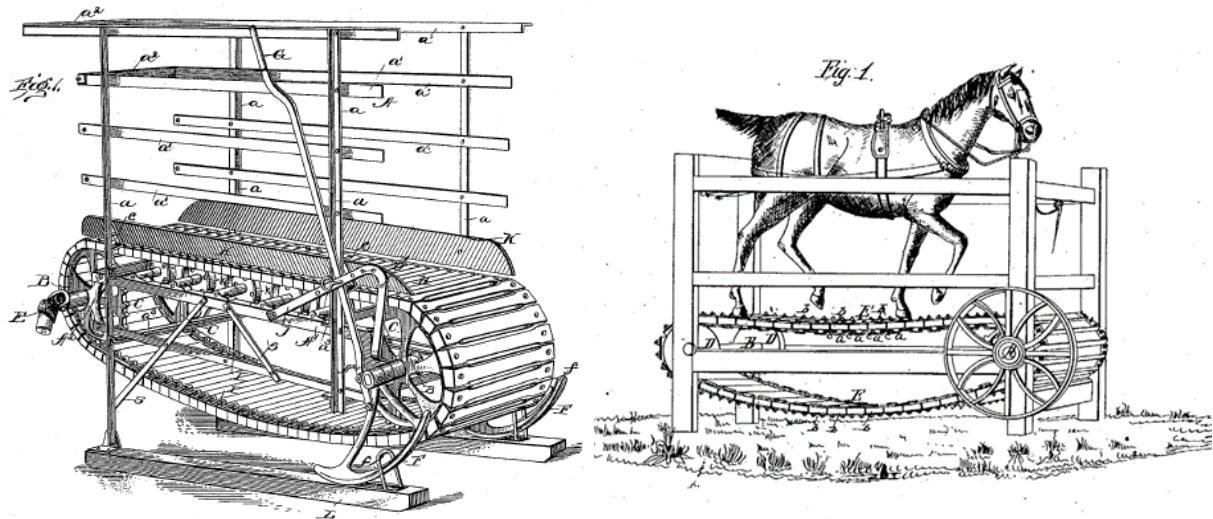
50. A treadmill is “an exercise device that consists of an endless conveyor belt that is rotated either manually or by a motor and on which a person can walk or jog in one place.” (“Treadmills: Supplier Guide” Ex. 1007 at 2.) The user moves their foot against a running surface that would propel them forward, however, in most treadmills, the running surface moves rearward at the same speed such that the user walks or runs in place. Treadmills, when viewed through the lens of a POSA, fall under two categories of broad technical skills: machine design and biomechanics. The biomechanical portion covers the anthropometry of humans, such as their size and shape, *i.e.* anthropometry. The aspect of machine design includes the knowledge of elementary machine components and how they are assembled to accomplish intended tasks, *i.e.*, power transmission.

51. A manual treadmill is generally regarded as a treadmill in which the user provides the power that moves the running surface, whereas a motorized treadmill includes a motor that propels the running surface. A treadmill may include a flat running surface or a curved running surface, which is the two-dimensional shape of the running surface when viewed from the side, irrespective of the orientation relative to level ground. Treadmills typically include one or more bearings to support the running surface. Treadmills have a number of safety concerns that are addressed by several standards bodies including The Australian Competition and Consumer Commission, ASTM International (*e.g.*, ASTM F2115), and International Organization for Standardization (*e.g.*, ISO 20957).

A. Manual vs Motorized Treadmills

52. Manual treadmills have been used for harnessing human or animal power for hundreds of years using hamster-style wheels. Treadmills resembling modern treadmills began to appear in the mid-1800s and early 1900s. For example, U.S. Patent No. 641,424 to Ziebell (Ex. 1008) issued in 1900, and U.S. Patent 8308X to Briggs¹ issued in 1834; both patents describe treadmills for harnessing animal power.

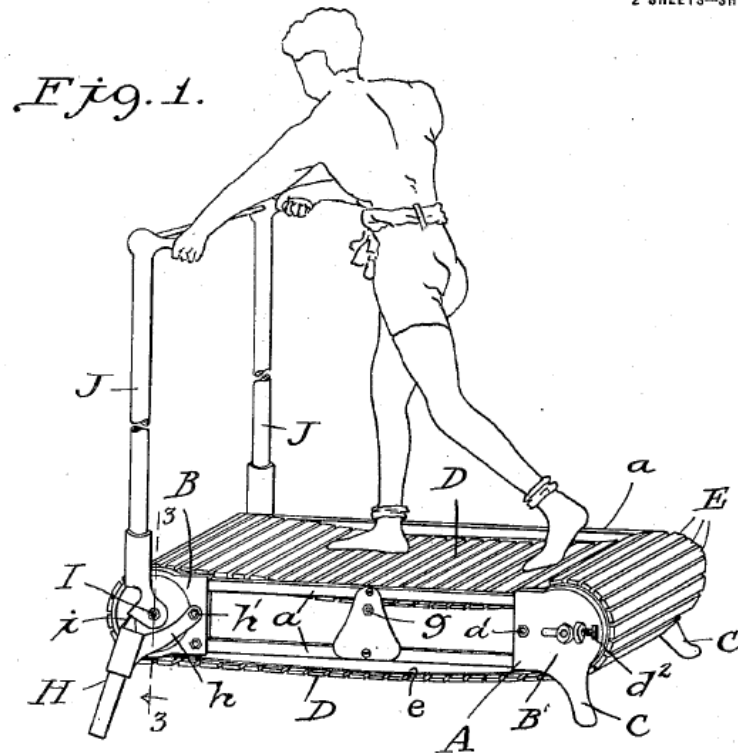
¹ Available at <https://catalog.archives.gov/id/178329130>.



Ziebell, Ex. 1008, Fig. 1 (Left); Briggs, Fig. 1 (Right)

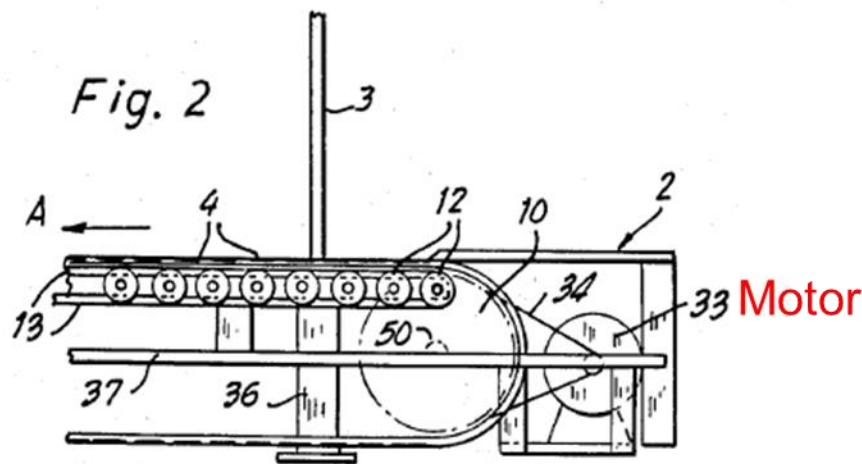
53. Manual treadmills for exercise purposes emerged in the early 1900's, before electrical power and electrical motors were widely available to consumers. For example, U.S. Patent No. 1,211,765 to A.P. Schmidt issued January 9, 1917, and describes a "Health Exerciser." (Ex. 1009.)

2 SHEETS--SHEE



Schmidt, Ex. 1009, Fig. 1

54. By the late 1900's inexpensive and lightweight polymeric belts were widely available, electricity and electric motors were also widely available, and accordingly, treadmills began to be offered with motors to propel the running surface. For example, U.S. Patent No. 4,614,337 to Schonenberger (Ex. 1010) issued on September 30, 1986 and describes a motorized treadmill:



Schonenberger, Ex. 1010, Fig. 2 (Annotated)

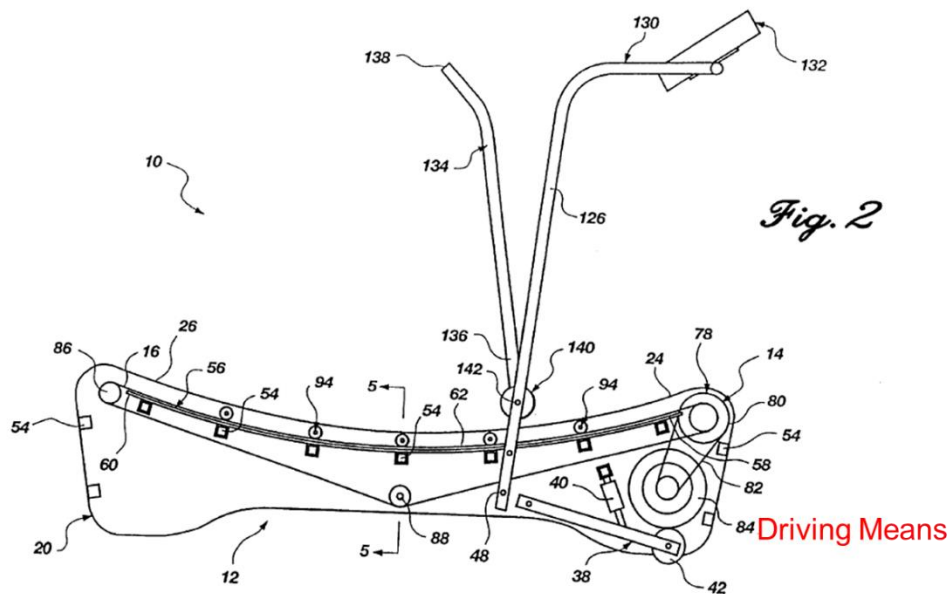
The physical exercise apparatus illustrated in FIG. 1 is driven by a motor 33 (FIGS. 2, 3) which drives the movable surface 1. A person standing on the surface, when driven, in order to remain thereon, must walk, jog, or run. The apparatus is enclosed in a housing 2 to which also support bars 3 are secured.

(Schonenberger, Ex. 1010, 4:1-6.)

55. Similarly, U.S. Patent No. 5,897,461 to Socwell (Ex. 1011) issued on April 27, 1999 and describes an Exercise Treadmill with driving means 84, such as a conventional electric motor, for rotating the running surface:

In one presently preferred embodiment of the present invention, a driving means 84 is operably connected to at least one roller to enable the rotation of the belt 16. The driving means 84 preferably comprises a conventional electric motor for rotating the belt 16.

(Socwell, Ex. 1011, 11:34-38; Fig. 2.)



Socwell, Ex. 1011, Fig. 2 (Annotated)

56. Motorized treadmills add cost and complexity:

A meaningful disadvantage of prior art motorized exercise treadmills includes the general disposition or placement of the motor in relation to the roller assembly and belt. Accordingly, the motor may be generally disposed either in front of, behind, or at one side of the endless belt. The usual placement or disposition of the motor in relation to prior art exercise treadmills, however, typically minimizes valuable space which could be alternatively allocated to the disposition of other internally working components of the treadmill or for the purpose of increasing the walking surface provided by the dimensional size of the belt.

(Socwell, Ex. 1011, 2:1-11.)

57. Manual treadmills do not require electricity to drive the belt, which is an attractive option for a climate conscious runner. Accordingly, to reduce cost,

complexity, and electrical energy consumption, both Schonenberger and Socwell also describe offering their treadmills without motors for use as manual treadmills:

This invention allows a runner to use the apparatus in a 5% elevation position without any external motor power.

(Schenkenberger, Ex. 1010, 6:16-18.²)

One of the drums 10 is driven by motor 33, or by gravity of earth or by any other suitable motive drive apparatus by means of a drive belt 34 (FIGS. 2, 3), preferably with interposition of a step-down gearing.

(Schenkenberger, Ex. 1010, 4:34-37.)

In an alternate embodiment, the curved deck treadmill 10 or the present invention may be implemented without a driving means engagably disposed to a roller in order to facilitate the forced rotation of the belt 16. If so implemented, the rollers 78, 86 and 88 and the deck 56 should be generally calibrated in relation to the belt 16 to provide an optimal frictional resistance to enable a user to safely walk, jog, and/or run thereon, while still providing sufficient resistance to enable a user to exercise.

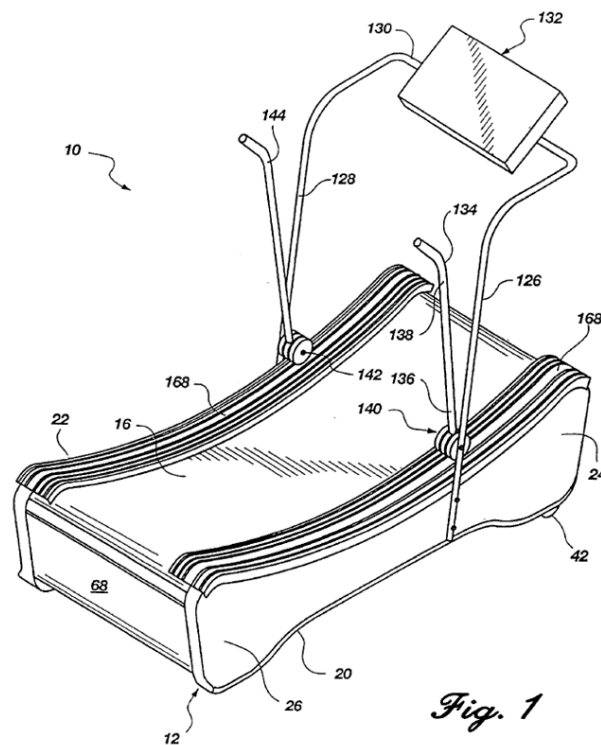
(Socwell, Ex. 1011, 11:53-61.)

B. Running Surface

58. The running surface is the portion of the treadmill where the user is expected to place their feet while exercising. Treadmills typically include one of

² All emphasis added unless otherwise noted.

two different types of running surfaces: a belt style, or a track style. A belt-style running surface is a flexible unitary endless belt that is usually formed from a thin sheet of a polymer material, although a number of other materials and methods of construction also are known, such as using a woven fabric or metal. This type of belt as shown in Figure 1 of Socwell below:



Socwell, Ex. 1011, Fig. 1

59. A track-style running surface includes a plurality of lateral segments, or slats, that are connected together by flexible bands, belt(s) or chain to form an endless loop. In the Power Transmission field these can also be referred to as a

hinged belt (PT Handbook, Ex. 1016 at 6-4, 6-5) and they have a resemblance to a tank track as shown in Figure 1 of Schonenberger:

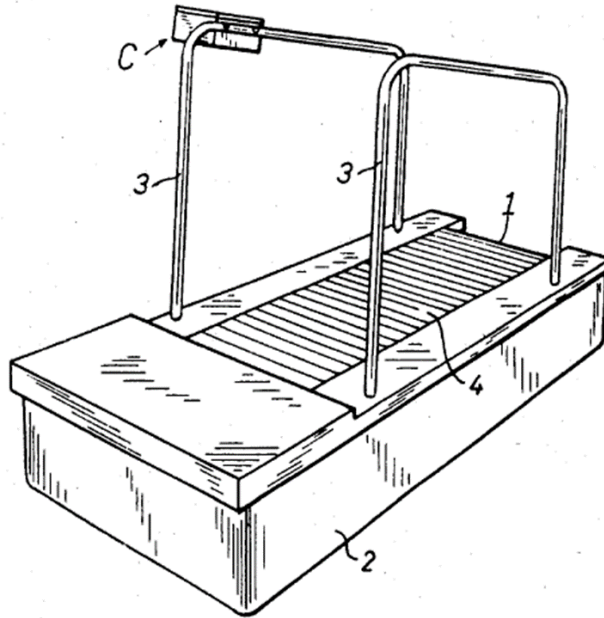


Fig. 1

Schonenberger, Ex. 1010, Fig. 1

60. Motorized treadmills also include drawbacks related to energy consumption and noise generation. Schmidt discloses a “noiseless” device. (Schmidt, Ex. 1009, 3:22-27.) And there are also reports that as of 2007 sustainable

gyms had already started to emerge where it was seen as a benefit to generate energy via exercise instead of consuming it. (Ex. 1024.³)

C. Curved vs Flat Treadmills

61. Flat treadmills are understood to result in greater impact loading on the users' joints, unsmooth or jerky operation, as well as a likelihood of users falling off of the back:

In accordance with prior art exercise treadmills comprising a flat, horizontal or slightly inclined moveable surface, the endless belt supportably disposed in relation to the rollers will typically absorb the full impact force of the foot of a user repetitively depressed thereagainst. The impact force sustained by the endless belt of prior art exercise treadmills generally produces a breaking [SIC] effect which causes temporary stalling of the rotational movement of the belt. This undesirable stalling motion of the belt typically alters the continuity of the user's exercise routine and may further institute jerking movements with each step of the user. As the force or pressure associated with the impact of the user's feet on the flat, horizontal surface increases, the more likely prior art exercise treadmills will realize this breaking effect. In this regard, a heavy person running on a

³ Inhabitat, "HUMAN-POWERED GYMS in Hong Kong" is a true and accurate copy of a webpage that is understand was posted by Inhabit on March 8, 2007. (Available at <https://inhabitat.com/human-powered-gyms-in-hong-kong/>)

horizontal belt supported by rollers engaging a frame will more likely introduce a consistent breaking effect on the rotational movement of the belt, than a lighter person walking on the same treadmill.”

(Socwell, Ex. 1011, 2:12-29.)

Another meaningful disadvantage of exercise treadmills of the prior art is the inherent danger associated with users tending to fall off the back end of the treadmill and become injured. Several attempts have been made to keep a user exercising on prior exercise treadmills from falling off the back end of the endless belt and from the treadmill frame. For example, prior art exercise treadmills were developed by those skilled in the art which include a belt for harnessing the user to the treadmill. Unfortunately, harnessing a user to the treadmill is often found to be as dangerous as falling off the back of the treadmill.

(Socwell, Ex. 1011, 2:45-55.)

Another meaningful disadvantage of prior art exercise treadmills is their general inability to reduce the physical impact to the joints and muscles of a user conducting general exercise routines in relation thereto. In this regard, an exercise treadmill which is capable of reducing the physical impact on the knees and back of a user will resolve several barriers left unsolved by known prior art devices, especially in light of providing an operative role in rehabilitative exercises.

(Socwell, Ex. 1011, 3:1-9.)

62. Treadmills having a curved running surface provide benefits, such as providing an inclined rear surface to push forward from, alleviating some of the

risk of falling off of the back end, as well as a shape that conforms to the natural path of the foot in relation to the body.

Another feature of the present invention not found in prior art structures is that, associated with the frictional resilient tread, is means whereby the tread surface may assume, under the action of the operator, a slightly curved surface, thereby greatly facilitating the operation of running or walking upon the exerciser and, at the same time, allowing the operator to maintain perfect equilibrium and balance.

(Schmidt, Ex. 1009, 1:50-59.)

In view of the foregoing, it is a primary object of the present invention to provide a novel curved deck treadmill which provides a structurally supported arcuate shaped, moveable surface on which a user may exercise.

(Socwell, Ex. 1011, 3:26-29.)

By curving the running surface to correspond to the curve described by the length of the legs when running, the rear leg remains in contact with the running surface while the front leg already resumes contact therewith. As a result, the airborne phase is nearly entirely eliminated when running on the treadmill according to the invention, such that the body's center of gravity can remain in a stable position.

* * *

The body's center of gravity remains substantially at the same position, and the movement of the user when running or walking

remains “round” in the broadest sense of the word. Because of the nearly constant level of the body’s center of gravity, the absence of impact to the joints in the absorption phase, and the movement of the legs in their natural arc, running is substantially easier, more gentle to the joints, and more enjoyable in particular. Frictional resistances that occur in conventional treadmills from the sliding of the running surface over the flat subsurface do not occur with the treadmill according to the invention, resulting in smoother treadmill for the user, and the use of a motor is usually unnecessary, thus lowering the operating costs for such an apparatus.

(Tollkien, Ex. 1031, [0009], [0012].)

63. A user can adjust their running pace by adjusting the angle of the running surface:

When a faster pace is desired, the inclination of the tread surface 16a is increased by moving pins 30 into one of the upper holes 17, or by elevating the forward end of the base 10 with jackscrews 11, or both. A slower pace is attained by reversing these operations.

(Chickering, Ex. 1013, 2:44-49.)

64. A runner may adjust their running speed by running on a different portion of a curved running surface:

A continuous belt has an upper course lying above and resting on these rollers, and a lower course below them, so that a person walking, jogging, or running on them automatically locates himself fore-and-aft of the exerciser by the balance between his weight, his

speed, and the variation in inclination along the curved path of the continuous belt.

(Cutter, Ex. 1014, Abstract.)

D. Treadmill Bearing Systems

65. A bearing is a general term for a mechanical element that provides a means for low friction movement between two surfaces (PT Handbook, Ex. 1016, 2-1). The motion between the elements may be rotary motion or “linear” motion (PT Handbook, Ex. 1016, 2-1). The three most common and predominant bearing systems for supporting a treadmill running surface are: rotary plain/journal bearings, rotary rolling element bearings, and linear bearings/bearing surfaces.

66. The type of running surface that is used corresponds with the type of bearing system selected for the treadmill. The belt style treadmill generally implements rollers, a rotary style of bearing typically identified by its elongated form factor that may also incorporate journal bearings or rolling element bearings to manage its frictional qualities, or a bearing surface (i.e., a “deck” or slider bed) because the belt cannot resist the loads imparted to it from the operator so the belt relies on rollers or deck underneath the belt to provide rigidity to the running surface. On the other hand, small rolling element bearings are predominantly selected for the track style running surface because the transverse slats are strong enough to resist the operator’s loads without anything directly underneath the slats where the operator’s foot is. Historically, treadmills that implement small rolling

element bearings still include front and rear connections, such as a roller, drum, sheave, pulley or shaft assembly, between the two frontmost side bearings and also the two rearmost side bearings to ensure alignment of the endless belt(s). These common and well understood methods are also found in known Power Transmission technology, i.e., conveyor technology, see, for example PT Handbook, Ex. 1016, 6-2, 6-4.

1. Plain / Journal Bearings

67. Plain rotary bearings are widely used in machinery and equipment. They function as a tight-fitting cylinder that encloses and supports a moving member, generally called the shaft or journal (PT Handbook, Ex. 1016 at 2-1, 2-2). Plain / Journal Bearings are generally recognized by the characteristic that they are a single piece that provides low-friction rotary motion through sliding action. The low-friction interface can be achieved by the material of the plain bearing itself or it can be achieved by imparting a lubricant into or applying a coating to the surface of the bearing; some plain bearings are also intended to be lubricated. A bearing system that includes such a series of plain / journal bearings is described in Chickering (Ex. 1013):

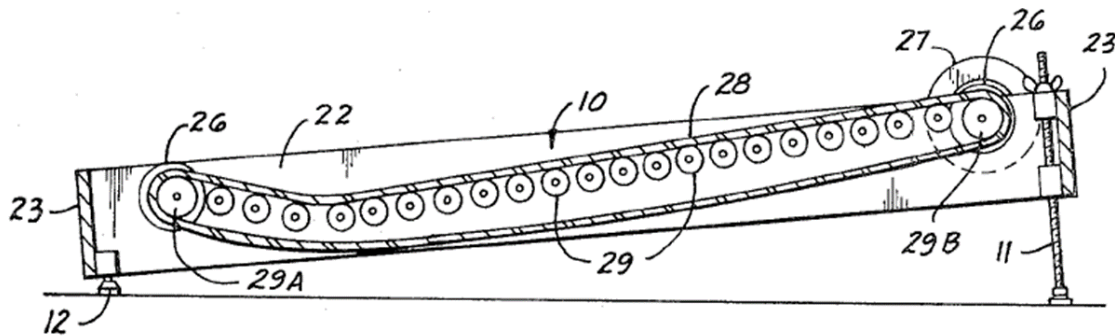


Fig. 3

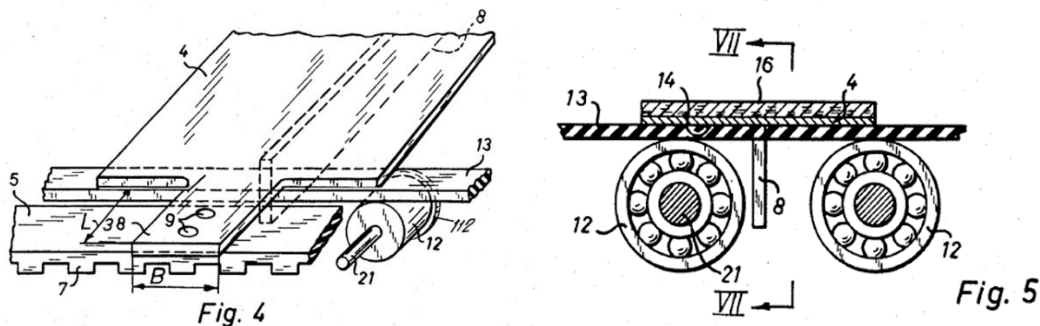
Chickering, Ex. 1013, Fig. 3

2. Rolling Element Bearings

68. Rolling element rotary bearings include multiple elements and the low friction rotary motion they enable is provided by rolling action, not sliding action, in contrast to plain bearings. Rolling element rotary bearings include a series of rolling elements, like rollers or balls, that are located between two concentric rings or races⁴. The portion of the rings that the rolling elements contact is known as the race. Rolling element bearings usually fall into two categories: ball bearings and roller bearings. Ball bearings have tiny balls that are spherically shaped whereas roller bearings include some sort of cylindrical element that is longer than it is in diameter (the diameter does not need to be constant, as is the case with spherical roller bearings). (PT Handbook, Ex. 1016 at 2-3.) In the treadmill art, rolling

⁴ A POSA would have understood that the terms “race” and “ring” are used interchangeably when describing bearing and clutch components.

element bearings are typically found along the sides of the frame and/or down the middle of the running surface where they either are attached to the treadmill or the track. There are some treadmills found in the art that employ an array of rotary bearings distributed two-dimensionally in a deck instead of using sliding contact on a deck surface. Rolling element bearings are usually found inside of other objects, as how they are found in skateboard wheels, however some rolling element bearings called cam followers, track followers, or stud bearings, are also common and these implement a thick outer ring so that they can be used as the contact surface themselves without an outer wheel or roller (PT Handbook, Ex. 1016, 2-7.) A side bearing system typically includes rotary bearings that are disposed along the sides of the running surface to provide low friction motion between the running surface. The side bearing system is often used with track style running surfaces because track style running surfaces are typically much more rigid than a belt style and accordingly, are able to resist the loads from the user without a supplemental support structure beneath. Schonenberger (Ex. 1010) and U.S. Patent No. 6,042,514 to Abelbeck (Ex. 1015) disclose such side roller bearing systems.



Schonenberger, Ex. 1010, Figs. 4, 5

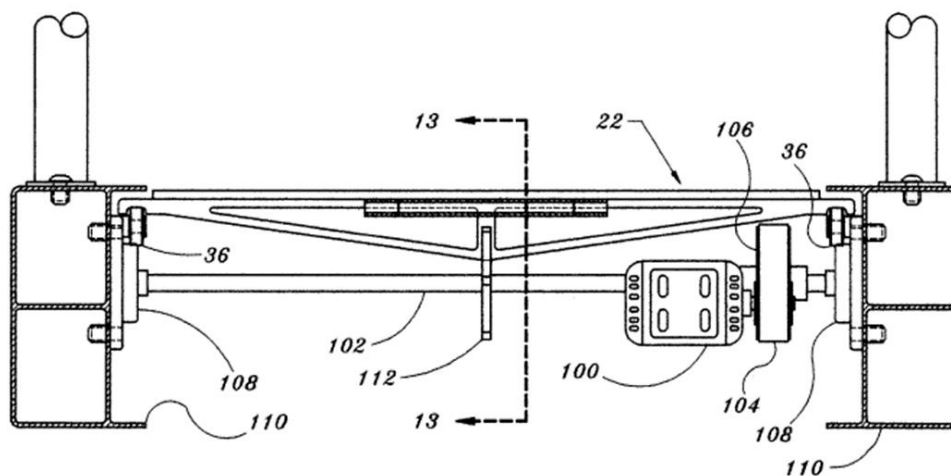


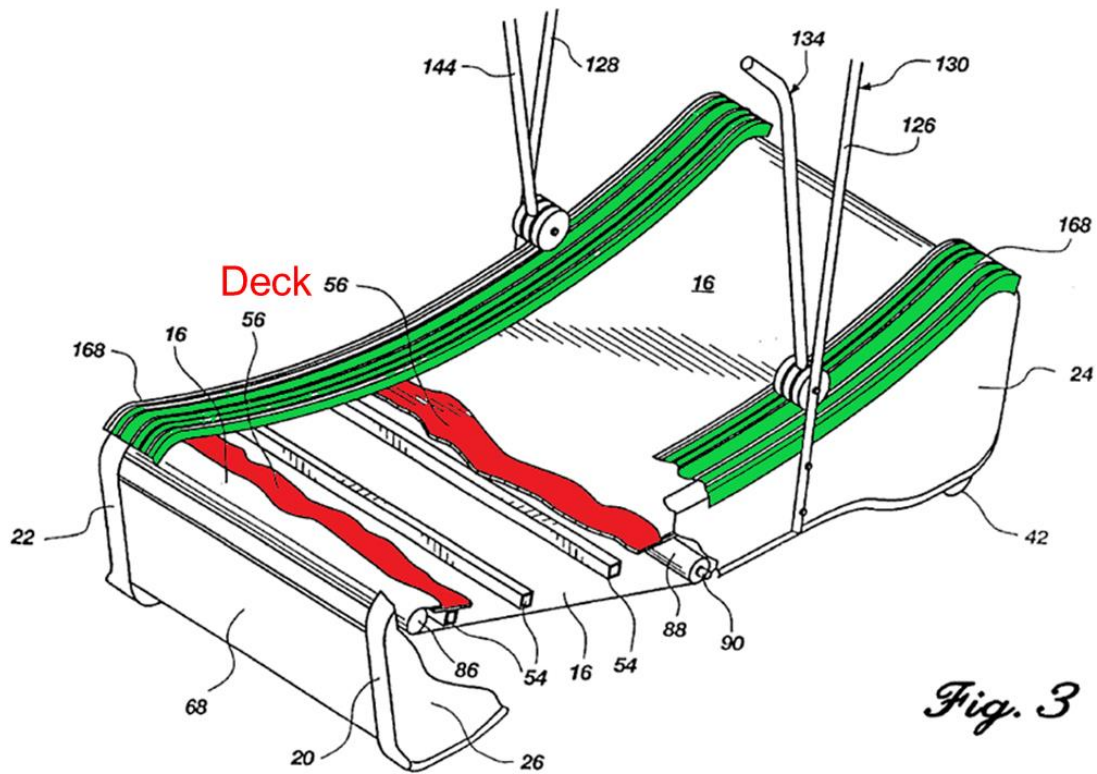
Fig. 12

Abelbeck, Ex. 1015, Fig. 12

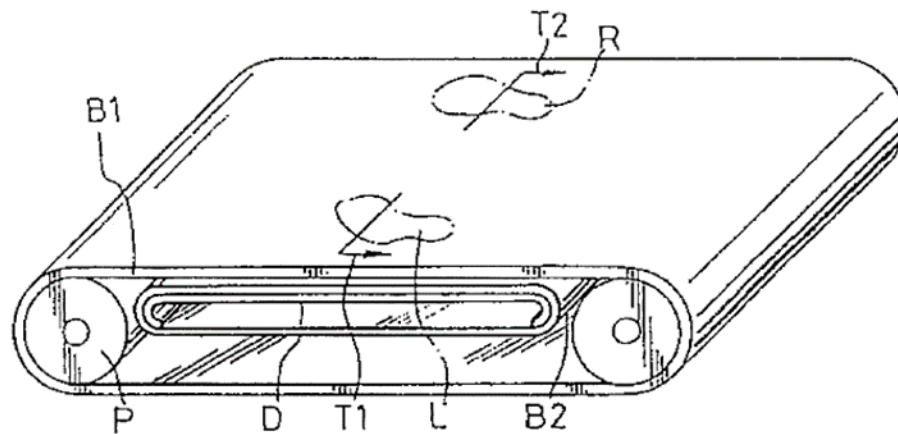
3. Bearing Surface

69. A bearing surface is a low friction surface that does not move relative to another surface that slides across it, and the bearing surface is typically more rigid than the moveable surface in treadmill art. “As with any other power transmission system, a linear motion system must be supported and guided. Forces generated by moving parts in a linear system must be resisted by bearings for the

system to remain stable.” (PT Handbook, Ex. 1016 at 10-11.) Bearing surfaces are also known as plain linear bearings or slider beds in general, and in the treadmill art they are known as a deck. The PT Handbook describes these plain linear bearings as being “the oldest device that lets one machine element, such as the bed of a planer, move easily on another.” (PT Handbook, Ex. 1016 at 10-11.) Bearing surfaces are generally coupled to a treadmill frame underneath the running surface to resist the loading applied by the user while still enabling a low friction sliding action between the deck and belt. The bearing surface may be formed of a low-friction material, a material impregnated with lubricant, or a lubricant may be applied to the bearing surface, just as with plain rotary bearings. Socwell and Magid disclose such bearing surfaces, *i.e.*, decks:



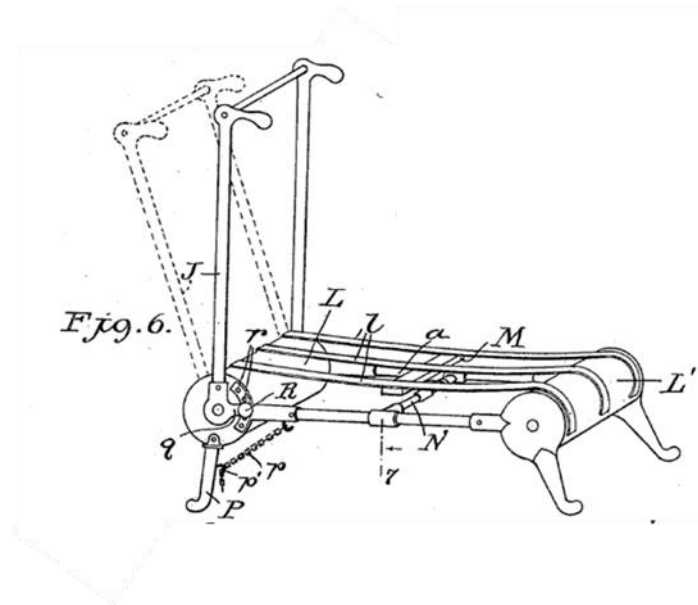
Socwell, Ex. 1011, Fig. 3 (Annotated)



PRIOR ART
FIG. 1

Magid, Ex. 1012, Fig. 1

70. Schmidt discloses a bearing surface that includes a series of longitudinally extending suspension rods: “Thus, as the person operates the apparatus, he walks upon a resilient, springy suspension, and the flexible tread band glides, in frictional contact, over suspension rods *d* in a smooth and noiseless manner.” (Schmidt, Ex. 1009, 3:22-27.)



Schmidt, Ex. 1009, Fig. 6

E. Safety

1. Safety Concerns

71. It has long been recognized that users may be injured by falling off of a treadmill either while mounting or dismounting it or during use. This may be due to the treadmill belt moving in an unexpected direction or in such a way that the user cannot regain their equilibrium. It could also be due to the incline of the surface causing the position of user to drift rearwards, and off, over time.

72. Chickering describes such a problem due to insufficient friction between a belt and rollers in a roller bearing system:

In Wood and Morairty, which exemplify the more common type of treadmills in general use today, the problem is just the opposite. There the support harness and railings are necessitated by the fact that the tread surface on each device is frictionless-comprising merely an

endless belt which is disposed about a series of frictionless rollers on an inclined base. A person exercising on this type of 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. Also, the user is likely to run off the lower end of the treadmill because the faster he runs the faster the belt accelerates and moves beneath his feet, carrying him to the rear. Thus, some external support is necessary to enable the user of such treadmills to maintain his balance, as well as his position on the moving belt.

(Chickering, Ex. 1013, 1:24-39.)

a. Safety Solutions

73. Socwell acknowledges this problem and proposes using rollers with sufficient friction:

In addition, if sufficient frictional resistance is not found in relation to the rotation of the free-moving rollers rotatably engaging the belt, a user attempting to exercise on the treadmill may suffer from injuries sustained as a result of an uncontrolled rotation of the anti-friction rollers engaging the belt. In particular, if the rollers supportably disposed in relation to the endless belt are so easily moveable, the user may potentially lose his equilibrium or balance and fall from the exercise treadmill resulting in possible injuries.

(Socwell, Ex. 1011, 1:28-36.)

74. Magid describes using a one-way clutch (an external ratchet and pawl clutch) to limit the belt to motion in one direction:

A unidirectional control means 6,6' is installed to permit only unidirectional movement of the left and right foot belts 4, 4'. In this embodiment, the control means 6,6' includes a pair of ratchet gears 61 attached to outer ends of the front rollers 41 and mounted rotatably on the first shaft 411, and a pair of pawls 62 secured to the base 11 and engaging one of the ratchet gears 61 to permit unidirectional rotation of the front rollers 451, thereby preventing bidirectional movement of the foot belts 4, 4'. A releasable means (not shown) may be provided to release selectively the pawls 62 from the ratchet gears 61 in a known manner to permit reciprocating movement of the foot belts 4, 4' when desired. Of course, the ratchet gears may be attached to the rear rollers 42 to achieve the same result.

(Magid, Ex. 1012, 4:46-59.)

Control Means

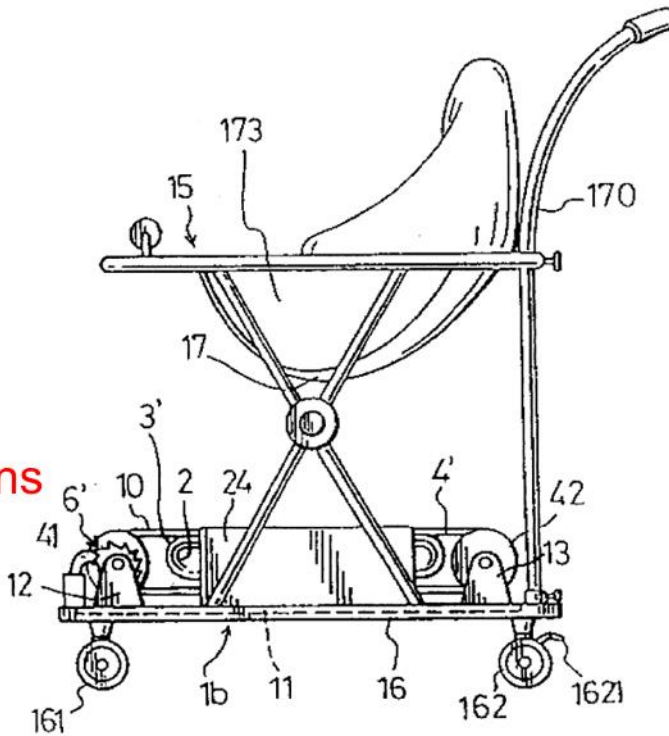


FIG. 5

Magid, Ex. 1012, Fig. 5 (Annotated)

75. A recognized issue with treadmill use is a user falling off the back of the treadmill due to an inability to move forward on the running surface:

Another meaningful disadvantage of exercise treadmills of the prior art is the inherent danger associated with users tending to fall off the back end of the treadmill and become injured. Several attempts have been made to keep a user exercising on prior exercise treadmills from falling off the back end of the endless belt and from the treadmill frame. For example, prior art exercise treadmills were developed by those skilled in the art which include a belt for harnessing the user to

the treadmill. Unfortunately, harnessing a user to the treadmill is often found to be as dangerous as falling off the back of the treadmill.

(Socwell, Ex. 1011, 2:45-55.)

76. Treadmills include handrails or a curved track to prevent a user from falling off the back:

Additionally, exercise treadmills of the prior art may furnish a user with an upright handle to grasp while exercising. While somewhat useful in retaining the user's balance on the rotating endless belt, having to grasp a fixed handle may impede the natural body motion of a user attempting to exercise. Such an encumbrance may be feasible when a user is attempting to walk, but when a user begins to jog or run on prior art exercise treadmills, having to grasp a handle to keep centered on the treadmill may severely interfere with one's natural body motion and further abdicate the inherent physical advantages of the exercise routine.

(Socwell, Ex. 1011, 2:56-67.)

77. Several prior art exercisers have provided a solution to the user's inability to control their position relative to the running belt by shaping the running surface so that the rear of the running surface is inclined upward providing a surface to push forward from that is not reliant on frictional resistance:

Also, the surface 25a, due to its upward inclination, will support a forward component of force which enables the person using the exercise device to "push off" against surface 25a at the end of each step. 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.

(Chickering, Ex. 1013, 2:64-72.)

b. Safety Standards

78. Several standards bodies have produced industry standards that provide guidance to manufacturers regarding both exercise equipment safety in general and specifically for treadmill safety. ASTM International published F2115 in 2005 (Standard Specification for Motorized Treadmills) (“ASTM Standard,”⁵ Ex. 1019). This standard defines terminology such as deck, and foot rail, and usable moving surface. (ASTM Standard, Ex. 1019 at 1-2.) This standard also provides guidance regarding safety, including: the stability of a treadmill, safety against pinch points, “[a]ll treadmills shall be equipped with foot rails to facilitate mounting and dismounting,” and “[a]ll treadmills shall be equipped with a handrail for user support during use to assist in dismount.” (ASTM Standard, Ex. 1019 at 3-4.) The ASTM Standard also invokes UL 1647 as part of its instruction that

⁵ ASTM F2115-05, Standard Specification for Motorized Treadmills, (ASTM, 2005) (“ASTM Standard”) is a true and accurate copy of a standard that I understand was published by ASTM in 2005.

“Electrical elements shall be guarded so as to meet or exceed UL1647.” *Id.* at 3. This standard also provides guidance regarding warnings, labeling, and the control panel, as well as how fast a support structure system may raise or lower the treadmill. (ASTM Standard, Ex. 1019 at 5.)

79. The international community also published a standard, ISO 20957-6, also in 2005 under the title Stationary training equipment – Part 6: Treadmills, additional specific safety requirements and test methods. (“ISO Standard,”⁶ Ex. 1020.) This standard also requires “side handrails or front handlebar for user support and emergency dismount” and foot platforms with a “non slip surface” for safety. (ISO Standard, Ex. 1020 at 8.) Stationary Training Equipment is a true and accurate copy of a standard that I understand was published by ISO in 2005. Also like ASTM, ISO includes a clause regarding electrical safety where it invokes EN 60335 and EN 60601. (ISO Standard, Ex. 1020 at 8.)

80. Finally, the Australian Competition and Consumer Commission published a Product safety bulletin first published in 2010 and describes in

⁶ ISO 20957-6 Stationary Training Equipment – Part 6: Treadmills, additional specific safety requirements and test methods. (ISO, 2005) (“ISO Standard”) is a true and accurate copy of a standard that I understand was published by ISO in 2005.

common language the Australian Regulation that was enacted to apply to all treadmills in Australia enacted on June 4, 2009. (ACCC Product Safety Supplier Guide, Ex. 1007.)

F. Mechanical Clutches

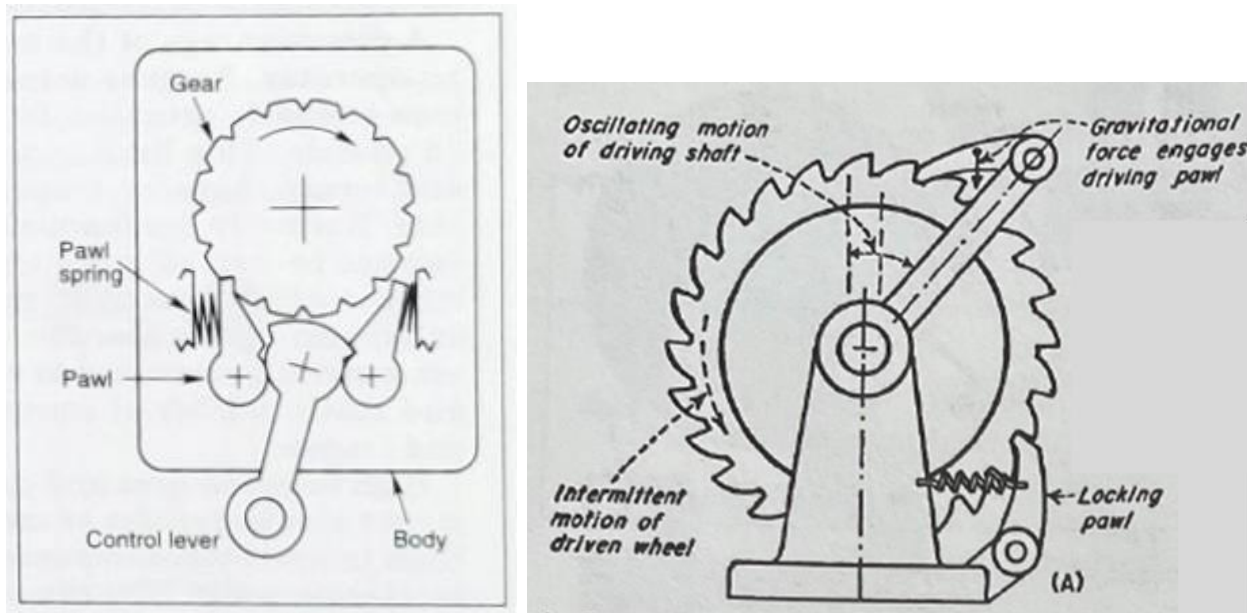
81. A mechanical clutch is used to control and transmit torque, speed, and power in a rotating drive system. (PT Handbook,⁷ Ex. 1016 at 5-1.) An overrunning clutch transmits torque in one direction and freewheels, locks up, or reduces speed in the reverse direction. Some common mechanical clutches include ratchet clutches and cam type one-way clutches, such as sprag clutches.

1. Ratchet Clutch

82. A ratchet clutch is typically a clutch where a spring-loaded pawl engages a notched wheel or gear, permitting rotation in only one direction. (PT Handbook, Ex. 1016 at 5-5.) A ratchet clutch may be used in low-speed overrunning, indexing, and backstopping modes of operation. (*Id.*) As shown in the figures below, the position of a control lever (left figure) or the gear tooth profile

⁷ Power Transmission Handbook (Power Transmission Distributors Association 1993). The PT Handbook is a true and accurate copy of a book that I understand was published by the Power Transmission Distributors Association in 1993.

and pawl orientation (right figure) determines whether the clutch operates in forward, reverse, freewheeling (neutral), or locked modes.



PT Handbook, Ex. 1016 at 5-5; Sclater,⁸ Ex. 1017 at 316.

83. A ratchet clutch having a pawl that contacts the gear during overrunning is loud, as compared to other mechanical clutches:

(A) A ratchet and pawl mechanism converts reciprocating or oscillating movement to intermittent rotary motion. This motion is positive but limited to a multiple of the tooth pitch. (B) A friction-type clutch is quieter, but it requires a spring device to keep the eccentric pawl in constant engagement. (C) Balls or rollers replace the pawls in

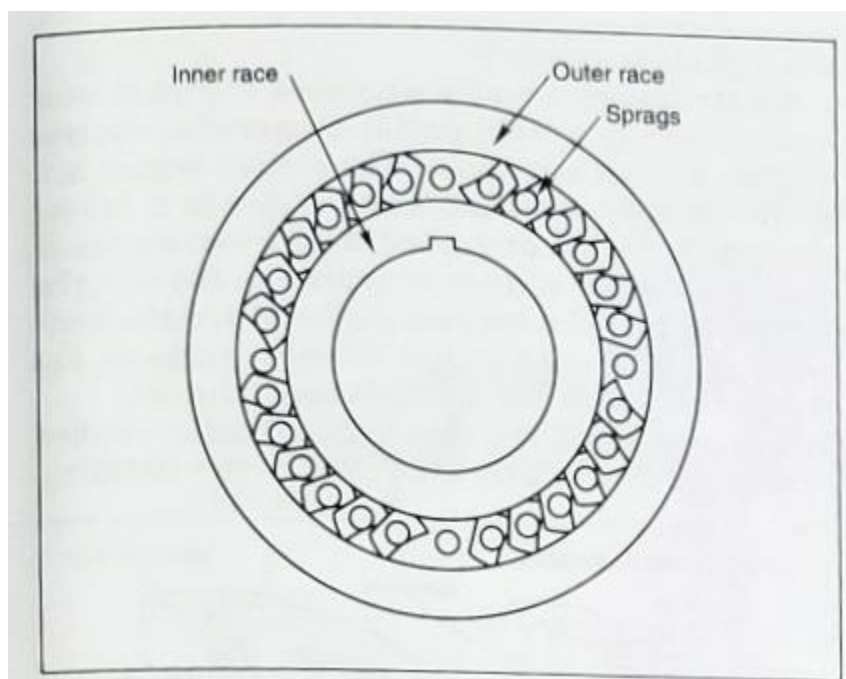
⁸ Neil Sclater and Nicholas P. Chironis, *Mechanisms & Mechanical Devices Sourcebook*, Third Ed. (McGraw-Hill 2001). Sclater is a true and accurate copy of a book that I understand was published by McGraw-Hill in 2001.

this device. Motion of the outer race wedges the rollers against the inclined surfaces of the ratchet wheel.

(Sclater, Ex. 1017 at 316.)

2. Sprag Type One-Way Bearing Clutch

84. A sprag type overrunning (one-direction) clutch includes cylindrical inner and outer races, or rings, with sprags filling the space between. The inner race may be secured to a shaft by a key-keyway interface. Such a keyway is illustrated in the figure below.



PT Handbook, Ex. 1016 at 5-5

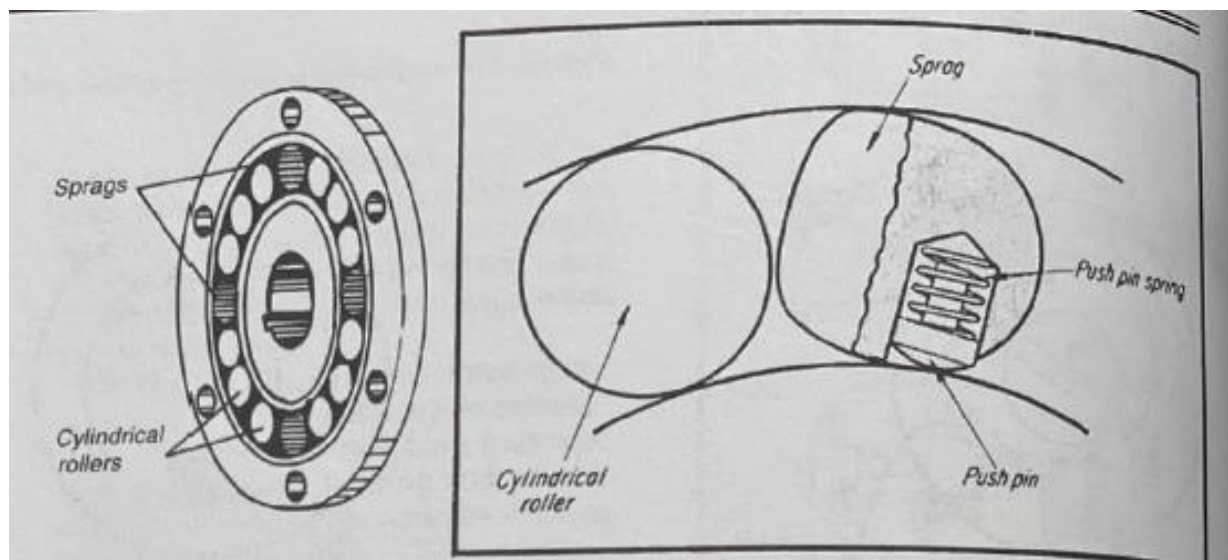
85. The sprags are “sized, shaped, and mounted in a manner that causes them to wedge between, and thereby link, the two races when rotation occurs in the proper direction.” (PT Handbook, Ex. 1016 at 5-4.) However, “[w]hen rotation is reversed, or when output overruns input in the driven direction, the sprags fall out

of engagement.” (PT Handbook, Ex. 1016 at 5-5.) This wedging, or jamming, action is accomplished through frictional means.

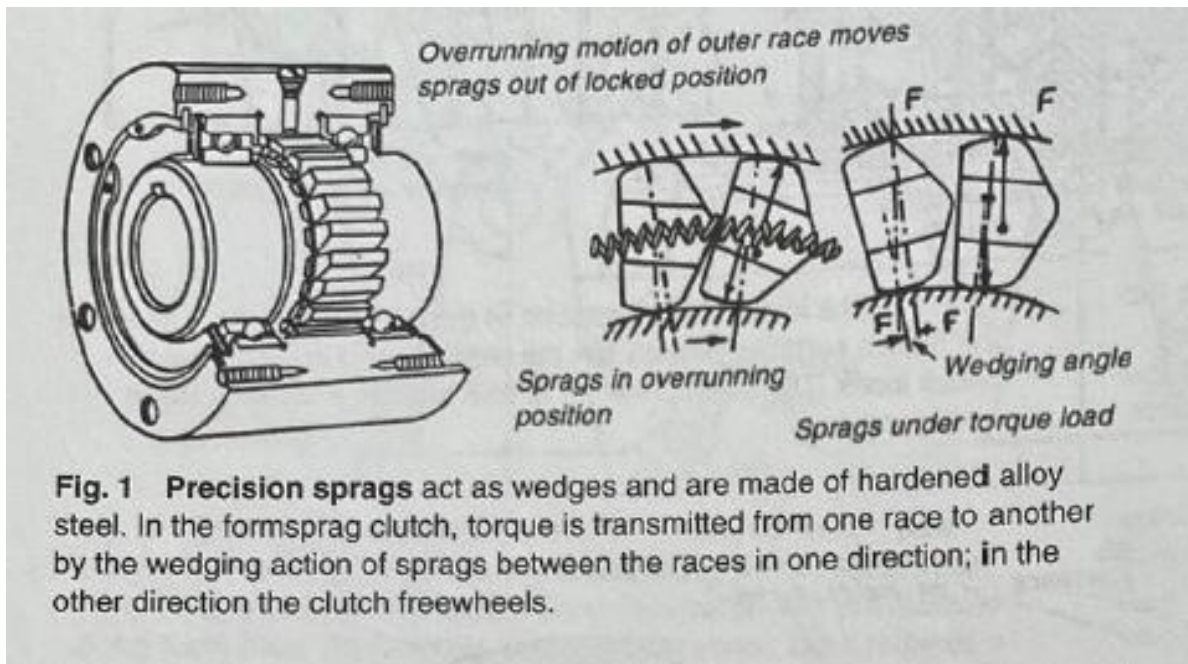
86. Sclater discloses a one-way bearing that includes sprags combined with rolling elements, such as cylindrical rollers or balls:

Sprags combined with cylindrical rollers in a bearing assembly can provide a simple, low-cost method for meeting the torque and bearing requirements of most machine applications. Designed and built by Est. Nicot of Paris, this unit gives one-direction only torque transmission in an overrunning clutch. In addition, it also serves as a roller bearing.

(Sclater, Ex. 1017 at 312.)



Sclater, Ex. 1017 at 312



Sclater, Ex. 1017 at 318

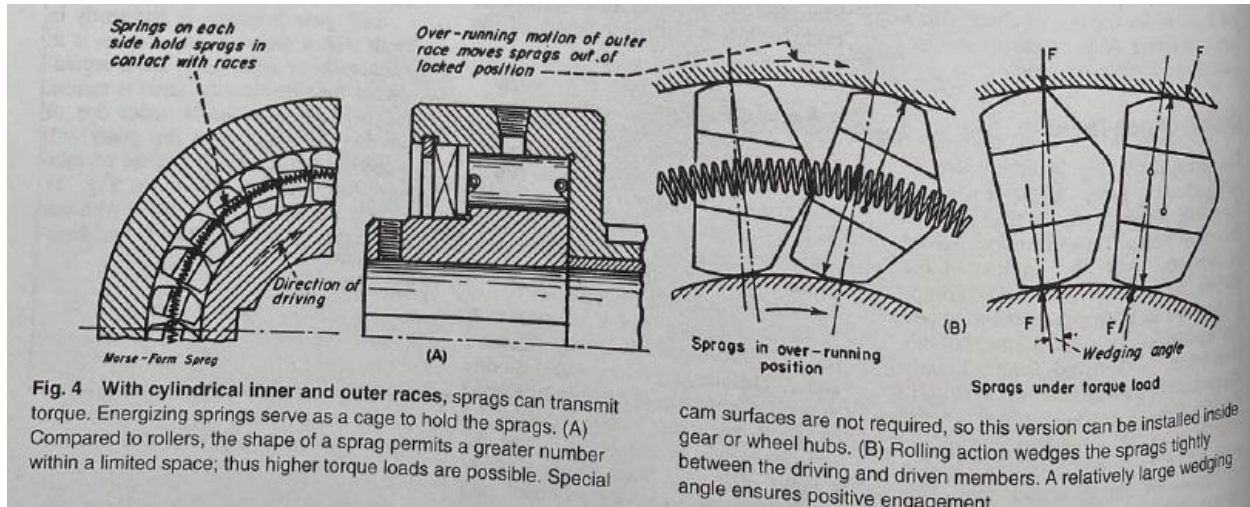
87. Sclater discloses that the inner and outer races are concentric but the sprags are nonconcentric, or asymmetric, to provide a locking ramp:

Races are concentric; a locking ramp is provided by the sprag profile, which is composed of two nonconcentric curves of different radius. A spring-loaded pin holds the sprag in the locked position until the torque is applied in the running direction.

(Sclater, Ex. 1017 at 312.)

88. As illustrated in the figure below on the left, when the inner race rotates in a first direction relative to the outer race, the sprags move out of the locked position such that an overrun condition occurs. However, as illustrated below right, when the inner race rotates in the opposite direction relative to the outer race, the sprags move, jamming within the races, locking the outer and inner

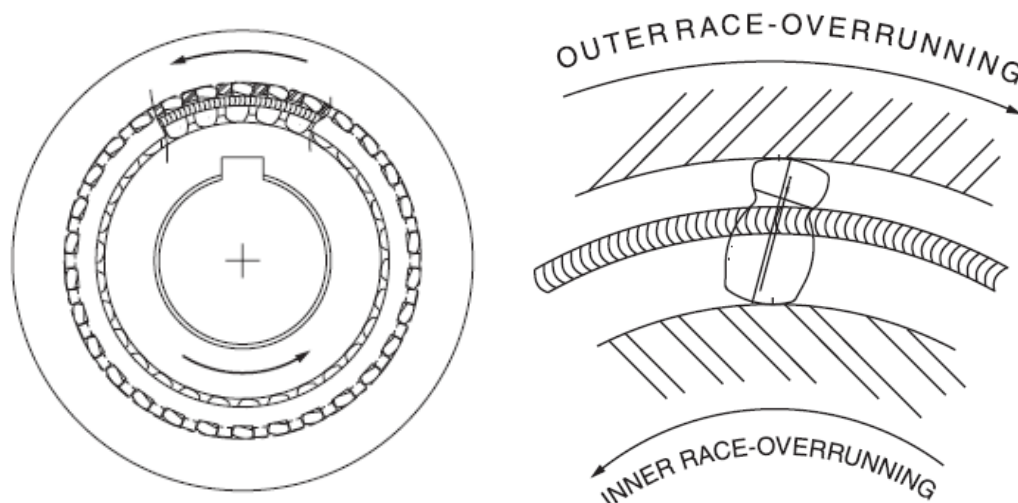
race into rotating together, or not rotating at all if the outer race is fixed (*i.e.*, a backstop mode of operation).



Sclater, Ex. 1017 at 316

a. Modes of Operation

89. Mechanical lockup devices, *i.e.*, clutches, are some of the oldest and most basic clutching methods, and offer a simple design for no-slip registry and indexing. (PT Handbook, Ex. 1016 at 5-3.) They operate in three basic modes of operation: overrunning, indexing, and backstopping. During an overrunning operation, the clutch allows one or both members to rotate freely (freewheel) without transferring torque to the other.

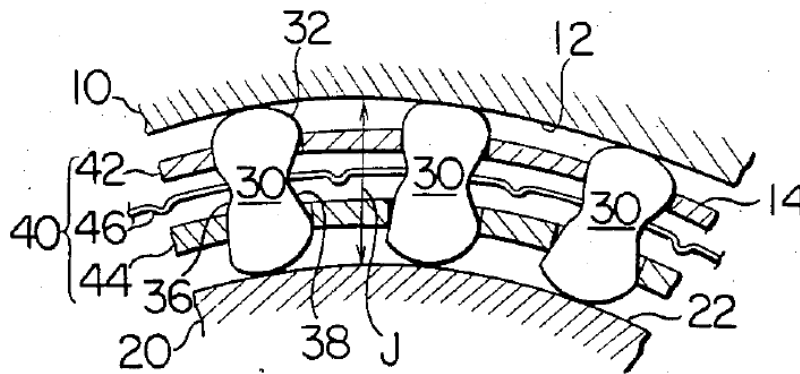


Emerson,⁹ Ex. 1018 at 8, 9

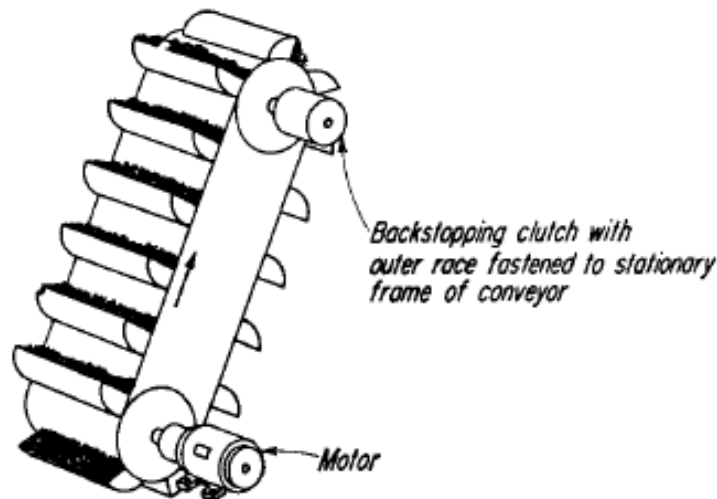
90. During a backstopping or lock up operation, the clutch is used to prevent reverse rotation. For example, U.S. Patent No. 4,635,771 to Shoji issued in 1987 and describes a sprag-type “one-way clutch bearing” for a backstop mode of operation. (Ex. 1029, Fig. 1.) For such an application, the outer race is typically fixed to a frame and the inner race is coupled to a rotating shaft. For example, Sclater describes a backstopping mode of operation for a conveyor using a sprag clutch in which the outer race is fixed to the frame using a torque arm:

⁹ Emerson, Mechanical Clutches and Torque Overload Devices (Emerson Industrial Automation, 2001). Emerson is a true and accurate copy of a catalog that I understand was published by Emerson Industrial Automation in 2001.

FIG. 1



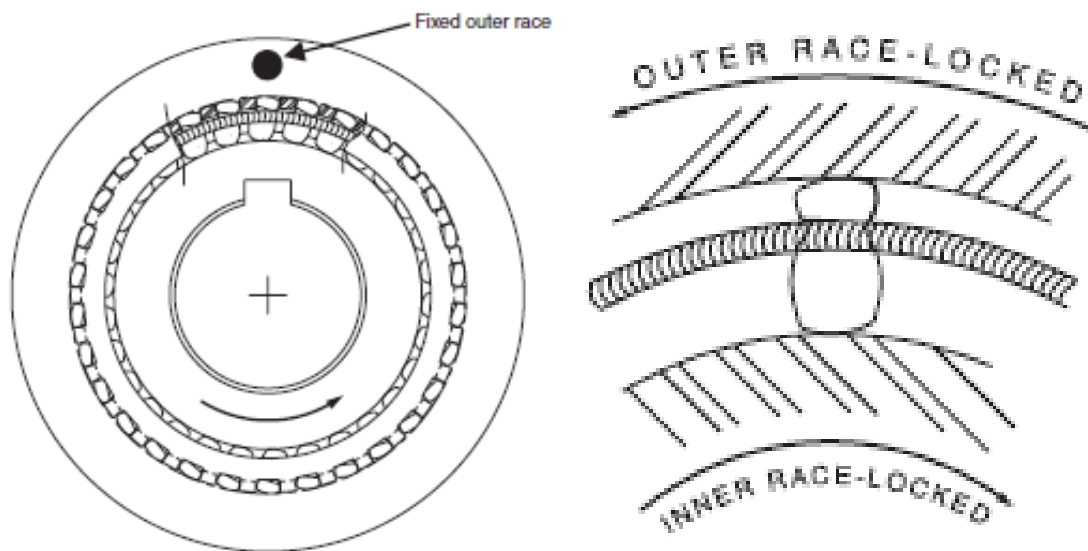
Shoji, Ex. 1029, Fig. 1



Sclater, Ex. 1017, Fig. 2 on pg. 320

Fig. 2 Backstopping permits rotation in one direction only. The clutch serves as a counter-rotation holding device. An example is a clutch mounted on the headshaft of a conveyor. The outer race is restrained by torque-arming the stationary frame of the conveyor.

(Sclater, Ex. 1017 at 320.)



Emerson, Ex. 1018 at 8, 9

b. Applications

91. Sprag-type one-way clutch bearings are used in multiple applications, as illustrated in Emerson Industrial Automation’s Mechanical Clutches and Torque Overload Devices from 2001. (Emerson, Ex. 1018.) For example, Emerson describes its NSS Series sprag type one-way clutch as an option for multiple “Field Applications,” including “Exercise equipment,” “Food processing equipment,” “Printing presses,” and “Roll conveyors.” (Ex. 1018 at 52-53.) Emerson offers their commercially available one-way clutches with keyways on the inner race and also on the outer race, as illustrated below. Emerson describes the sprag clutches as “often referred to as freewheel, sprag, overrunning, backstop or one-way clutches,

depending upon their application.” (Emerson, Ex. 1018 at 3.) Emerson advertises their bearings as designed with the same dimensions as standard metric light series ball bearings, available with keyed inner races, and furnished with grease to increase life. (*Id.* at 5). Emerson also describes torque arms for mounting the bearings to an underlying surface. (*Id.* at 38-43.)

Morse NSS Series
 Models NSS-8 - NSS-60

The NSS Series clutch is available in 12 sizes and is designed with the same overall dimensions as a light metric series ball bearing. The inner race offers a key seat and the outer race press fits into the housing. The clutch is furnished with protective oil and must be lubricated before operating. These clutches do not have bearings to support radial force, so additional bearing support is required. The NSS Series clutch is excellent for applications where space is restricted, and is suitable for overrunning.

Lubrication

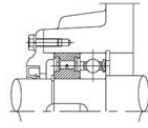
1. Oil lubrication is recommended.
2. Do not use greases or lubricants with EP additives.



Model Number	Torque Capacity		Maximum Overrunning Speed		Drag Torque		Bore Size H7		Keyway		Dimensions	
	lb.-ft.	Nm	rpm	rpm	lb.-ft.	Nm	inches	mm	inches	mm	inches	mm
NSS-8	4.9	6.7	6,000	3,000	0.004	0.003	0.3150	8	0.3150	0.08 x 0.04	2 x 1.0	0.315
NSS-10	8.9	12.0	4,500	2,250	0.006	0.005	0.3600	10	0.3600	0.10 x 0.06	3 x 1.4	0.360
NSS-12	12.5	17.0	4,000	2,000	0.007	0.006	0.4254	12	0.4254	0.12 x 0.07	4 x 1.8	0.425
NSS-15	16.2	22.0	3,500	1,750	0.007	0.010	0.5080	15	0.5080	0.15 x 0.08	5 x 2.2	0.508
NSS-20	20.3	27.5	3,000	1,500	0.007	0.010	0.5715	20	0.5715	0.20 x 0.08	6 x 2.4	0.571
NSS-25	25.0	34.0	2,500	1,250	0.010	0.015	0.6350	25	0.6350	0.25 x 0.08	8 x 2.8	0.635
NSS-30	30.0	40.8	2,000	1,000	0.010	0.015	0.7080	30	0.7080	0.30 x 0.08	8 x 3.0	0.708
NSS-35	35.0	47.7	1,800	900	0.010	0.015	0.7874	35	0.7874	0.35 x 0.08	10 x 3.4	0.787
NSS-40	40.0	54.4	1,600	800	0.010	0.015	0.8648	40	0.8648	0.40 x 0.08	10 x 3.6	0.865
NSS-45	45.0	61.2	1,400	700	0.010	0.015	0.9443	45	0.9443	0.45 x 0.08	12 x 4.0	0.944
NSS-50	50.0	68.0	1,200	600	0.010	0.015	1.0250	50	1.0250	0.50 x 0.08	12 x 4.2	1.025
NSS-55	55.0	74.8	1,000	500	0.010	0.015	1.1070	55	1.1070	0.55 x 0.08	14 x 4.7	1.107
NSS-60	60.0	81.6	900	450	0.010	0.015	1.1900	60	1.1900	0.60 x 0.08	14 x 5.0	1.190

Installation and Usage

1. The NSS series cam clutch is designed for press fit installation. Correct interference dimensions must be maintained to obtain maximum clutch performance.
2. Make sure the housing has enough strength to withstand the pressure required for the press fitting installation of the clutch. The internal diameter of the housing should meet the H7 tolerance.



Morse NSS Series
 Models NSS-8 - NSS-60

Features

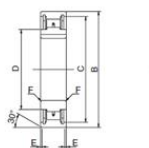
- Sprag type one way clutch
- High torque and longer life than roller ramp clutches
- Full metric design
- Overrunning speed is higher than roller ramp clutches

Industries Served

- Food and beverage
- Gearing
- Printing
- Textile

Field Applications

- Exercise equipment
- Food processing equipment
- Printing presses
- Roll conveyors



Model Number	B		C		D		E		F		Weight	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	lb.	g
NSS-8	0.004	0.1	0.014	0.35	0.040	1.0	0.009	0.2	0.004	0.1	0.003	14
NSS-10	0.009	0.2	0.020	0.51	0.014	0.35	0.009	0.2	0.009	0.2	0.003	27
NSS-12	0.011	0.28	0.025	0.64	0.014	0.35	0.009	0.2	0.009	0.2	0.003	31
NSS-15	0.014	0.35	0.030	0.76	0.014	0.35	0.009	0.2	0.009	0.2	0.003	39
NSS-20	0.020	0.51	0.037	0.94	0.014	0.35	0.009	0.2	0.009	0.2	0.003	115
NSS-25	0.025	0.64	0.045	1.14	0.014	0.35	0.009	0.2	0.009	0.2	0.003	140
NSS-30	0.031	0.79	0.050	1.27	0.014	0.35	0.009	0.2	0.009	0.2	0.003	210
NSS-35	0.035	0.89	0.055	1.40	0.014	0.35	0.009	0.2	0.009	0.2	0.003	270
NSS-40	0.040	1.02	0.060	1.52	0.014	0.35	0.009	0.2	0.009	0.2	0.003	340
NSS-45	0.045	1.14	0.065	1.65	0.014	0.35	0.009	0.2	0.009	0.2	0.003	420
NSS-50	0.050	1.27	0.070	1.78	0.014	0.35	0.009	0.2	0.009	0.2	0.003	510
NSS-55	0.055	1.40	0.075	1.90	0.014	0.35	0.009	0.2	0.009	0.2	0.003	610
NSS-60	0.060	1.52	0.080	2.03	0.014	0.35	0.009	0.2	0.009	0.2	0.003	720

Installation and Usage (continued)

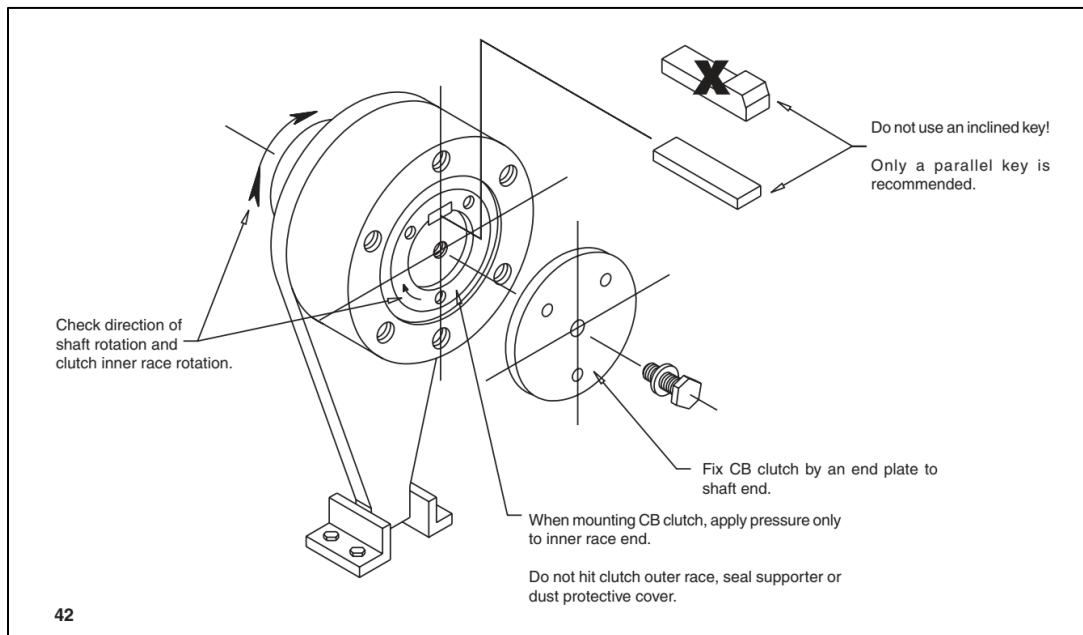
3. When installing the clutch, mount it with a type 62 bearing to avoid radial force, since this clutch does not have any bearings inside.
4. Confirm the direction of rotation before installation.
5. The recommended shaft tolerance is H7, and the key profile should be in accordance with the following standard.
6. NSS-8 - 12 DIN 6885. 1
7. NSS-15 - 60 DIN 6885. 3
8. Suitable surface pressure of the key should be selected according to your company design standards.

For selection assistance, call Application Engineering at 1-800-626-2093 or visit www.emerson-apt.com

Emerson, Ex. 1018 at 52-53 (Annotated)



Emerson, Ex. 1018 at 6



Emerson, Ex. 1018 at 42

VII. U.S. Patent No. 11,465,005 to Bayerlein et al.

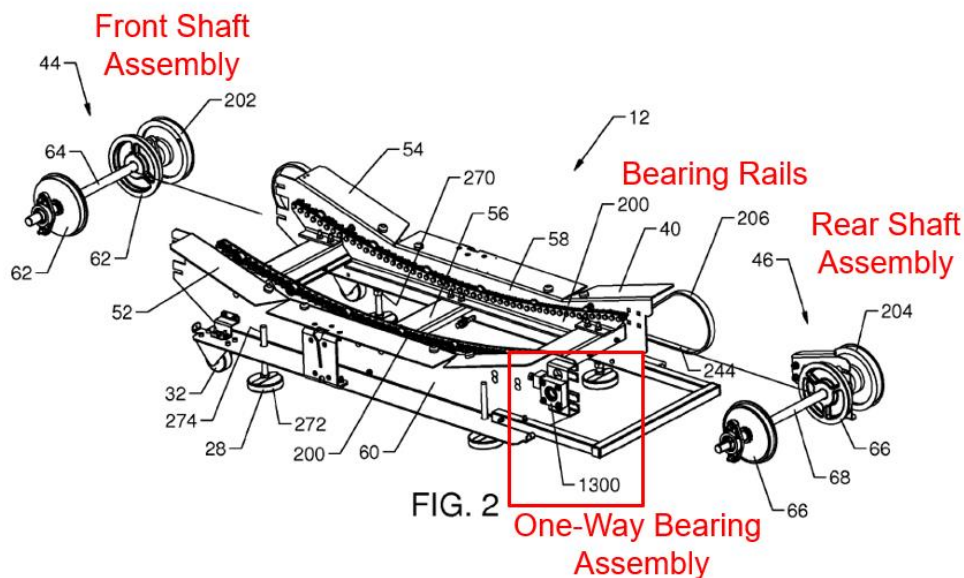
A. Overview of the '005 Patent

92. The '005 Patent relates generally treadmills and mechanisms for controlling the motion of a running belt of the treadmill. ('005 Patent, Ex. 1001, Abstract.) With reference to Figure 1, the '005 Patent discloses a manual treadmill 10 that includes “a running belt 16 that extends substantially longitudinally along a longitudinal axis 18” of a base 12. ('005 Patent, Ex. 1001, 4:53-55.)

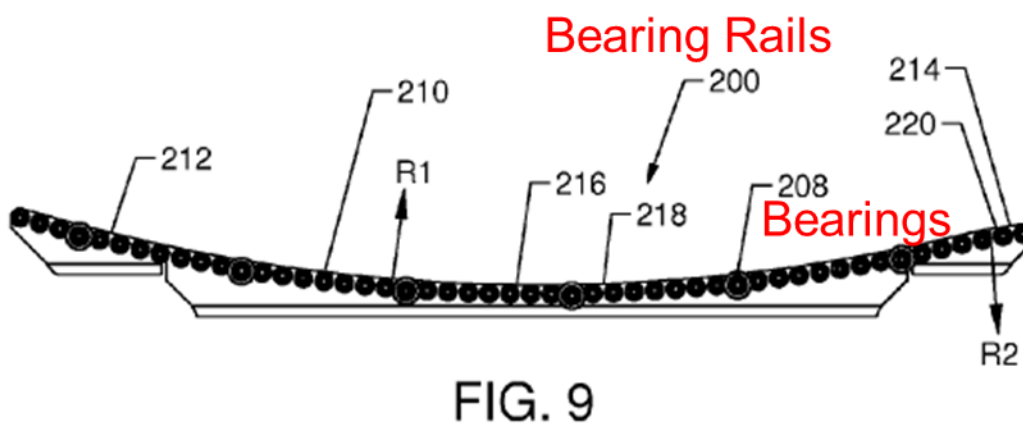


LIFECORE EX. 1003

the shape of the top profile 210 of the bearing rails 200.” (‘005 Patent, Ex. 1001, 11:50-52.)



‘005 Patent, Ex. 1001, Fig. 2 (Annotated)



‘005 Patent, Ex. 1001, Fig. 9 (Annotated)

94. As illustrated in Figure 2 above, and Figure 36 below, the treadmill 12 includes a “safety device shown as a one-way bearing assembly 1300 . . . 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.” (‘005 Patent, Ex. 1001, 27:13-19.) The ‘005 Patent further discloses that “[t]he 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.” (*Id.*, 27:22-26.) The one-way bearing assembly includes a “plurality of sprags (not shown) [that] are disposed between the inner ring 1304 and the outer ring 1306.” (*Id.*, 27:26-27.) Although the ‘005 Patent does not show the sprags, it states that each sprag has an “asymmetric” shape to “provide for motion in one direction and prevent rotation in the opposite direction.” (*Id.*, 27:29-30.) And that the “sprags become wedged between the inner ring 1304 and the outer ring 1306, preventing the counterclockwise rotation of the inner race and key 1312 disposed therein.” (*Id.*, 27:61-64.)

One-Way Bearing Assembly

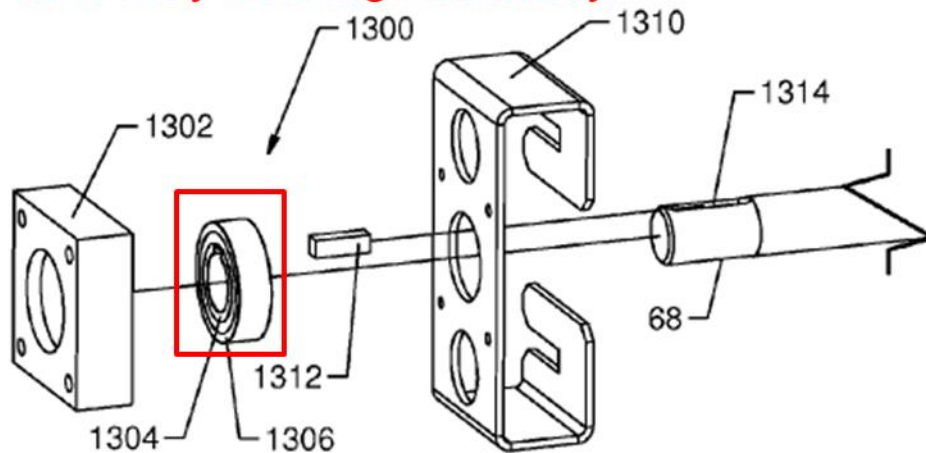


FIG. 36

‘005 Patent, Ex. 1001, Fig. 36 (Annotated)

95. Independent claims 1, 9, and 15 of the ‘005 Patent are directed to a common treadmill topology that includes a belt supported by rotatable elements, e.g., front and rear pulleys, to provide a curved running surface. The running belt is constrained by a safety device so that it moves in only one direction. Independent claim 1 is representative and reproduced below:

1. 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 running belt 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, the first element substantially surrounding the second element or the second element substantially surrounding the first element;

wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.

96. In my opinion, the technology of the challenged independent claims of the '005 Patent was old and well-known in the art by March 2009. The treadmill topology of claims 1, 9, and 15 is a straightforward treadmill with a curved running surface. This topology has existed for human exercise since at least 1917. (*See e.g., Schmidt, Ex. 1009, Fig. 1.*) The use of shaft assemblies with pulleys to support a treadmill belt is also old and well known. (*See e.g., Schonenberger, Ex. 1010, Fig. 7; Socwell, Ex. 1011, Fig. 2; Tollkien, Ex. 1031, Fig. 1.*)

97. The need to limit the motion of the treadmill belt motion for user stability and safety was also well known. (*See, e.g., Chickering, Ex. 1013, 1:24-39; Socwell, Ex. 1011, 1:28-41; ASTM Standard, Ex. 1019 at 3-4.*). Further, using

one-way clutches to limit belt motion to one direction dates back to at least 1996. (See e.g., Magid, Ex. 1012, 4:46-59, Fig. 5; Sclater, Ex. 1017, 320.) And sprag-type one-way bearings that include two race elements, where one race element “*substantially surrounds*” the other race element were well-known and/or commercially available for exercise equipment since at least 2001. (Emerson, Ex. 1018 at 52-53; Sclater, Ex. 1017, 318; Shoji, Ex. 1029; see ¶¶84-91.)

98. The dependent claims add common features, e.g., shafts (claims 2–3), one-way bearings (claims 4 and 12), bearings (claim 6, 13, and 16), a handle (claim 7), slats (claim 8) and manual operation (claim 11).

B. Priority Claim

99. It is my understanding that the ‘005 Patent is part of an extensive family of patents and pending patent applications. The ‘005 Patent claims priority to several patent applications within this large patent family. A graphic of the ‘005 Patent Family is provided below, with the ‘005 Patent highlighted in yellow and the related asserted patents shaded in gray:

PRV	61/161,027 - 17MAR2009	
PCT	PCT/US2010/027543 - 16MAR2010	
	WO2010/107840 - 23SEPT2010	
CIP	CIP - Abandoned 13/235,065 - 16SEPT2011 US2012/0010053 - 12JAN2012	
	14/243,716 - 2APRIL2014 US8,986,169	14/076,912 - 11NOV2013 US9,114,276
	14/656,942 - 13MAR2015 US9,039,580 - 26MAY2015	14/832,708-21AUG2015 US10,265,566
		15/958,339 - 20APRIL2018 US10,561,884 - 18FEB2020
		15/957,721-19APRIL2018 US10,561,883
		16/792,426 - 17FEB2020 US10,799,745 - 13OCT2020
		16/792,444-17FEB2020 US10,850,150
		17/247,101-30NOV2020 US11,465,005-11OCT2022

The '005 Patent Family

100. The earliest application filing date in the priority claim is March 17, 2009 and is associated with provisional Application No. 61/161,027 (“the ’027 Provisional Application”). The ‘005 Patent also claims priority to PCT Application No. PCT/US2010/027543 (“the PCT Application”) filed March 16, 2010, a continuation-in-part (“CIP”), U.S. Patent Application No. 13/235,065 (“the ‘065 CIP Application”) filed September 16, 2011, a continuation of U.S. patent application Ser. No. 14/832,708, filed Aug. 21, 2015, a continuation of U.S. patent application Ser. No. 15/957,721, filed Apr. 19, 2018, and a continuation of U.S. patent application Ser. No. 16/792,444, filed Feb. 17, 2020.

101. For purposes of my analysis below, I have assumed a priority date of March 17, 2009 because I understand the effective filing date of the challenged

claims is not relevant to the specific grounds of unpatentability forming the basis of this challenge.

C. File History

102. U.S. Patent Application No. 17/247,1010 was filed on November 30, 2020 with 20 claims, including independent claims 1, 10, and 17. (Ex. 1002 at 91-94.) Each independent claim included a broad “safety device” limitation. Dependent claims 9, 12, and 20 recited a more narrow “safety device” limitation, i.e., that “one of the first and second elements substantially surrounds the other of the first and second elements.”

103. On May 20, 2022 the Examiner issued a non-final office action rejecting claims 1-4, 6-7, 10-11, 13-15, and 17-18 as obvious over U.S. 3,642,279 to Cutter (Ex. 1014) and U.S. 5,538,489 to Magid (Ex. 1012); and claims 5, 16, and 19 over Cutter, Magid and U.S. 5,492,517 to Bostic. (*Id.* at 202-205.) The Examiner relied on Magid’s disclosure for satisfying the “safety device” limitations. (*Id.* at 202-203.) The Examiner also rejected claims 1-20 on the ground of nonstatutory double patenting over claims of U.S. 11,179,589; U.S. 10,850,150; U.S. 10,561,884; and U.S. 10,561,883; and indicated that dependent claims 9, 12, and 20 would be allowable if written in independent form and if the Patent Owner filed a terminal disclaimer to overcome the double patenting rejections. (*Id.*, 207-208.) On August 22, 2022 Patent Owner filed an amendment amending each

independent claim to include the allowable limitations of claims 9, 12, 20 (*id.*, 274-276), and the application proceeded to allowance. (*Id.* at 285-289.)

104. Intentionally left blank.

D. Construction of Terms in the Challenged Claims

105. I have been asked to review claims 1-4, 6-13, and 15-16.

106. In order to properly evaluate these claims, I understand that the terms of the claims must first be construed. For purposes of this declaration, I am applying the following claim constructions for my analysis regarding unpatentability:

107. Intentionally left blank.

108. I understand that the proposed construction of the term “*safety device*,” as recited in claims 1, 4 and 15 is a “device having two ring-shaped components.”

109. I understand that the proposed construction of the term “*substantially prevent*[],” as recited in claims 1, 9, and 15 is “prevent any movement after allowing no or minimal movement.”

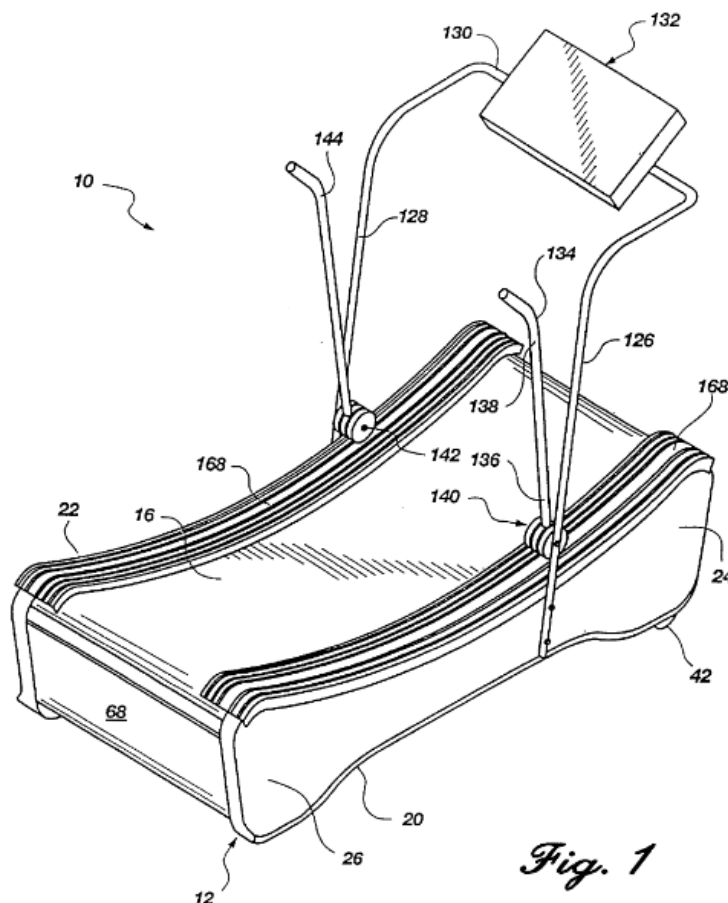
VIII. Patentability Analysis of the Challenged Claims

A. Overview of the prior art

1. U.S. Patent No. 5,897,461 (“Socwell,” Ex. 1011)

110. Socwell is a U.S. patent that issued on April 27, 1999. I understand that Socwell is prior art to all claims of the '005 Patent under 35 USC § 102(b).

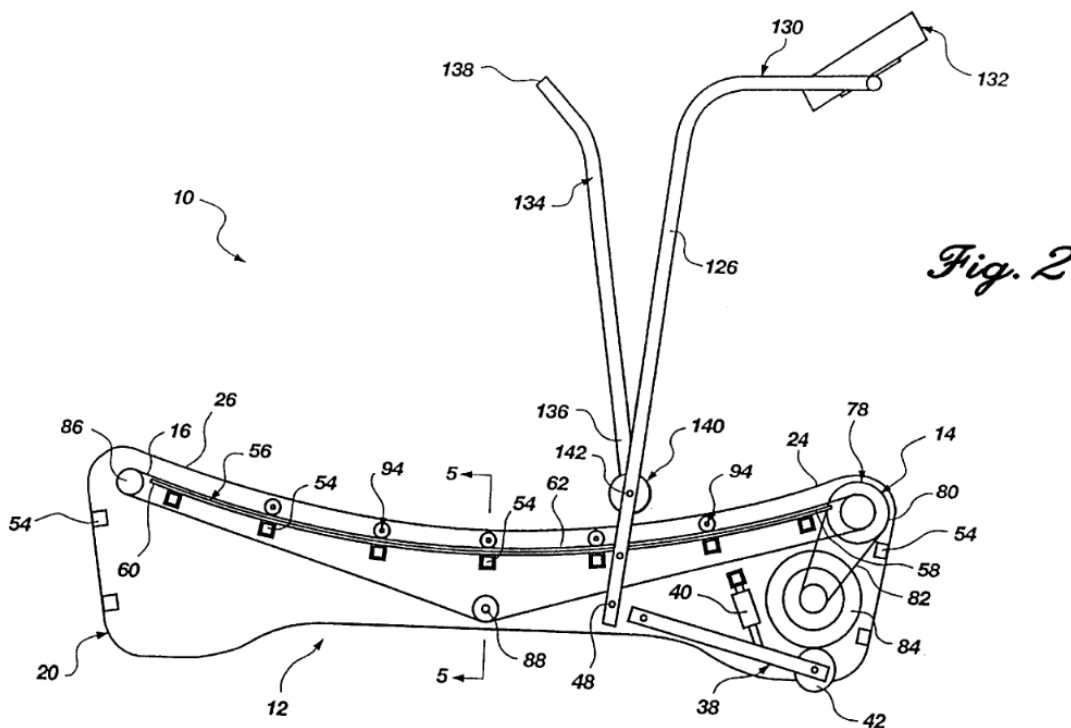
111. Socwell is directed to “exercise treadmills and, more particularly, to novel systems and methods for providing a curved deck treadmill.” (Socwell, Ex. 1011, 1:10-12.) Socwell discloses a manual, curved treadmill having a belt that forms the running surface. (Socwell, Ex. 1011, 11:53-61.)



Socwell, Ex. 1011, Fig. 1

112. The belt is looped around front and rear rollers, is supported from beneath by a curved deck, and is maintained in the curved shape by upper rollers

positioned longitudinally along the left and right sides of the belt. (Socwell, Ex. 1011, 3:30-36, 5:20-45, 7:31-42, 10:17-31.) The rollers are arranged curvilinearly to match the curvature of the deck.



Socwell, Ex. 1011, Fig. 2

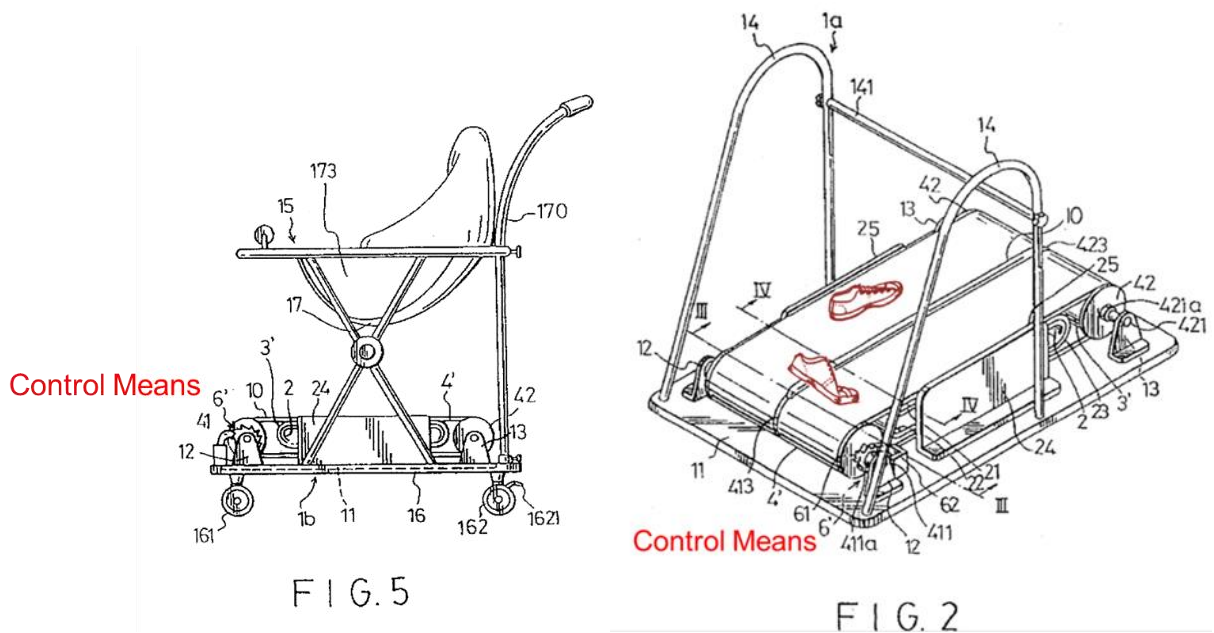
113. The bearings are mounted to their respective side of the frame by secondary supports that are elongate and extend longitudinally. The secondary supports are bolted to the frame. (Socwell, Ex. 1011, 10:49-60, 11:15-33.)

114. Socwell discloses support feet used for changing an inclination of the running surface. The support feet are pivotal relative to the frame to adjust the height and include wheels. (Socwell, Ex. 1011, 9:29-56.)

2. U.S. Patent No. 5,538,489 (“Magid,” Ex. 1012)

115. Magid is a U.S. patent that issued on July 23, 1996. I understand that Magid is prior art to all claims of the '005 Patent under 35 USC § 102(b).

116. Magid discloses a manual treadmill with a belt that is supported by a plurality of rollers or a flat bearing surface. (Magid, Ex. 1012, Figs., 8, 1.) Magid also discloses a one-way clutch that is coupled to a front shaft or a rear shaft to permit only unidirectional movement of the belt. (Magid, Ex. 1012, Fig. 5, 4:46-59.)



Magid, Ex. 1012, Figs. 5, 2 (Annotated)

3. Neil Sclater and Nicholas P. Chironis, Mechanisms & Mechanical Devices Sourcebook, Third Ed., (McGraw-Hill 2001) (“Sclater,” Ex. 1017)

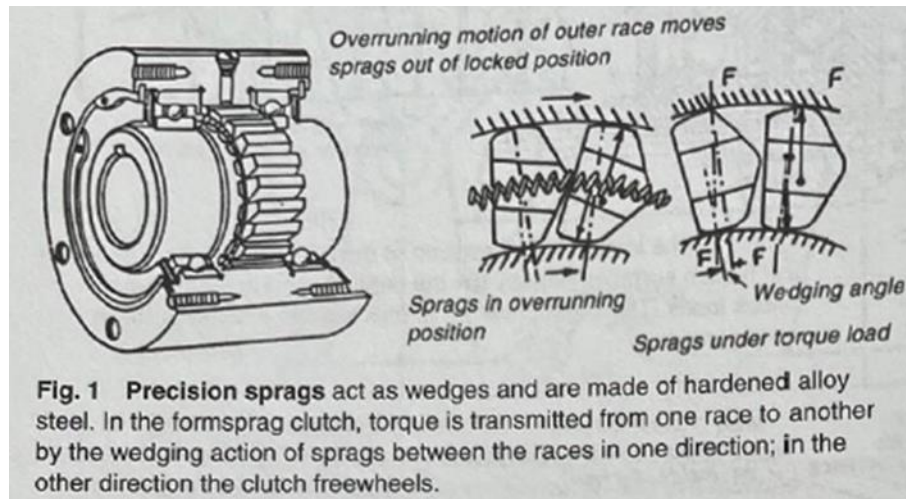
117. Sclater is a reference sourcebook that published in 2001. I understand that Sclater is prior art to all claims of the '005 Patent under 35 USC § 102(b).

118. Sclater is a reference sourcebook that “contains drawings and descriptions of more than 2000 different mechanisms and mechanical devices that have proven themselves in modern products, machines, and systems.” (Sclater, Ex. 1017 at 24, Back Cover.) Neil Sclater explains Ex. 1017 as a book of “different solutions to machine design problems”:

Readers trying to arrive at new and different solutions for machine design problems can thumb through these pages, study their many illustrations, and consider adapting some of the successful mechanical inventions of the past to their new applications. Thus, proven solutions from the past can be recycled to perform new duties in the present. An old invention might be transferred without modification, or perhaps it could be improved if made from newer materials by newer manufacturing methods. What is old can be new again!

(Sclater, Ex.1017, Preface xii.)

119. Sclater describes different types of coupling, clutching, and braking devices in Chapter 9, including ratchet clutches and one-way bearing assemblies that include sprags, to solve various design problems. (Sclater, Ex. 1017 at 311-312.)



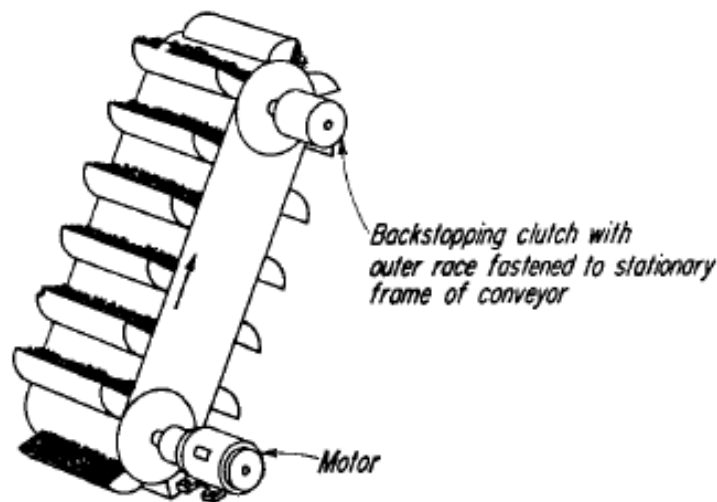
Sclater, Ex. 1017 at 318

120. Sclater also discloses some of the deficiencies of pawl and ratchet clutches as compared to overrunning roller and friction type clutches, including noise and speed limitations. (Sclater, Ex. 1017 at 302-303, 316.) Sclater further describes multiple “Applications for Sprag-Type Clutches” or overrunning sprag clutches, including back stopping:

Overrunning sprag clutches transmit torque in one direction and reduce speed, rest, hold, or free-wheel in the reverse direction. Applications include overrunning, back stopping and indexing. Their selection—similar to other mechanical devices—requires a review of the torque to be transmitted, overrunning speed, type of lubrication, mounting characteristics, environmental conditions, and shock conditions that might be encountered.

(Sclater, Ex. 1017 at 320.)

121. Sclater illustrates a back stopping mode of operation for a conveyor using a sprag clutch in which the outer race is fixed to the frame using a torque arm:



Sclater, Ex. 1017, Fig. 2 on pg. 320

Fig. 2 Backstopping permits rotation in one direction only. The clutch serves as a counter-rotation holding device. An example is a clutch mounted on the headshaft of a **conveyor**. The outer race is restrained by torque-arming the stationary frame of the conveyor.

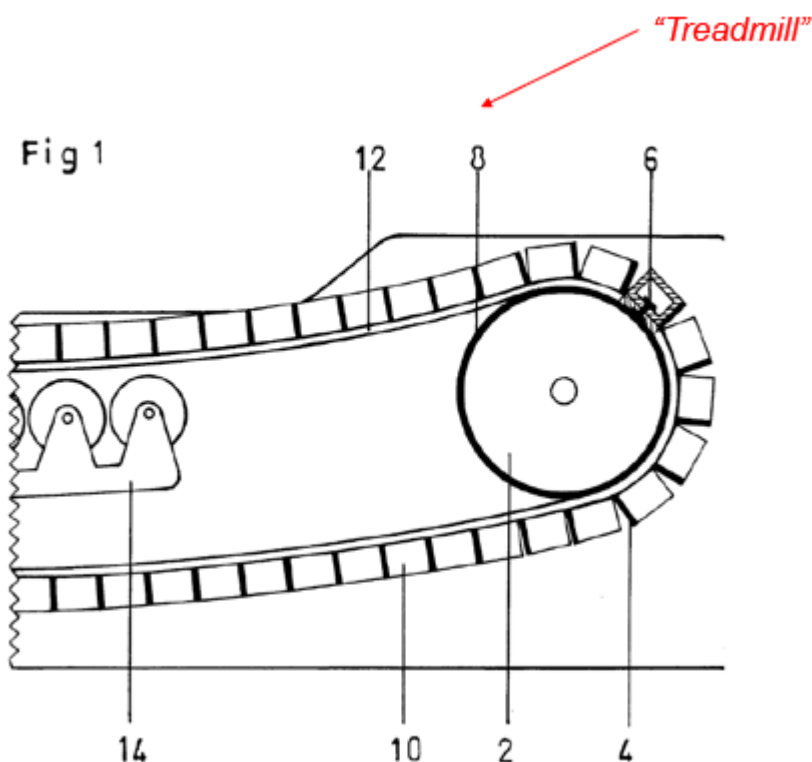
(Sclater, Ex. 1017 at 320.)

4. DE Patent No. 199 22 822 B4 (“Tollkien,” Ex. 1031)

122. Tollkien is a German Patent that issued on July 15, 2004. I understand that Tollkien is prior art to all claims of the ‘005 Patent under 35 USC § 102(b).

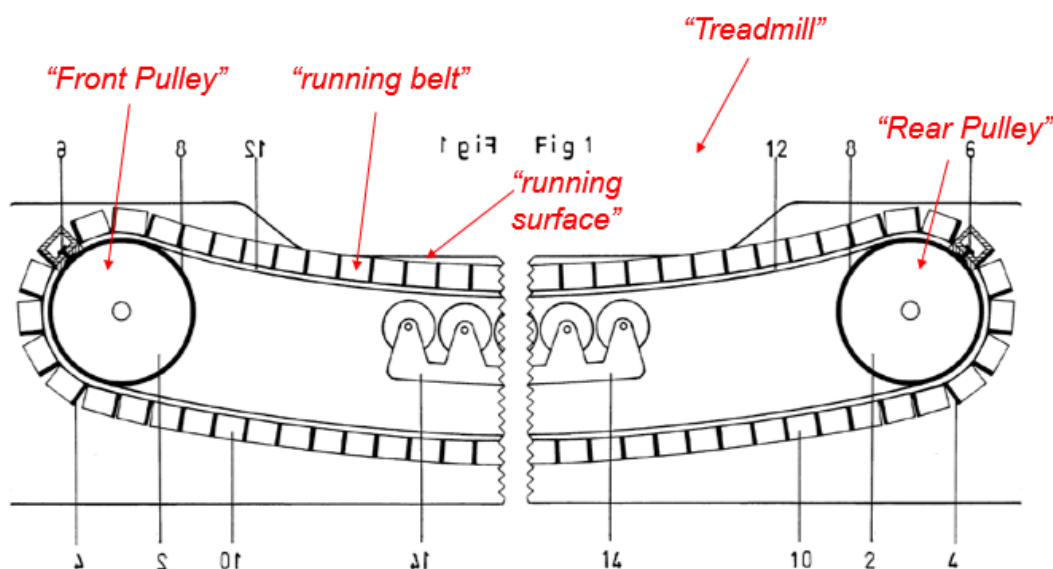
123. Tollkien discloses “A treadmill for fitness training with a running surface formed between two rollers (2).” (Ex. 1031, Abstract.) Tollkien discloses

that the “treadmill is powered by either a motor or the user,” i.e., “*manually powered*” (Ex. 1031, [0002].) With reference to Figure 1, Tollkien discloses “a side view of part of a treadmill without a motor.” (Ex. 1031, [0018]).



Ex. 1031, Fig. 1 (Annotated)

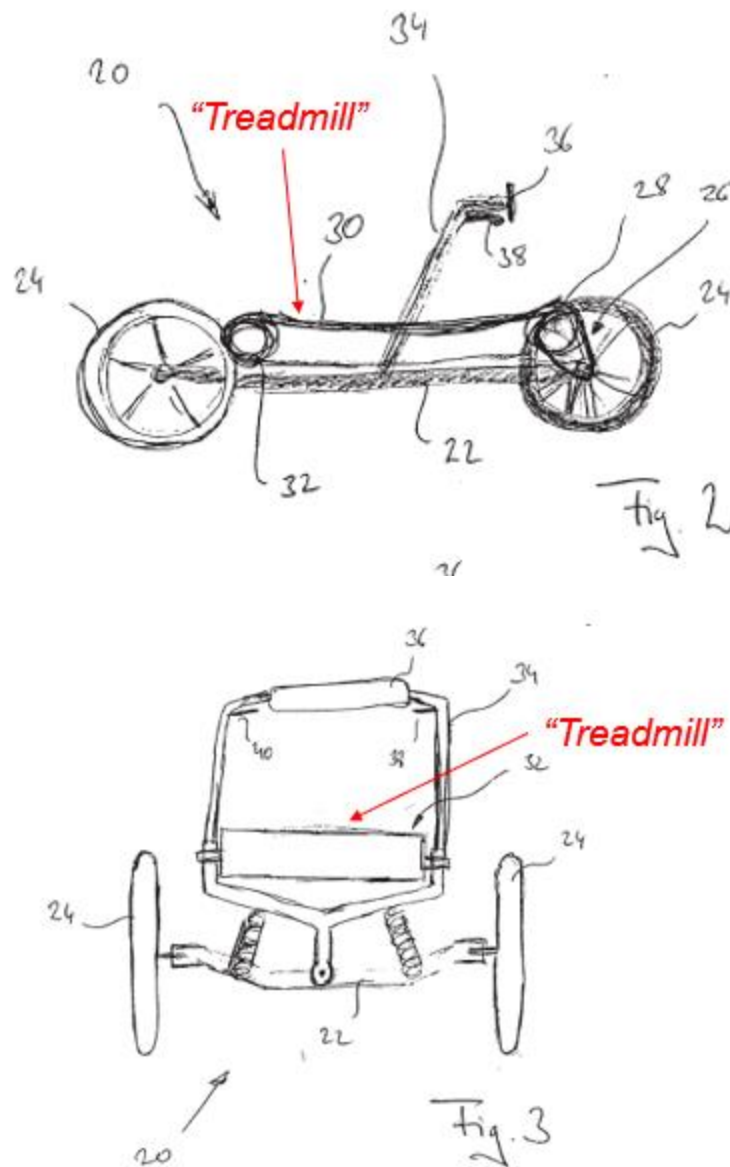
124. Tollkien discloses “A treadmill for fitness training with a running surface formed between two rollers (2).” (Ex. 1031, Abstract.) Tollkien discloses a continuous belt 12 that is wrapped around the front and rear rollers and supported in the middle by runners 14. (Ex. 1031, [0018]–[0020].)



Ex. 1031, Fig. 1 (Annotated)

125. Tollkien discloses that the curving radius of its curved running surface “can be adjusted.” (Ex. 1031, [0008].) Tollkien describes Socwell in its prior art section as a treadmill “that has a curved running surface” however the “curving radius is not adjustable.” (Ex. 1031, [0005].)

126. Tollkien further discloses integrating the treadmill with a vehicle 20 in which a user propels the vehicle by running on the belt 30. (Ex. 1031, [0022]-[0023]).



Tollkien, Ex. 1031, Figs. 2 and 3

127. Intentionally left blank.

128. Intentionally left blank.

IX. Grounds for Challenge

A. Ground 1 – Claims 1–4, 6–7, 9-13 and 15–16 are obvious over Socwell, Magid, and Sclater

1. Rationale to Combine Socwell with Magid

129. It would have been obvious to a POSA to combine the manual treadmill topology with a curved running surface disclosed in Socwell with the known technique of a one-way clutch to prevent treadmill belt motion in a forward direction as disclosed in Magid.

130. Socwell and Magid are from the same field—Exercise Equipment, more specifically treadmills for home exercise use. (Socwell, Ex. 1011, 1:10-12; Magid, Ex. 1012, 1:53-56; 3:23-27.) Both Socwell and Magid disclose treadmills with a running belt that is supported by end rollers and a deck. (Socwell, Ex. 1011, 5:33-44; 8:7-27, Fig. 3; Magid, Ex. 1012, 4:64-5:18, Fig. 2.) Socwell discloses a curved deck 56 and rollers 98 that cooperate to place the belt 16 in a curved shape. (Socwell, Ex. 1011, 10:5-31, Fig. 2.)

131. It has long been recognized that users may be injured by falling off a treadmill while mounting or dismounting, or during use. This may be due to the treadmill belt moving in an unexpected direction or in such a way that the user cannot regain their equilibrium. It could also be due to the incline of the surface causing the position of user to drift rearwards, and off, over time. (See ¶¶71-72.)

A person exercising on this type of 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. Also, the user is likely to run off the

lower end of the treadmill because the faster he runs the faster the belt accelerates and moves beneath his feet, carrying him to the rear.

(Chickering, Ex. 1013, 1:30-37.)

In particular, if the rollers supportably disposed in relation to the endless belt are so easily moveable, the user may potentially lose his equilibrium or balance and fall from the exercise treadmill resulting in possible injuries.

(Socwell, Ex. 1011, 1:32-36.)

Another meaningful disadvantage of exercise treadmills of the prior art is the inherent danger associated with users tending to fall off the back end of the treadmill and become injured.

(Socwell, Ex. 1011, 2:45-48.)

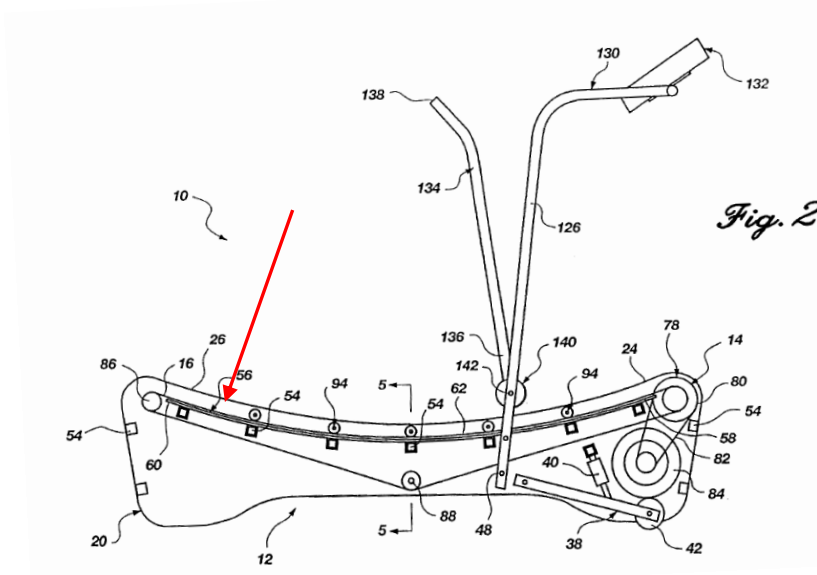
132. Several professional organizations have produced standards to provide guidance to manufacturers regarding both exercise equipment safety in general and other standards specifically for treadmill safety. See ASTM Standard, Ex. 1019; ISO Standard, Ex. 1020; and ACCC Product Safety Supplier Guide, Ex. 1007. These standards establish requirements for foot rails and handrails on treadmills to address user stability and safety. (ASTM Standard, Ex. 1019, 3-4; ISO Standard, Ex. 1020, 8.)

133. Socwell recognizes that it is difficult to stabilize the running belt in manual treadmills. According to Socwell, it is difficult to balance the frictional and inertial qualities of belt supporting devices. (Socwell, Ex. 1011, 1:30-56.) Socwell

describes motorization as the prior-art solution to the problem of balancing these qualities (Socwell, Ex. 1011, 1:57-67.)

134. Rather than relying on a motor, Socwell discloses calibrating the rollers and deck to provide optimal frictional resistance of the belt to ensure safety while providing proper resistance for to exercising. (Socwell, Ex. 1011, 11:56-61.) Socwell explains that the curved running surface prevents a user from falling off the back. (Socwell, Ex. 1011, 3:40-45.)

135. Socwell's curved running surface does not fully address the safety issue of the running belt moving in a forward direction when a user steps onto the treadmill. For example, with a manual curved running surface, such as that disclosed in Socwell, belt motion, in the opposite direction of travel, is likely to occur if a user were to step onto the rearward end of the running surface (indicated by the red arrow in the figure below), causing the foot to unexpectedly move towards the lowest portion of the treadmill. In the condition where the user adjusts the frame to a generally horizontal position using the front elevating mechanism, as depicted in the image below, this unexpected motion would be exacerbated and could result in a fall.



Socwell, Ex. 1011, Fig. 2. (Annotated)

136. Magid discloses a one-way clutch (control means 6, 6') that is coupled to a front shaft (Fig. 5) or a rear shaft (Fig. 2) to permit only unidirectional movement of the belt. (Magid, Ex. 1012, Fig. 5, 4:46-60.)

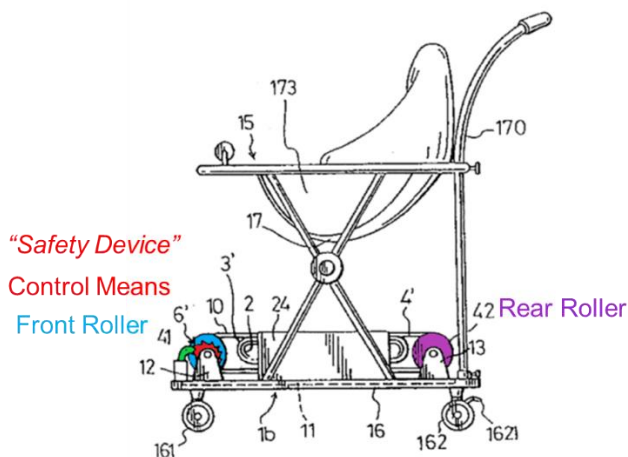


FIG. 5

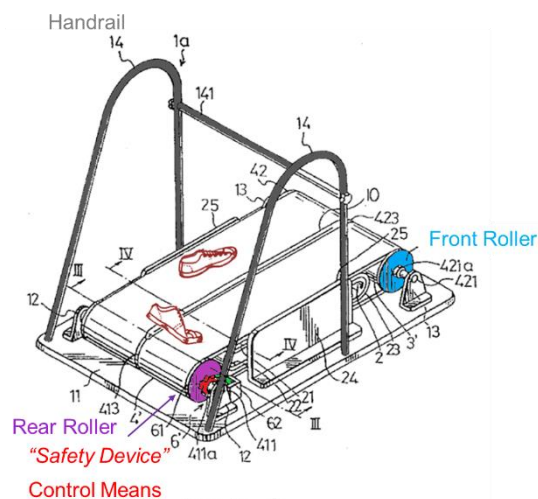


FIG. 2

Magid, Ex. 1012, Figs. 5 and 2 (Annotated)

137. It would have been obvious to a POSA to combine Socwell's treadmill with Magid's control means to permit only unidirectional movement of the running belt to reduce the risk of a user stepping onto the running belt of the treadmill and losing their balance when the belt moves in the forward direction.

138. Accordingly, a POSA would have been motivated to modify Socwell to include Magid's control means mounted to the front roller or the rear roller as discussed above. For example, the ratchet gear 62 would be mounted coaxially with the roller 86 (or roller 78) and the pawl 61 would be rotationally attached to the frame 12. As modified, the ratchet gear 62 would be supported by the journal housing 34 at least through the roller 86 and the control means 6/6' would be coupled to the belt 16 via the roller 86. Thus, the control means (*"safety device"*) is at least partially supported by the journal housing.

139. This modification would have been a simple combination of known elements in the prior art: Socwell's manual treadmill with a curved running surface and Magid's one-way ratchet clutch. The pawl is arranged forward of the ratchet gear and biased to engage the gear teeth. The profile of the ratchet gear teeth is swept forward to yield predictable results: allowing the ratchet gear to overrun counter-clockwise with rearward motion of the belt and providing a backstop clockwise to prevent forward motion of the belt. (See ¶¶82-83.)

140. The one-way clutch of Magid would function the same when added to Socwell and provide the predictable result of permitting only unidirectional motion of Socwell's running belt in the exercise direction thus providing the same benefit described in Magid. (Magid, Ex. 1012, 4:46-59.) The modification would also be the use of a known technique—using a one-way clutch in a backstopping mode of operation—to improve similar devices, i.e., treadmills and conveyor belts, in the same way, i.e., to provide unidirectional belt motion. (See ¶¶82-83, 89-90; Emerson, Ex. 1018 at 8-9, 52-53; Sclater, Ex. 1017 at 320.)

2. Rationale to Combine Socwell and Magid with Sclater

141. A POSA would have been further motivated to substitute Sclater's one-way sprag-type bearing assembly for Magid's ratchet-and-pawl one-way clutch mechanism to obtain predictable results, e.g., reduced noise and improved durability, while maintaining the backstopping functionality and resultant safety benefits of Magid. Magid describes its “unidirectional control means 6, 6'” as including “a pair of ratchet gears 61 . . . and a pair of pawls 62” in an “embodiment.” (Ex. 1012, 4:47–55.) This suggests that that the unidirectional control means 6 6' could be a unidirectional control mechanism other than the ratchet and pawl in another embodiment. For example, Magid states that:

While the present invention has been described in connection with what is considered the most practical and preferred embodiments, it is understood that this invention is not limited to the disclosed

embodiments but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all such modifications and equivalent arrangements.

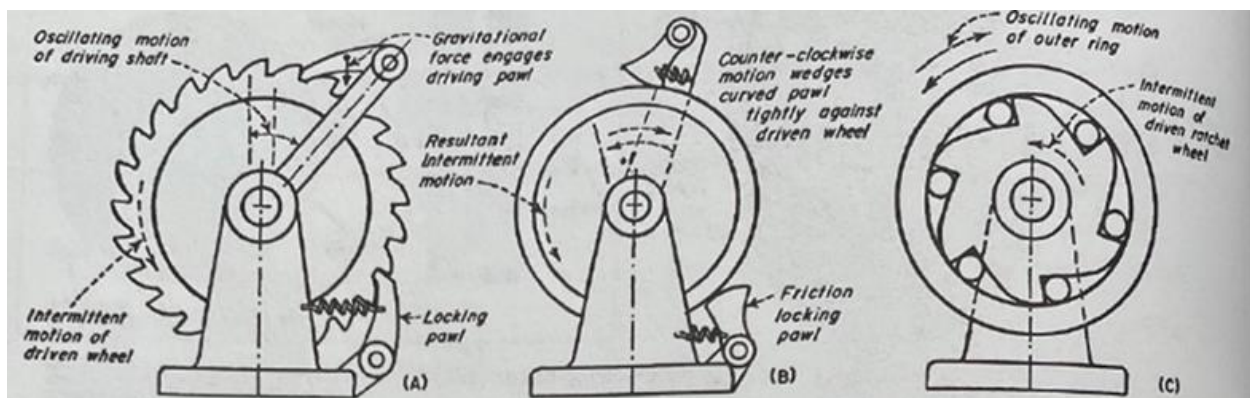
(Magid, Ex. 1012, 7:61–67.)

142. Sclater is a reference sourcebook that “contains drawings and descriptions of more than 2000 different mechanisms and mechanical devices that have proven themselves in modern products, machines, and systems.” (Sclater, Ex. 1017 at 24, Back Cover.) Neil Sclater describes Ex. 1017 as a book of “different solutions to machine design problems.” (Sclater, Ex.1017, Preface xii.)

143. Sclater describes different types of coupling, clutching, and braking devices in Chapter 9 to solve various design problems. (Sclater, Ex. 1017 at 311-312.) For example, ratchet-and-pawl clutch mechanisms make noise during operation. The pawl is spring-loaded to engage each gear tooth of the ratchet and it would make an audible “click” when colliding with the gear tooth root after overrunning or passing over each tooth. A POSA would have been aware that a quiet device is more desirable and would have been aware of this noise from other common ratchet clutches, such as those included in a ratchet wrench, a bicycle wheel, and an automotive parking brake and consulted Sclater for a solution to this noise problem. Sclater acknowledges that a “friction-type clutch” is quieter than a ratchet-type clutch:

Fig. 1 Elementary overriding clutches: (A) A ratchet and pawl mechanism converts reciprocating or oscillating movement to intermittent rotary motion. This motion is positive but limited to a multiple of the tooth pitch. (B) A friction-type clutch is quieter, but it requires a spring device to keep the eccentric pawl in constant engagement. (C) Balls or rollers replace the pawls in this device. Motion of the outer race wedges the rollers against the inclined surfaces of the ratchet wheel.

(Sclater, Ex. 1017 at 316.)



Sclater, Ex. 1017 at 316

144. Sclater further discloses that roller clutches are better suited for high-speed freewheeling than pawl-and-ratchet clutches. This is because the pawl may skip past a few teeth before backstopping the ratchet gear, whereas the sprags are always in contact with the races and do not need to find a discrete gear tooth to engage. Additionally, because there are multiple sprags, they distribute the load over a larger surface area:

Fig. 9 Cam and Roller Clutch: **This over-running clutch is better suited for higher-speed free-wheeling than a pawl-and-ratchet clutch.** The inner driving member has cam surfaces on its outer rim that hold light springs that force the rollers to wedge between the cam surfaces and the inner cylindrical face of the driven member. While driving, friction rather than springs force the rollers to wedge tightly between the members to provide positive clockwise drive. The springs ensure fast clutching action. If the driven member should begin to run ahead of the driver, friction will force the rollers out of their tightly wedged positions and the clutch will slip.

(Sclater, Ex. 1017 at 303.)

Overrunning sprag clutches transmit torque in one direction and reduce speed, rest, hold, or free-wheel in the reverse direction. Applications include overrunning, back stopping and indexing. Their selection – similar to other mechanical devices – requires a review of the torque to be transmitted, overrunning speed, type of lubrication, mounting characteristics, environmental conditions, and shock conditions that might be encountered.

(Sclater, Ex. 1017 at 320.)

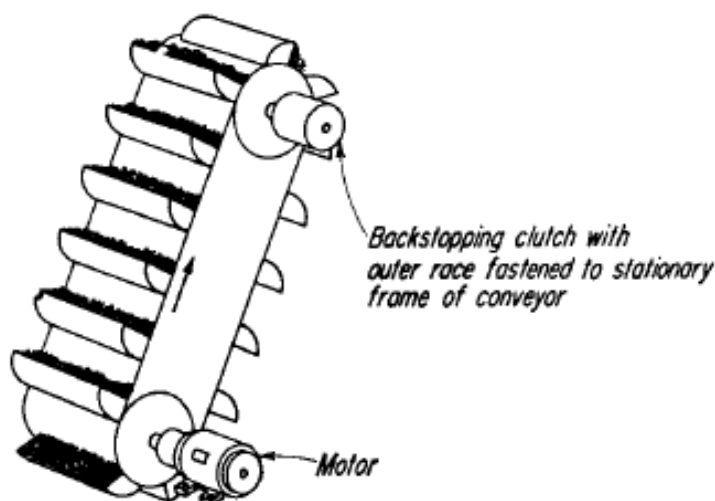
145. Sclater further describes multiple “Applications for Sprag-Type Clutches” including back stopping:

Overrunning sprag clutches transmit torque in one direction and reduce speed, rest, hold, or free-wheel in the reverse direction. Applications include overrunning, back stopping and indexing. Their selection—similar to other mechanical devices—requires a review of

the torque to be transmitted, overrunning speed, type of lubrication, mounting characteristics, environmental conditions, and shock conditions that might be encountered.

(Sclater, Ex. 1017 at 320.)

146. Sclater illustrates a back stopping mode of operation for a conveyor using a one-way bearing in which the outer race is fixed to the frame using a torque arm:



Sclater, Ex. 1017, Fig. 2 on pg. 320

Fig. 2 Backstopping permits rotation in one direction only. The clutch serves as a counter-rotation holding device. An example is a clutch mounted on the headshaft of a **conveyor**. The outer race is restrained by torque-arming the stationary frame of the conveyor.

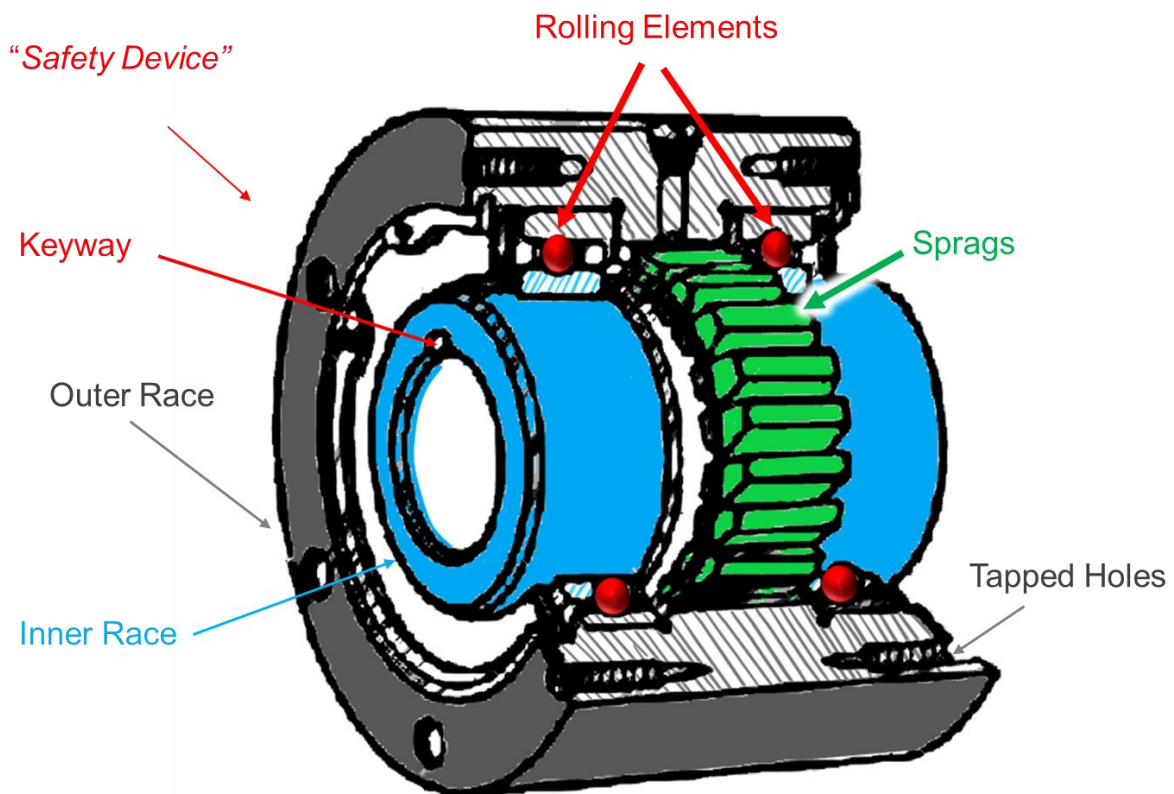
(Sclater, Ex. 1017 at 320.)

147. A POSA would have understood conveyers and treadmills operate the same. Accordingly, a POSA would have considered a sprag-type one-way clutch

bearing for an exercise equipment application, such as a treadmill having a belt that functions like the belt of a conveyor. For example, Emerson is a bearing catalog from 2001 that marketed sprag-type bearings. Emerson describes its NSS Series sprag type one-way clutch as an option for multiple “Field Applications,” including “Exercise equipment,” “Food processing equipment,” “Printing presses,” and “Roll conveyors.” (Ex. 1018 at 52-53.)

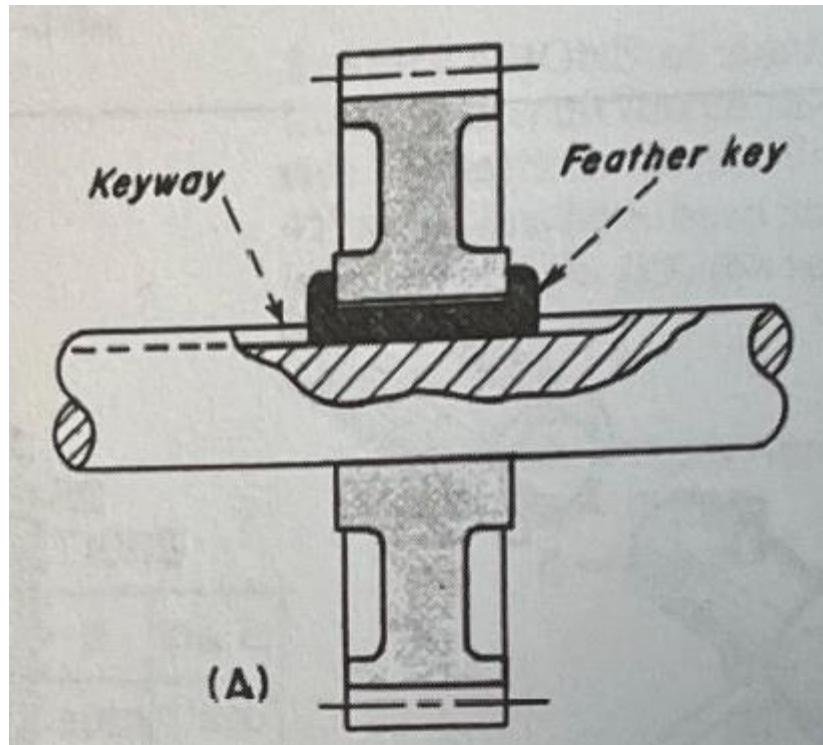
148. A POSA would have known how to replace Magid’s control means with Sclater’s one-way bearing assembly. For example, the outer race would be fixed to the frame 12 either directly or through one or more intermediaries, e.g., a bracket, the journal housing 34, or support element, as Sclater described with reference to the conveyor application “The outer race is restrained by torque-arming the stationary frame of the conveyor.” (Sclater, Ex. 1017 at 320.) Emerson describes examples of off-the-shelf, commercially available brackets or torque arms. (See Ex. 1018, 38-43.) Other traditional methods also exist to restrain the outer race, such as using an interference fit with a housing (or other support structure) or a keyway on the outer race as well.

149. Sclater illustrates below that the outer race includes tapped holes for receiving fasteners for mounting the one-way bearing to a support structure:



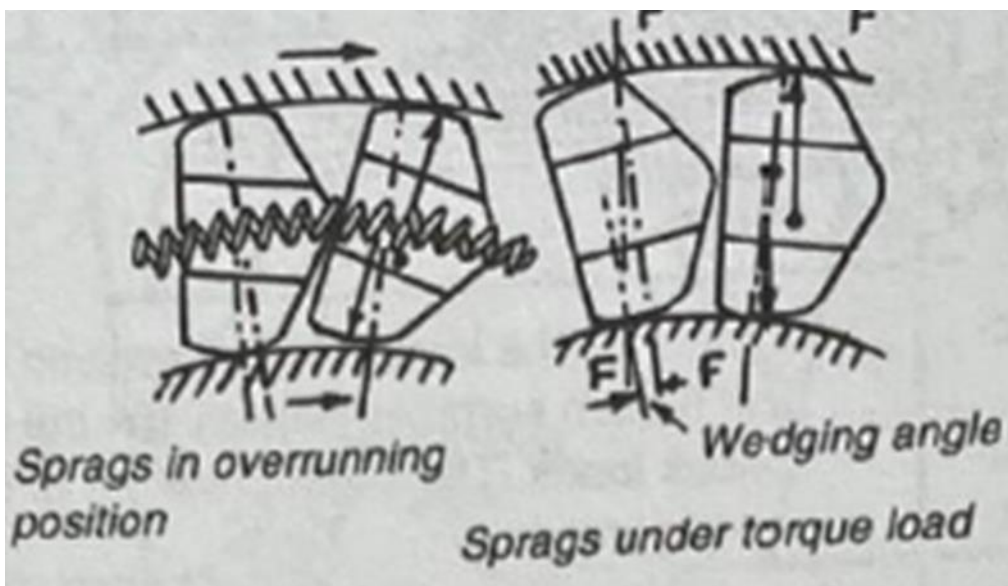
Sclater, Ex. 1017 at 318 (Annotated)

150. The inner race of the one-way bearing would be secured to the front roller or rear roller, e.g., with a traditional key/keyway interface, such as that disclosed by Sclater:



Sclater, Ex. 1017 at 420

151. With this arrangement, rearward motion of the endless belt 16 would rotate the front/rear roller and inner race so that the inner race would overrun and move the sprags out of the locked position. However, forward motion of the endless belt 16 would rotate the inner race in the opposite direction and wedge the sprags into the locked position to backstop and prevent forward motion, i.e., rotation, of the belt 16.



Sclater, Ex. 1017 at 318

3. Independent Claim 1

152. I have given each of the limitations of claim 1 a unique numerical identifier, as shown in the chart below:

U.S. Patent No. 11,464,005	
[1.0]	A manually powered treadmill, comprising:
[1.1]	a frame;
[1.2]	at least one front running belt pulley coupled to the frame;
[1.3]	at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;
[1.4]	a running belt 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;

[1.5] a safety device coupled to the frame and the running belt, the safety device having a first element and a second element, the first element substantially surrounding the second element or the second element substantially surrounding the first element;

[1.6] wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.

... **[1.0] A manually powered treadmill, comprising:**

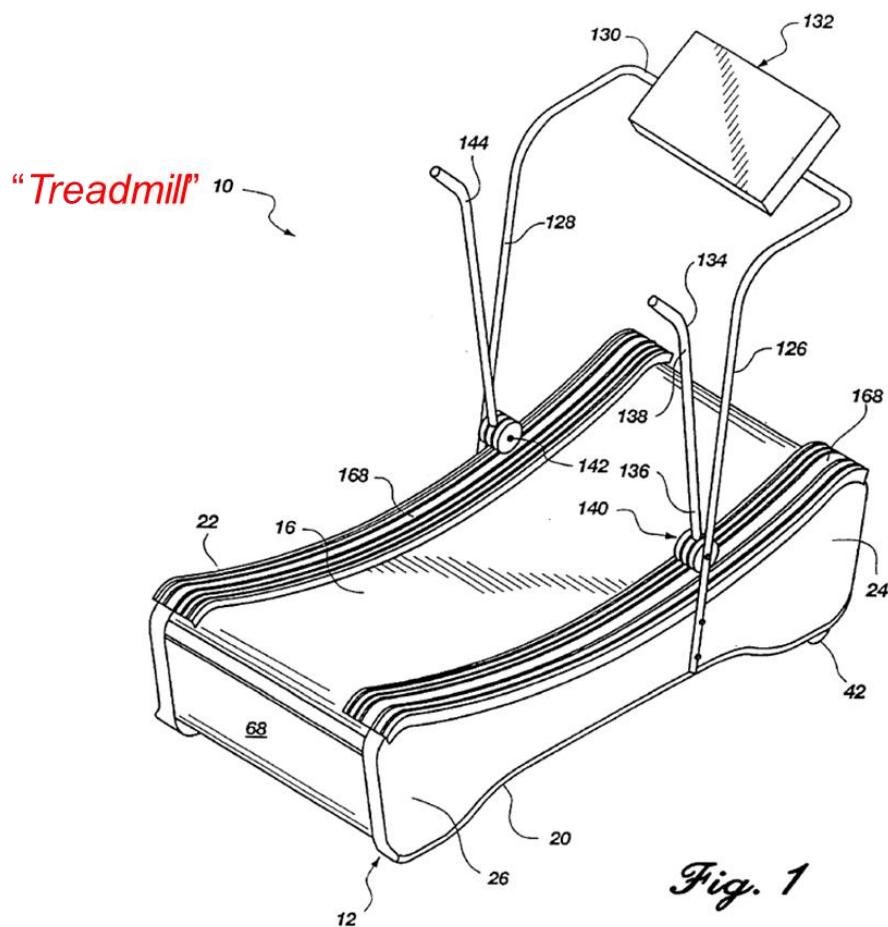
153. Socwell discloses a treadmill 10. (Socwell, Ex. 1011, Abstract.) Socwell explains it “is a primary object of the present invention to provide a novel curved deck treadmill which provides a structurally supported arcuate shaped, movable surface on which a user may exercise.” (Socwell, Ex. 1011, 3:26-29.) Socwell discloses that the treadmill 10 may be powered by a drive means 84, e.g., an electric motor, or, alternatively, manually driven:

In one presently preferred embodiment of the present invention, a driving means 84 is operably connected to at least one roller to enable the rotation of the belt 16. The driving means 84 preferably comprises a conventional electric motor for rotating the belt 16.

(Socwell, Ex. 1011, 11:34-38.)

[T]he curved deck treadmill 10 . . . **may be implemented without a driving means** engagably disposed to a roller in order to facilitate the forced rotation of the belt 16. If so implemented, the rollers 78, 86 and 88 and the deck 56 should be generally calibrated in relation to the belt to provide an optional frictional resistance to enable the user to safely walk, jog, and/or run thereon, while still providing sufficient resistance to enable a user to exercise.

(Socwell, Ex. 1011, 11:53-61.)



Socwell, Ex. 1011, Fig. 1 (Annotated)

154. Thus, Socwell discloses “*A manually powered treadmill.*”

... **[1.1] a frame;**

155. Socwell discloses, “the curved deck treadmill 10 comprises **a support frame 12** having a first side 20 and a second opposing side 22 and having a deck 56 supportably disposed therebetween.” (Socwell, Ex. 1011, 5:23-26; Fig. 1.) “The first side 20 of the support frame 12 includes a first end 24 and a second opposing end 26.” (Socwell, Ex. 1011, 6:23-25.) The second side 22 is the same as the first side. (Socwell, Ex. 1011, 9:57-65.)



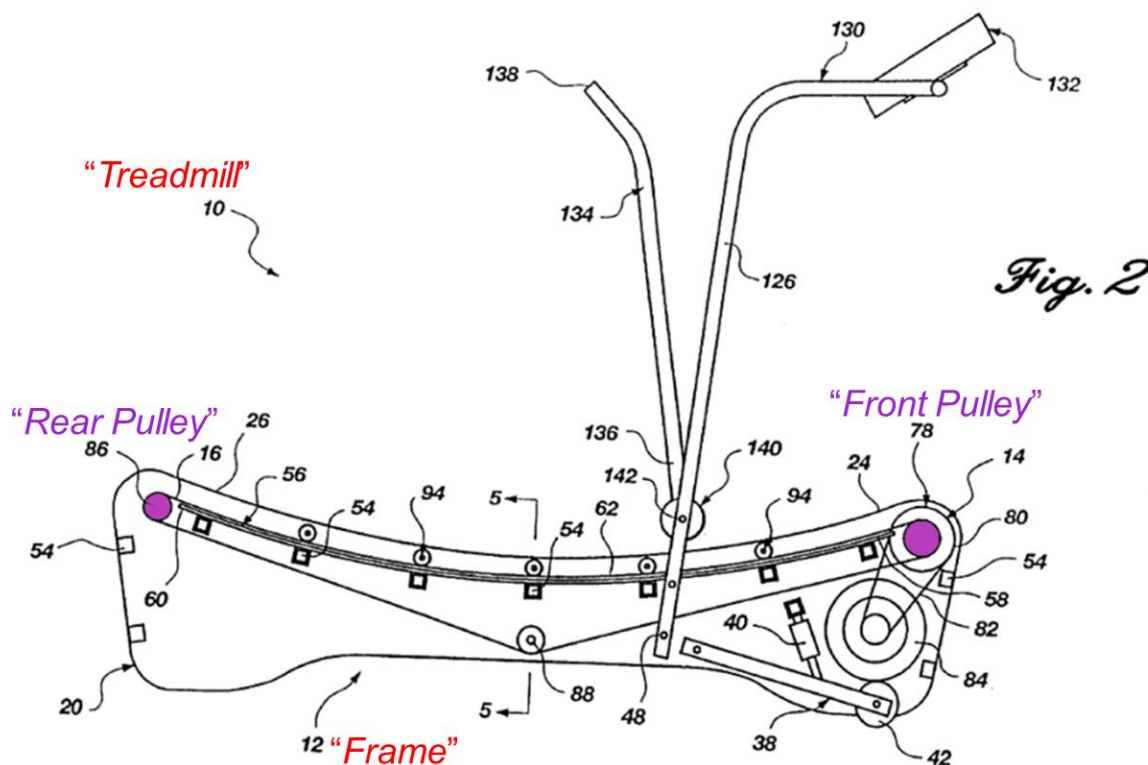
... [1.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;

LIFECORE EX. 1003

roller 86:

Further, a **roller assembly 14** is provided preferably comprising a **first and second roller 78, 86**. The **first roller 78** may be rotatably disposed contiguous the first end 58 of the deck 56 between the first side 20 and the second opposing side 22 of the support frame 12. Correspondingly similar in construction and design, a **second roller 86** is preferably disposed contiguous the second end 60 of the deck 56 between the first and second sides 20, 22 of the support frame 12.

(Socwell, Ex. 1011, 5:33-41.)



Socwell, Ex. 1011, Fig. 2 (Annotated)

158. Since the rollers 78, 86 transmit power to each other and to other components such as the third roller 88 by means of a belt 16 passing over their outer rims, a POSA would have understood the rollers to be “*pulley[s]*.” The first roller 78 is located at the front end of the treadmill 10 and is a “*front running belt pulley*.” Similarly, the second roller 86 is located at the rear end of the treadmill 10 and is a “*rear running belt pulley*.”

159. The rollers 78, 86 extend transversely between the right and left sides frames 20, 22. The right and left sides 20, 22 of the frame include journal housings 28 and 34, e.g., slots, configured to receive the journaled ends of the rollers 78, 86 to couple the rollers to the right and left sides of the frame 20, 22.

As best illustrated in FIGS. 2 and 4, **a first journal housing 28** may be formed substantially adjacent the first end 24 of the first side 20 of the support frame 12. Preferably, **the first journal housing 28 is formed having an opening readily adapted to receive at least one journaling end (not shown) of the first roller 78**. Similarly, **a second journal housing 34** may be formed substantially adjacent the second end 26 of the first side 20 of the support frame 12 **and include an opening readily adapted to receive at least one journaling end (not shown) of the second roller 86**.

In preferred design, **the journal housings 28, 34** formed at the first and second ends 24, 26 of the first side 20 of the support frame 12, respectively, **may be formed having an opening which provides a means for facilitating the introduction of the journaling ends of**

the respective first and second rollers 78, 86. Preferably, the opening comprises an elongated slot wherein the journaling ends of the first and second rollers 78, 86 may be slidably adjusted.

(Socwell, Ex. 1011, 6:27-45.)

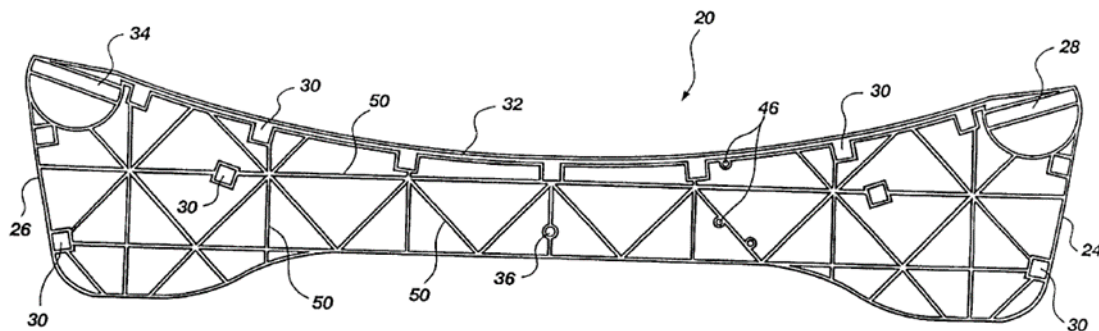


Fig. 4

Socwell, Ex. 1011, Fig. 4

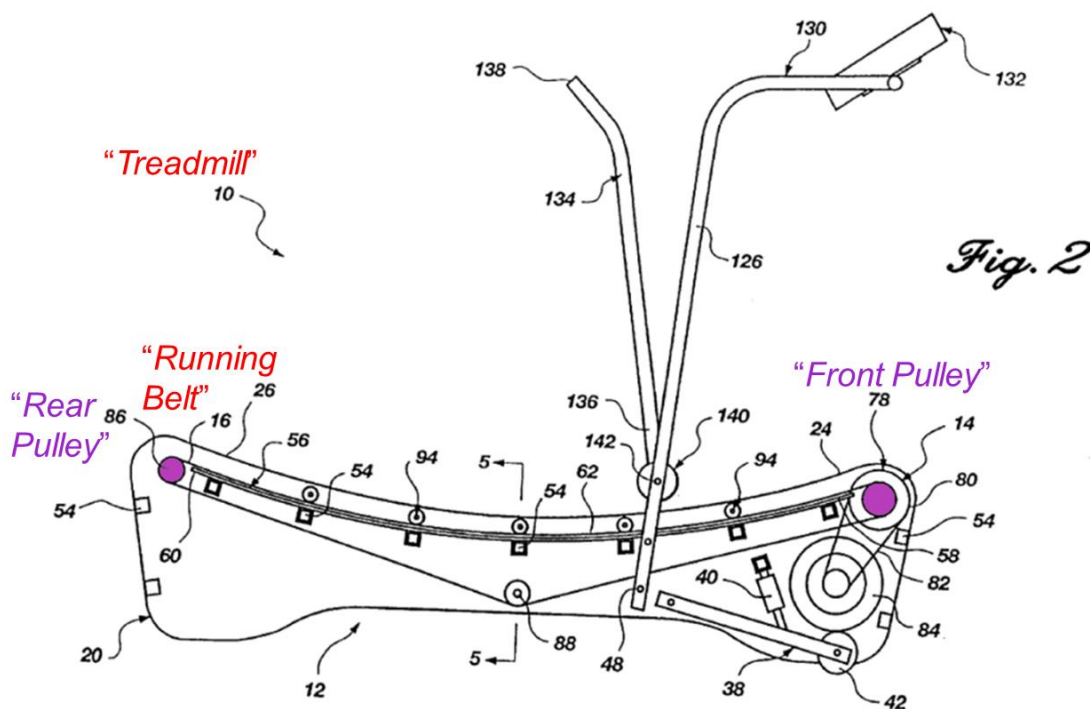
160. Thus, Socwell discloses “*at least one front running belt pulley [roller 78] coupled to the frame; at least one rear running belt pulley [roller 86] coupled to the frame and spaced a distance from the at least one front running belt pulley.*”

... [1.4] a running belt 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;

161. Socwell discloses a curved belt 16 (“running belt”) looped around the front roller 78 (“front running belt pulley”) and the rear roller 86 (“rear running belt pulley”).

In preferred operation, a belt 16 is rotatably mounted in relation to the roller assembly 14 and operatively disposed in relation to the deck 56, whereby providing a structurally supported arcuate shaped, movable surface on which a user may exercise.

(Socwell, Ex. 1011, 5:41-45.)



Socwell, Ex. 1011, Fig. 2 (Annotated)

162. Socwell discloses the curved belt 16 is secured on a curved deck 56 by the rollers 98. (Socwell, Ex. 1011, 10:17-26; Fig. 5.) The arrangement of the deck 56 and rollers 98 ensure the deck 56 “*follows a curved running surface*”:

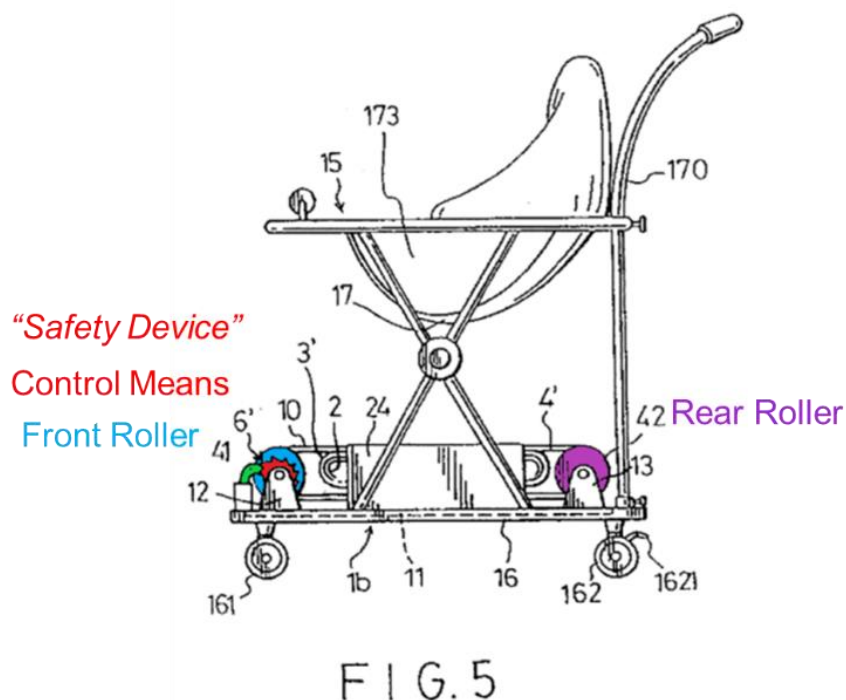
[A]n endless belt may be rotatably mounted in relation to the roller assembly and operatively disposed in relation to the deck, whereby providing a structurally supported arcuate shaped, movable surface on which a user may exercise.”

(Socwell, Ex. 1011, 4:13-18, Figs. 2-3.)

163. Thus, Sowell discloses “*a running belt [belt 16] at least partially supported by at least one of the at least one front running belt pulley [roller 78] and the at least one rear running belt pulley [roller 86], wherein the running belt includes a running surface, at least a portion of which is curved.*”

... [1.5] a safety device coupled to the frame and the running belt, the safety device having a first element and a second element, the first element substantially surrounding the second element or the second element substantially surrounding the first element;

164. Magid discloses a walker apparatus with adjacent left and right foot belts (4, 4’). (Magid, Ex. 1012, Figs. 5, 6.) Magid further discloses “A unidirectional control means 6, 6’ is installed to permit only unidirectional movement of the left and right foot belts 4, 4’.” (Magid, Ex. 1012, 4:46-49.)



Magid, Ex. 1012, Fig. 5 (Annotated)

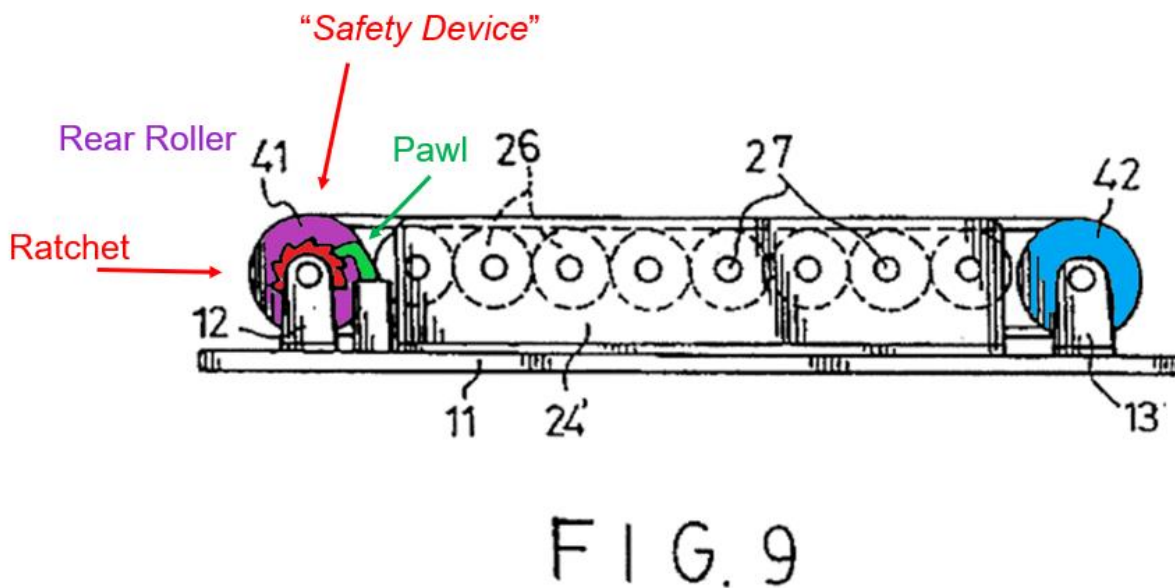
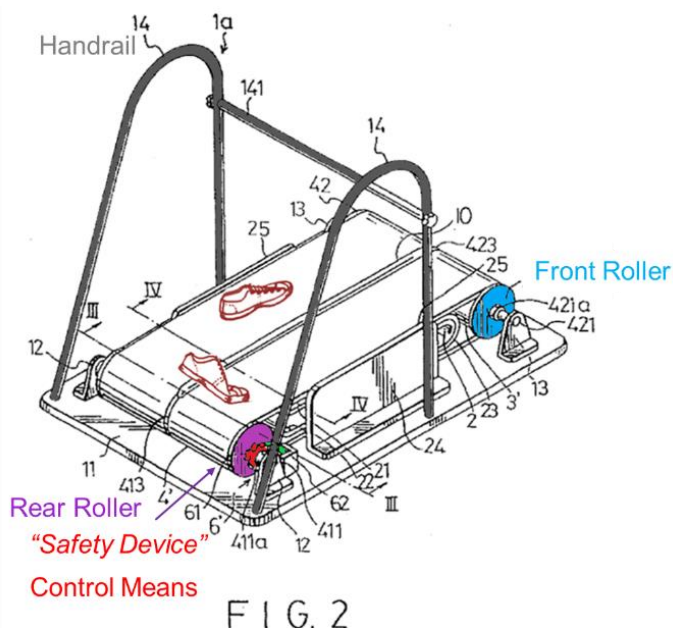
165. As shown in Figure 5, Magid discloses that the control means 6, 6' are a pair of control means attached to opposing ends of the front rollers 41. Magid also discloses that the control means 6, 6' may be attached to the rear rollers 42 and that each control means 6, 6' includes a ratchet gear 61 and a pawl 62:

A unidirectional control means 6, 6' is installed to permit only unidirectional movement of the left and right foot belts 4, 4'. In this embodiment, the control means 6, 6' includes a pair of ratchet gears 61 attached to outer ends of the front rollers 41 and mounted rotatably on the first shaft 411, and a pair of pawls 62 secured to the base 11 and engaging one of the ratchet gears 61 to permit only unidirectional rotation of the front rollers 41, thereby preventing bidirectional movement of the foot belts 4, 4'. A releasable means (not shown) may

be provided to release selectively the pawls 62 from the ratchet gears 61 in a known manner to permit reciprocating movement of the foot belts 4, 4' when desired. Of course, the ratchet gears may be attached to the rear rollers 42 to achieve the same result.

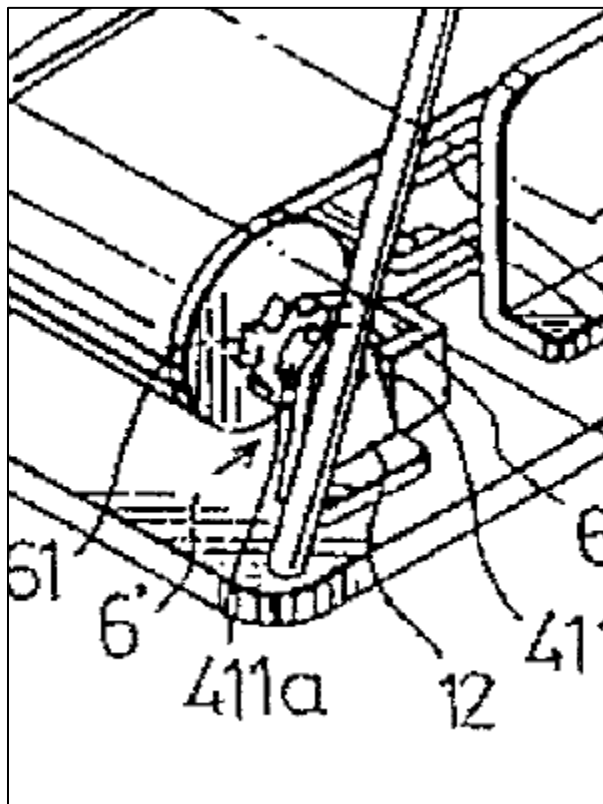
(Magid, Ex. 1012, 4:46-60.)

166. Magid illustrates the control means 6, 6' coupled to the rear rollers in Figure 2 and 9 below. Although Magid mislabels the front roller and the rear roller with the wrong reference numeral in Figures 2 and 9, a POSA would have understood, from the orientation of the handrail 14, and ratchet gear 6' depicted, that the control means 6, 6' are mounted to the rear roller. (Figure 2 of Magid is annotated to include a user's feet to further illustrate front and rear rollers of the treadmill.)



Magid, Ex. 1012, Figs. 2, 9 (Annotated)

167. Additionally, the gear profile of the ratchet and orientation of the pawl in Figures 2 and 9 would prevent the rear roller from rotating clockwise, which corresponds with the belt being blocked from moving to the right on the page, or forward.



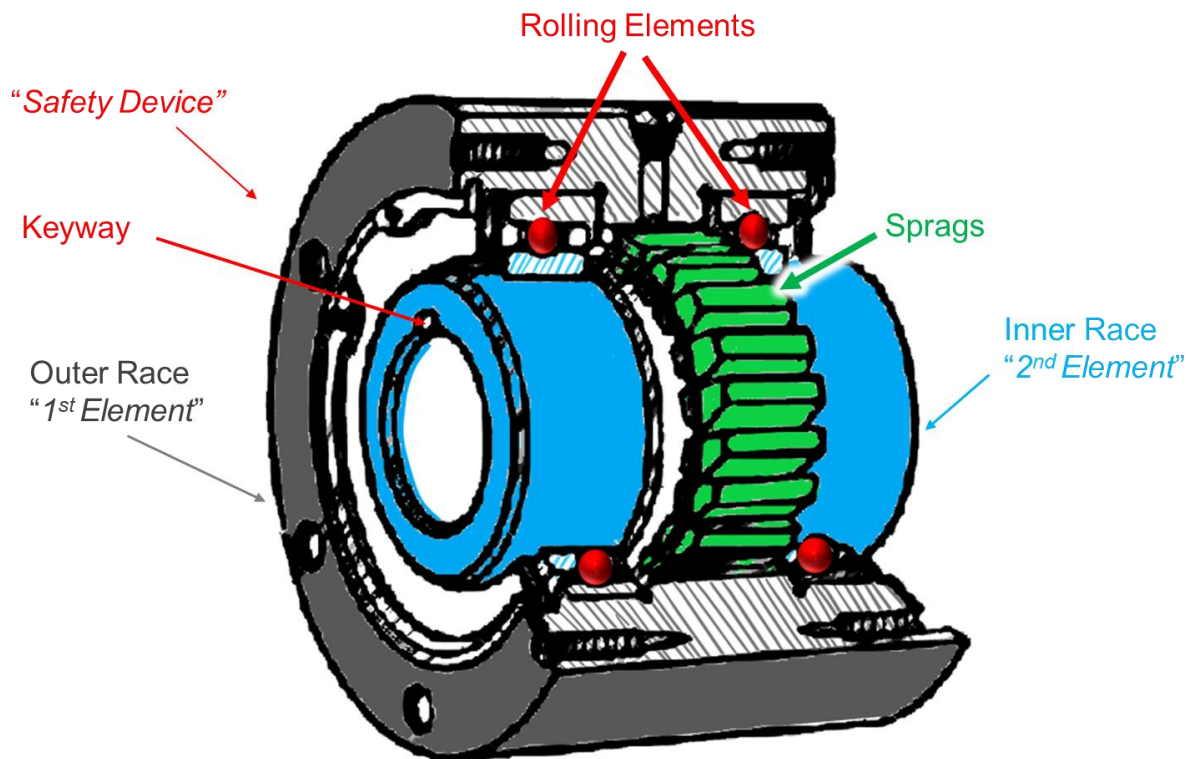
Magid, Ex. 1012, Fig. 2 (Enlarged)

168. As explained in ¶¶129-140, it would have been obvious to a POSA to combine Socwell's treadmill with Magid's control means to permit only unidirectional movement of the running belt to reduce the risk of a user stepping onto the running belt of the treadmill and losing their balance when the belt moves in the forward direction. Magid's control means 6, 6' provide a "*safety device*" by preventing the left and right foot belts 4, 4' from moving forward. A POSA would have been motivated to modify Socwell to include Magid's control means 6, 6' mounted to the front roller or the rear roller. For example, the ratchet gear 62

would be mounted coaxially with the roller 86 (or roller 78) and the pawl 61 would be rotationally attached to the frame 12.

169. Magid does not disclose that the ratchet gear or pawl “*substantially surround[s]*” the other. Sclater discloses sprag-type one-way bearing assemblies that include sprags combined with rolling elements, such as cylindrical rollers or balls. “Sprags combined with cylindrical rollers in a bearing assembly can provide a simple, low-cost method for meeting the torque and bearing requirements of most machine applications.” (Sclater, Ex. 1017 at 312.)

170. As illustrated in the image below, Sclater discloses that the sprag-type one-way bearing assembly includes an inner race, an outer race surrounding the inner race, and a plurality of sprags and rolling elements disposed between the inner race and the outer race. The outer race includes tapped holes allowing the outer race to be fixed to another support structure, such as a frame of a treadmill.



Sclater, Ex. 1017 at 318 (Annotated)

171. Sclater discloses that the inner race defines a center hole that is sized to receive a shaft and defines a keyway on the inner diameter. The keyway is a traditional means for coupling the inner race to a shaft such that they rotate together via a key.

172. Sclater further discloses that this sprag-type bearing assembly functions as a one-way bearing by providing "one-direction only torque transmission in an overrunning clutch." (Sclater, Ex. 1017 at 312.)

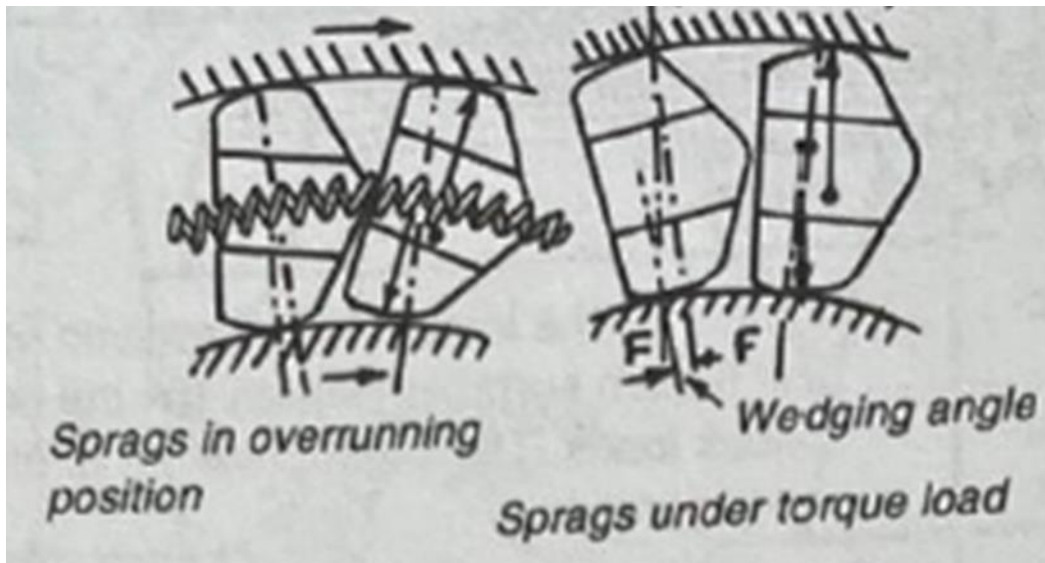
173. Sclater discloses that the sprags have a “sprag profile, which is composed of two nonconcentric curves of different radius” that provide “a locking ramp.” (Sclater, Ex.1017 at 312.) Sclater further discloses that the:

Precision sprags act as wedges and are made of hardened alloy steel.

In the formsprag clutch, **torque is transmitted from one race to another by the wedging action of sprags between the races in one direction**; in the other direction the clutch freewheels.

(Sclater, Ex.1017 at 318.)

174. Socwell’s belt 16 (“*running belt*”) would be coupled to the inner race (“*second element*”) through the front roller 78 or the rear roller 86. As illustrated in the figure below on the left, the belt 16 and the inner race rotate in a first direction relative to the outer race (“*first element*”) to overrun. However, as illustrated in the figure below on the right, wedging or interference between the sprags and the inner and outer race prevents rotation of the inner race in an opposite direction, which prevents the belt 16 from moving forward. The outer race (“*first element*”) would be fixed to the frame 12 by fasteners that are received in the tapped holes defined therein.



Sclater, Ex. 1017 at 318

175. Thus, the combination of references teaches “a *safety device* [control means 6, 6’] coupled to the frame [frame 12] and running belt [belt 16], the safety device having a first element [outer race] and a second element [inner race], the first elements [outer race] substantially surrounding the second element [inner race].”

a. Claim Construction of “*Safety Device*”

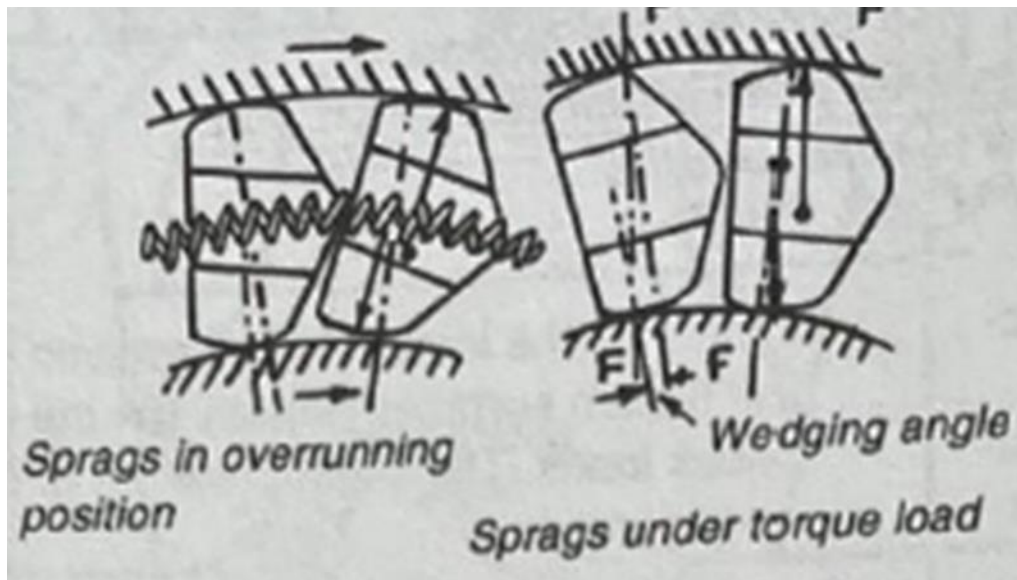
176. I understand that Petitioner proposes construing the term “*safety device*” as a “device having two ring-shaped components” and Patent Owner proposed construing the term “*safety device*” as a “device that permits movement in only one direction” in the related litigation. Sclater discloses sprag-type one-way bearing assemblies. “Sprags combined with cylindrical rollers in a bearing assembly can provide a simple, low-cost method for meeting the torque and bearing requirements of most machine applications.” (Sclater, Ex.1017 at 312.)

Sclater discloses that the sprag-type one-way bearing assembly includes an inner race, an outer race, and a plurality of sprags disposed between the inner race and the outer race. (Ex. 1017, 316.) The inner race and the outer race are “two ring-shaped components.” As explained in ¶151, Sclater’s one-way bearing permits movement of the belt in only one direction, rearward. However, forward motion of the endless belt 16 would rotate the inner race in the opposite direction and wedge the sprags into the locked position to backstop and prevent forward motion, i.e., rotation, of the belt 16. Thus, the combination of references teaches both constructions.

b. Claim Construction of “*Substantially Prevent[]*”

177. I understand that Petitioner proposes construing the term “*substantially prevent rotation*” as “prevent any movement after allowing no or minimal movement” and Patent Owner proposed the term be construed under its plain and ordinary meaning. A sprag-type one-way bearing allows minimal movement before the sprags rotate into a locked position. As illustrated in the figure below on the left, Sclater discloses that when the inner race rotates in a first direction relative to the outer race, the sprags move out of the locked position such that an overrun condition occurs. However, as illustrated below right, when the inner race rotates in the opposite direction, the sprag profile rotates away from the overrunning position and wedges the sprags into a locked position preventing

relative motion between the inner and outer races. Thus, the combination of references teaches both constructions.



Sclater Ex.1017, 318

... [1.6] wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.

178. Magid discloses that the unidirectional control means 6,6' ("safety device") "prevent[s] bidirectional movement of" the treadmill belt. Each control means 6, 6' includes a ratchet gear 61 rotationally coupled to the shaft 411 and a pawl 62 coupled to the base 11. (Ex.1012, 4:46-59.) As illustrated in Figure 2 below, Magid discloses that the ratchet 61 has a gear profile and the pawl 62 is

“Safety Device”

Control Means

Front Roller

2 Rear Roller

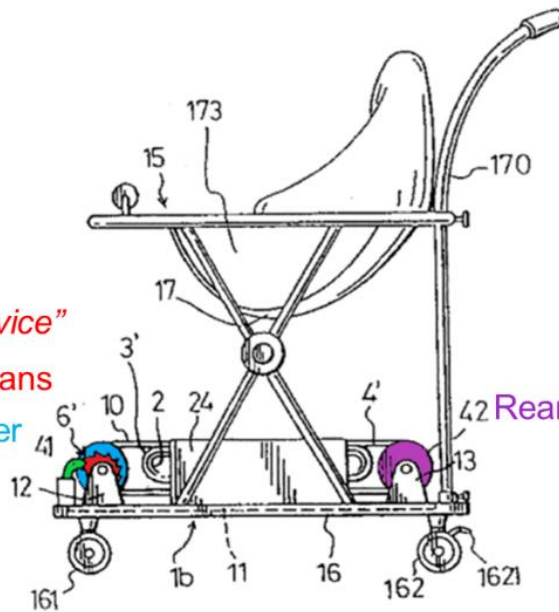
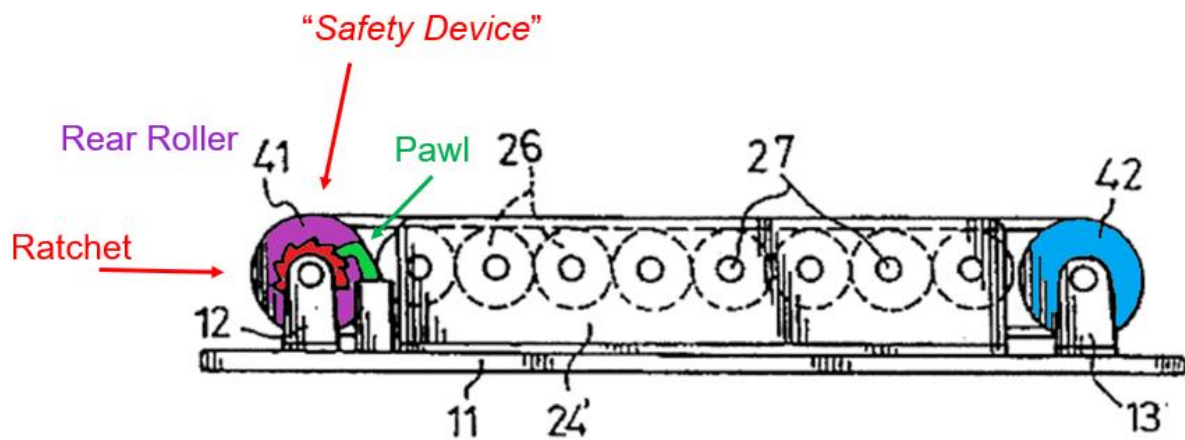
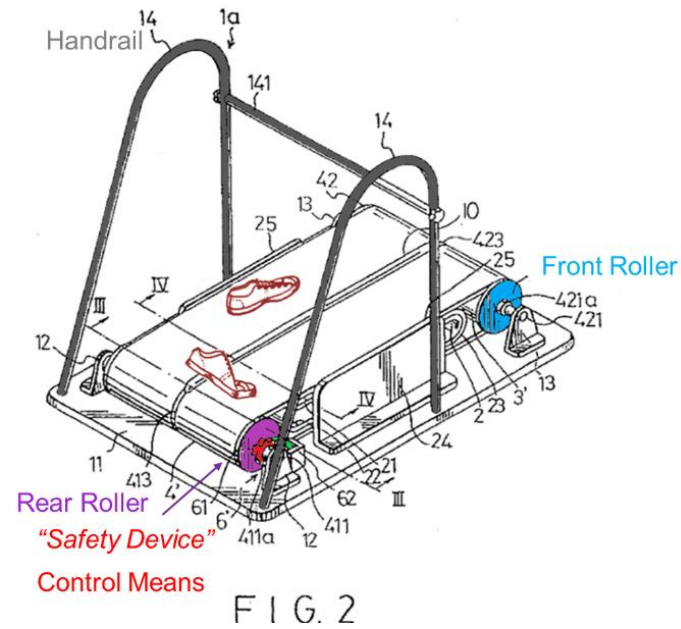
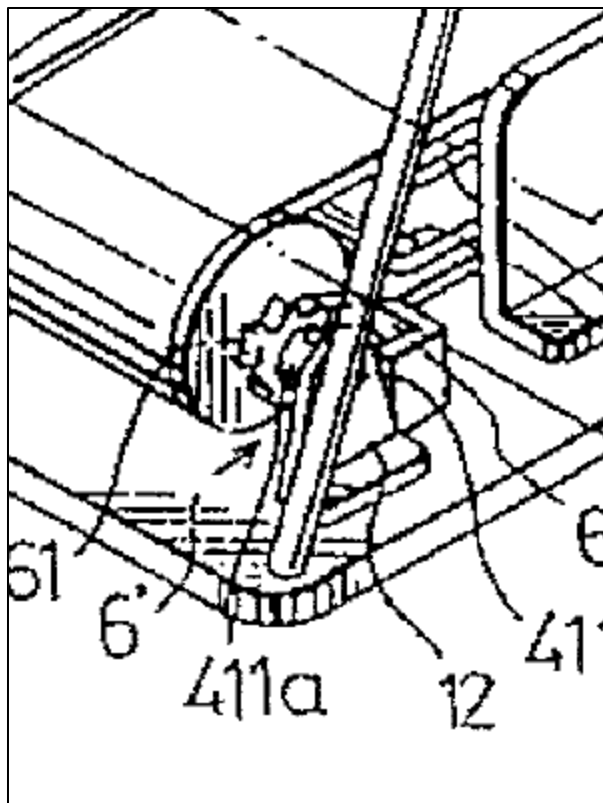


FIG. 5

Magid, Ex.1012, Fig.5



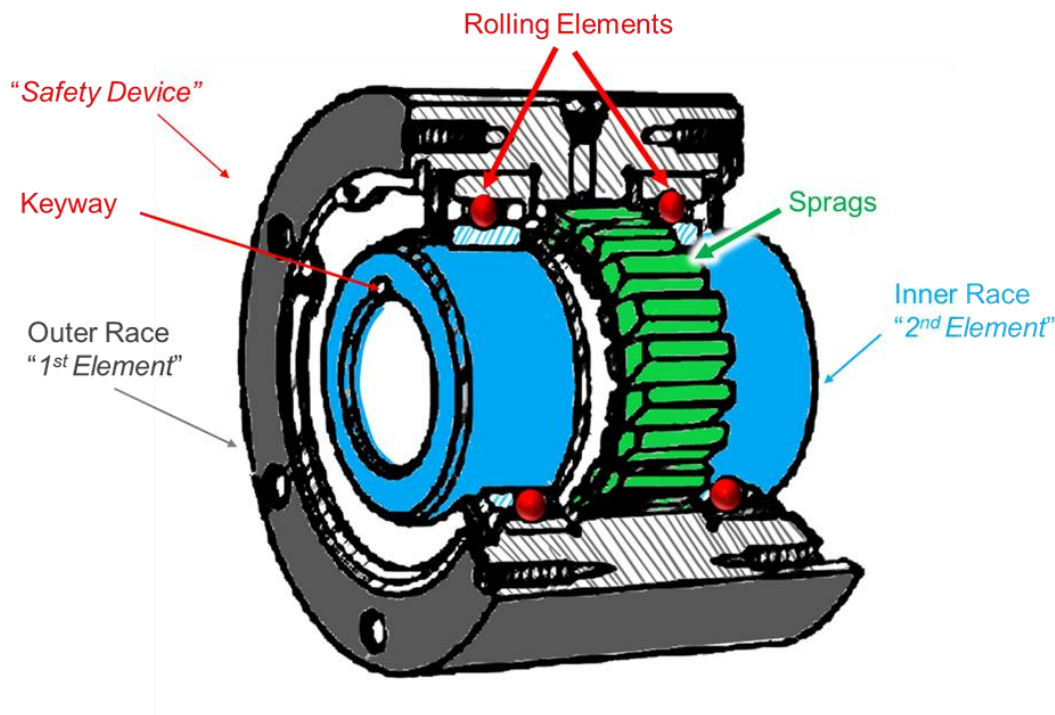
Magid, Ex.1012, Figs.2, 9



Magid, Ex.1012, Fig.2

179. As explained in ¶¶129-140, it would have been obvious to a POSA to combine Socwell's treadmill with Magid's control means 6, 6' mounted to the front roller or the rear roller to permit only unidirectional movement of the running belt to reduce the risk of a user stepping onto the running belt of the treadmill and losing their balance when the belt moves in the forward direction. Magid's control means 6, 6' provide a "safety device" by preventing the left and right foot belts 4, 4' from moving forward. As explained in ¶¶141-151, a POSA would have been further motivated to substitute Sclater's one-way sprag-type bearing assembly for Magid's ratchet-and-pawl one-way clutch mechanism. Sclater discloses a sprag-type bearing assembly including an inner race, an outer race surrounding the inner

race, and a plurality of sprags and rolling elements (balls) disposed between the inner race and the outer race. (Ex.1017 at 312.) As illustrated in the figure below, the inner race defines a center hole sized to receive a shaft and defines a keyway on the inner diameter. The keyway provides means for rotatably coupling the inner race to a shaft via a key.

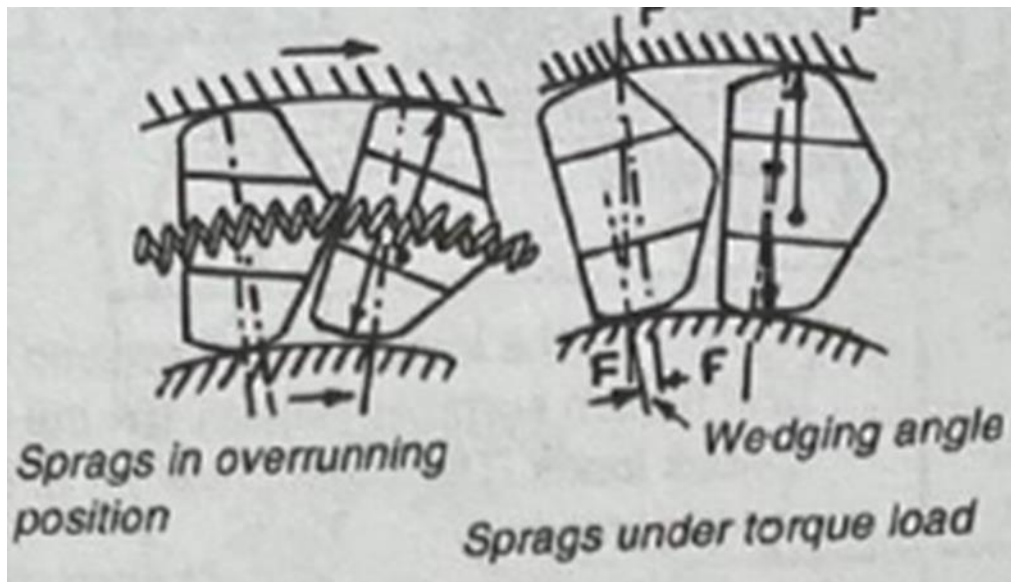


Ex.1017, 318

180. The sprag-type bearing assembly functions as a one-way bearing by providing “one-direction only torque transmission in an overrunning clutch.” (Ex.1017, 312.) The sprags have a “sprag profile, which is composed of two nonconcentric curves of different radius” that provide “a locking ramp.” (*Id.*) Sclater further discloses that the:

Precision sprags act as wedges and are made of hardened alloy steel. In the formsprag clutch, **torque is transmitted from one race to another by the wedging action of sprags between the races in one direction**; in the other direction the clutch freewheels.

(Sclater, Ex.1017 at 316, 318.)



Sclater, Ex. 1017 at 318

181. The belt 16 (“running belt”) is coupled to the inner race (“second element”) through the front roller 78 or the rear roller 86. As illustrated in the figure above on the left, the belt 16 and the inner race rotate in a first direction relative to the outer race (“first element”), which is fixed to the frame, to overrun. However, as illustrated in the figure above on the right, wedging or interference between the sprags and the inner and outer race prevents rotation of the inner race in an opposite direction, which prevents the belt 16 from moving forward. Thus, the combination of references teach “*wherein one of the first and second elements*

of the safety device and the running belt [inner race and belt 16] freely rotate in a first direction of rotation relative to the frame [frame 12], however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements [inner race] is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.”

4. Dependent Claims 2–4 and 6–7

182. Claims 2–4 and 6–7 depend from claim 1 which I understand means that these claims require all of the limitations of claim 1 in addition to their additional limitations. The combination of Socwell, Magid, and Sclater discloses all of the limitations of claim 1 as described above. (See ¶¶153-181.)

... [2.] The manually powered treadmill of claim 1, further comprising a front shaft coupled to frame, the front shaft being adapted to support the at least one front running belt pulley.

... [3.] The manually powered treadmill of claim 1, further comprising a rear shaft coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley.

183. As discussed above for limitations [1.2]-[1.3], Socwell discloses a roller assembly 14 supported between the right side frame 20 and the left side frame 22 that includes the first roller 78 (“*front running belt pulley*”) and the second roller 86 (“*rear running belt pulley*”):

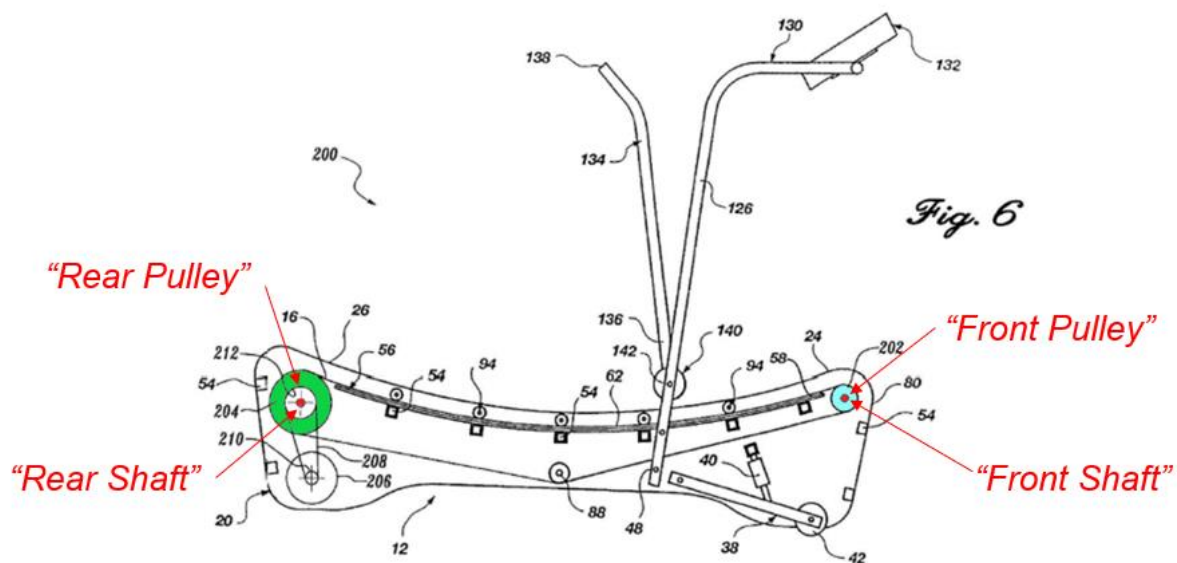
Further, **a roller assembly 14** is provided preferably comprising a **first and second roller 78, 86**. The **first roller 78** may be rotatably disposed contiguous the first end 58 of the deck 56 between the first side 20 and the second opposing side 22 of the support frame 12. Correspondingly similar in construction and design, **a second roller 86** is preferably disposed contiguous the second end 60 of the deck 56 between the first and second sides 20, 22 of the support frame 12.

(Socwell, Ex. 1011, 5:33-41.)

184. Socwell discloses that each roller 78, 86 includes a journaling end (“*front shaft*” and “*rear shaft*”) that is received in a journal housing 28, 34 of the frame:

As best illustrated in FIGS. 2 and 4, **a first journal housing 28 may be formed substantially adjacent the first end 24 of the first side 20 of the support frame 12. Preferably, the first journal housing 28 is formed having an opening readily adapted to receive at least one journaling end (not shown) of the first roller 78**. Similarly, a second journal housing 34 may be formed substantially adjacent the second end 26 of the first side 20 of the support frame 12 and include an opening readily adapted to receive at least **one journaling end (not shown) of the second roller 86**.

(Socwell, Ex. 1011, 6:27-37.)



Ex. 1011, FIG. 6 (Annotated)

185. Socwell also discloses, with reference to Figure 5, a third roller 88 with a journaling end 90 that is received in a third journal housing 36 “[c]onsistent with the first and second journal housings 28, 34.” (Ex. 1011, 6:60-64.) The rollers 78, 86, 88 are supported by journal housings 28, 34, 36 on the frame sides 20, 22. Socwell explains that each of the rollers has journaling ends received in the journal housings 28, 34, 36.

In accordance with one presently preferred embodiment of the present invention, **the journal housings 28, 34, 36** formed in the first side 20 of the support frame 12 may be disposed in operative alignment with the journal housings formed in the second side 22 of the support frame 12. **This arrangement of the journal housings 28, 34, 36 in both the first and second sides 20, 22 of the support frame 12 preferably provides for the introduction and retention of the**

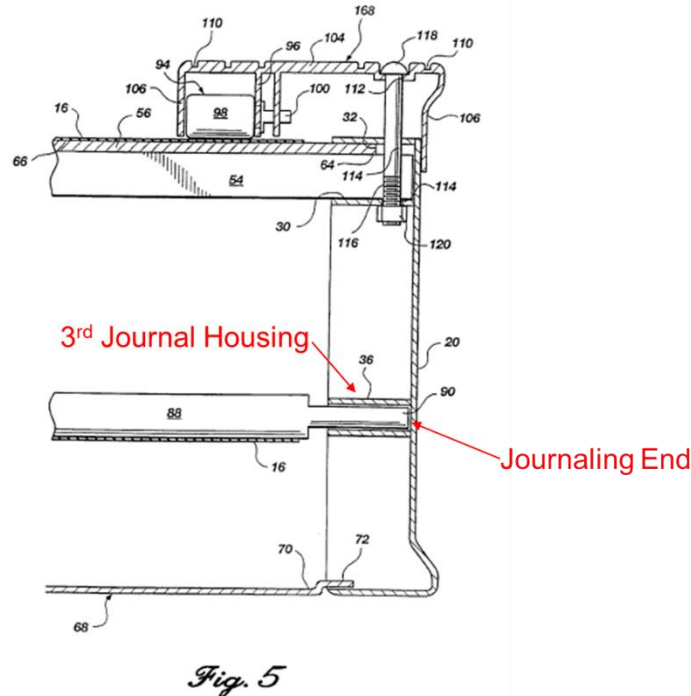
journaling ends of the corresponding rollers 78, 86, 88, thereby facilitating a means for rotating the rollers on a substantially fixed axis.

(Socwell, Ex. 1011, 7:8-18.)

186. Socwell describes the structure of the roller 88 in the most detail. The third roller 88 has journaling ends 90 received in journal housings 36 of the sides 20, 22. The journaling ends 90 are substantially cylindrical and cooperate with the journal housings 36 to provide low-friction coupling of the roller 88 to the frame sides 20, 22. A POSA would have understood the cylindrical journaling end 90 to be a shaft. Indeed, Socwell shows the roller 88 having a shaft (or shaft portion) in Fig. 5. The shaft is coupled to the frame side 20 by the journal housing 36.

Consistent with the first and second journal housings 28, 34, the third journal housing 36 is preferably formed including an opening having an internal periphery sufficient for introducing at least **one journaling end 90 of the third roller 88** therein, as shown in FIG. 5. Preferably, the **journaling end 90 of the third roller 88 is formed having a substantially cylindrical configuration comprising an outer diameter which is less than the internal diameter of the opening formed in the third journal housing 36.**

(Socwell, Ex. 1011, 6:60-7:1.)



Socwell, Ex. 1011, Fig. 5 (Annotated)

187. Socwell explains that the rollers 78, 86 are the same structure as the rollers 88 and are also supported in journal housing 28, 34, respectively, just like the roller 86.

Consistent with the first and second journal housings 28, 34, the third journal housing 36 is preferably formed including an opening having an internal periphery sufficient for introducing at least one journaling end 90 of the third roller 88 therein, as shown in FIG. 5. Preferably, the journaling end 90 of the third roller 88 is formed having a substantially cylindrical configuration comprising an outer diameter which is less than the internal diameter of the opening formed in the third journal housing 36. It will be readily appreciated by those skilled in the art, however,

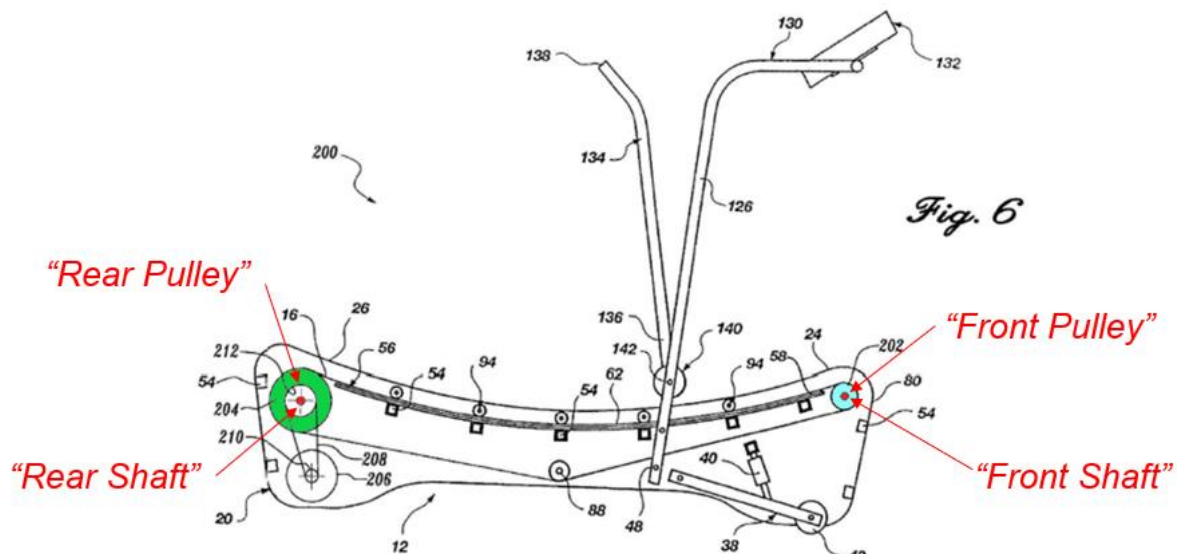
that other shapes, sizes and/or configurations of the journal housings 28, 34, 36 and/or the internal openings formed therein are possible as such to provide a means for introducing at least one journaling end of the first, second and third rollers 78, 86, 88, respectively, therein.

In accordance with one presently preferred embodiment of the present invention, the journal housings 28, 34, 36 formed in the first side 20 of the support frame 12 may be disposed in operative alignment with the journal housings formed in the second side 22 of the support frame 12. **This arrangement of the journal housings 28, 34, 36 in both the first and second sides 20, 22 of the support frame 12 preferably provides for the introduction and retention of the journaling ends of the corresponding rollers 78, 86, 88, thereby facilitating a means for rotating the rollers on a substantially fixed axis.**

Although the journal housings 28, 34, 36 of the first and second sides 20, 22 of the support frame 12 preferably receive the journaling ends of the respective rollers 78, 86, 88, it will be apparent to those skilled in the art that other mechanisms may be constructed and/or numerous other relative dispositions of the respective rollers may be anticipated in accordance with the inventive principles disclosed herein in order to achieve the desired results of the present invention. It is intended, therefore, that the examples provided herein be viewed as exemplary of the principles of the present invention, and not as restrictive to a particular structure or structures for implementing those principles.

(Socwell, Ex. 1011, 6:60-7:31.)

188. Therefore, a POSA reviewing Socwell wholistically would have understood that the journalling ends of the first roller 78 and the second roller 86 were the same as the journaling end 90 of the third roller 88. That is, the first and second rollers 78 and 86 each have shaft ends received in the journal housings 28 and 34. This understanding is further confirmed by Socwell in the figures of the second embodiment, which shows the journaling ends for the front and rear rollers 202 and 204 with shaft ends in FIG. 6. Socwell further states that the front roller 202 is the same as rear roller 86.



Socwell, Ex. 1011, FIG. 6 (Annotated)

FIG. 6 illustrates another preferred embodiment of the present invention wherein those components that are the same as or similar to those employed in the embodiment of the present invention shown in FIGS. 1-5 are designated with the same part numbers. In the embodiment of the present invention shown in FIG. 6, the endless belt

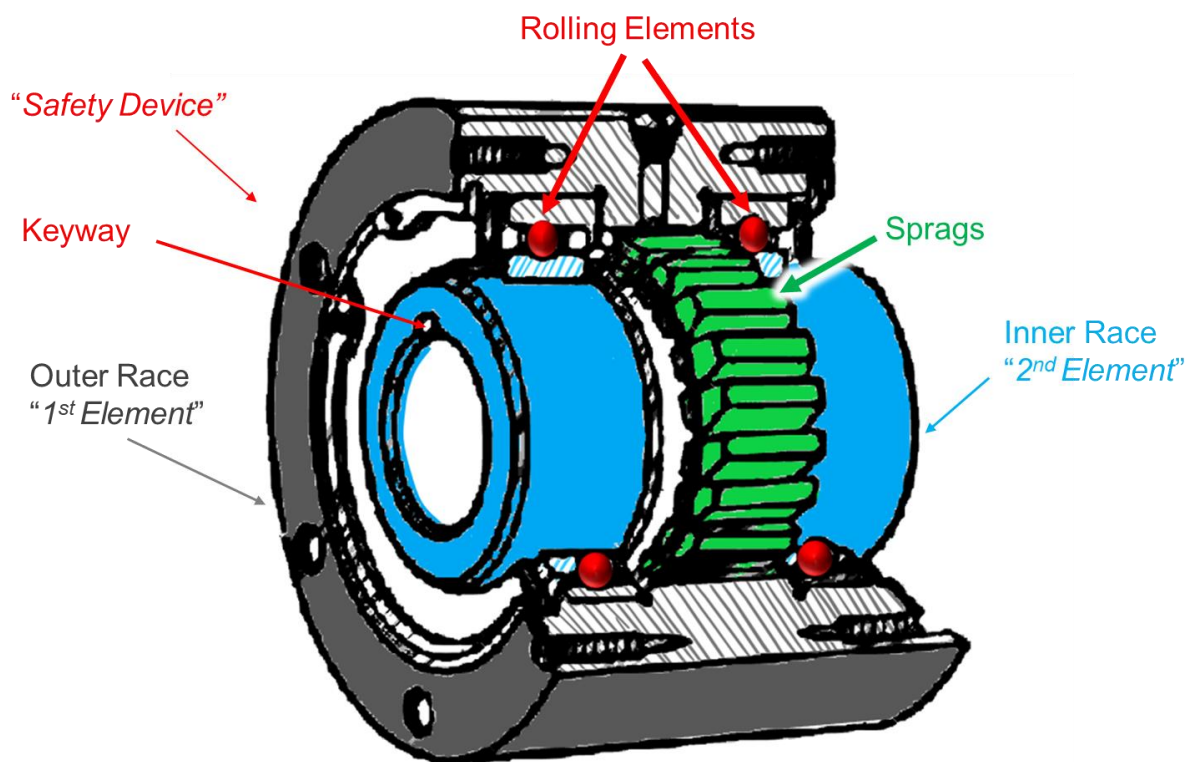
16 is driven at the rear of treadmill 200 rather than at the front. An **idler roller 202 is rotatably mounted at the first or front end 58 of the deck 56 in a manner similar to the mounting of rear roller 86 shown in FIGS. 2 and 3.**

(Socwell, Ex. 2011 at 13:54-64.)

189. Thus, Socwell discloses, “a front shaft [journaling end] coupled to frame, the front shaft being adapted to support the at least one front running belt pulley [first roller 78];” and “a rear shaft [journaling end] coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley [second roller 86].”

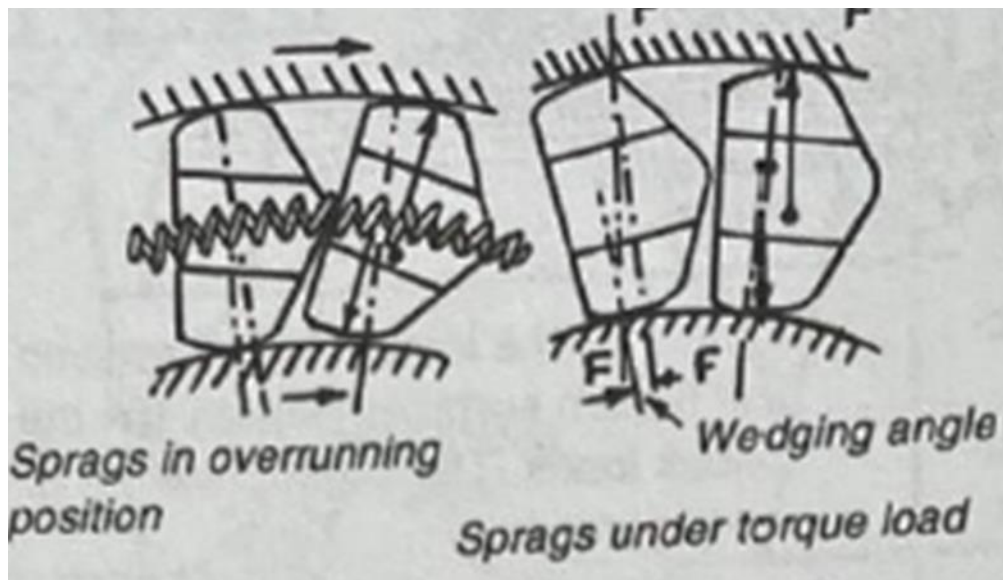
... **[4.] The treadmill of claim 1, wherein the first and second elements of the safety device at least partly form a one-way bearing.**

190. Sclater discloses a one-way bearing assembly. (Sclater, Ex. 1017 at 312.) As illustrated below, Sclater discloses that the sprag-type one-way bearing assembly includes sprags that are disposed between an inner race (“second element”) and an outer race (“first element”).



Sclater, Ex. 1017 at 318

191. Sclater discloses that the sprags have a “sprag profile, which is composed of two nonconcentric curves of different radius” that provide “a locking ramp.” (Sclater, Ex.1017 at 312.) Sclater further discloses that “torque is transmitted from one race to another by the wedging action of sprags between the races in one direction; in the other direction the clutch freewheels.” (Ex.1017 at 316.) The bearing assembly is a “*one-way bearing*” due to the interaction of the sprags, rolling elements (balls), and the races.



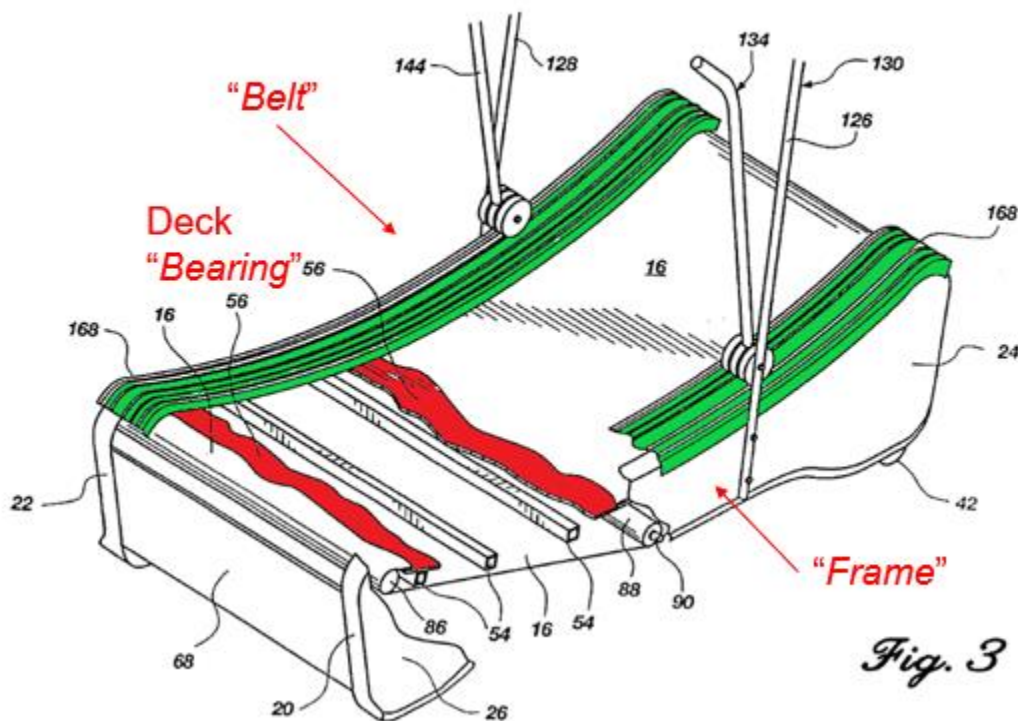
Sclater, Ex. 1017 at 318

192. Thus, the combination of references teaches, “*wherein the first and second elements [outer race/inner race] of the safety device at least partly form a one-way bearing.*”

... [6.] The manually powered treadmill of claim 1, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

193. Socwell discloses a deck 56 (“*bearing*”) that is coupled to opposing sides of the frame 12: “the curved deck treadmill 10 comprises a support frame 12 having a first side 20 and a second opposing side 22 and having a deck 56 supportably disposed therebetween.” (Ex.1011, 5:22-25.) “[T]he deck 56 is preferably formed consisting of a wood laminate having an upper surface 66 that may be impregnated with a wax material to provide a means for reducing the

coefficient of friction acting thereon.” (Ex.1011, 8:11-15.) The deck 56 is a bearing surface that supports the belt 16.



Socwell, Ex.1011, Fig.3 (Annotated)

194. Socwell also discloses belt securing assemblies 94 that engage a topside of the belt 16 to retain the belt in its curvilinear configuration:

Referring now to FIG. 5, the curved deck treadmill 10 may include one or more **belt securing assemblies 94** which provide a means for **retaining the endless belt 16 in a curvilinear configuration being substantially flush with the upper surface 66 of the deck 56**. Preferably, the belt securing assemblies 94 provide a means for **substantially conforming the inherent flexible nature of the belt**

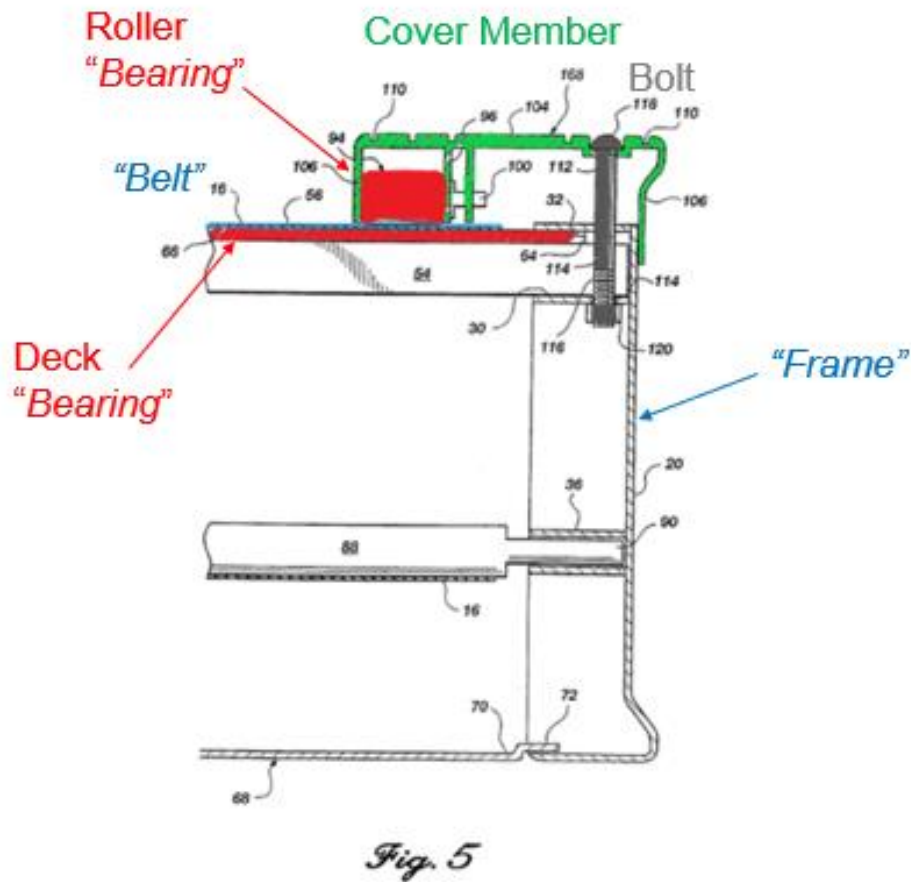
16 to the arcuate configuration of the intermediate portion 62 of the deck 56.

(Socwell, Ex. 1011, 10:5-12.)

195. Each belt securing assembly 94 includes a roller 98 in rolling engagement with the belt 16. The roller 98 is mounted on an axle 100 supported by a bracket 96 to provide a low-friction connection with the belt 16:

[T]he belt securing assembly 94 comprises a roller 98 having an axle 100 which rotatably engages a mounting bracket 96. The mounting bracket 96 is preferably disposed in relation to the roller 98 such that the roller 98 may engage the belt 16, thereby substantially retaining a side portion of the belt 16 substantially flush with the deck 56. In preferred operation, as the belt 16 rotates in relation to the roller assembly 14, the rollers 98 of the belt securing assembly 94 preferably rotate in relation thereto.

(Socwell, Ex. 1011, 10:17-26.)



Socwell, Ex. 1011, Fig. 5 (Annotated)

196. As illustrated above in Figure 5, like the deck 56 (“bearing”), the rollers 98 (“bearings”) are coupled to the frame via a mounting bracket 96 and cover member 168 assembly. (Ex.1011, 10:17-23, 10:45-60, 11:15-33.) Socwell discloses a plurality of belt securing assemblies 94 disposed along the right and left sides of the frame 12. (Ex.1011, Fig. 2.) As I explained in the State-of-the-Art Section, rollers, such as the rollers 98, are “bearings.” (¶68.) Therefore, the rollers

98 and the deck 56 collectively provide a “*plurality of bearings*” and at least the desk 56 supports the belt 16.

197. Thus, Socwell discloses, “*at least one bearing of the plurality of bearings [deck 56 and rollers 98] configured to at least partially support the running belt [belt 16].*”

... [7.] The treadmill of claim 1, further comprising a rearwardly extending handle coupled to the frame.

198. Socwell discloses right and left handles 134/144 that are coupled to the sides 20/22 of the frame 12. Both handles extend *rearwardly*” from the frame 12:

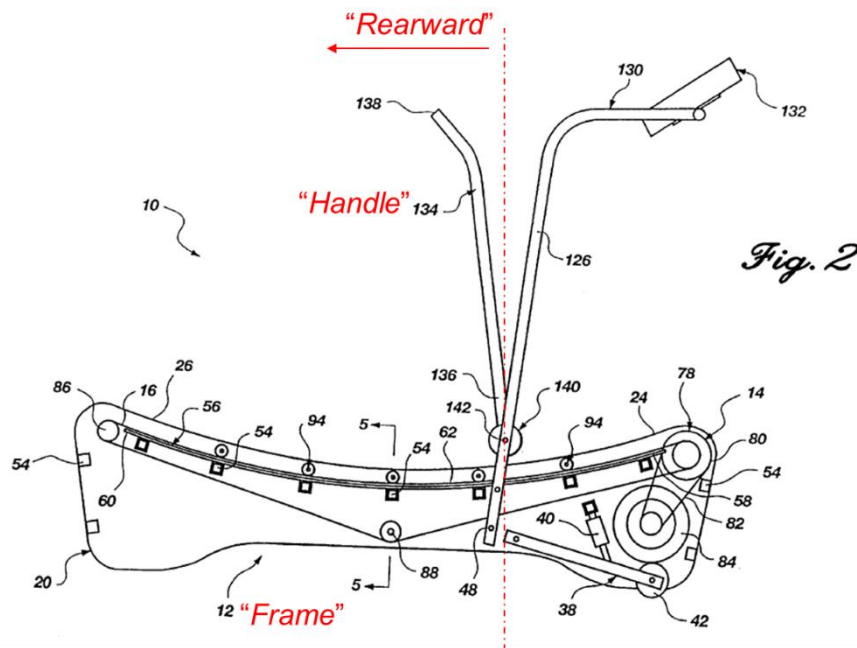
As further illustrated in FIGS. 1 and 2, at least one crossbar 130 may be structurally supported in relation to the support frame 12. Preferably, the crossbar 130 functionally supports a console 132 substantially above the upper surface area of the support frame 12, deck 56, and belt 16. Disposed in relation to the support frame 12, the crossbar 130 may be formed having a generally U-shaped configuration. Further, the crossbar 130 may comprise a pivotal engagement 140 which provides a means for pivotally engaging **one or more handles 134, 144 in relation to the crossbar 130 at the opposing sides thereof 126, 128.**

(Socwell, Ex. 1011 at 5:46-56.)

Although the first 134 and second handles 144 are described herein as being connected to the opposing sides 126, 128 of the crossbar 130 by

a pivotal connection 140, it will be readily appreciated by those skilled in the art that other points of connection are possible. For example, the first and second handles 134, 144 may be pivotally connected to the first and second sides 20, 22, respectively, of the support frame 12.

(Socwell, Ex. 1011 at 13:8-20.)



Socwell, Ex. 1011, FIG. 2 (Annotated)

199. The handle 134 has a lower pivot end 136 connected to the first side 126 of the cross bar 130 and a distal end 138. As clearly shown in FIG. 2, the distal end is angled rearwardly. Therefore, a POSA would have understood that Socwell discloses *“a rearwardly extending handle coupled to the frame.”*

In preferred structure, the crossbar 130 may comprise a pivotal engagement 140 which provides a means for pivotally engaging one or more handles 134, 144 in relation to the opposing sides 126, 128 of

the crossbar 130, as illustrated in FIGS. 1, 2 and 3. **The handles 134, 144** may be constructed of any suitable rigid material. For example, the handles 134, 144 may be formed of a metal or metal alloy, wood, fiberglass, graphite, ceramic, plastic or any other suitable composite material. Additionally, the handles 134, 144 may include a gripping member (not shown) preferably disposed substantially adjacent the distal ends of the handles 134, 144 to enable a user to more easily grip the handle. In particular, a rubber grip may be disposed in relation to the distal end 138 of the handle 134, 144 and positioned so that a user may grasp the gripping member of the handle 134, 144 when exercising.

Preferably, a first handle 134 includes a pivot end 136, a distal end 138 and an intermediate portion disposed therebetween. As best shown in FIG. 1, the pivot end 136 of the first handle 134 may be pivotally connected to the first side 126 of the crossbar 130 by means of a pivotal connection 140. In current design, the pivotal connection 140 comprises a conventional through-bore and a pivot pin 142 operably disposed therein, whereby providing a pivoting means for the handle 134 to pivot in relation thereto. Similarly, a second handle 144 may be pivotally connected to the second side 128 of the crossbar 130.

(Socwell, Ex. 1011 at 12:39-65).

5. Independent claim 9

200. Independent claim 9 is similar independent claim 1. To illustrate, the table below shows a side-by-side comparison of claims 1 and 9. Claim 9 is “marked up” to show the differences.

‘005 Patent Claim 1	‘005 Patent Claim 9
[1.0] A manually powered treadmill, comprising:	[9.0] A [] treadmill, comprising:
[1.1] a frame;	[9.1] a frame;
[1.2] at least one front running belt pulley coupled to the frame;	[9.2] a rotatable element coupled to the frame;
[1.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;	N/A
[1.4] a running belt 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;	[9.3] a running belt at least partially supported by the rotatable element, wherein the running belt includes a running surface, at least a portion of which is curved; and
[1.5] a safety device coupled to the frame and the running belt, the safety device having a first element and a second element, the first element	[9.4] [] a first element and a second element, both of which are coupled to the running belt, and wherein the first element substantially surrounds the

substantially surrounding the second element or the second element substantially surrounding the first element;	second element or the second element substantially surrounds the first element;
[1.6] wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.	[9.5] wherein one of the first and second elements and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.

201. Intentionally left blank.

... **[9.0] A treadmill, comprising:**

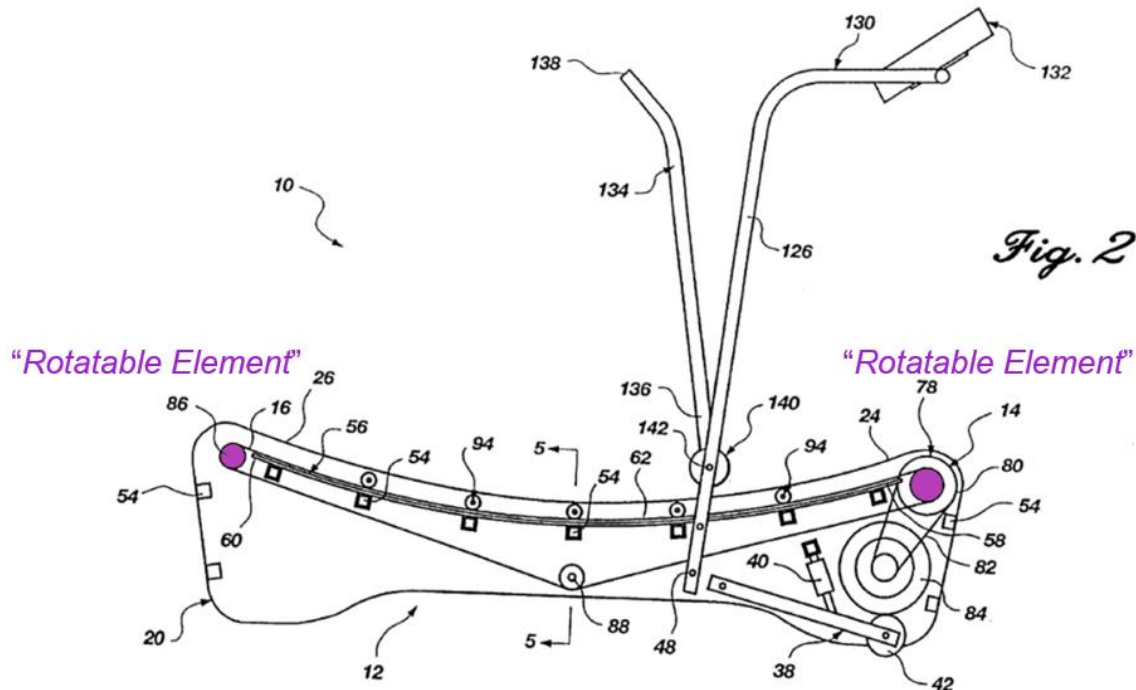
202. Claim limitation [9.0] is substantially similar to limitation [1.0]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶153-154.)

... **[9.1] a frame;**

203. Claim limitation [9.1] is substantially similar to limitation [1.1]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶155-156.)

... [9.2] a rotatable element coupled to the frame;

204. Socwell discloses multiple “rotatable element[s]” that are coupled to the frame.” As I discussed above in claim limitation [1.2]–[1.3], Socwell discloses that the rollers 78, 86 extend transversely between the right and left sides frames 20, 22. The right and left sides 20, 22 of the frame include journal housings 28 and 34, e.g., slots, that are “readily adapted to receive” the journaling ends of the rollers 78, 86 to couple the rollers to the right and left sides of the frame 20, 22. (Socwell, Ex. 1011, 6:27-45; see ¶¶158-160.) A POSA would have considered each roller 78/86 to be a rotatable element coupled to the frame.



Socwell, Ex. 1011, Fig. 2 (Annotated)

205. Therefore, Socwell discloses “*a rotatable element [roller 78/86] coupled to the frame [12].*”

... [9.3] a running belt at least partially supported by the rotatable element, wherein the running belt includes a running surface, at least a portion of which is curved; and

206. As I discussed above in claim limitation [1.4], Socwell discloses a curved running belt 16 looped around the rollers 78, 86 and including a curved running surface. (See ¶¶161-163.) The rollers 78, 86 are “*rotatable elements.*”¹⁰ The belt 12 is disposed on top of the rollers 78, 86; therefore, the rollers 78, 86 at least partially support the belt 16. Thus, Socwell discloses, “*a running belt [16] at least partially supported by the rotatable element [rollers 78 or 86].*”

[9.4] a first element and a second element, both of which are coupled to the running belt, and wherein the first element substantially surrounds the second element or the second element substantially surrounds the first element;

207. Claim limitation [9.4] is substantially similar to limitation [1.5]. Therefore, I refer back to my analysis of this limitation of claim 1. (See ¶¶164-178.)

¹⁰ See claim limitation 9.2. (¶¶ 204-205.)

208. Claim 9.4 slightly differs by reciting “*both of which [i.e., the first element and the second element] are coupled to the running belt.*” As discussed above, modified Socwell has a safety device with an inner race (fixed to the roller 78/86) and an outer race fixed to the frame 12. The inner race is coupled to the belt 16 through the roller 78/86, and the outer race is also coupled to the belt 16 through the inner race.

209. Thus, the combination of Socwell, Magid, and Sclater teaches “*a first element [inner race] and a second element [outer race], both of which are coupled to the running belt, and wherein the first element substantially surrounds the second element or the second element [outer race] substantially surrounds the first element [inner race].*”

... [9.5] wherein one of the first and second elements and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent rotation of the running belt relative to the frame.

210. Claim limitation [9.5] is substantially similar to limitation [1.6]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶178-181.)

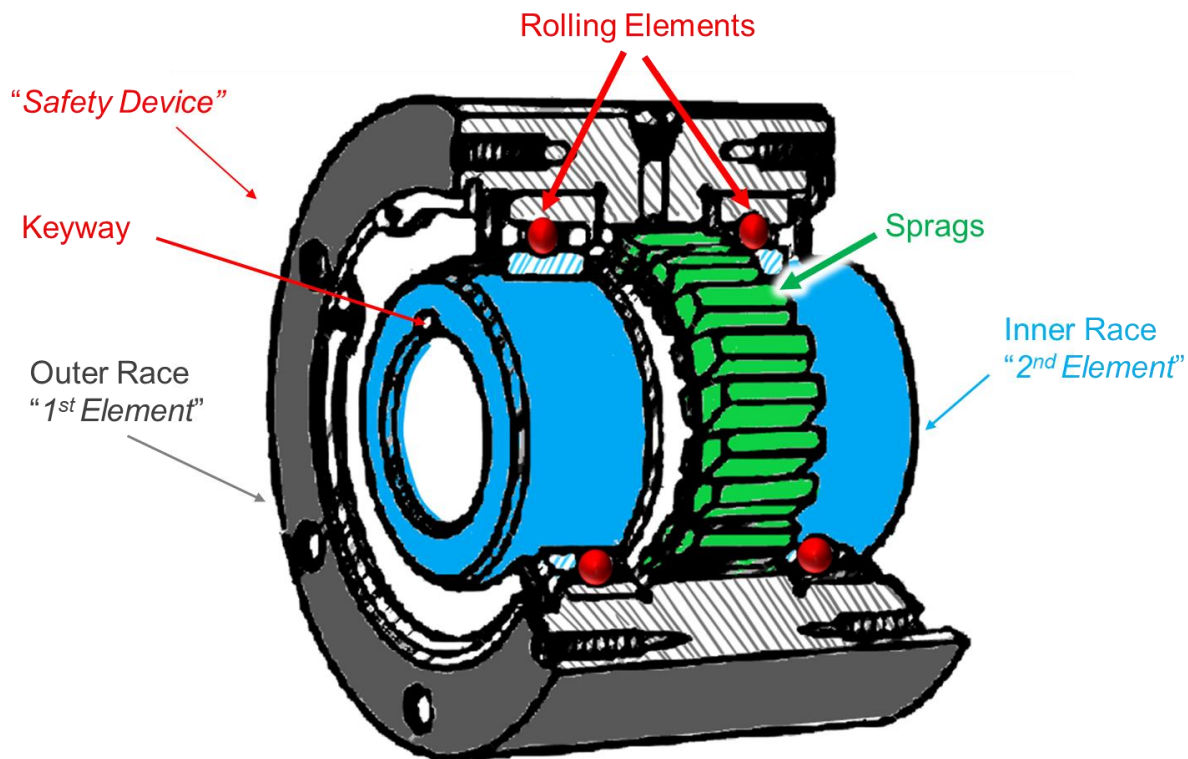
6. Dependent claims 10–14

211. Claims 10–14 depend from claim 9 which I understand means that these claims require all of the limitations of claim 9 in addition to their additional limitations.

212. The combination of Socwell, Magid, and Sclater disclose all of the limitations of claim 9 as described above. (See ¶¶202-210.)

... [10.] The treadmill of claim 9, wherein only one of the first and second elements is freely rotatable relative to the frame.

213. As discussed above in claim 1, the combination of references includes the inner race of Sclater's one-way bearing fixed to one of Socwell's rollers 78/86 and the outer race fixed to Socwell's frame 12.



Sclater, Ex. 1017 at 318 (Annotated)

214. Sclater discloses that the inner race defines a center hole that is sized to receive a shaft and defines a keyway on the inner diameter. The keyway is a traditional means for coupling the inner race to a shaft via a key. Sclater further discloses that this sprag-type bearing assembly functions as a one-way bearing by providing “one-direction only torque transmission in an overrunning clutch.” (Sclater, Ex. 1017 at 312.)

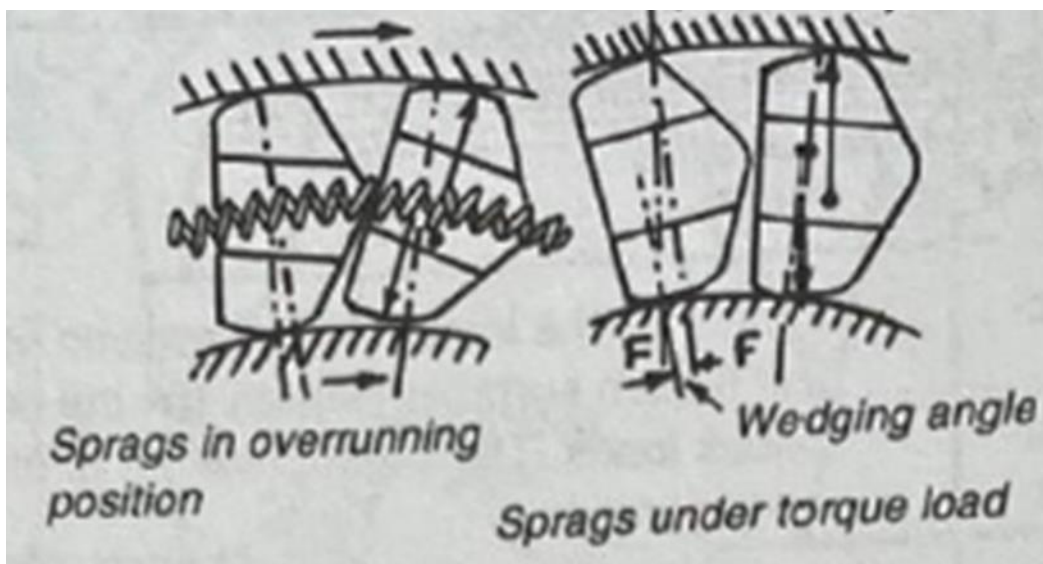
215. Sclater further discloses that the:

Precision sprags act as wedges and are made of hardened alloy steel.

In the formsprag clutch, torque is transmitted from one race to another by the wedging action of sprags between the races in one direction; in the other direction the clutch freewheels.

(Sclater, Ex.1017 at 318.)

216. The belt 16 (“*running belt*”) would be coupled to the inner race (“*second element*”) through the front roller 78 or the rear roller 86. As illustrated in the figure below on the left, the belt 16 and the inner race rotate in a first direction relative to the outer race (“*first element*”) to freewheel or overrun. However, as illustrated in the figure below on the right, wedging or interference between the sprags and the inner and outer race prevents rotation of the inner race in an opposite direction, which prevents the belt 16 from moving forward.



Sclater, Ex. 1017 at 318

217. By overrunning, the inner race “freely rotates” relative to the frame, however the outer race is mounted and fixed to the frame. Thus, the combination of Socwell, Magid, and Sclater discloses, “*wherein only one of the first and second elements [inner race] is freely rotatable relative to the frame.*”

... ***[11.] The treadmill of claim 9, wherein the treadmill is non-motorized.***

218. Socwell discloses that the treadmill 10 may include “driving means 84” such as a “conventional electric motor for rotating the belt 16.” (Ex.1011, 11:34-38.) Alternatively, “the curved deck treadmill 10 . . . may be implemented without a driving means,” (Ex.1011, 11:53-61.) Therefore, Socwell discloses a “non-motorized” treadmill.

... ***[12.] The treadmill of claim 10, wherein the first and second elements at least partly form a one-way bearing.***

219. Claim 12 is largely duplicative of claim 4. To illustrate, the table below shows a side-by-side comparison of claims 4 and 12. Claim 12 is “marked up” to show the minor differences.

‘005 Patent Claim 4	‘005 Patent Claim 12
[4.0] The treadmill of claim 1, wherein the first and second elements of the safety device at least partly form a one-way bearing.	[12.0] The treadmill of claim 10, wherein the first and second elements [] at least partly form a one-way bearing.

220. Because the additional limitations of claim 12 are also recited in claim 4, I refer back to my analysis of these limitations of claim 4 in Ground 1 to establish that they are met by the same combination of references. (See ¶¶190-192.)

... [13.] The treadmill of claim 9, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

221. Claim 13 is largely duplicative of claim 6. To illustrate, the table below shows a side-by-side comparison of claims 6 and 13. Claim 13 is “marked up” to show the minor differences.

‘005 Patent Claim 4	‘005 Patent Claim 13
[6.] The manually powered treadmill of claim 1, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.	[13.] The treadmill of claim 9 , further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

222. Because the additional limitations of claim 13 are identical to the additional limitations of claim 6, I refer back to my analysis of these limitations of claim 6 in Ground 1 to establish that they are met by the same combination of references. (See ¶¶193-197.)

7. Independent claim 15

223. Independent claim 15 is largely duplicative of independent claim 1.

To illustrate, the table below shows a side-by-side comparison of claims 1 and 15.

‘005 Patent Claim 1	‘005 Patent Claim 15
[1.0] A manually powered treadmill, comprising:	[15.0] A manually powered treadmill, comprising:
[1.1] a frame;	[15.1] a frame;
[1.2] at least one front running belt pulley coupled to the frame;	[15.2] at least one front running belt pulley coupled to the frame;
[1.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the front running belt pulley;	[15.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;
[1.4] a running belt 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;	[15.4] a running belt 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;
[1.5] a safety device coupled to the frame and the running belt, the safety device having a first element and a second element, the first element substantially surrounding the second	[15.6] wherein the safety device includes another element, wherein one of the element and the another element substantially surrounds the other of the element and the another element.

element or the second element substantially surrounding the first element;	
[1.6] wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.	[15.5] a safety device coupled to the frame and the running belt, the safety device having an element adapted for rotation relative to the frame in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the element is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame; and

... **[15.0] A manually powered treadmill, comprising:**

224. Claim limitation [15.0] is substantially similar to limitation [1.0]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶153-154.)

... **[15.1] a frame;**

225. Claim limitation [15.1] is substantially similar to limitation [1.1]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶155-156.)

... [15.2] at least one front running belt pulley coupled to the frame;

... [15.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;

226. Claim limitations [15.2]-[15.3] are substantially similar to limitations [1.2]-[1.3]. Therefore, I refer back to my analysis of these limitations of claim 1 to establish that they are met by the combination of Socwell, Magid, and Sclater. (See ¶¶157-160.)

... [15.4] a running belt 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;

227. Claim limitation [15.4] is substantially similar to limitation [1.4]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶161-163.)

... [15.5] a safety device coupled to the frame and the running belt, the safety device having an element adapted for rotation relative to the frame in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the element is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame;

228. Claim limitation [15.5] is substantially similar to limitation [1.6]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶178-181.)

... [15.6] wherein the safety device includes another element, wherein one of the element and the another element substantially surrounds the other of the element and the another element.

229. Claim limitation [15.6] is substantially similar to limitation [1.5]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Socwell, Magid, and Sclater. (See ¶¶164-178.)

8. Dependent claim 16

230. Claim 16 depends from claim 15 which I understand means that these claims require all of the limitations of claim 15 in addition to their additional limitations.

231. The combination of Socwell, Magid, and Sclater disclose all of the limitations of claim 15 as described above. (See ¶¶ 224-229.)

... [16.] The treadmill of claim 9, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

232. Claim 16 is largely duplicative of claim 6. To illustrate, the table below shows a side-by-side comparison of claims 6 and 16. Claim 16 is “marked up” to show the minor differences.

‘005 Patent Claim 4	‘005 Patent Claim 16
[6.] The manually powered treadmill of claim 1, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.	[16.] The treadmill of claim 15, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

233. Because the additional limitations of claim 16 are identical to the additional limitations of claim 6, I refer back to my analysis of these limitations of claim 6 in Ground 1 to establish that they are met by the same combination of references. (See ¶¶193-197.)

234. Intentionally left blank.

B. Ground 2 – Claims 1–4, 6–13 and 15–16 are obvious over Tolkien and Sclater

1. Rationale to Combine Tolkien and Sclater

235. It would have been obvious to a POSA to combine the manual treadmill topology with a curved running surface disclosed in Tollkien with the known technique of backstopping a belt (with a one-way bearing assembly) disclosed by Sclater to prevent forward motion of the treadmill belt.

236. Tollkien discloses “a treadmill for fitness training.” (Tollkien, Ex. 1031, [0001].) Sclater is a reference sourcebook that “contains drawings and descriptions of more than 2000 different mechanisms and mechanical devices that have proven themselves in modern products, machines, and systems.” (Ex.1017 at 24, Back Cover.) Sclater describes different types of coupling, clutching, and braking devices in Chapter 9 to solve various design problems. (Sclater, Ex. 1017 at 311-312.)

237. Sclater discloses a well-known mechanism (a sprag-type one-way bearing assembly) for solving the problem of unexpected belt rotation in the opposite direction of travel and explicitly discloses the use of the mechanism to permit only unidirectional motion of a conveyer belt. (Sclater, Ex. 1017 at 316–321). A POSA would have understood conveyers and treadmills operate the same. Therefore, it would have been obvious to a POSA to apply Sclater’s known technique of backstopping a belt with a sprag type one-way bearing assembly to Tollkien’s treadmill to prevent forward motion of the belt. (Sclater, Ex. 1017 at 320).

238. It has long been recognized that users may be injured by falling off of a treadmill while mounting or dismounting it, or during use. This may be due to the treadmill belt moving in an unexpected direction or in such a way that the user cannot regain their equilibrium. It could also be due to the incline of the surface causing the position of the user to drift rearwards, and off, over time. (See ¶¶71-72.)

239. Additionally, several professional organizations have produced standards to provide guidance to manufacturers regarding both exercise equipment safety in general and other standards specifically for treadmill safety. See ASTM Standard, Ex. 1019; ISO Standard, Ex. 1020; and ACCC Product Safety Supplier Guide, Ex. 1007. These standards establish requirements for foot rails and handrails on treadmills to address user stability. (ASTM Standard, Ex. 1019, 3-4; ISO Standard, Ex. 1020, 8.)

240. Tollkien explains his invention in view of previous treadmills explained in his background, including Socwell (Ex. 1011). (Tollkien, Ex. 1031, [0005].) Tollkien describes Socwell as a treadmill “that has a curved running surface” however the “curving radius is not adjustable.” (Ex. 1031, [0005].) Accordingly, a POSA reading Tollkien, would have considered Socwell’s teachings.

241. Socwell explains that users may be injured by falling off a treadmill while mounting or dismounting, or while exercising due to unexpected belt movement.

In particular, if the rollers supportably disposed in relation to the endless belt are so easily moveable, the user may potentially lose his equilibrium or balance and fall from the exercise treadmill resulting in possible injuries.

(Socwell, Ex. 1011, 1:32-36.)

Another meaningful disadvantage of exercise treadmills of the prior art is the inherent danger associated with users tending to fall off the back end of the treadmill and become injured.

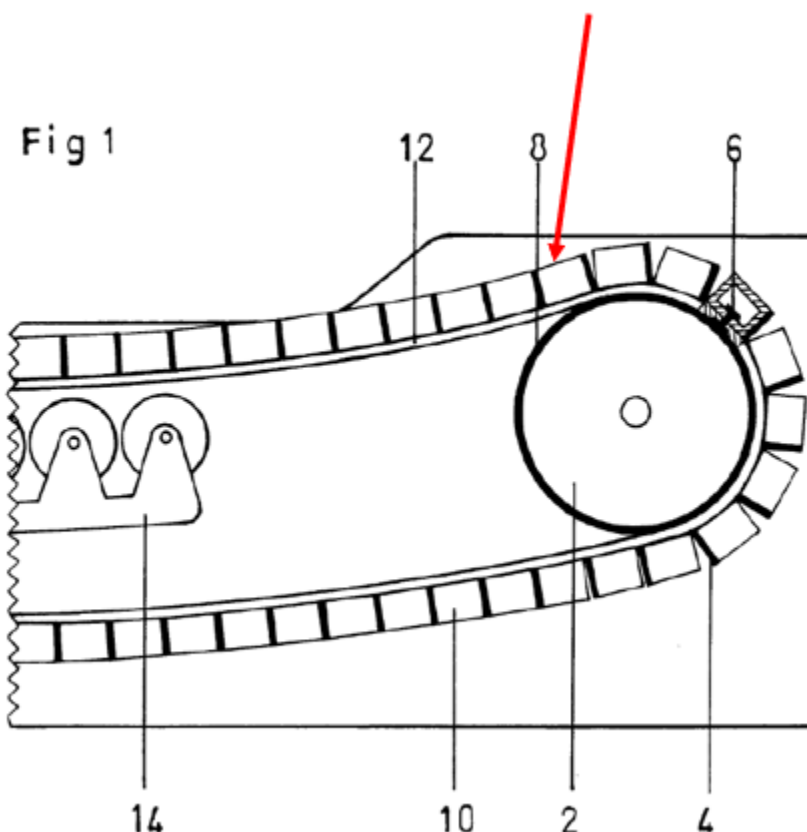
(Socwell, Ex. 1011, 2:45-48.)

242. Socwell further recognizes that it is difficult to stabilize the running belt in manual treadmills. According to Socwell, this is due to the difficulty in balancing the frictional and inertial qualities of belt supporting devices. (Socwell, Ex. 1011, 1:30-56.)

243. While Tollkien explains the exercise benefits of curved belts¹¹, Tollkien does not specifically address the safety issues identified by Socwell. Socwell explains that curved running surfaces do not fully address the safety issue

¹¹ Paragraphs [0008]–[0013] explain that curved running surfaces are less taxing on the body and may provide a more satisfactory exercising experience.

of unexpected forward motion of the running belt e.g., if a user steps onto the rearward end of the running surface (indicated by the red arrow), causing the foot to unexpectedly move towards the lowest portion of the treadmill. This unexpected forward motion could result in a fall.



Tollkien, Ex. 1031, Fig. 1 (Annotated)

244. A POSA reviewing Tollkien would have been alerted to safety issues associated with curved running surfaces by reviewing the cited Socwell reference. A POSA would have understood that preventing forward belt motion would solve this problem, and that there were dozens of off-the-shelf one-way clutches

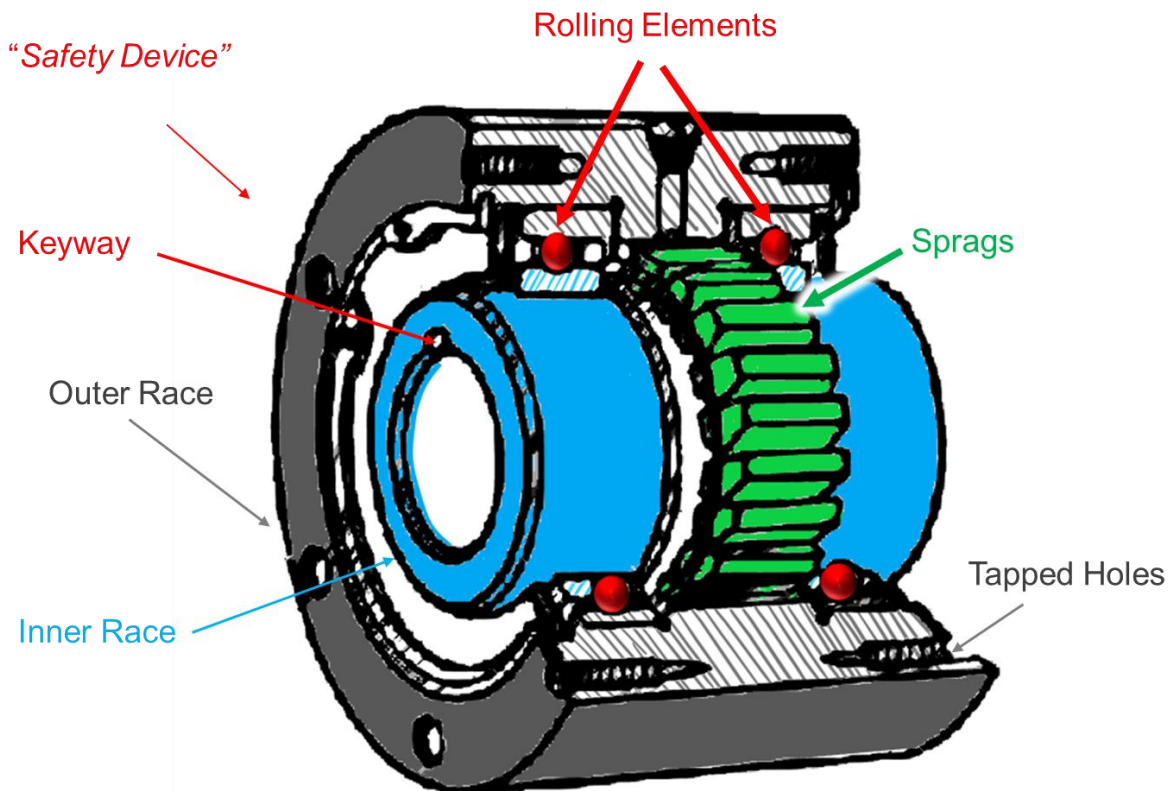
available. Sclater, and similar publications e.g., the PT Handbook (Ex. 1016) and catalogs e.g., Emerson (Ex. 1018), were useful reference material for a POSA and illustrate how the claimed safety device is, and has been, merely an off-the-shelf part. Indeed, Sclater explains how to use the one-way bearing assembly to backstop a conveyer belt. (Sclater, Ex. 1017, 320; *see also* Emerson, Ex. 1018 at 52-53).

245. It would have been obvious to a POSA to combine the off-the-shelf one-way bearing assembly of Sclater to the treadmill of Tollkien to permit only unidirectional movement of the running belt to reduce the risk of a user stepping onto the running belt of the treadmill and losing their balance when the belt moves in the forward direction.

246. Accordingly, a POSA would have been motivated to modify Tollkien to include Sclater's one-way bearing to the front roller or the rear roller as discussed above.

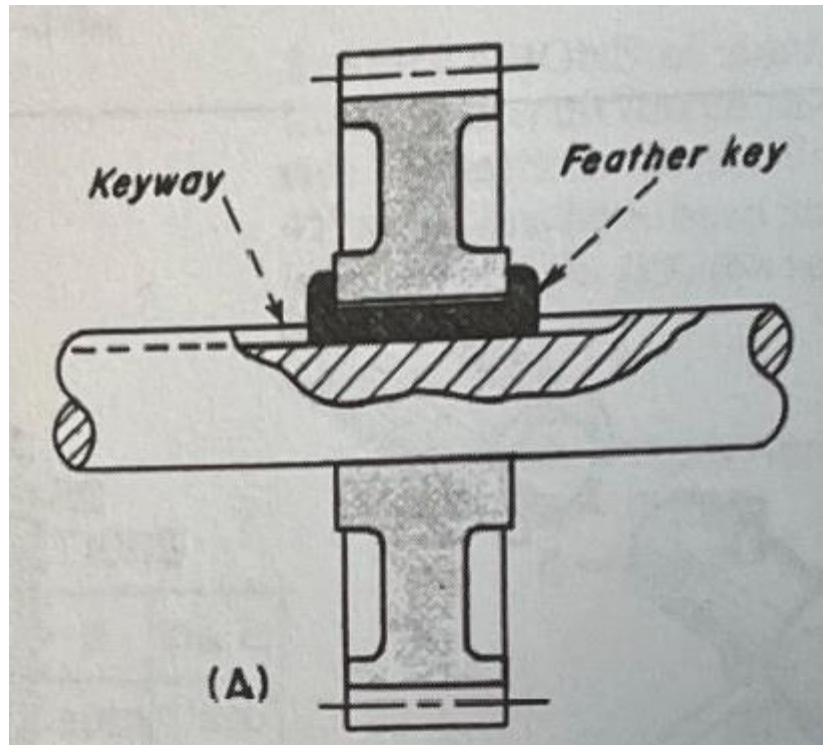
247. This modification would have been a simple combination of known elements in the prior art: Tollkien's manual treadmill with a curved running surface and Sclater's one-way bearing. For example, the outer race would be fixed to the frame either directly or through one or more intermediaries, e.g., a bracket. Sclater illustrates that the outer race includes tapped holes for receiving fasteners for mounting the one-way bearing to a treadmill frame or intermediary support

structure. Other traditional methods also exist to restrain the outer race, such as using an interference fit with a housing (or other support structure) or a keyway on the outer race as well.



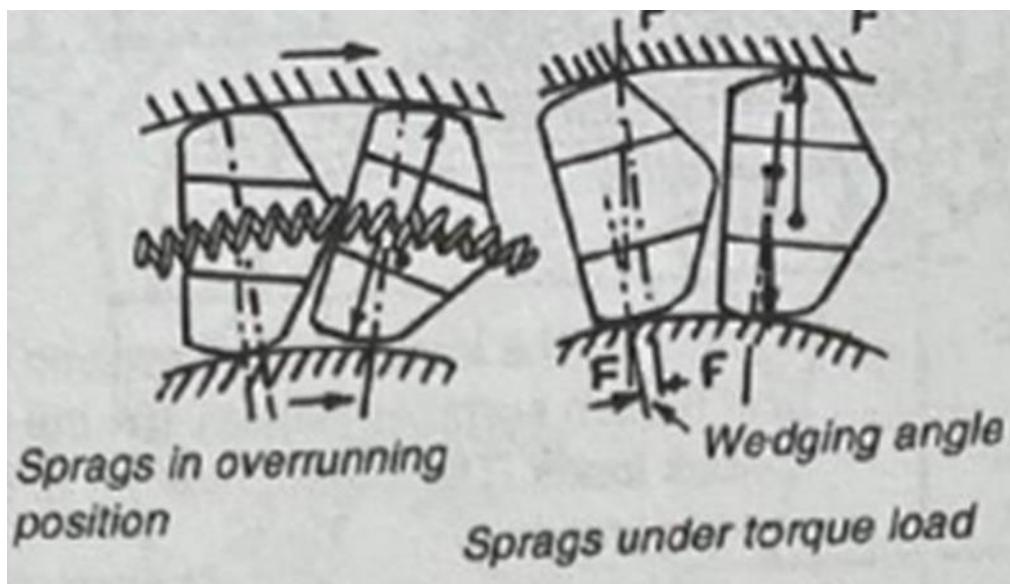
Sclater, Ex. 1017 at 318 (Annotated)

248. The inner race of the one-way bearing would be secured to the front roller or rear roller, e.g., with a traditional key/keyway interface, such as that disclosed by Sclater:



Sclater, Ex. 1017 at 420

249. With this arrangement, rearward motion of Tollkien's belt 12 would rotate the front/rear roller and inner race so that the inner race would overrun and move the sprags out of the locked position. However, forward motion of the belt 12 would rotate the inner race in the opposite direction and wedge the sprags into the locked position to backstop and prevent forward motion, i.e., rotation, of the belt.



Sclater, Ex. 1017 at 318

250. The one-way bearing of Sclater would function the same when added to Tollkien and provide the predictable result of Tollkien's running belt only rotating in the exercise direction thus providing the same benefit described by Sclater in the conveyer example. (Sclater, Ex. 1017, 302). The modification would also be the use of a known technique—using a one-way clutch in a backstopping mode of operation—to improve similar devices, i.e., treadmills and conveyor belts, in the same way, i.e., to provide unidirectional belt motion. (See also ¶¶84-91; Emerson, Ex. 1018 at 8-9, 52-53.)

251. A POSA would have considered a sprag-type one-way clutch bearing for an exercise equipment application, such as a treadmill. For example, Emerson is a bearing catalog from 2001 that describes its NSS Series sprag type one-way clutch as an option for multiple "Field Applications," including "Exercise

equipment,” “Food processing equipment,” “Printing presses,” and “Roll conveyors.” (Ex. 1018 at 52-53.)

252. Intentionally left blank.

2. Independent Claim 1

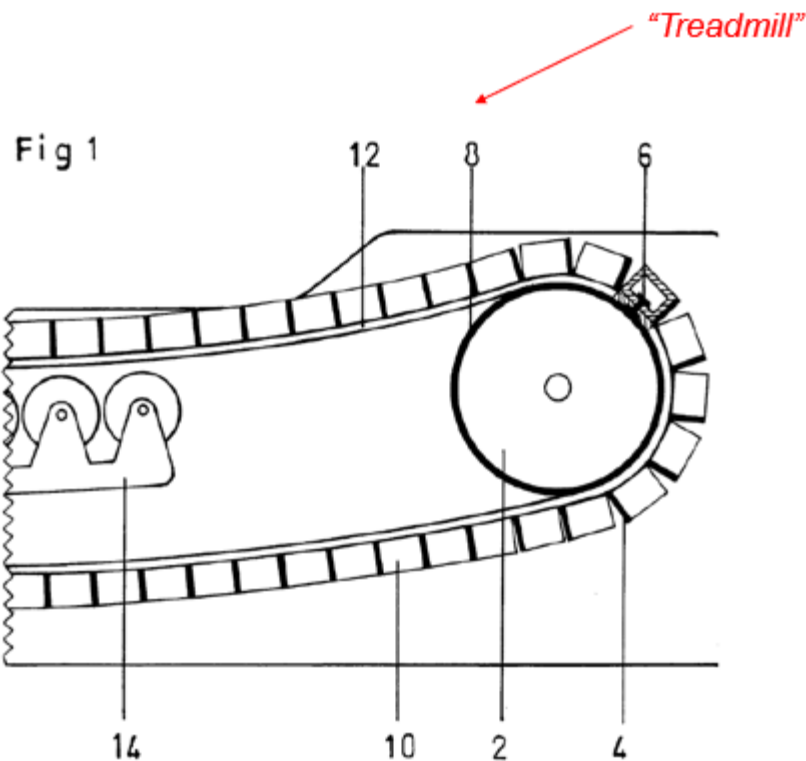
... ***[1.0] A manually powered treadmill, comprising:***

253. Tollkien discloses a treadmill. (Tollkien, Ex. 1031, Abstract.) Tollkien explains “[t]he invention relates to a treadmill for fitness training.” (Tollkien, Ex. 1031, [0001].) Tollkien discloses that the treadmill is powered by a user, *i.e.*, “*manually powered*”:

The treadmill is powered by either a motor or the user, and can normally be adjusted to different angles of inclination.

(Tollkien, Ex. 1031, [0002].)

254. With reference to Figure 1, Tollkien discloses “a side view of part of a treadmill without a motor.” (Tollkien, Ex. 1031, [0018].)



Tollkien, Ex. 1031, Fig. 1 (Annotated)

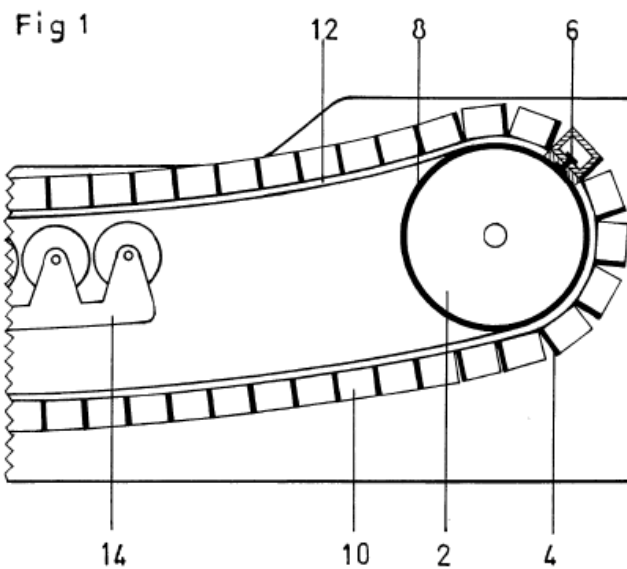
255. Tollkien further discloses a second embodiment in which the treadmill is integrated with a vehicle 20. (Tollkien, Ex. 1031, Figs. 2–3, [0022]–[0023].)

256. Thus, Tollkien discloses “*A manually powered treadmill.*”

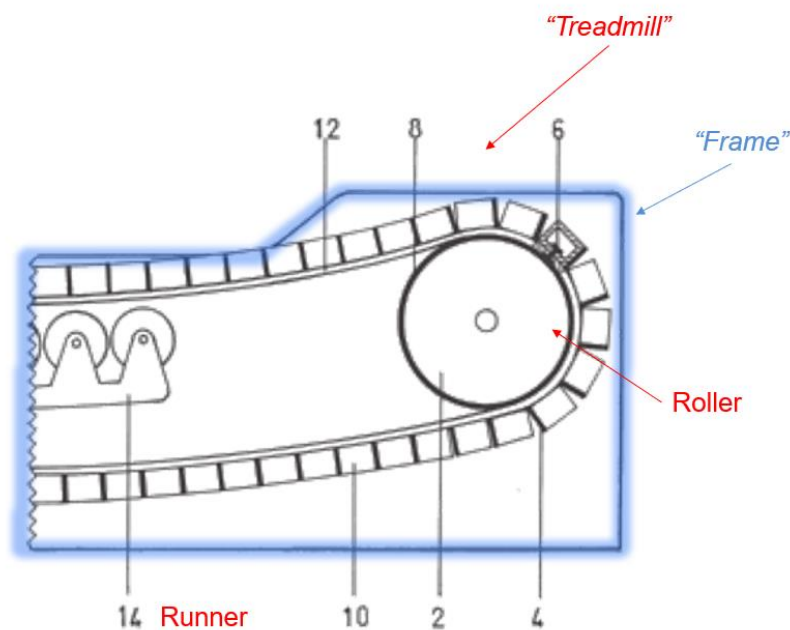
257. Intentionally left blank.

... **[1.1] a frame;**

258. Tollkien discloses that “Fig. 1 shows a section of a treadmill in a partially cutaway side view.” (Tollkien, Ex. 1031, [0014].) Tollkien further discloses that the treadmill includes a “*frame*” annotated in blue in the figure below. (Tollkien, Ex. 1031, [0018], Abstract, Fig. 1.)



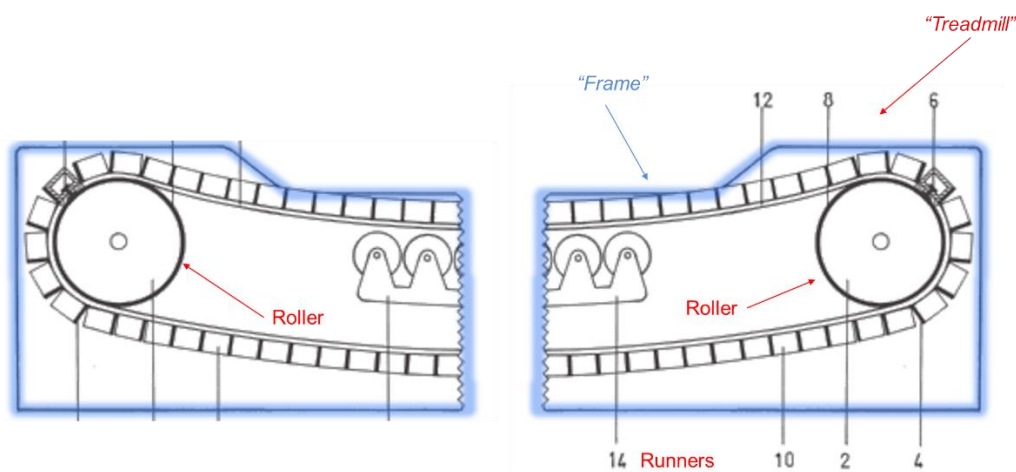
Tollkien, Ex.1030, Fig. 1



Tollkien, Ex.1030, Abstract Fig.¹² (Annotated)

¹² The figure illustrated in the Abstract of Tollkien is slightly different from Figure 1 in that it includes the right edge of the frame.

259. Tollkien discloses “A treadmill for fitness training with a running surface formed between two rollers (2).” (Ex.1031, Abstract.) Tollkien further discloses that “Fig. 1 shows a side view of part of a treadmill” illustrating one roller and explains that “[t]he other side is mirror-symmetrical.” (Ex.1031, ¶[0018].) The following image includes Figure 1 with a mirror image of Figure 1 to depict both sides of the treadmill.



Tollkien, Ex.1030, Abstract Fig. (Annotated)

260. Thus, Tollkien discloses “*a frame.*”

261. Intentionally left blank.

... ***[1.2] at least one front running belt pulley coupled to the frame;***

... ***[1.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;***

262. Tollkien discloses the treadmill includes a belt 12 wrapped around rollers 2 (“*front running belt pulley*”) and (“*rear running belt pulley*”) located at the ends and supported in the middle by runners 14.

A treadmill for fitness training with a running surface formed between two rollers (2).

(Tollkien, Ex. 1031, Abstract.)

Fig. 1 shows a side view of part of a treadmill without a motor. **In order to show details clearly, only one third of the belt is shown. The other side is mirror-symmetrical, the middle is an analogous extension of the arc. The running surface is formed by cross members 10 that are transverse to the direction of movement, which are attached with rivets 6 to a continuous belt 12.** A resilient plastic strip 4 is attached to one long side of each cross member 10 running transverse to the direction of movement, such that – as can be readily seen in Fig. 1 – two cross members 10 never come in direct contact with one another, but instead are always separated in a cushioning manner by the plastic strip 4. The tension and consequently the shape of the running surface is obtained in the exemplary embodiment by the interactions of the cross members 10, the elastic strips 4 between them, the connections of the cross sections

to the belt (by means of rivets 6 in the exemplary embodiment), and the belt itself.

(Tollkien, Ex. 1031, [0018].)

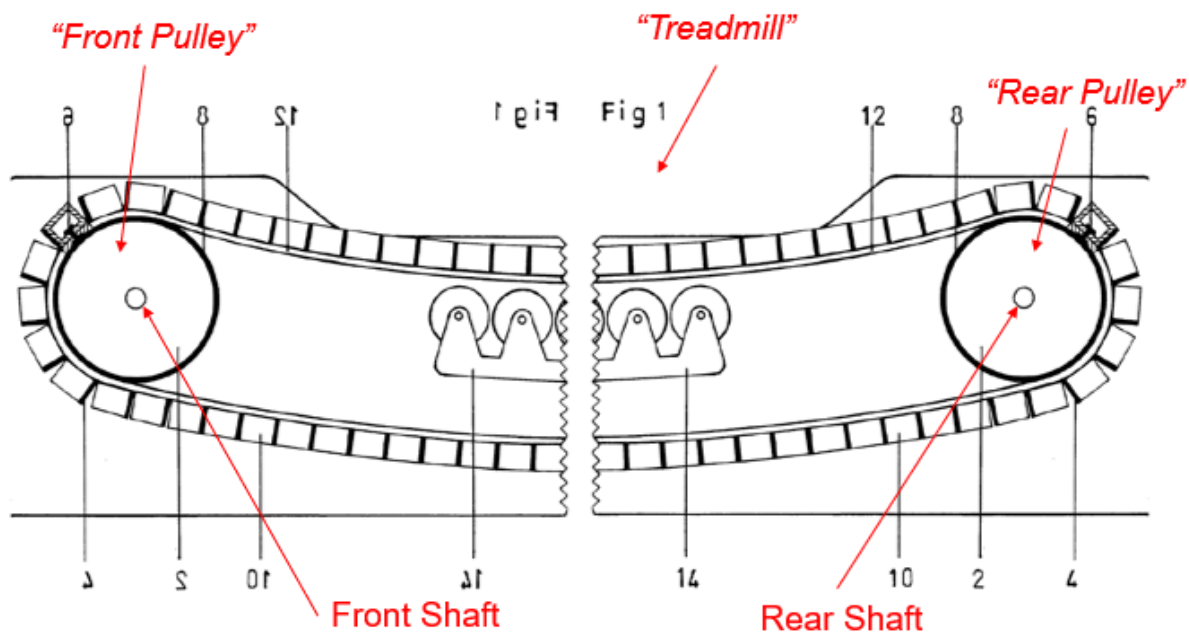
263. The belt is supported at the ends by rollers 2 and in the middle by runners 14.

Each roller 2 is coated with rubber 8, thus increasing the frictional adhesion between the belt 12 and the rollers 2 and protecting the roller where the rivet comes in contact therewith. The tension is released on the outer surface of each roller and in the lower area of the belt, facing away from the running surface, such that the belt can travel over the rollers without any notable resistance. Because the spacing between adjacent cross members is very small, and the strips also expand, no space is indicated in the illustration between the cross members in the section of the belt that is currently underneath. The runners 14 placed underneath the running surface prevent the belt from bouncing when in use.

(Tollkien, Ex. 1031, [0020].)

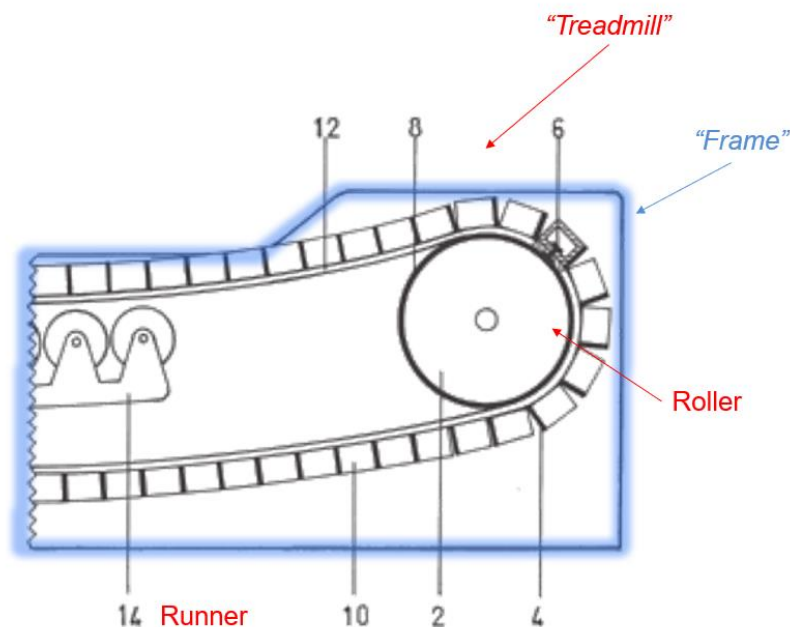
264. As discussed above, the treadmill of Tollkien is symmetrical and has rollers 2 located at the front and rear of the treadmill. The rollers 2 are spaced a distance from each other. Since the rollers transmit power by means of an endless belt 12, a POSA would have understood the rollers 2 to be “*running belt pulleys*.”

(Tollkien, Ex. 1031, [0018] and [0020].)



Tollkien, Ex. 1031, Fig. 1 (Annotated)

265. Tollkien also discloses, in Figure 1, a shaft extending through the center of each roller 2. (Ex.1031, Fig. 1.) A POSA would have understood that the ends of these shafts are received in journals formed in the frames for support, such that each roller (“pulley” or “rotatable element”) is “coupled to the frame.”

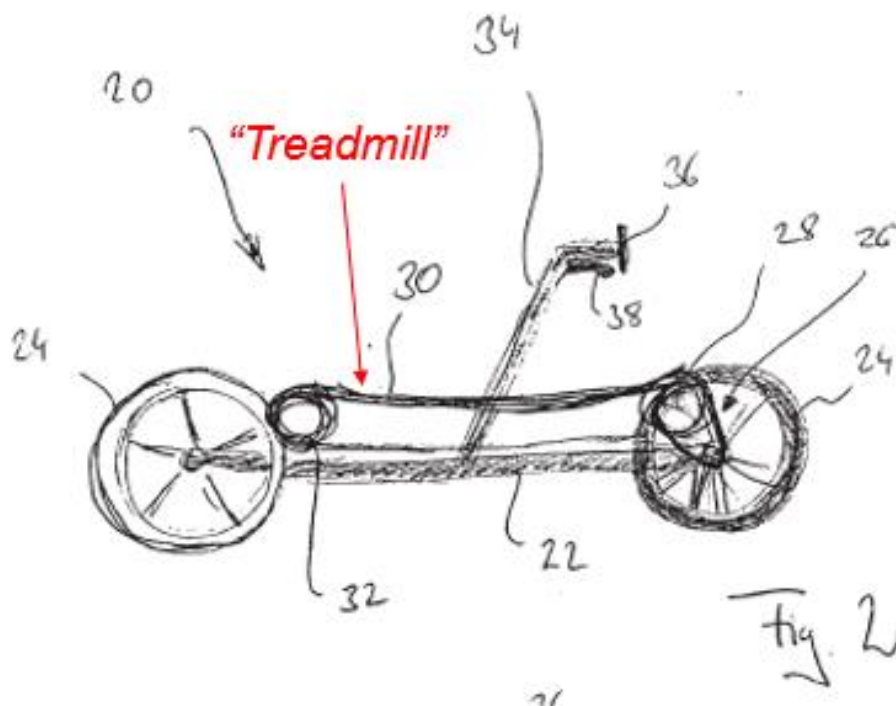


Tollkien, Ex.1030, Abstract Fig.¹³ (Annotated)

266. Tollkien further discloses a second embodiment in which the treadmill is integrated with a vehicle 20. (Tollkien, Ex. 1031, Figs. 2–3, [0022].) “[T]he two rear wheels . . . are powered by a typical chain drive 26, in which the drive chain itself is driven by the rear roller 28, which in turn is moved by the circulating belt 30.” (*Id.*) “The belt 30 is analogous to the belt 12 shown in Fig. 1.” The vehicle is propelled by a user running on the belt 30: “This results in an effective propulsion of the vehicle through the application of the predominantly vertical energy portion

¹³ The figure illustrated in the Abstract of Tollkien is slightly different from Figure 1 in that it includes the right edge of the frame.

by the belt drive to an axle or the wheels of the outdoor apparatus.” (Tollkien, Ex. 1031, [0023].)



Tollkien, Ex. 1031, Figs. 2 and 3

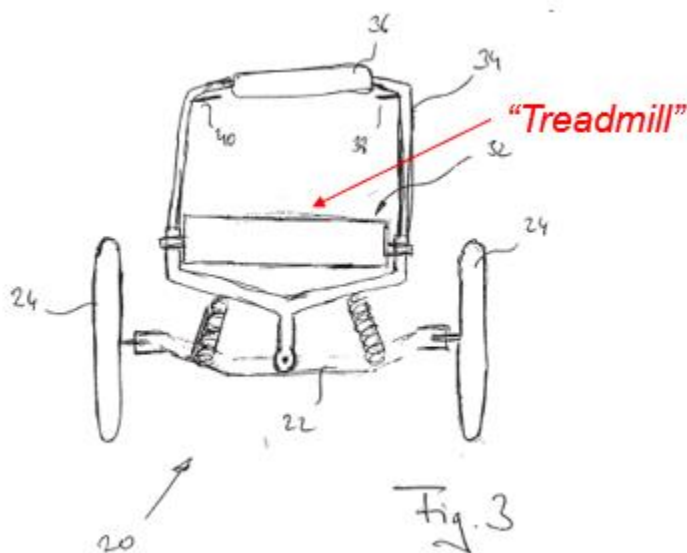
267. Tollkien also discloses a front roller 32 and a rear roller 28 in the vehicle embodiment of Figs. 2 and 3.

The vehicle 20 shown merely schematically in Figs. 2 and 3, is composed substantially of a chassis 22, with four conventional wheels 24 attached thereto in the conventional manner. In this exemplary embodiment, the two rear wheels, seen in the direction of travel, are powered by a typical chain drive 26, in which the drive chain itself is driven by **the rear roller 28**, which in turn is moved by the circulating belt 30. The belt 30 is analogous to the belt 12 shown in Fig. 1, in particular comprising numerous cross members. There is a

second roller 32 in the front of the vehicle 20, thus enabling the belt 30 to circulate continuously on the two rollers 28 and 32.

(Tollkien, Ex. 1031, [0022].)

268. Tollkien also shows a treadmill frame in the vehicle embodiment of Figs. 2 and 3. Fig. 3 shows the rollers 32 include a shaft that extends through the frame to support the rollers 32 for rotation.



Tollkien, Ex. 1031, Fig. 3 (Annotated)

269. As such, a POSA would have understood that Tollkien discloses “a front running belt pulley [roller 2] coupled to the frame; a rear running belt pulley [roller 2] coupled to the frame and spaced a distance from the front running belt pulley.”

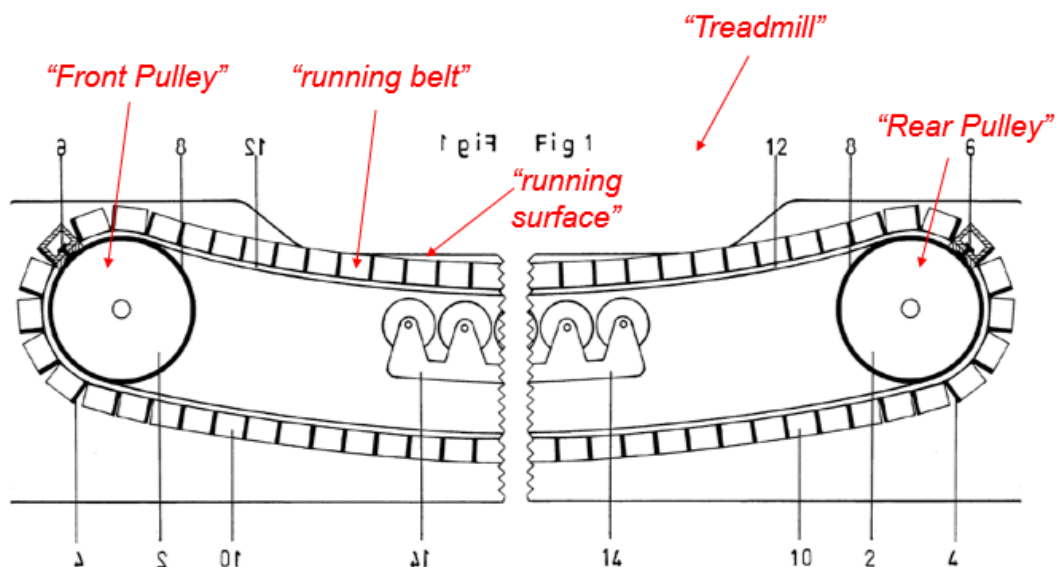
270. Intentionally left blank.

... [1.4] a running belt 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;

271. Tollkien discloses a continuous belt 12 (“*running belt*”) looped around the front and rear pulleys or rollers 2. (Tollkien, Ex. 1031, [0020].) The belt 12 is supported at the ends by the rollers 2 and in the middle by the runners 14. The belt 12 is curved and has a running surface formed by cross members 10.

Fig. 1 shows a side view of part of a treadmill without a motor. In order to show details clearly, only one third of the belt is shown. The other side is mirror-symmetrical, the middle is an analogous extension of the arc. **The running surface is formed by cross members 10 that are transverse to the direction of movement, which are attached with rivets 6 to a continuous belt 12.** A resilient plastic strip 4 is attached to one long side of each cross member 10 running transverse to the direction of movement, such that – as can be readily seen in Fig. 1 – two cross members 10 never come in direct contact with one another, but instead are always separated in a cushioning manner by the plastic strip 4. **The tension and consequently the shape of the running surface is obtained in the exemplary embodiment by the interactions of the cross members 10, the elastic strips 4 between them, the connections of the cross sections to the belt (by means of rivets 6 in the exemplary embodiment), and the belt itself.**

(Tollkien, Ex. 1031, [0018].)



Ex. 1031, Fig. 1 (Annotated)

272. Tollkien further discloses adjusting the tension of the running surface to adjust its curvature:

A treadmill for fitness training with a running surface formed between two rollers (2), which is curved away from the user where it faces the user such that the curving radius basically corresponds to the length of the user's legs, characterized in that – the running surface is formed by cross members (10) that are transverse to the direction of movement, and – the curving radius can be adjusted.

(Tollkien, Ex. 1031, Abstract.)

The arrangement of these elements results in the upper edges of the cross members, cushioned by the plastic strips, pressing against one another, while the lower edges tend to spread apart, but only as far as the attachment to the belt by the rivets allows for. **The give of the**

running surface is obtained in this case by the combined compression in the upper area, reinforced by the resilience of the strips and the stretch at the connections in the lower area where two cross members meet. The tension or shape of the running surface can be increased or otherwise varied by attaching different strips, in particular when the tension decreases due to wear. A higher tension results in a flatter curvature, which is therefore more suited to larger runners with longer legs that describe a larger arc radius during the running movement. A higher tension is also more suited to overweight people, as this decreases the steepness of the curvature.

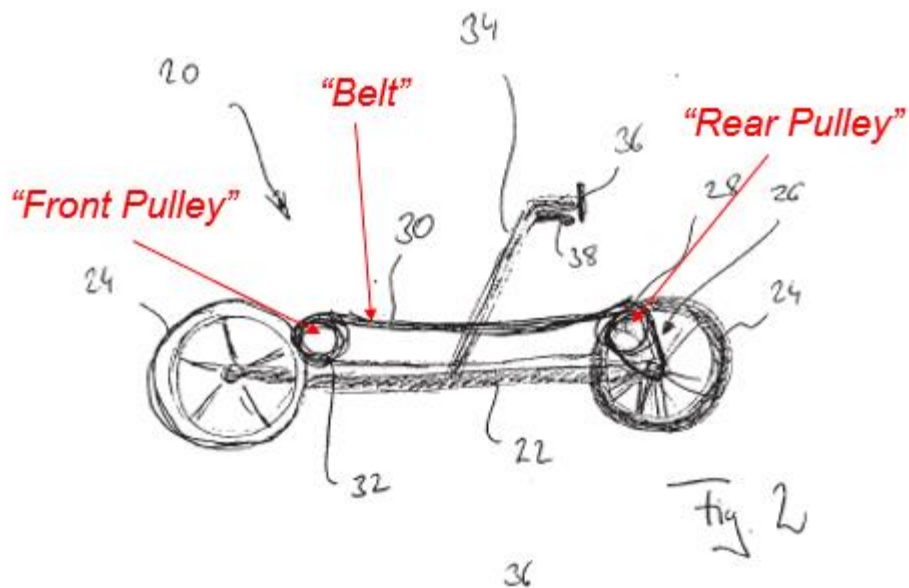
Each roller 2 is coated with rubber 8, thus increasing the frictional adhesion between the belt 12 and the rollers 2 and protecting the roller where the rivet comes in contact therewith. The tension is released on the outer surface of each roller and in the lower area of the belt, facing away from the running surface, such that the belt can travel over the rollers without any notable resistance. Because the spacing between adjacent cross members is very small, and the strips also expand, no space is indicated in the illustration between the cross members in the section of the belt that is currently underneath. The runners 14 placed underneath the running surface prevent the belt from bouncing when in use.

(Tollkien, Ex. 1031, [0019]–[0020].)

273. Tollkien also discloses a curved running belt 30 wrapped around rollers 32, 28. The running belt 30 is analogous to belt 12.

The vehicle 20 shown merely schematically in Figs. 2 and 3, is composed substantially of a chassis 22, with four conventional wheels 24 attached thereto in the conventional manner. In this exemplary embodiment, the two rear wheels, seen in the direction of travel, are powered by a typical chain drive 26, in which the drive chain itself is driven by **the rear roller 28**, which in turn is **moved by the circulating belt 30**. **The belt 30 is analogous to the belt 12 shown in Fig. 1, in particular comprising numerous cross members**. There is a **second roller 32 in the front** of the vehicle 20, thus enabling the belt 30 to circulate continuously on the two rollers 28 and 32. **The belt 30 curves downward in the area facing the runner between the two rollers 28 and 32, and the radius of this curve basically corresponds to the length of a user's legs, resulting in the desired, joint-protecting and particularly efficient running described above.**

(Tollkien, Ex. 1031, [0022]).



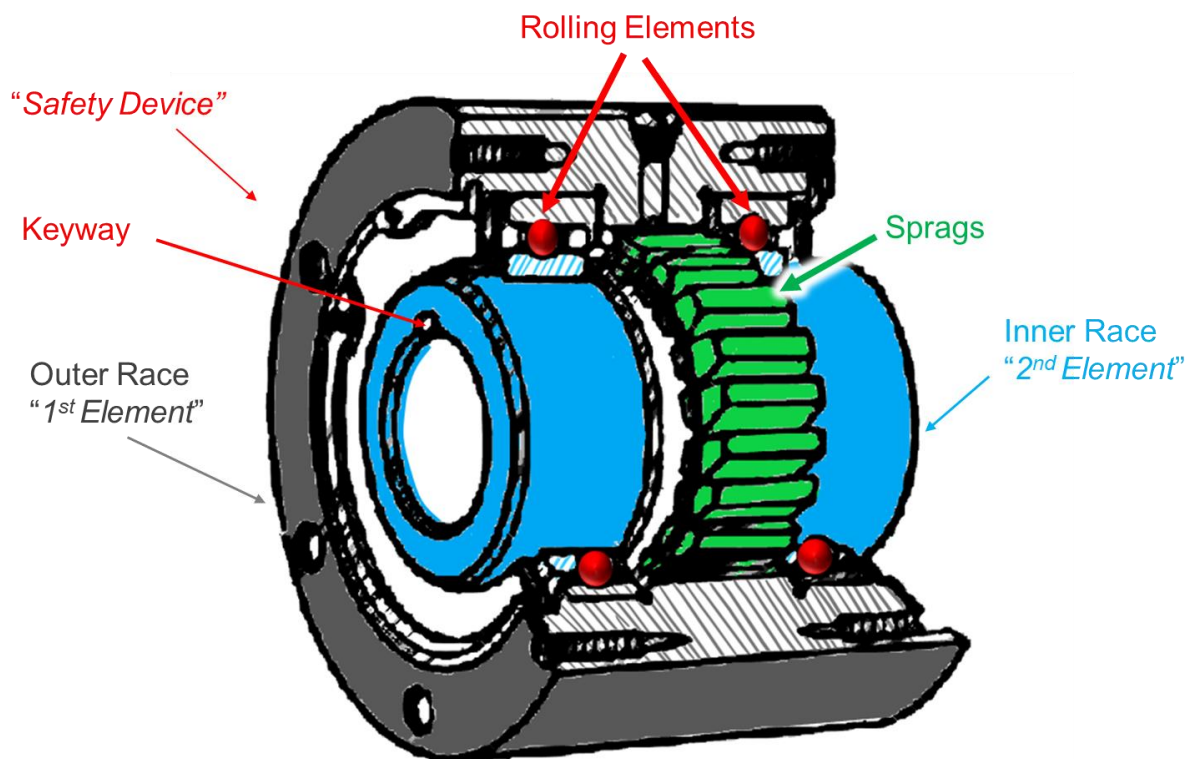
Tollkien, Ex. 1031, Fig. 2 (Annotated)

274. Thus, Tollkien discloses “a running belt [belt 12/30] at least partially supported by at least one of the at least one front running belt pulley [roller 2/32] and the at least one rear running belt pulley [roller 228], wherein the running belt includes a running surface, at least a portion of which is curved.”

... [1.5] a safety device coupled to the frame and the running belt, the safety device having a first element and a second element, the first element substantially surrounding the second element or the second element substantially surrounding the first element;

275. Sclater discloses sprag-type one-way bearing assemblies that include sprags (green) combined with rolling elements, such as cylindrical rollers or balls (red). “Sprags combined with cylindrical rollers in a bearing assembly can provide a simple, low-cost method for meeting the torque and bearing requirements of most

machine applications.” (Sclater, Ex. 1017 at 312.) The sprags and rollers are radially disposed between an inner race (blue) and an outer race (gray) surrounding the inner race. The outer race includes tapped holes allowing the outer race to be fixed to another support structure, such as a frame of a treadmill.



Sclater, Ex. 1017 at 318 (Annotated)

276. The inner race defines a center hole that is sized to receive a shaft and defines a keyway on the inner diameter. The keyway is a traditional means for coupling the inner race to a shaft such that they rotate together via a key. Thus, the

inner race is configured to be coupled to an item coupled to the shaft, such a treadmill belt.

277. Sclater further discloses that this sprag-type bearing assembly functions as a one-way bearing by providing “one-direction only torque transmission in an overrunning clutch.” (Sclater, Ex. 1017 at 312.)

278. Sclater discloses that the sprags have a “sprag profile, which is composed of two nonconcentric curves of different radius” that provide “a locking ramp.” (Sclater, Ex.1017 at 312.) Sclater further discloses that the:

Precision sprags act as wedges and are made of hardened alloy steel.

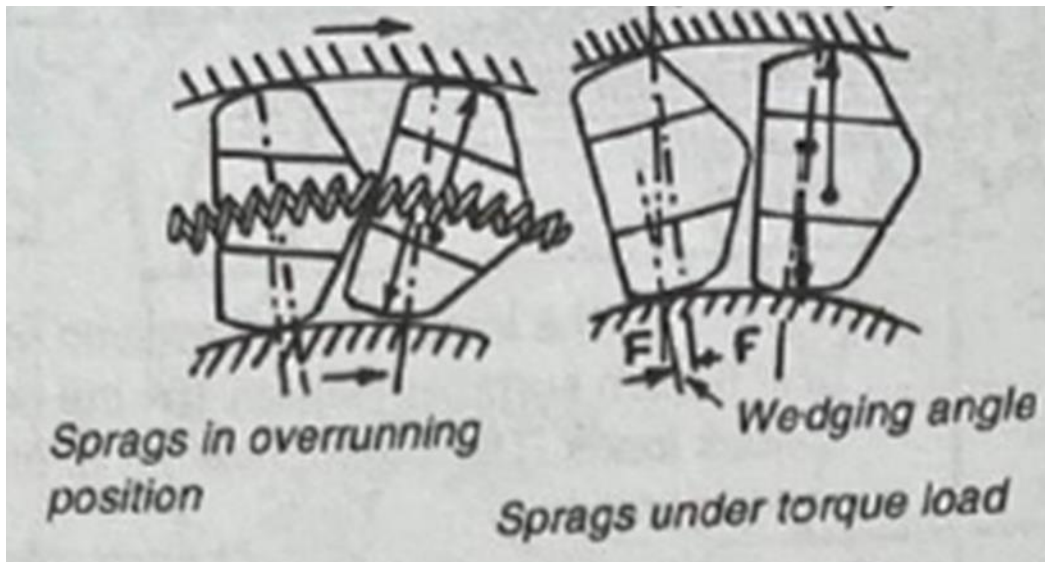
In the formsprag clutch, **torque is transmitted from one race to another by the wedging action of sprags between the races in one direction;** in the other direction the clutch freewheels.

(Sclater, Ex.1017 at 318.)

279. Tolkien’s continuous belt 12 (“*running belt*”) would be coupled to the inner race (“*second element*”) through the front roller 2 or the rear roller 2. The belt 12 (“*running belt*”) would also be coupled to the outer race (“*first element*”) through the inner race.

280. As illustrated in the figure below on the left, the belt 12 and the inner race (“*second element*”) rotate in a first direction relative to the outer race (“*first element*”) to overrun. However, as illustrated in the figure below on the right, wedging or interference between the sprags and the inner and outer race prevents

rotation of the inner race in an opposite direction, which prevents the belt 12 from moving forward. The outer race (“*first element*”) would be fixed to the frame by fasteners that are received in the tapped holes defined therein.



Sclater, Ex. 1017 at 318

281. Thus, the combination of references teaches “a safety device [one-way bearing assembly] coupled to the frame and running belt [belt 12/30], the safety device having a first element [outer race] and a second element [inner race], the first elements [outer race] substantially surrounding the second element [inner race].”

282. Intentionally left blank.

a. Claim Construction of “Safety Device”

283. I understand that Petitioner proposes construing the term “safety device” as a “device having two ring-shaped components” and Patent Owner

proposed construing the term “*safety device*” as a “device that permits movement in only one direction” in the related litigation.

284. Sclater discloses sprag-type one-way bearing assemblies. “Sprags combined with cylindrical rollers in a bearing assembly can provide a simple, low-cost method for meeting the torque and bearing requirements of most machine applications.” (Sclater, Ex.1017 at 312.) Sclater discloses that the sprag-type one-way bearing assembly includes an inner race, an outer race, and a plurality of sprags disposed between the inner race and the outer race. (Ex. 1017, 316.) The inner race and the outer race are “two ring-shaped components.” As explained in ¶249, Sclater’s one-way bearing permits movement of the belt in only one direction, rearward. However, forward motion of Tolkien’s belt 12 would rotate the inner race in the opposite direction and wedge the sprags into the locked position to backstop and prevent forward motion, i.e., rotation, of the belt 12. Thus, the combination of references teaches both constructions.

285. Intentionally left blank.

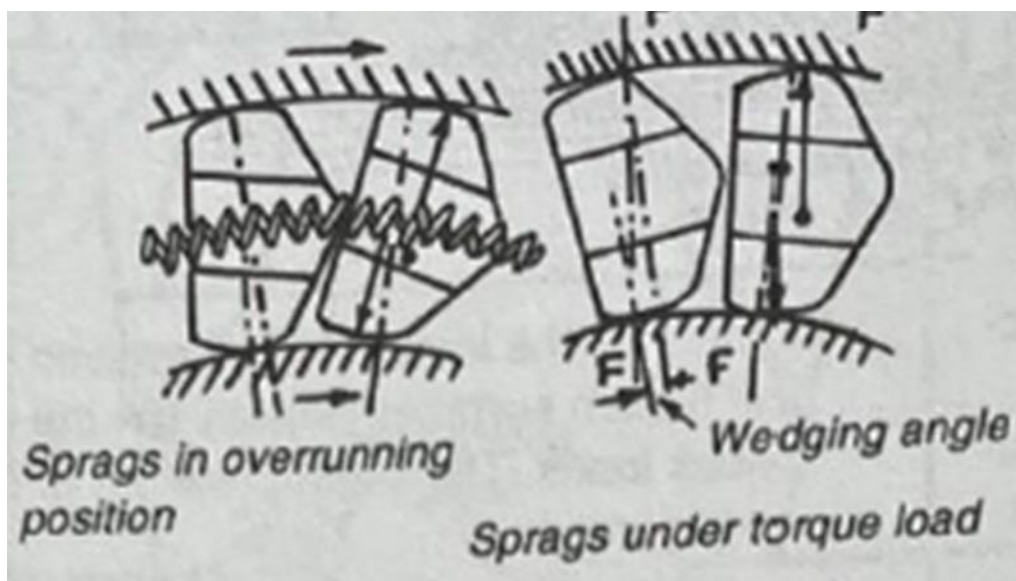
286. Intentionally left blank.

b. Claim Construction of “*Substantially Prevent[]*”

287. I understand that Petitioner proposes construing the term “*substantially prevent rotation*” as “prevent any movement after allowing no or

minimal movement” and Patent Owner proposed the term be construed under its plain and ordinary meaning.

288. A sprag-type one-way bearing allows minimal movement before the sprags rotate into a locked position. As illustrated in the figure below on the left, Sclater discloses that when the inner race rotates in a first direction relative to the outer race, the sprags move out of the locked position such that an overrun condition occurs. However, as illustrated below right, when the inner race rotates in the opposite direction, the sprag profile rotates away from the overrunning position and wedges the sprags into a locked position preventing relative motion between the inner and outer races. Thus, the combination of references teaches both constructions.



Sclater Ex.1017, 318

289. Intentionally left blank.

290. Intentionally left blank.

... [1.6] wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.

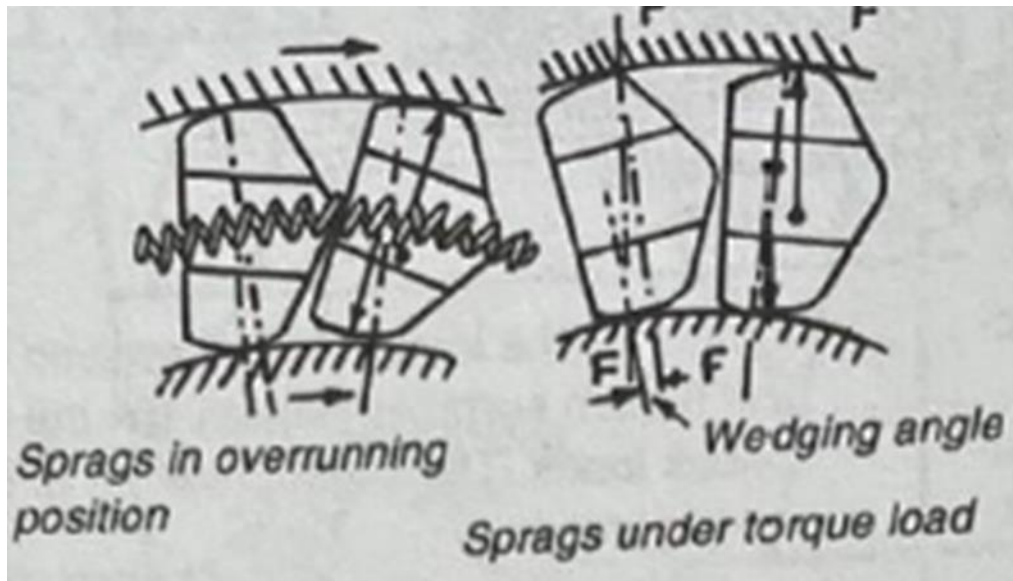
291. The sprag-type bearing assembly functions as a one-way bearing by providing “one-direction only torque transmission in an overrunning clutch.” (Ex.1017, 312.) The sprags have a “sprag profile, which is composed of two nonconcentric curves of different radius” that provide “a locking ramp.” (*Id.*) Sclater further discloses that the:

Precision sprags act as wedges and are made of hardened alloy steel. In the formsprag clutch, **torque is transmitted from one race to another by the wedging action of sprags between the races in one direction**; in the other direction the clutch freewheels.

(Sclater, Ex.1017 at 316, 318.)

292. The belt 12 (“*running belt*”) is coupled to the inner race (“*second element*”) through the front roller 78 or the rear roller 86. As illustrated in the figure below on the left, the belt 16 and the inner race rotate in a first direction relative to the outer race (“*first element*”), which is fixed to the frame, to overrun.

However, as illustrated in the figure below on the right, wedging or interference between the sprags and the inner and outer race prevents rotation of the inner race in an opposite direction, which prevents the belt 12 from moving forward.



Sclater, Ex. 1017 at 318

293. Thus, the combination of references teach “*wherein one of the first [outer race] and second [inner race] elements of the safety device and the running belt [belt 12] freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.*”

294. Intentionally left blank.

295. Intentionally left blank.

296. Intentionally left blank.

3. Dependent Claims 2–4 and 6–8

297. Claims 2–4 and 6–8 depend from claim 1 which I have understood means that these claims require all of the limitations of claim 1 in addition to their additional limitations.

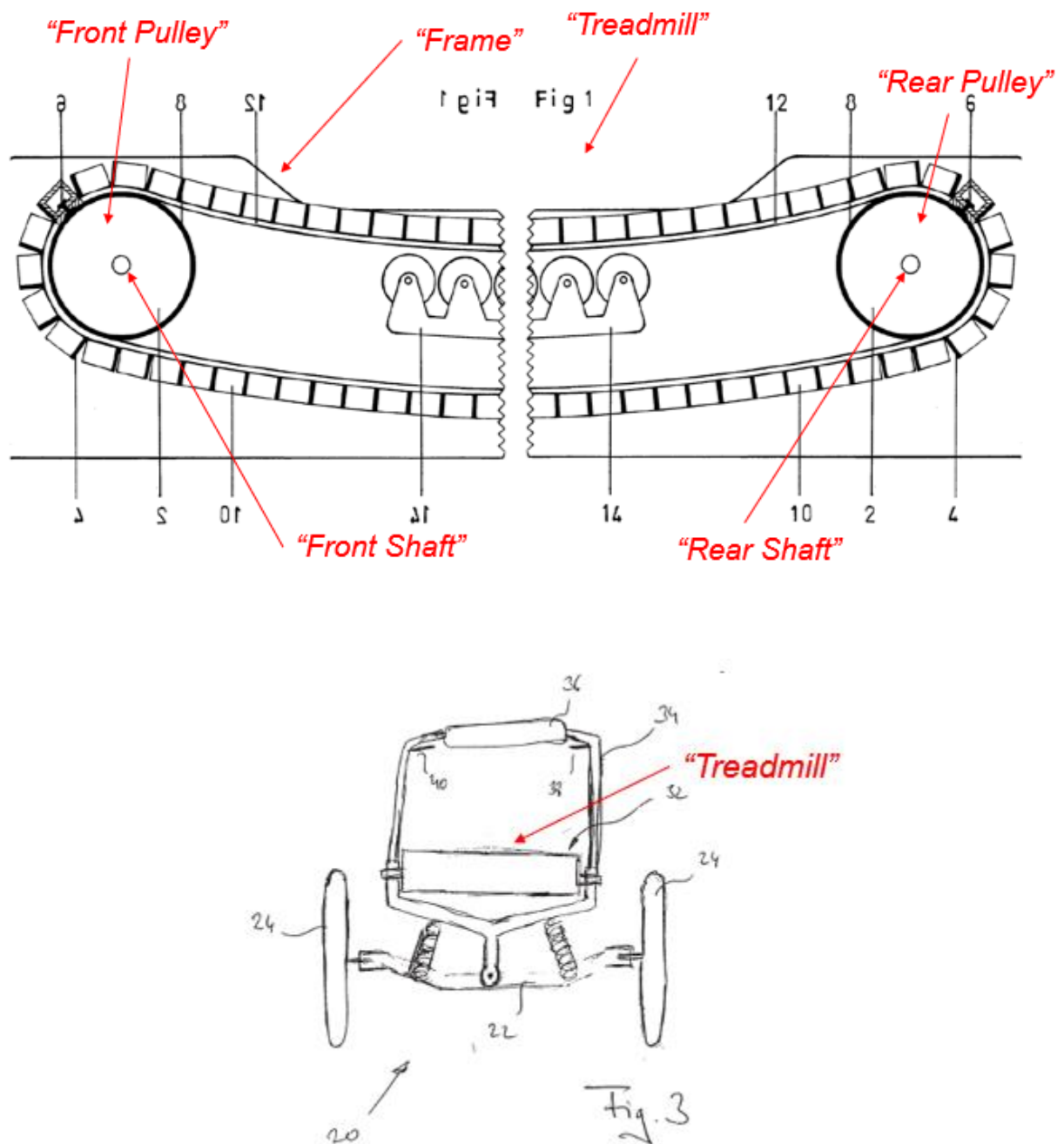
298. The combination of Tollkien and Sclater disclose all of the limitations of claim 1 as described above. (See ¶¶253-293.)

299. Intentionally left blank.

... [2.] The manually powered treadmill of claim 1, further comprising a front shaft coupled to frame, the front shaft being adapted to support the at least one front running belt pulley.

... [3.] The manually powered treadmill of claim 1, further comprising a rear shaft coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley.

300. Tollkien discloses a shaft (“*front shaft*”) extending through the center of the front roller 2 (“*front pulley*”) and a shaft (“*rear shaft*”) extending through the center of the rear roller 2 (“*rear pulley*”). (Tollkien, Ex. 1031, Fig. 1.) Tollkien illustrates an example coupling in Fig. 3, wherein the frame defines holes and the front shaft is receive through the holes.



Tollkien, Ex. 1031, Figs. 1 and 3 (Annotated)

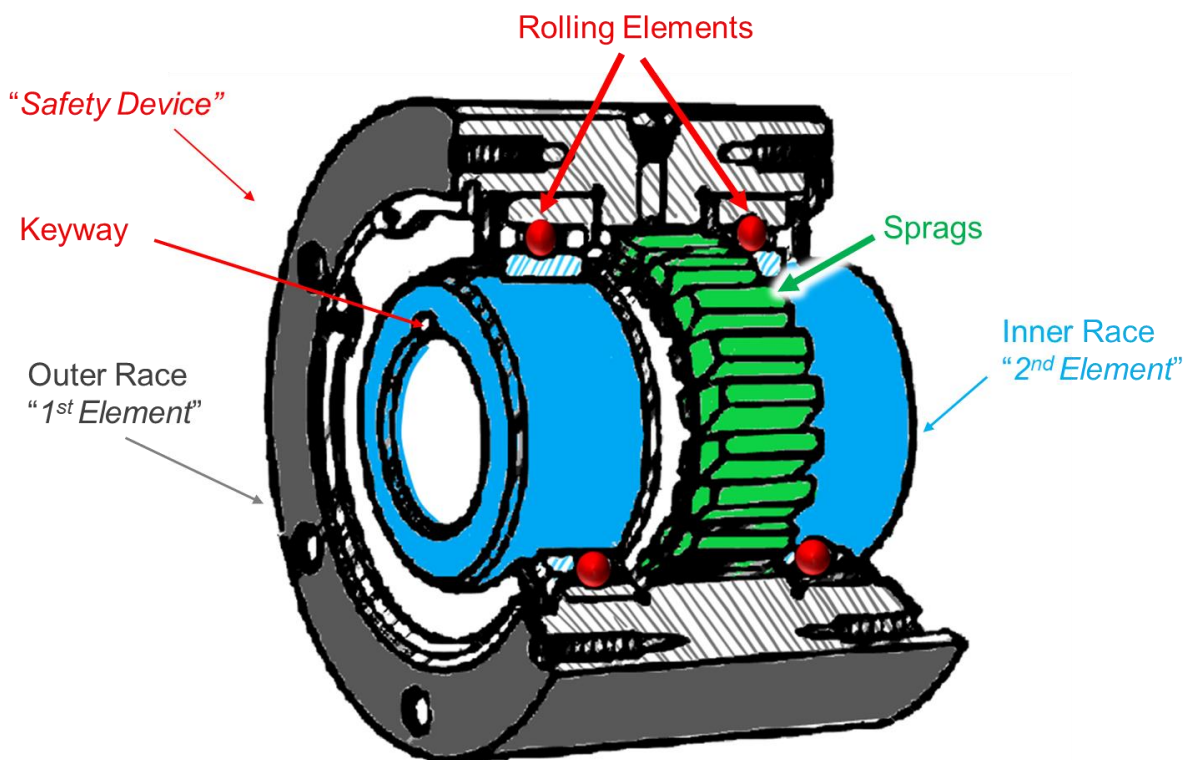
301. Thus, Tollkien discloses, “a front shaft coupled to frame, the front shaft being adapted to support the at least one front running belt pulley [roller

2/32]” and “a rear shaft coupled to frame, the rear shaft being adapted to support the at least one rear running belt pulley [2/28].”

302. Intentionally left blank.

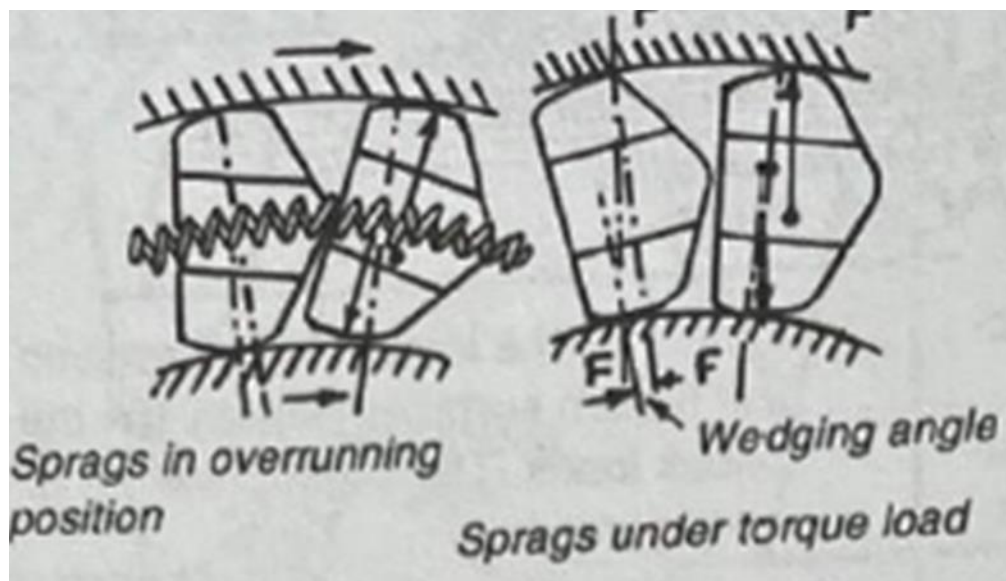
... [4.] *The treadmill of claim 1, wherein the first and second elements of the safety device at least partly form a one-way bearing.*

303. Sclater discloses a one-way bearing assembly. (Sclater, Ex. 1017 at 312.) As illustrated below, Sclater discloses that the sprag-type one-way bearing assembly includes sprags that are disposed between an inner race (“second element”) and an outer race (“first element”).



Sclater, Ex. 1017 at 318

304. Sclater discloses that the sprags have a “sprag profile, which is composed of two nonconcentric curves of different radius” that provide “a locking ramp.” (Sclater, Ex.1017 at 312.) Sclater further discloses that “torque is transmitted from one race to another by the wedging action of sprags between the races in one direction; in the other direction the clutch freewheels.” (Sclater, Ex.1017 at 316.) The bearing assembly is a “*one-way bearing*” due to the interaction of the sprags, rolling elements (balls), and the races.



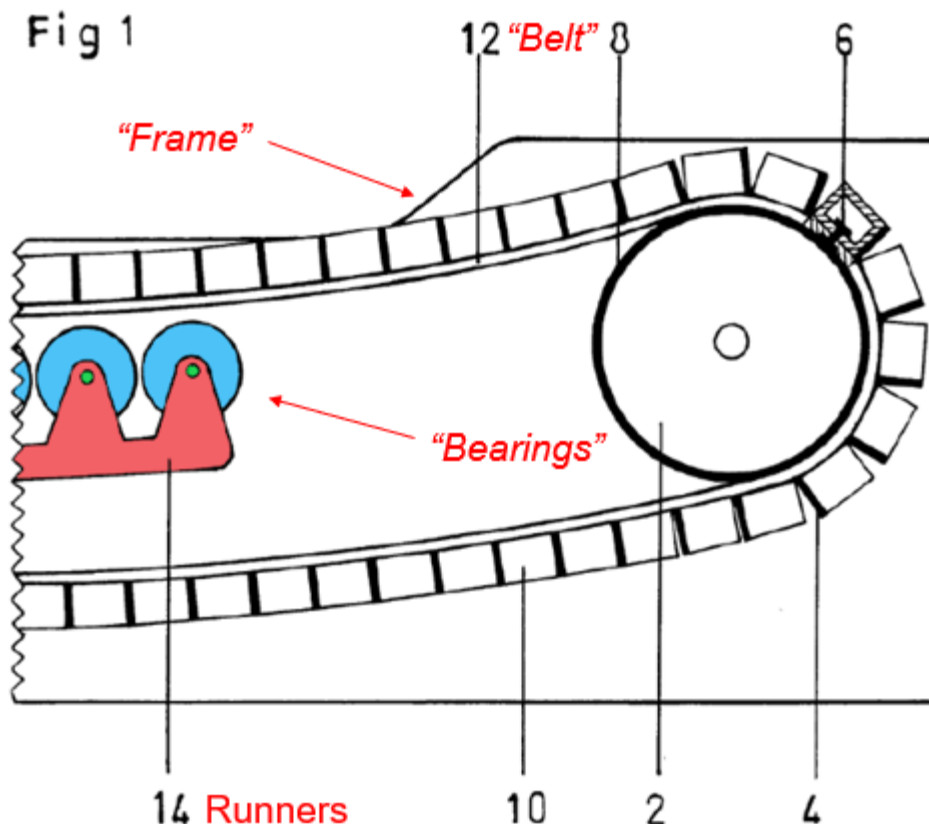
Sclater, Ex. 1017 at 318

305. Thus, the combination of references teaches, “*wherein the first and second elements [outer race/inner race] of the safety device at least partly form a one-way bearing.*”

306. Intentionally left blank.

... [6.] The manually powered treadmill of claim 1, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

307. Tollkien discloses runners 14 that support a middle portion of the belt 12: “The runners 14 placed underneath the running surface prevent the belt from bouncing when in use.” (Tollkien, Ex. 1031, [0020].) As shown in Fig. 1, the runners 14 include a base or support structure (annotated in red) that supports a plurality of bearings (annotated in blue). The bearings are supported for rotation relative to the support structure by a plurality of axles (annotated in green). The bearings are arranged underneath the running belt 12 and are configured to engage the underside of the running belt 12 to provide support and prevent bouncing of the belt.



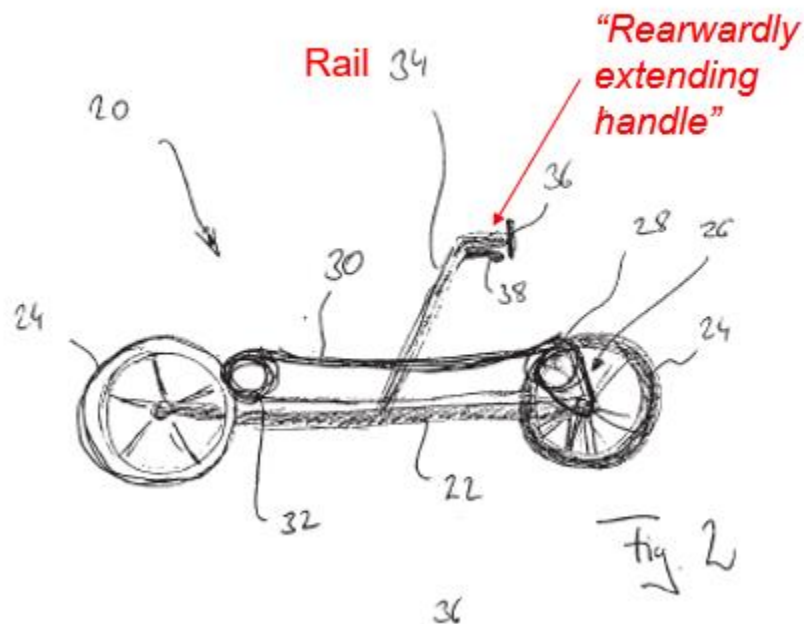
Tollkien, Ex. 1031, Fig. 1 (Annotated)

308. A POSA would have understood that the runners 14 are mounted and fixed to the frame and the bearings are mounted for rotation about the axels and relative to the frame to provide rolling engagement with the continuous belt 12.

309. Therefore, Tollkien discloses *“a plurality of bearings [runners 14] coupled to the frame, at least one bearing of the plurality of bearings [runners 14] configured to at least partially support the running belt [belt 12].”*

310. Intentionally left blank.

311. Tolkien discloses a rail 34 having left and right side handles for the treadmill when it is integrated with a vehicle:



Tolkien, Ex. 1031, Fig. 2 (Annotated)

312. The handles are used to control the vehicle and to support or “brace” the user during operation.

... There is also a rail 34 attached to the chassis 22, which has a wide, cushioned contact surface 36 at the height of a user's pelvis, and to which two braking and steering levers 38 and 40 are **attached**. In this exemplary embodiment, a brake, not shown, on the left rear wheel is actuated with the left-hand lever 38, and a brake, not shown, on the right rear wheel is actuated with the right-hand lever

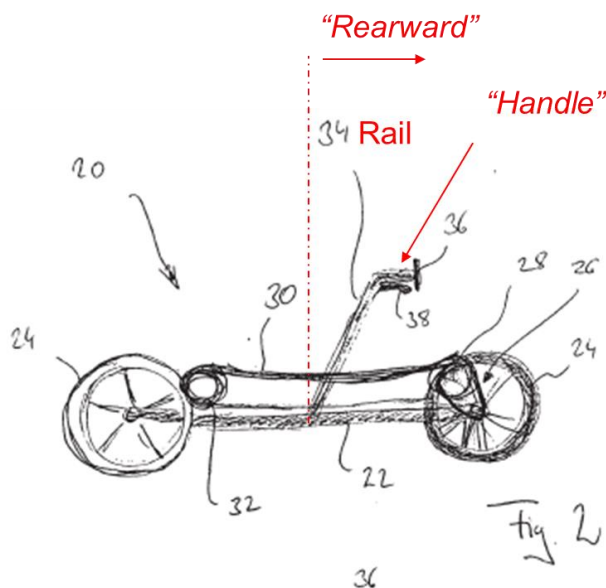
40, such that when both levers 38 and 40 are actuated, the vehicle is braked, and when just one lever is actuated, the vehicle turns.

(Tollkien, Ex. 1031, [0022].)

The hip/pelvic support can be combined with two side handles in a special embodiment, which can have brake elements and gearshift elements, which can be turned to aid in the steering through tilting the belt, or even to steer the vehicle themselves. By way of example, in a hazardous situation, by gripping the handles at the height of the pelvis and diagonally to the front thereof, it is possible to brake, brace, and steer the vehicle.

(Tollkien, Ex. 1031, [0026].)

313. As illustrated below, the side handles extend rearwardly.



Tollkien, Ex. 1031, Fig. 2 (Annotated)

314. A POSA would have understood that the rails could be used to support or brace a user of the treadmill, even during use without the vehicle. As explained in ¶¶73-77, a POSA would have known that handrails were a common feature to prevent a user from falling off of a treadmill. For example, Socwell discloses that “exercise treadmills of the prior art may furnish a user with an upright handle to grasp while exercising.” (Socwell, Ex. 1011, 2:56-58.) Additionally, certain standards required handrails, e.g., “[a]ll treadmills shall be equipped with a handrail for user support during use to assist in dismount.” (ASTM Standard, Ex. 1019 at 3-4.)

315. Therefore, Tollkien discloses, “*a rearwardly extending handle [side handles of rail 34] coupled to the frame.*”

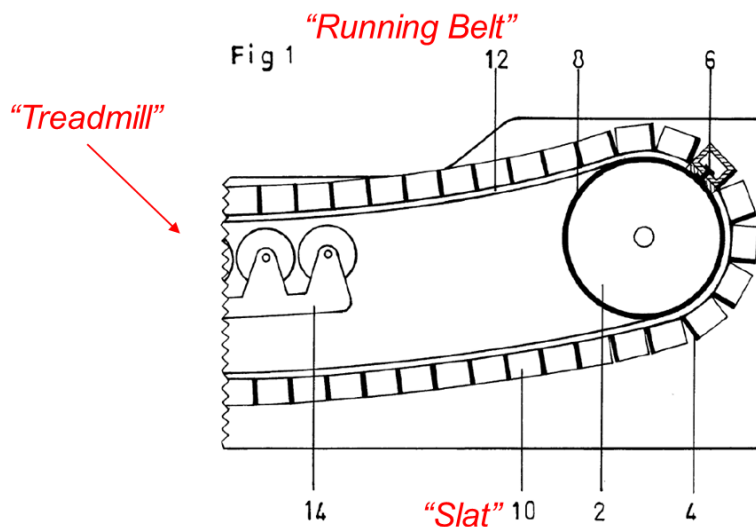
316. Intentionally left blank.

... ***[8.] The manually powered treadmill of claim 1, wherein the running belt includes at least one slat.***

317. Tollkien discloses that the belt 12 includes cross members 10 that form a running surface:

Fig. 1 shows a side view of part of a treadmill without a motor. In order to show details clearly, only one third of the belt is shown. The other side is mirror-symmetrical, the middle is an analogous extension of the arc. **The running surface is formed by cross members 10 that are transverse to the direction of movement, which are attached with rivets 6 to a continuous belt 12.**

(Tollkien, Ex. 1031, [0018].)



Tollkien, Ex. 1031, Fig. 1 (Annotated)

318. Therefore, Tollkien discloses “wherein the running belt [belt 12] includes at least one slat [cross members 10].”

319. Intentionally left blank.

4. Independent claim 9

320. Independent claim 9 is similar independent claim 1. To illustrate, the table below shows a side-by-side comparison of claims 1 and 9. Claim 9 is “marked up” to show the differences.

‘005 Patent Claim 1	‘005 Patent Claim 9
[1.0] A manually powered treadmill, comprising:	[9.0] A treadmill, comprising:
[1.1] a frame;	[9.1] a frame;
[1.2] at least one front running belt	[9.2] a rotatable element coupled to the

pulley coupled to the frame;	frame;
[1.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;	N/A
[1.4] a running belt 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;	[9.3] a running belt at least partially supported by the rotatable element, wherein the running belt includes a running surface, at least a portion of which is curved; and
[1.5] a safety device coupled to the frame and the running belt, the safety device having a first element and a second element, the first element substantially surrounding the second element or the second element substantially surrounding the first element;	[9.4] ☐ a first element and a second element, both of which are coupled to the running belt, and wherein the first element substantially surrounds the second element or the second element substantially surrounds the first element;
[1.6] wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of	[9.5] wherein one of the first and second elements and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of

rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.	the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.
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... ***[9.0] A treadmill, comprising:***

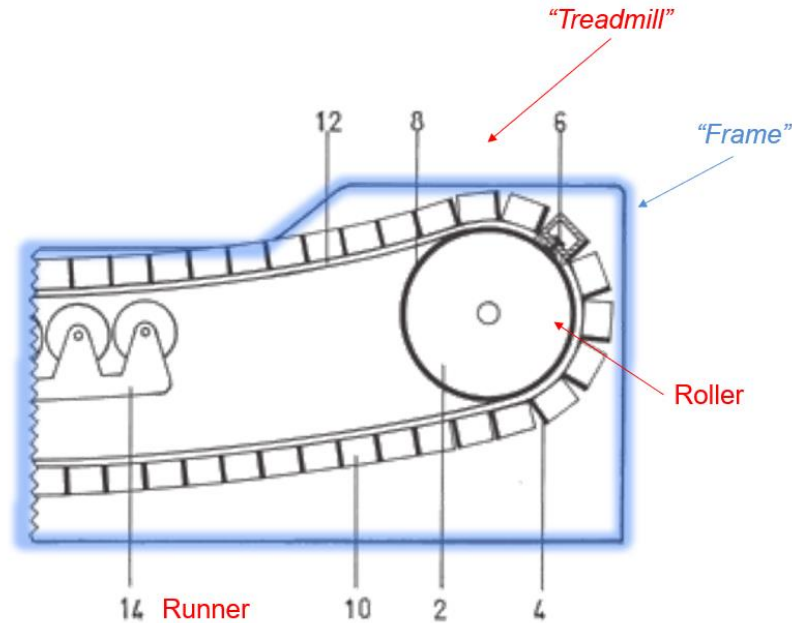
321. Claim limitation [9.0] is substantially similar to limitation [1.0]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that they are met by the combination of Tolkien and Sclater. (See ¶¶253-257.)

... ***[9.1] a frame;***

322. Claim limitation [9.1] is substantially similar to limitation [1.1]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Tolkien and Sclater. (See ¶¶258-261.)

... ***[9.2] a rotatable element coupled to the frame;***

323. As I discussed above in claim limitation [1.2]–[1.3], Tolkien discloses rollers 2 that are coupled to the frame. (See ¶¶262-269.) Tolkien discloses in Figure 1 a shaft extending through the center of each roller 2. (Ex.1031, Fig. 1.) A POSA would have understood that the ends of these shafts are received in journals formed in the frames for support, such that each roller (“rotatable element”) is “coupled to the frame.”



Tollkien, Ex. 1031, Fig. 1 (Annotated)

324. Therefore, Tollkien discloses “a rotatable element [roller 2] coupled to the frame.”

325. Intentionally left blank.

... [9.3] a running belt at least partially supported by the rotatable element, wherein the running belt includes a running surface, at least a portion of which is curved; and

326. As I discussed above in claim limitation [1.4], Tollkien discloses a belt 12/30 looped around the rollers 2 and including a curved running surface formed by the crossmembers 10. (See ¶¶271-274.) The rollers are “rotatable

elements.”¹⁴ The belt 12 is disposed on top of the rollers; therefore, the rollers at least partially support the belt.

327. Thus, Tollkien discloses, “*a running belt [12] at least partially supported by the rotatable element [rollers 2].*”

... [9.4] a first element and a second element, both of which are coupled to the running belt, and wherein the first element substantially surrounds the second element or the second element substantially surrounds the first element;

328. Claim limitation [9.4] is substantially similar to limitation [1.5]. Therefore, I refer back to my analysis of this limitation of claim 1. (See ¶¶275-290.)

329. Claim limitation [9.4] slightly differs by reciting “*both of which are coupled to the running belt.*” As discussed above, modified Tollkien has a safety device with an inner race fixed to the roller 2 and an outer race fixed to the frame. The inner race is coupled to the belt 12 through the roller, and the outer race is coupled to the belt through the inner race, e.g., to provide backstop functionality.

330. Thus, the combination of Tolkien and Sclater teaches “*a first element [inner race] and a second element [outer race], both of which are coupled to the running belt, and wherein the first element substantially surrounds the second*

¹⁴ See claim limitation 9.2. (¶¶323-324.)

element or the second element [outer race] substantially surrounds the first element [inner race].”

331. Intentionally left blank.

... [9.5] wherein one of the first and second elements and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from rotation relative to the frame to substantially prevent rotation of the running belt relative to the frame.

332. Claim limitation [9.5] is substantially similar to limitation [1.6]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Tolkien and Sclater. (See ¶¶291-296.)

333. Intentionally left blank.

5. Dependent claims 10–14

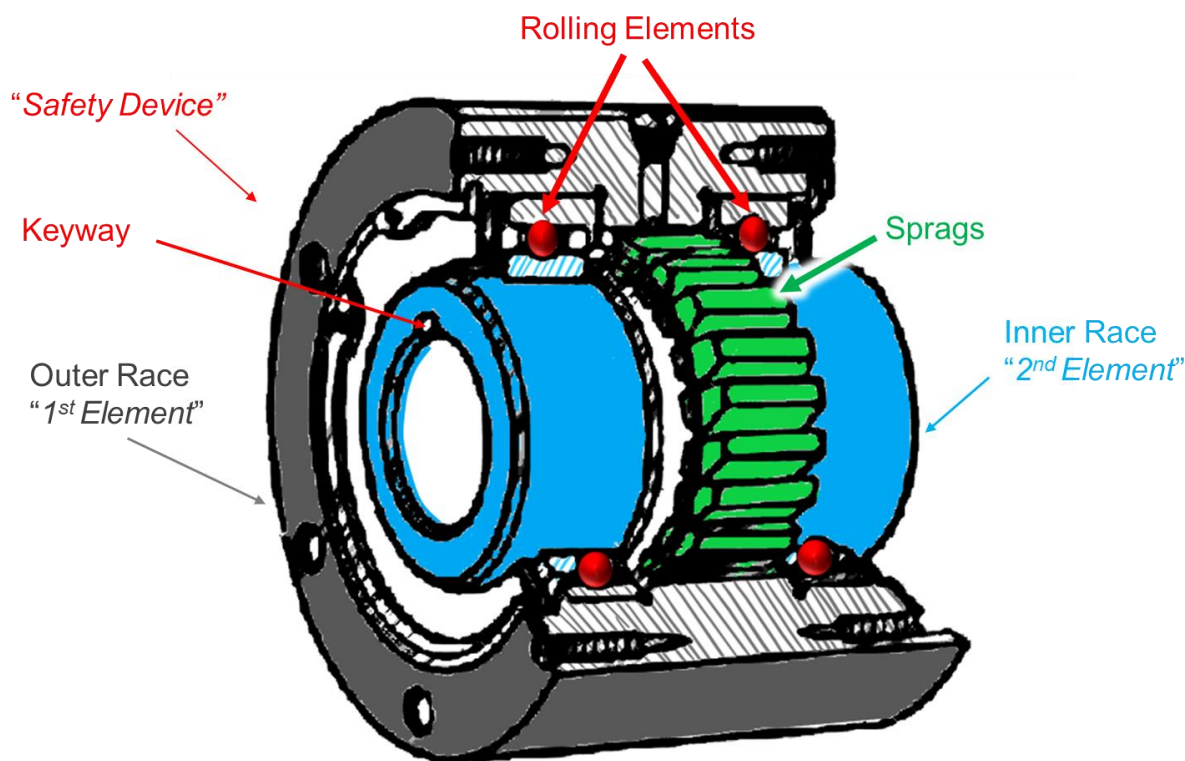
334. Claims 10–14 depend from claim 9 which I have understood means that these claims require all of the limitations of claim 9 in addition to their additional limitations.

335. The combination of Tolkien and Sclater disclose all of the limitations of claim 9 as described above. (See ¶¶320-332.)

336. Intentionally left blank.

... [10.] *The treadmill of claim 9, wherein only one of the first and second elements is freely rotatable relative to the frame.*

337. As discussed above in claim 1, modified Tolkien includes the inner race of Sclater's one-way bearing fixed to one of Tolkien's rollers 2, 2, and the outer race fixed to Tolkien's frame 12.



Sclater, Ex. 1017 at 318 (Annotated)

338. Sclater discloses that the inner race defines a center hole that is sized to receive a shaft and defines a keyway on the inner diameter. The keyway is a traditional means for coupling the inner race to a shaft via a key. Sclater further discloses that this sprag-type bearing assembly functions as a one-way bearing by

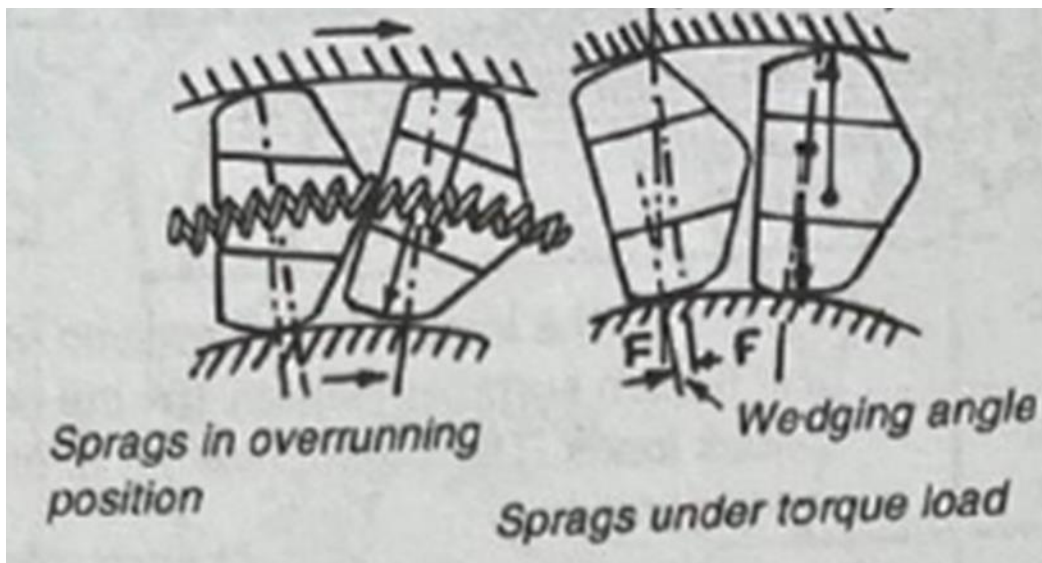
providing “one-direction only torque transmission in an overrunning clutch.”
(Sclater, Ex. 1017 at 312.)

339. Sclater further discloses that the:

Precision sprags act as wedges and are made of hardened alloy steel.
In the formsprag clutch, torque is transmitted from one race to another
by the wedging action of sprags between the races in one direction; in
the other direction the clutch freewheels.

(Sclater, Ex.1017 at 318.)

340. Tollkien’s belt 12 (“*running belt*”) would be coupled to the inner race
 (“*second element*”) through the front roller 2 or the rear roller 2. As illustrated in
 the figure below on the left, the belt 12 and the inner race rotate in a first direction
 relative to the outer race (“*first element*”) to freewheel or overrun. However, as
 illustrated in the figure below on the right, wedging or interference between the
 sprags and the inner and outer race prevents rotation of the inner race in an
 opposite direction, which prevents the belt 12 from moving forward.



Sclater, Ex. 1017 at 318

341. By overrunning, the inner race “*freely rotates*” relative to the frame, however the outer race is mounted and fixed to the frame. Thus, the combination of references discloses, “*wherein only one of the first and second elements [inner race] is freely rotatable relative to the frame.*”

342. Intentionally left blank.

... [11.] ***The treadmill of claim 9, wherein the treadmill is non-motorized.***

343. Tollkien discloses that the “treadmill is powered by either a motor or the user.” (Tollkien, Ex.1031, [0002].) With reference to Figure 1, Tollkien discloses “a side view of part of a treadmill without a motor” i.e., “*non-motorized.*” (Tollkien, Ex.1031, [0018].)

344. Intentionally left blank.

... [12.] The treadmill of claim 10, wherein the first and second elements at least partly form a one-way bearing.

345. Claim 12 is largely duplicative of claim 4. To illustrate, the table below shows a side-by-side comparison of claims 4 and 12. Claim 12 is “marked up” to show the minor differences.

‘005 Patent Claim 4	‘005 Patent Claim 12
[4.0] The treadmill of claim 1, wherein the first and second elements of the safety device at least partly form a one-way bearing.	[12.0] The treadmill of claim 9, wherein the first and second elements [] at least partly form a one-way bearing.

346. Because the additional limitations of claim 12 are also recited in claim 4, I refer back to my analysis of these limitations of claim 4 in Ground 2 to establish that they are met by the same combination of references. (See ¶¶303-305.)

347. Intentionally left blank.

... [13.] The treadmill of claim 9, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

348. Claim 13 is largely duplicative of claim 6. To illustrate, the table below shows a side-by-side comparison of claims 6 and 13. Claim 13 is “marked up” to show the minor differences.

‘005 Patent Claim 6	‘005 Patent Claim 13
[6.] The manually powered treadmill of claim 1, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.	[13.] The treadmill of claim 9, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

349. Because the additional limitations of claim 13 are identical to the additional limitations of claim 6, I refer back to my analysis of these limitations of claim 6 in Ground 2 to establish that they are met by the same combination of references. (See ¶¶307-309.)

350. Intentionally left blank.

6. Independent claim 15

351. Independent claim 15 is largely duplicative of independent claim 1. To illustrate, the table below shows a side-by-side comparison of claims 1 and 18.

‘005 Patent Claim 1	‘005 Patent Claim 15
[1.0] A manually powered treadmill, comprising:	[15.0] A manually powered treadmill, comprising:
[1.1] a frame;	[15.1] a frame;
[1.2] at least one front running belt pulley coupled to the frame;	[15.2] at least one front running belt pulley coupled to the frame;
[1.3] at least one rear running belt pulley	[15.3] at least one rear running belt

coupled to the frame and spaced a distance from the front running belt pulley;	pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;
[1.4] a running belt 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;	[15.4] a running belt 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;
[1.5] a safety device coupled to the frame and the running belt, the safety device having a first element and a second element, the first element substantially surrounding the second element or the second element substantially surrounding the first element;	[15.6] wherein the safety device includes another element, wherein one of the element and the another element substantially surrounds the other of the element and the another element.
[1.6] wherein one of the first and second elements of the safety device and the running belt freely rotate in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the one of the first and second elements is substantially prevented from	[15.5] a safety device coupled to the frame and the running belt, the safety device having an element adapted for rotation relative to the frame in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the element is substantially

rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame.	prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame; and
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... ***[15.0] A manually powered treadmill, comprising:***

352. Claim limitation [15.0] is substantially similar to limitation [1.0]. Therefore, I refer back to my analysis of this limitation in claim 1 to establish that they are met by the combination of Tollkien and Sclater. (See ¶¶253-256.)

... ***[15.1] a frame;***

353. Claim limitation [15.1] is substantially similar to limitation [1.1]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Tollkien and Sclater. (See ¶¶258-260.)

... ***[15.2] at least one front running belt pulley coupled to the frame;***

... ***[15.3] at least one rear running belt pulley coupled to the frame and spaced a distance from the at least one front running belt pulley;***

354. Claim limitations [15.2]-[15.3] are substantially similar to limitations [1.2]-[1.3]. Therefore, I refer back to my analysis of these limitations of claim 1 to establish that they are met by the combination of Tollkien and Sclater. (See ¶¶262-269.)

... [15.4] a running belt 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;

355. Claim limitation [15.4] is substantially similar to limitation [1.4]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Tolkien and Sclater. (See ¶¶271-274.)

356. Intentionally left blank.

... [15.5] a safety device coupled to the frame and the running belt, the safety device having an element adapted for rotation relative to the frame in a first direction of rotation relative to the frame, however, in a second direction of rotation, opposite the first direction of rotation, the element is substantially prevented from rotation relative to the frame to substantially prevent or resist rotation of the running belt relative to the frame;

357. Claim limitation [15.5] is substantially similar to limitation [1.6]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Tolkien and Sclater. (See ¶¶291-293.)

358. Intentionally left blank.

... [15.6] wherein the safety device includes another element, wherein one of the element and the another element substantially surrounds the other of the element and the another element.

359. Claim limitation [15.6] is substantially similar to limitation [1.5]. Therefore, I refer back to my analysis of this limitation of claim 1 to establish that it is met by the combination of Tolkien and Sclater. (See ¶¶275-288.)

360. Intentionally left blank.

7. Dependent claim 16

361. Claim 16 depends from claim 15 which I have understood means that these claims require all of the limitations of claim 15 in addition to their additional limitations.

362. The combination of Tolkien and Sclater disclose all of the limitations of claim 15 as described above. (See ¶¶352-359.)

... [16.] The treadmill of claim 9, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

363. Claim 16 is largely duplicative of claim 6. To illustrate, the table below shows a side-by-side comparison of claims 6 and 16. Claim 16 is “marked up” to show the minor differences.

'005 Patent Claim 6	'005 Patent Claim 16
[6.] The manually powered treadmill of claim 1, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.	[16.] The treadmill of claim 15, further comprising a plurality of bearings coupled to the frame, at least one bearing of the plurality of bearings configured to at least partially support the running belt.

364. Because the additional limitations of claim 16 are identical to the additional limitations of claim 6, I refer back to my analysis of these limitations of claim 6 in Ground 2 to establish that they are met by the same combination of references. (See ¶¶307-309.)

365. Intentionally left blank.

X. Objective Indicia Does Not Support Patentability

366. Considering the information that I have reviewed, my general knowledge of the field of exercise equipment, including manual treadmills with curved running surfaces, and publications within that and related fields, I am not aware of any objective evidence that might support the patentability of the claims of the '005 Patent. Further, from my review of the file history (Ex. 1002) of the '005 Patent, I did not see that the applicant raised any secondary indicia of nonobviousness during prosecution. I am not otherwise aware of any publicly available evidence of secondary indicia of nonobviousness. Should any alleged

secondary indicia of nonobviousness be presented, I reserve the right to provide an opinion thereon.

XI. Conclusion

367. In my opinion, all the elements of the challenged claim limitations are disclosed by the references discussed above and that the claims are unpatentable in view of these prior art references.

368. I reserve the right to supplement my opinions to address any information obtained, or positions taken, based on any new information that comes to light throughout this proceeding.

I declare under penalty of perjury that the foregoing is true and accurate to the best of my ability.

Executed on: October 24, 2023



Robert Giachetti, Ph.D.