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UTILITY PATENT APPLICATION TRANSMITTAL <i>(Only for new nonprovisional applications under 37 CFR 1.53(b))</i>	Attorney Docket No.	DEJ10730P00072US
	First Named Inventor	Aaron DeJule
	Title	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE...
	Priority Mail Express® Label No.	

APPLICATION ELEMENTS <i>See MPEP chapter 600 concerning utility patent application contents.</i>	Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450
1. ☒ Fee Transmittal Form (PTO/SB/17 or equivalent) 2. ☒ Applicant asserts small entity status. See 37 CFR 1.27 3. ☐ Applicant certifies micro entity status. See 37 CFR 1.29. Applicant must attach form PTO/SB/15A or B or equivalent. 4. ☒ Specification [Total Pages <u>33</u>] Both the claims and abstract must start on a new page. (See MPEP § 608.01(a) for information on the preferred arrangement) 5. ☒ Drawing(s) (35 U.S.C. 113) [Total Sheets <u>6</u>] 6. ☒ Inventor's Oath or Declaration [Total Pages <u>3</u>] (including substitute statements under 37 CFR 1.64 and assignments serving as an oath or declaration under 37 CFR 1.63(e)) a. ☐ Newly executed (original or copy) b. ☒ A copy from a prior application (37 CFR 1.63(d)) 7. ☒ Application Data Sheet * See note below. See 37 CFR 1.76 (PTO/AIA/14 or equivalent) 8. ☐ CD-ROM or CD-R in duplicate, large table, or Computer Program (Appendix) ☐ Landscape Table on CD 9. ☐ Nucleotide and/or Amino Acid Sequence Submission (if applicable, items a. – c. are required) a. ☐ Computer Readable Form (CRF) b. ☐ Specification Sequence Listing on: i. ☐ CD-ROM or CD-R (2 copies); or ii. ☐ Paper c. ☐ Statements verifying identity of above copies	ACCOMPANYING APPLICATION PAPERS 10. ☐ Assignment Papers (cover sheet & document(s)) Name of Assignee _____ 11. ☐ 37 CFR 3.73(c) Statement ☐ Power of Attorney (when there is an assignee) 12. ☐ English Translation Document (if applicable) 13. ☒ Information Disclosure Statement (PTO/SB/08 or PTO-1449) ☒ Copies of citations attached 14. ☐ Preliminary Amendment 15. ☐ Return Receipt Postcard (MPEP § 503) (Should be specifically itemized) 16. ☐ Certified Copy of Priority Document(s) (if foreign priority is claimed) 17. ☐ Nonpublication Request Under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent. 18. ☐ Other: _____ _____ _____ _____

***Note:** (1) Benefit claims under 37 CFR 1.78 and foreign priority claims under 1.55 **must** be included in an Application Data Sheet (ADS).
 (2) For applications filed under 35 U.S.C. 111, the application must contain an ADS specifying the applicant if the applicant is an assignee, person to whom the inventor is under an obligation to assign, or person who otherwise shows sufficient proprietary interest in the matter. See 37 CFR 1.46(b).

19. CORRESPONDENCE ADDRESS					
☒ The address associated with Customer Number: <u>32116</u> OR ☐ Correspondence address below					
Name	WOOD, PHILLIPS, KATZ, CLARK & MORTIMER				
Address	500 W. Madison Street, Suite 1130				
City	Chicago	State	IL	Zip Code	60152
Country	US	Telephone	312-876-1800	Email	docketing@woodphillips.com
Signature	/John S. Mortimer/			Date	May 10, 2019
Name (Print/Type)	John S. Mortimer			Registration No. (Attorney/Agent)	30,407

This collection of information is required by 37 CFR 1.53(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DEJ10730P00072US
		Application Number	
Title of Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2:

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

Inventor	1				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Aaron		DeJule			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
City	River Forest	State/Province	IL	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	306 Park Avenue					
Address 2						
City	River Forest	State/Province	IL			
Postal Code	60305	Country i	US			
Inventor	2				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Scott		Padiak			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						
City	Glance	State/Province	IL	Country of Residence	US	
Mailing Address of Inventor:						
Address 1	1170 Terrace Court					
Address 2						
City	Glance	State/Province	IL			
Postal Code	60022	Country i	US			
Inventor	3				Remove	
Legal Name						
Prefix	Given Name	Middle Name	Family Name	Suffix		
	Paul	C.	Evans			
Residence Information (Select One) • US Residency Non US Residency Active US Military Service						

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		Application Number	
Title of Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		

City	Bellaire	State/Province	MI	Country of Residence	US
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Mailing Address of Inventor:

Address 1	2343 Bush Road				
Address 2					
City	Bellaire	State/Province	MI		
Postal Code	49614	Country	US		
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.					

Correspondence Information:

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

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

Customer Number	32116		
Email Address	docketing@woodphillips.com	Add Email	Remove Email

Application Information:

Title of the Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		
Attorney Docket Number	DEJ10730P00072US	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	

Filing By Reference:

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

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

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

Publication Information:

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

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

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DEJ10730P00072US
		Application Number	
Title of Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		

Representative Information:

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

Please Select One:	☒ Customer Number	US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	82116		

Domestic Benefit/National Stage Information:

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

When referring to the current application, please leave the "Application Number" field blank.

Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
	Continuation of	15040735	2016-02-10
Prior Application Status		Remove	
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)
15040735	Claims benefit of provisional	62114706	2015-02-11
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			Add

Foreign Priority Information:

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

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		Application Number	
Title of Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Remove Access Code ^j (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			Add

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

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

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DEJ10730P00072US
		Application Number	
Title of Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		

Authorization or Opt-Out of Authorization to Permit Access:

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

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

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

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

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

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

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

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

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

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

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

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DEJ10730P00072US
		Application Number	
Title of Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.				
Applicant	1			Remove
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.				
Clear				
Assignee	Legal Representative under 35 U.S.C. 117		Joint Inventor	
Person to whom the inventor is obligated to assign.		Person who shows sufficient proprietary interest		
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:				
Name of the Deceased or Legally Incapacitated Inventor:				
If the Applicant is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Applicant:				
Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Applicant Data may be generated within this form by selecting the Add button. Add				

Assignee Information including Non-Applicant Assignee Information:

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

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DEJ10730P00072US
		Application Number	
Title of Invention	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		

Assignee	1			
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
				Remove
If the Assignee or Non-Applicant Assignee is an Organization check here.				☐
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				Add

Signature:

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

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

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

Signature	/John S. Mortimer/		Date (YYYY-MM-DD)	2019-05-10
First Name	John	Last Name	Mortimer	Registration Number
				30407
Additional Signature may be generated within this form by selecting the Add button.				Add

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	DEJ10730P00072US
		Application Number	
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1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ABSTRACT OF THE DISCLOSURE

[00119] A reconfigurable apparatus for seating a user and having: a frame; a seat movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position; a back rest with a changeable angular orientation relative to the frame; and an adjusting assembly having a plurality of gears that move relative to each other as an incident of the seat moving from the first position into the loaded position to thereby cause an increase in resistance to changing of the angular orientation of the back rest.

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CLAIMS

1. A reconfigurable apparatus for seating a user, the reconfigurable apparatus comprising:

a frame;

a seat mounted on the frame and movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position into which the seat moves from the first position as an incident of a user sitting on the seat;

a back rest against which a user sitting on the seat can bear his/her back to produce a leaning force that changes an angular orientation of the back rest relative to the frame,

the apparatus configured so that a first leaning force is required to be applied to the back rest to change the angular orientation of the back rest from a starting angular position relative to the frame with no user sitting in the seat; and

an adjusting assembly comprising a plurality of gears that cooperate and move relative to each other as an incident of the seat moving from the first position into the loaded position and configured to thereby increase a resistance to changing of the angular orientation of the back rest from the starting angular position,

whereby as an incident of a user sitting on the seat a leaning force greater than the first leaning force is required to change the angular position of the back rest from the starting angular position.

-29-

2. The reconfigurable apparatus for seating a user according to claim 1 wherein the plurality of gears comprises a first rack gear and first pinion gear, the first rack gear and first pinion gear cooperating with, and movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

3. The reconfigurable apparatus for seating a user according to claim 2 wherein the plurality of gears comprises a second rack gear and a second pinion gear, the second rack gear and second pinion gear cooperating with, and movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

4. The reconfigurable apparatus according to claim 1 wherein the reconfigurable apparatus comprises an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part.

5. The reconfigurable apparatus for seating a user according to claim 4 wherein as an incident of the seat being changed from the first position into the loaded position the fulcrum part is caused to move along the length of the elongate spring bar so as to thereby increase a force required to bend the elongate spring bar about the fulcrum part and as an incident thereof increase the leaning force required to change the angular orientation of the back rest.

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6. The reconfigurable apparatus for seating a user according to claim 5 wherein the plurality of gears are configured so that the seat moves a first distance between the first and loaded positions and the fulcrum part moves greater than the first distance along the length of the fulcrum bar in response to a same movement of the seat relative to the frame.

7. The reconfigurable apparatus for seating a user according to claim 1 wherein the back rest is mounted directly to the frame.

8. The reconfigurable apparatus for seating a user according to claim 1 wherein the back rest is mounted directly to the seat.

9. The reconfigurable apparatus for seating a user according to claim 8 wherein the back rest follows movement of the seat as the seat is changed from the first position into the loaded position.

10. The reconfigurable apparatus for seating a user according to claim 8 wherein the back rest is attached to and movable relative to the seat.

11. The reconfigurable apparatus for seating a user according to claim 1 wherein the sitting apparatus comprises a chair.

12. The reconfigurable apparatus for seating a user according to claim 11 wherein the frame comprises wheels that support the chair on a subjacent surface.

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13. The reconfigurable apparatus for seating a user according to claim 11 wherein the chair comprises a pair of armrests.

14. The reconfigurable apparatus for seating a user according to claim 11 wherein the chair is a task chair.

15. The reconfigurable apparatus for seating a user according to claim 1 wherein the plurality of gears comprises first and second gears that each turns around an axis and the first and second gears have different diameters.

16. The reconfigurable apparatus for seating a user according to claim 15 wherein the first and second gears turn around different axes.

17. The reconfigurable apparatus for seating a user according to claim 15 wherein the first and second gears turn around a same axis.

18. The reconfigurable apparatus for seating a user according to claim 1 wherein the reconfigurable apparatus comprises at least one spring bar that is bent under forces applied by a user to the reconfigurable apparatus to resist reconfiguration of a part of the reconfigurable apparatus.

19. The reconfigurable apparatus for seating a user according to claim 18 wherein the at least one spring bar comprises a plurality of spring bars.

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20. The reconfigurable apparatus for seating a user according to claim 19 wherein at least one of the spring bars comprises an elongate spring bar with a length and the elongate spring bar resists reconfiguration of the reconfigurable apparatus by being bent transversely to the length of the elongate spring bar.

21. The reconfigurable apparatus for seating a user according to claim 3 wherein the reconfigurable apparatus comprises an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part, the seat moves a first distance between the first and loaded positions, and the first and second rack and pinion gears are configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

22. The reconfigurable apparatus for seating a user according to claim 4 wherein the seat moves a first distance between the first and loaded positions and the plurality of gears comprises first and second gear pairs configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

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APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] This invention relates to apparatus upon which variable weight is applied during normal use and, more particularly, to an apparatus having at least one part with different adjusting characteristics during normal use depending upon the particular applied weight.

BACKGROUND ART

[0002] A very significant percentage of furniture sold commercially has an ability to be adjusted/reconfigured to accommodate users with different body types and demands. As one example, task chairs are routinely engineered so that a single design can be offered with a substantial amount of versatility in terms of how it can be adapted to size and weight of different individuals so as to optimize function and comfort level.

[0003] In a typical task chair construction, a wheeled frame supports a vertically adjustable seat. A back rest is integrated into the frame and/or seat so that it can be tilted or reclined to accommodate a user's normal movements and/or to allow inclined back positions to be comfortably maintained by the user's upper torso weight as he/she is sitting. The task

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chairs may be made with or without armrests. When utilized, armrests are commonly made to be at least vertically adjustable to allow comfortable support for a user that may be different depending upon the particular user's build and/or the task(s) to be performed using the chair.

[0004] Reconfigurable designs are also commonly incorporated into seating used for leisure activities. Reading chairs and sectional pieces on modular furniture commonly have such an adjusting capability.

[0005] With a single design, performance of a particular seating apparatus will be different depending upon the weight of a user. For example, a heavier individual may be able to comfortably urge a back rest towards an inclined position and comfortably maintain potentially a number of different, desired, inclined positions within a range. On the other hand, a lighter individual with the same design may have to engage in a more unnatural movement and constantly exert a pressure on the seat back to prevent it from returning to its normal upright position, generally maintained through some sort of biasing mechanism.

[0006] Similar tilt features may be integrated into the seat itself with a user's weight affecting how the mechanisms will operate.

[0007] One industry solution to the above problem is to provide manual adjusting capabilities whereby biasing forces on movable components can be changed. For example, a mechanism has been incorporated that allows a user to change a spring force on a back rest to be more compatible with that user's weight.

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[0008] Tilt and tension adjustment is typically achieved by rotating a knob or pulling a lever, which loads a spring. Once the chair is optimally adjusted, the user can recline to a comfortable backward distance. However, to optimize balance, the user must iteratively lean back and adjust. This process of adjusting tension and tilt by pulling a lever or turning a knob may require many rotations or pulls depending on the weight of the previous user, resulting in potentially wasted time and imperfect adjustments.

[0009] With the multitude of different manual adjusting capabilities currently in existing furniture designs, user operation is becoming more complicated. Even a basic task chair often has multiple actuators which a user is required to manually operate to customize a chair for his/her purposes. Oftentimes, such mechanisms are confusing to users who may default to simply using a chair in its current configuration, even if not optimally configured. This problem is aggravated when persons routinely move from chair to chair during a typical work day in certain office environments in which there are group meetings, training, collaboration at different locations, sharing of resources such as at computer stations, etc. This same sharing of chairs occurs in classrooms, libraries, open plan offices, etc.

[0010] The current demand for versatility may demand integration of adjusting mechanisms on even base line furniture. To control manufacturing costs, the quality of many of these mechanisms, and potentially the overall chair, may be compromised.

[0011] The challenges of providing customizable adjusting systems, while demonstrated in the chair environment above, is not so limited. Many

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different apparatus use adjusting components that rely on a certain balance that may be affected by a variable weight application encountered in normal use. As but one example, desktop mechanisms are now evolving which allow a user to elevate a work surface so that he/she has the option of either sitting or standing while working on a computer or performing other routine work day tasks. Ideally, a user has the ability to raise and lower the work surface in a range, and to maintain a desired position, without having to operate any locking or adjusting mechanisms. Given that different jobs require placement of different items on the work surface, the applied weight on the work surface may vary considerably, which makes a generic design difficult to practically construct.

[0012] These problems are contended with also in different environments and with different types of equipment outside of the furniture arena. In any environment wherein components are adjustable, designers strive to design systems so that they are affordable, reliable, and user friendly. Balancing these often competing objectives remains an ongoing challenge.

SUMMARY OF THE INVENTION

[0013] In one form, the invention is directed to a reconfigurable apparatus for seating a user. The reconfigurable apparatus has a frame, a seat, a back rest, and an adjusting assembly. The seat is mounted on the frame and movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position into

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which the seat moves from the first position as an incident of a user sitting on the seat. A user sitting on the seat can bear against the back rest with his/her back to produce a leaning force that changes an angular orientation of the back rest relative to the frame. The apparatus is configured so that a first leaning force is required to be applied to the back rest to change the angular orientation of the back rest from a starting angular position relative to the frame with no user sitting in the seat. The adjusting assembly has a plurality of gears that cooperate and move relative to each other as an incident of the seat moving from the first position into the loaded position to thereby increase a resistance to changing of the angular orientation of the back rest from the starting angular position. As an incident of a user sitting on the seat, a leaning force greater than the first leaning force is required to change the angular position of the back rest from the starting angular position.

[0014] In one form, the plurality of gears includes a first rack gear and first pinion gear. The first rack gear and first pinion gear cooperate with, and are movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

[0015] In one form, the plurality of gears includes a second rack gear and a second pinion gear. The second rack gear and second pinion gear cooperate with, and are movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

[0016] In one form, the reconfigurable apparatus has an elongate spring bar with a length. The elongate spring bar resists changing of the

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angular orientation of the back rest from the starting position by bending against a fulcrum part.

[0017] In one form, as an incident of the seat being changed from the first position into the loaded position, the fulcrum part is caused to move along the length of the elongate spring bar so as to thereby increase a force required to bend the elongate spring bar about the fulcrum part and as an incident thereof increase the leaning force required to change the angular orientation of the back rest.

[0018] In one form, the plurality of gears are configured so that the seat moves a first distance between the first and loaded positions. The fulcrum part moves greater than the first distance along the length of the fulcrum bar in response to the same movement of the seat relative to the frame.

[0019] In one form, the back rest is mounted directly to the frame.

[0020] In one form, the back rest is mounted directly to the seat.

[0021] In one form, the back rest follows movement of the seat as the seat is changed from the first position into the loaded position.

[0022] In one form, the back rest is attached to and movable relative to the seat.

[0023] In one form, the sitting apparatus is a chair.

[0024] In one form, the frame has wheels that support the chair on a subjacent surface.

[0025] In one form, the chair has a pair of armrests.

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[0026] In one form, the chair is a task chair.

[0027] In one form, the plurality of gears includes first and second gears that each turns around an axis. The first and second gears have different diameters.

[0028] In one form, the first and second gears turn around different axes.

[0029] In one form, the first and second gears turn around the same axis.

[0030] In one form, the reconfigurable apparatus has at least one spring bar that is bent under forces applied by a user to the reconfigurable apparatus to resist reconfiguration of a part of the reconfigurable apparatus.

[0031] In one form, the at least one spring bar includes a plurality of spring bars.

[0032] In one form, at least one of the spring bars is an elongate spring bar with a length. The elongate spring bar resists reconfiguration of the reconfigurable apparatus by being bent transversely to the length of the elongate spring bar.

[0033] In one form, the reconfigurable apparatus has an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part. The seat moves a first distance between the first and loaded positions. The first and second rack and pinion gears are configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum

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along the length of the elongate spring bar a distance different than the first distance.

[0034] In one form, the seat moves a first distance between the first and loaded positions. The plurality of gears includes first and second gear pairs configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035] Fig. 1 is a schematic representation of a reconfigurable apparatus, according to the present invention;

[0036] Fig. 2 is a side elevation view of a task chair, that is one representative form of apparatus as shown in Fig. 1, and incorporating an adjusting assembly according to the present invention;

[0037] Fig. 3 is a partially schematic representation of one specific form of adjusting assembly, integrated into the apparatus in Figs. 1 and 2;

[0038] Fig. 4 is a fragmentary view of a part of the adjusting assembly in Fig. 3, which utilizes a leaf spring, and from a different perspective;

[0039] Fig. 5 is an enlarged, fragmentary view of a modified form of a leaf spring utilized on the apparatus in Figs. 3 and 4;

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[0040] Fig. 6 is an enlarged, fragmentary, elevation view of a linkage, modified from a corresponding linkage as used on the apparatus in Figs. 3 and 4;

[0041] Figs. 7-16 are partially schematic representations of apparatus incorporating different forms of adjusting assemblies, according to the invention; and

[0042] Fig. 17 is a schematic representation of a further modified form of reconfigurable apparatus, according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0043] In Fig. 1, a reconfigurable apparatus, according to the present invention, is shown in schematic form at 10. The apparatus 10 consists of a frame 12 and at least a first component 14 on the frame 12 upon which a force is applied in a first manner in using the apparatus 10 for its intended purpose.

[0044] At least a second component 16 is provided on the frame 12 and is movable relative to the at least first component and/or the frame 12. A force can be applied in a second manner upon the at least second component to reconfigure the apparatus 10 by moving the at least second component 16 relative to the at least first component and/or the frame 12.

[0045] An adjusting assembly 18 cooperates between the at least first component 14 and the at least second component 16 and is configured so that, as an incident of the force being applied in the first manner changing,

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the force applied in the second manner required to reconfigure the apparatus 10 changes.

[0046] The adjusting assembly 18 includes a spring assembly 19. The spring assembly 19 is configured to exert a force that resists movement of the at least second component 16 that varies as a magnitude of the force applied in the first manner varies.

[0047] The generic showing of the apparatus 10 is intended to encompass a wide range of different products and different applications. The inventive concepts can be used in virtually any system or apparatus wherein its normal intended use requires the application of a force on a first component and wherein that force on the first component impacts a force required to be applied to a second component to reconfigure the apparatus as contemplated during use.

[0048] While not intended to be limiting, the detailed description herein will be focused upon furniture and, more particularly, a chair construction. This application of the inventive concepts is intended to be exemplary in nature only and should not be viewed as limiting the inventive concepts to the specific type of apparatus described in detail herein. Further, the schematic showing in Fig. 1 is intended to encompass not only a wide range of different systems/apparatus, but different forms of components and their interaction for each such system/apparatus.

[0049] For example, interlocking toothed components are described, in exemplary forms below. The invention contemplates not only different types of toothed components, such as gears, differential gears, epicyclic gears,

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rack and pinion arrangements, etc., but also virtually an unlimited number of different interengaging components, such as sprockets and chains, pulleys and cables, mechanisms using levers, pistons, different types of linkages, etc.

[0050] In Fig. 2, one exemplary apparatus 10 is shown in the form of a task chair, in this case without armrests. Of course, armrests might be incorporated and might also have parts thereof movable in different manners depending upon the weight of the user, as hereinafter explained.

[0051] The chair 10 has a wheeled frame 12 with a vertically extending pedestal assembly 20. The first component 14 is in the form of a conventional- type seat with an upwardly facing user support surface 22. In this case, the aforementioned force applied in the first manner is the weight of the user exerted downwardly on the support surface 22 as he/she sits on the chair 10.

[0052] A corresponding second component 16 is in the form of a back rest against which a seated user leans to exert the aforementioned force in the second manner to reconfigure the chair 10. That is, the back rest moves relative to the frame 12 and first component 14, as the user leans back and forth while seated, generally in a manner as indicated by the double-headed arrow 23.

[0053] The adjusting assembly 18, as shown schematically in Fig. 2, acts between the first component/seat 14 and second component/back rest 16 directly and/or through the frame 12. The adjusting assembly 18 may be added to the frame 12 by attachment thereto, virtually anywhere thereon, or

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integrated therein, as by being constructed within a hollow 24 on the pedestal assembly 20.

[0054] The chair 10 may incorporate one or more adjusting features other than one that permits reconfiguration by changing the angle of the second component/back rest 16. The adjusting assembly 18 may be integrated into the mechanisms associated with these other features. Alternatively, the other features may operate without effect by the adjusting assembly 18.

[0055] For purposes of simplicity, the second component/back rest 16 will be shown as repositionable relative to the first component/seat 14 to reconfigure the chair 10 by movement of the second component/back rest 16 relative to the first component/seat 14 and frame 12 around a pivot axis 26. This particular connection should not be viewed as limiting.

[0056] Exemplary specific forms of the adjusting assembly 18 will now be described. As noted above, virtually an unlimited number of different variations of adjusting assembly are contemplated within the generic showing of Figs. 1 and 2. These specific forms are exemplary in nature only. These particular mechanisms will also be described with respect to the apparatus in the form of a chair as shown in Fig. 2. Again, the particular nature of the apparatus is not limited to a chair or furniture, although it has particular applicability in this category of product.

[0057] In Figs. 3 and 4, the first component/seat 14 (hereinafter referred to only as the representative chair "seat 14") is integrated into a support 28 that has a depending post 30 that is slidable guidingly vertically,

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as indicated by the double-headed arrow 32, in a guide channel 34 on the frame 12. A biasing assembly, shown in one exemplary form as a coil spring 33, normally biasably urges the seat 14 upwardly relative to the frame 12.

[0058] A generally U-shaped member 36 has one leg 38 of the "U" mounted on a frame part 40. The other leg 42 of the "U" has an offset bracing end 44.

[0059] For purposes of simplicity, the support 28 and member 36 can be considered to be part of the frame 12 and/or the adjusting assembly 18. Similarly, the component 58 can be considered to be part of the back rest 16 and/or the adjusting assembly 18.

[0060] The spring assembly 19 in this embodiment is in the form of a leaf spring. The leaf spring 19 has an elongate body 46 with a length L between spaced ends 48, 50, a width W, and a thickness T.

[0061] The leaf spring end 19 is anchored in the member 36 to project in cantilever fashion vertically upwardly therefrom. In this embodiment, the body 46 of the leaf spring 19 is preloaded so that it naturally assumes the dotted line shape and position.

[0062] The bracing end 44 of the member 36 is bifurcated, as seen in Fig. 4, with spaced edges 52 (one shown) at the extremity of the bracing end 44 engageable with one surface 54 of the leaf spring body 46 to maintain the body 46 in the straight vertical orientation, as shown in Fig. 3.

[0063] A part of the second component/back rest 16 (hereafter referred to only as the representative chair "back rest 16") is connected to the support 28 for movement relative thereto around the axis 26 as seen in

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Fig. 2. As a user situated on the seat 14 leans against the back rest 16, a force is generated as shown by the arrow 56 on the back rest component 58 that tends to pivot the component 58 in the direction of the arrow 60 around the axis 26.

[0064] The component 58 is configured so that an edge 61 on a cantilevered part 62 thereof bears against the leaf spring surface 54. In the depicted state, this produces a force upon the leaf spring body 46, at a location A along the length of the body 46, that tends to bend the body 46 in the direction of the arrow 64 around a fulcrum location at 66 where the body 46 projects away from the part of the member 36 in which it is anchored. The leaf spring 19 thus biasably resists movement of the component 58, and the back rest 16 of which the component 58 is a part, with a first force.

[0065] The configuration in Fig. 3, while it could show a starting state without any force application on the seat 14, is also representative of the overall state of the apparatus 10 with an individual of a first weight seated thereon. This is an equilibrium position for the chair 10 resulting from the balancing of the user's weight and the upward biasing force generated by the spring 33 acting between the frame 12 and the seat 14 through the support 28.

[0066] In the event that an individual of greater weight assumes a sitting position on the seat 14, the support 28 and component 58 will translate further downwardly against the force of the spring 33, which causes the edge 61 on the back rest component 58 to bear upon the leaf spring 19 at a location below the location A. As a result, a shorter moment arm is established between the location where the edge 61 on the part 62 contacts

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the surface 54 and the fulcrum location at 66. Thus, the leaf spring 19 has an effectively shorter length, whereby a greater force is required to be applied to the leaf spring 19 to effect bending thereof as would in turn allow movement of the back rest 16 to reconfigure the chair 10.

[0067] To stabilize the support 28, a depending arm 70 thereon connects to the frame part 40 through a link 72. One link end 74 moves about an axis 76 that is fixed relative to the frame part 40. The other link end 78 pivotally connects to the arm 70 for movement about an axis 80.

[0068] The bifurcated configuration of the leg 42 allows the part 62 on the component 58 to move in an opening 82 through the region at the offset bracing end 44 so that the member 36 does not interfere with the back rest component 58 as the back rest component 58 lowers under increasing user weight.

[0069] Accordingly, an increase in the weight of a user causes the leaf spring 19 to produce a greater resistance to movement of the back rest 16 relative to the frame 12. As a result, the chair is self-adjusting. The parts thereof can be engineered so that a desired relationship between the user's weight and the force required to move the back rest 16 are appropriately established.

[0070] In designing the chair 10 using a leaf spring component, the leaf spring body 46 may have a uniform cross-sectional shape as viewed orthogonally to its length. Alternatively, this shape may be non-uniform over at least a portion of its length. For example, as shown for a portion of the

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length of a modified form of body 46a, as shown in Fig. 5, the cross-sectional area varies progressively.

[0071] Tapering the cross-sectional area of the leaf spring over its length may allow further tuning of performance. Thickened regions may be provided to produce larger resistance forces for users at the higher weight end of the functional range.

[0072] The leaf spring material may be metal, plastic, a composite, etc. The leaf spring may be straight, curved, with changing cross-sectional shapes, etc. Changing shapes, pre-loading, changing dimensions, etc., are just examples of options that might be practiced to design and tune the adjusting assemblies so that they adapt more appropriately to users throughout a workable user weight range.

[0073] In a still further modified form of the structure in Fig. 3, as shown in Fig. 6, the link 72a, corresponding to the link 72, can be connected to the frame 12 for pivoting movement about an axis 84 between its ends 74a, 78a. Accordingly, as the arm 70a moves downwardly under increasing user weight, link 72a pivots around the axis 84 so that the member 36a simultaneously moves upwardly. Thus, for each incremental movement of the seat 14 downwardly, there is a greater movement of the edge 61 on the part 62 toward the fulcrum location 66 for the leaf spring 19 than occurs with the design in Figs. 3 and 4.

[0074] In Fig. 7, a modified form of chair is shown at 10', with elements corresponding to those in Figs. 3 and 4 identified with like reference numerals and a "' ' designation.

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[0075] The chair 10' has a back rest component 58' that acts against a leaf spring 19' that is anchored in a component 36'.

[0076] In this embodiment, the leaf spring body 46' is mounted at a slight angle α to vertical. Accordingly, the part 62' of the component 58' tends to bind more with the leaf spring 19' as it slides downwardly thereagainst under increasing user weight. This binding creates frictional forces that augment the upward balancing force produced by the spring 33'.

[0077] Additionally, the chair 10' utilizes cooperating toothed elements 86, 88, 90 that interact to cause movement of the frame part 40', arm 70' and leg 38' relative to each other and the frame part 40' that replicates the relative movement that occurs with corresponding elements in the embodiment shown in Figs. 3 and 4. The toothed element 88 is in the form of a differential pinion that turns around an axis 92. Larger and smaller diameter toothed portions 94, 96, respectively, engage toothed racks 98, 100, respectively on the leg 38' and arm 70'. Turning of the toothed element 88 in the direction of the arrow 102 under increasing user weight causes simultaneous upward movement of the member 36' and downward movement of the support 28'.

[0078] In Fig. 8, a further modified form of chair, according to the present invention, is shown at 10". The chair 10" incorporates a back rest component 58" that interacts with a leaf spring 19" and leg 42" in the same way that the corresponding components interact on the chair 10 in Figs. 3 and 4.

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[0079] Further, the chair 10" incorporates toothed elements 86", 88", 90" which function essentially in the same manner as the corresponding components on the chair 10' in Fig. 7. The primary difference between these embodiments is that the leg 38" has a curved shape that moves in a complementarily-curved channel 104 on the frame part 40". Whereas the support 28' associated with the seat 14 and member 36' move relative to each other in parallel, straight paths, the member 36" moves in a curved path, as dictated by the curvature of the leg 38" and cooperating channel 104. This curvature nominally matches the curved shape of the leaf spring 19" which is pre-loaded from the dotted line position to the operative, solid line position in Fig. 8. Accordingly, the relative movement of the member 36" and support 28" causes the part 62" that engages the leaf spring 19" to generally follow the pre-loaded curvature of the leaf spring 19".

[0080] In a further modified form of chair, as shown at 10''' in Fig. 9, the basic construction of Figs. 3 and 7 is utilized with the exception that the leaf spring 19''' is fixedly mounted to the component 58''' and acts against the member 36''', i.e., this component arrangement is reversed from that in the earlier embodiments. The leaf spring 19''' is pre-loaded from the dotted line position into the solid line position which is maintained by the abutment thereof to the member 36'''.

[0081] In Figs. 10 and 11, a further modified form of chair, according to the invention, is shown at 10⁴. In this embodiment, multiple leaf springs 19a⁴, 19b⁴, 19c⁴, 19d⁴ are utilized, each with an end anchored in a block 105.

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[0082] In this embodiment, the post 30^{4'} has a toothed rack 100^{4'} that cooperates with a toothed, differential pinion element 88^{4'}, that cooperates in turn with a toothed rack 98^{4'} making up part of a toothed element 86^{4'} on a member 36^{4'}.

[0083] Downward movement of the post 30^{4'} under the weight applied to the seat 14 causes the toothed rack 100^{4'} and toothed element 88^{4'}, and separately the toothed elements 88^{4'}, 86^{4'}, to interact to translate the member 36^{4'} in the direction of the arrow 106.

[0084] As the weight on the seat 14 is increased, the member 36^{4'} will move continuously in the direction of the arrow 106 to successively engage free ends of angled extensions 108a, 108b, 108c at the ends of leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, successively. The extensions 108a, 108b, 108c and one surface 110 on the leaf spring 19d^{4'} reside in a reference plane P. As user applied weight increases, a surface 112 on the member 36^{4'} moves along this plane P to successively engage the extensions 108a, 108b, 108c and eventually the surface 110, whereby the surface 112 defines separate fulcrum locations, corresponding to the fulcrum location 66, for the free ends of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'}. In other words, the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} are successively operatively engaged under increasing user weight. As a result, the resistance force to the applied leaning force on the back rest 18 in the direction of the arrow 114 is generated by some or all of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} as they are borne against the surface 112 under the user leaning force.

[0085] It is important to point out that the rack and pinion components are not restricted to any specific orientation. The cooperating rack and pinion

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components may be oriented in virtually any orientation that can be adapted to cause movement of the associated parts in the same manner.

[0086] Further, one or all of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} could be pre-loaded or in curved tracks.

[0087] In an alternative form of the basic structure in Figs. 10 and 11, as shown for the chair 10^{5'} in Figs. 12 and 13, the member 36^{5'} vertically advanced, or advanced in another direction, is caused to interact with some, or all, of a plurality, and in this case three, leaf springs 19a^{5'}, 19b^{5'}, 19c^{5'}, which are arranged to be substantially coplanar, as opposed to stacked as the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} are on the chair 10^{4'}.

[0088] Under an increasing user weight on the seat 14, a surface 112^{5'} on the member 36^{5'} engages successively against surfaces 116a^{5'}, 116b^{5'}, 116c^{5'}. As shown in Fig. 12, the particular exemplary weight causes engagement of the surface 112^{5'} with only two of the leaf springs 19a^{5'}, 19b^{5'}.

[0089] The leaning force on the back rest 18 is applied on an actuator 118 in a direction into the page, as indicated by the "X" at 120. Resistance to the leaning force is generated in the same manner for the chair 10^{5'} as for the chair 10^{4'} but with the different arrangement of leaf springs.

[0090] In an alternative form, each of the leaf springs in Figs. 12 and 13 might be substituted for by coil springs, compression/tension springs, or a torsion rod of the type described in an additional embodiment below. One or more springs might be utilized. More springs allow for finer control. Each spring can be individually tuned.

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[0091] In Fig. 14, a further modified form of chair, according to the invention, is shown at 10^{6'}. A post 30^{6'} has a toothed rack 100^{6'} that cooperates with a differential pinion/toothed element 88^{6'}. The toothed element 88^{6'} moves together with a component 58^{6'} that is part of the back rest 16 or otherwise moves in response to movement thereof. The component 58^{6'} is mounted for pivoting movement relative to a frame part 122 around an axis 124 as the post 30^{6'} raises and lowers as different weight forces are applied to and removed from the seat 14.

[0092] The leaning force on the back rest 16 is applied to an arm 126 on the component 58^{6'} in the direction of the arrow 128.

[0093] The frame part 122 has a "U" shape with spaced legs 130, 132. The component 58^{6'} is mounted on the leg 130.

[0094] The toothed element 88^{6'} cooperates with a separate toothed element 134 that moves guidingly in a channel 136 on the component 58^{6'}. In this embodiment, the toothed element 134 and cooperating channel 136 have a curved shape so that the toothed element 134 is movable guidingly in an arcuate path. A row of teeth 138 on one side of the toothed element 134 engage teeth 140 on the toothed element 88^{6'} so that the toothed element 134 moves back and forth within the channel 136 as the toothed element 88^{6'} is rotated in opposite directions around its axis 124.

[0095] The adjusting assembly 18^{6'} in this embodiment consists of an elongate spring assembly 19^{6'}, in this particular embodiment shown as a coil spring under tension. The spring 19^{6'} is connected between an end location at 144 on the toothed element 134 and the leg 132 on the frame part 122.

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[0096] As a user sits on the seat 14, without leaning against the back rest 16, the post 30^{6'} moves against the force of the spring 33^{6'} downwardly, thereby turning the toothed element 88^{6'} in the direction of the arrow 146, which causes the toothed element 134 to move in the direction of the arrow 148 in the channel 136. The precise position of the toothed element 134 in the channel 136 is dictated by the weight of the user.

[0097] Once the user is seated and leans back against the back rest 16, separate teeth 150, 152, on the toothed element 134 and component 58^{6'}, within the channel 136, engage, thereby to fix the position of the toothed element 134 within the channel 136.

[0098] Under an applied leaning force in the direction of the arrow 128 on the arm 126, the component 58^{6'}, and the associated back rest 16, tend to pivot around the axis 124, which is resisted by the force in the spring 142. Because the distance between the axis 124 and end location 144 where the resistant spring force is applied is increased with increasing weight of a user, the resistant force generated by the coil spring 19^{6'} is likewise increased.

[0099] The chair 10^{7'} in Fig. 15 operates on the same basic principles as the chair 10^{6'} in Fig. 14.

[00100] More particularly, a toothed element 134^{7'} moves in a channel 136^{7'} having an arcuate shape. A coil spring 19^{7'} connects between the toothed element 134^{7'} and a leg 132^{7'} on a U-shaped frame part 122^{7'}.

[00101] The primary difference between the structure in Fig. 15, compared to that in Fig. 14, is that the toothed element 134^{7'} is part of, and moves with, an elongate component 154 that is pivoted about an axis 156

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that is the approximate location at which the spring 19^{7'} connects to the leg 132^{7'}. The component 154 has a curved edge 158 with a constant radius R centered on the axis 156. That edge 158 has teeth 160 which mesh with teeth 162 on a post 30^{7'} that has a toothed rack 100^{6'} where the teeth 162 are located.

[00102] Increased weight of a user on the seat 14 pivots the component 154 in the direction of the arrow 164 around the axis 156 to move the toothed element 134^{7'} in the direction of the arrow 166 in the channel 136^{7'}. In so doing, the distance between the spring mount location at 144^{7'} on the toothed element 134^{7'} and the pivot axis 124^{7'} for the component 58^{7'} increases, thereby to cause an increase in the resistance to tilting of the back rest 16 in the same manner as occurs with the chair 10^{6'}.

[00103] In Fig. 16, a further modified form of chair is shown at 10^{8'} wherein the spring assembly 19^{8'} includes an elongate torsion component 168 with a lengthwise axis 170. The adjusting assembly 18^{8'} further includes an actuating component 172 that has a portion 174 keyed to the periphery of the torsion component 168 to move slidingly axially therealong in the same angular orientation. With the torsion component 168 fixed in relationship to the frame 12^{8'}, a user's weight on the seat 14 causes movement of the actuating component 172 through cooperation between a toothed rack 176 thereon and intermediate input structure 178 of suitable construction. Increased weight on the seat 14 causes the actuating component 172 to shift closer to a base 180 of the torsion component 168 closer to where it is anchored to the frame 12^{8'}.

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[00104] A leaning force on the back rest 16 is applied to the torsion component generally in the direction of the arrow 182, tending to turn the torsion component 168 around the axis 170. For the back rest 16 to reposition, the torsion component 168 must be twisted around the axis 170. This twisting action is resisted to a greater degree with the actuating component 172 closer to the base 180 under a heavier user weight.

[00105] On the other hand, with the actuating component 172 shifted towards its free end 184, as occurs with a lighter user, the torsion component 168 can be more readily twisted about its length and the axis 170.

[00106] In Fig. 17, a still further modified form of chair, according to the invention, is shown at 10^{9'} with an adjusting assembly 18^{9'} cooperating between a seat 14 and back rest 16. A spring assembly 19^{9'} is mounted to a frame 12^{9'} and consists of separate leaf springs with bodies 46^{9'} each with spaced ends supported by blocks 186, 188 on the frame 12^{9'}. With this arrangement, the bodies 46^{9'} and blocks 186, 188 cooperatively extend around an opening 190 with a width W.

[00107] An elongate, wedge-shaped actuating component 192 with a uniform width W₁, slightly less than the width W, extends through the opening 190.

[00108] A toothed rack 194 is provided on the actuating component 192 and moves therewith. In response to a weight force being applied to the seat 14, and through an appropriate force transfer structure 196, the toothed rack 194 and actuating component 192 are shifted in the direction of the arrow 198.

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[00109] By reason of the wedge shape, the actuating component 192 has oppositely facing actuating surfaces S1, S2, each with one dimension D1 at one end and a larger dimension D2 at its opposite end, that abut to, or reside adjacent to, facing surfaces S3, S4, respectively, on the bodies 46^{9'}. As the actuating component 192 shifts in the direction of the arrow 198, a progressively larger area of the surfaces S1, S2 confronts the leaf spring bodies 46^{9'}.

[00110] The back rest 16 imparts a force to the actuating component 192 through a suitable force transfer structure at 202 tending to turn the actuating component 192 around an axis 204.

[00111] Accordingly, a user leaning force generates a force on the actuating component 192 that bears the surfaces S1, S2 simultaneously against the surfaces S3, S4 of the leaf spring bodies 46^{9'} between the spaced supported ends. The larger the area of the surfaces S1, S2 in contact with the bodies 46^{9'}, the more resistant the bodies 46^{9'} are to deformation. This translates into a greater resistance to the repositioning of the back rest 16 for a larger weight application on the seat 14.

[00112] Further, as the actuating component 192 turns around the axis 204, the force transfer between the actuating component 192 and bodies 46^{9'} occurs primarily at corners C1, C2, C3, C4 of the actuating component 192, which bear against reinforced and thus more rigid parts of the bodies 46^{9'} adjacent to the blocks 186, 188 as more user weight is applied. Thus, greater resistance to back rest movement results.

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[00113] In a still further alternative form, as shown in Fig. 18, multiple adjusting assemblies 18 are utilized between a cooperating first component(s)/seat 14 and second component(s)/back rest 16 on a frame 12.

[00114] Ideally, the apparatus/chair 10 will adapt to users weighing as much as 350 pounds, or more. While one spring assembly might be designed for a total desired weight range to be accommodated, two or more spring assemblies might be utilized and their function and operation coordinated.

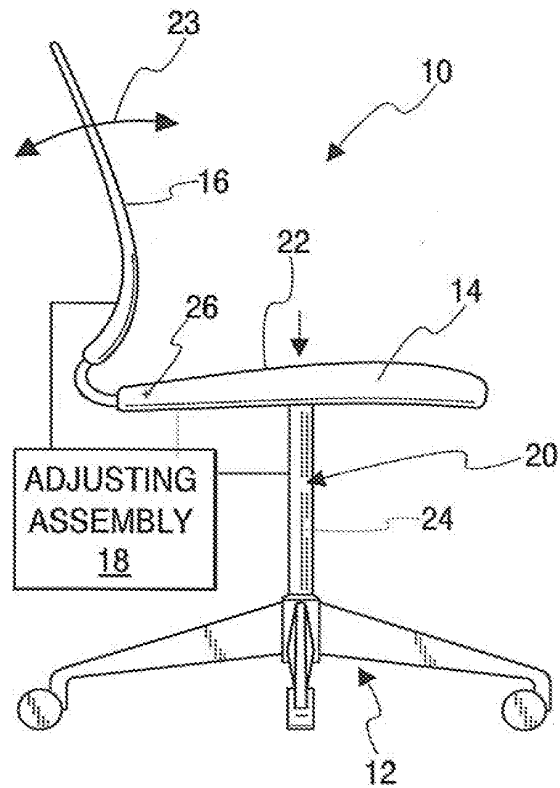
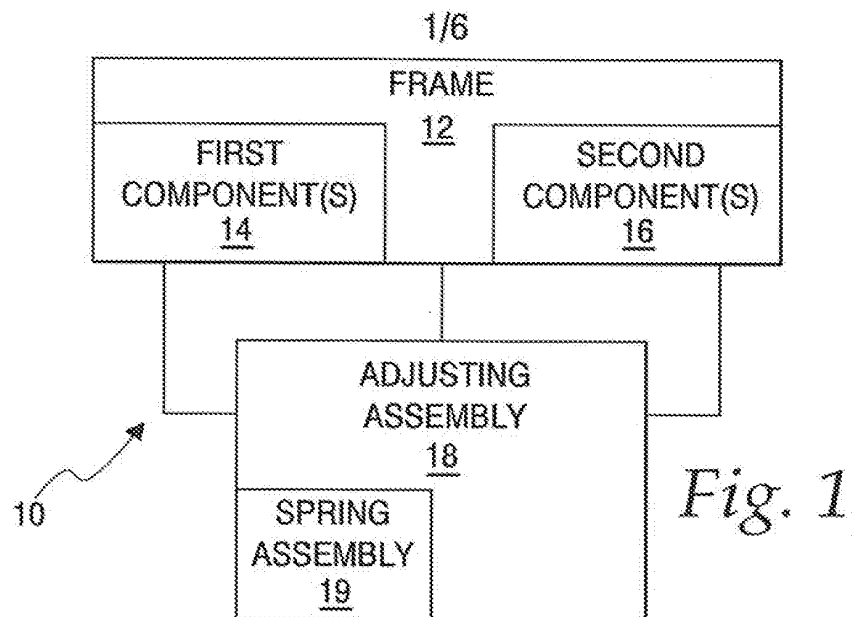
[00115] Further, different spring assemblies might be utilized with coordinated operation. For example, one spring assembly may cover a range of 30-175 pounds with a second spring assembly operational for user weights in the range of 175-350 pounds. More springs/spring assemblies might be added to further split up the weight ranges.

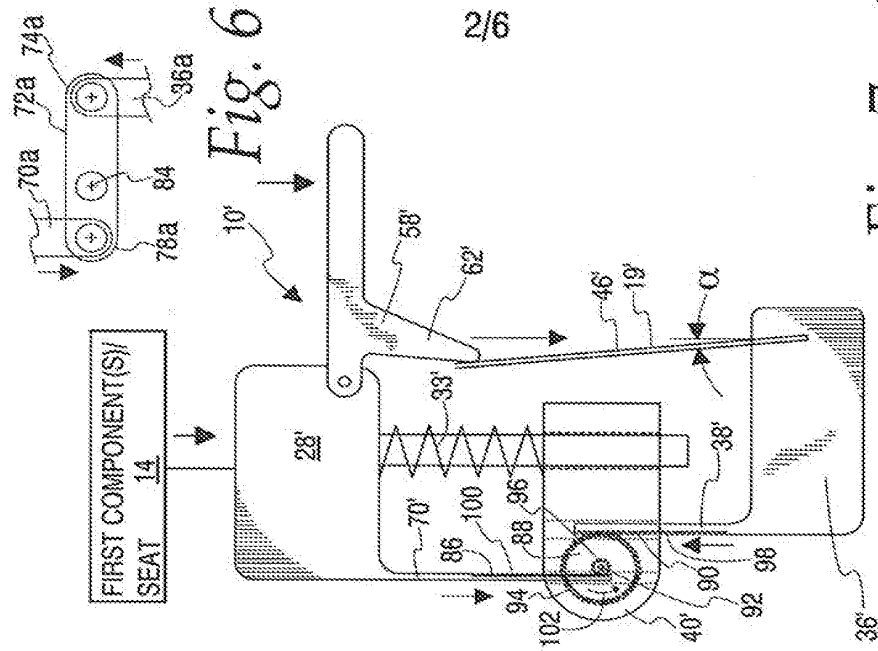
[00116] The spring assemblies may be designed in relationship to seat movement. For example, one spring assembly may be operational for 0-.5" of seat movement with a separate spring assembly operational for seat movement of 0.5"-1", where 1" is the seat movement for the maximum weight for which the apparatus is designed.

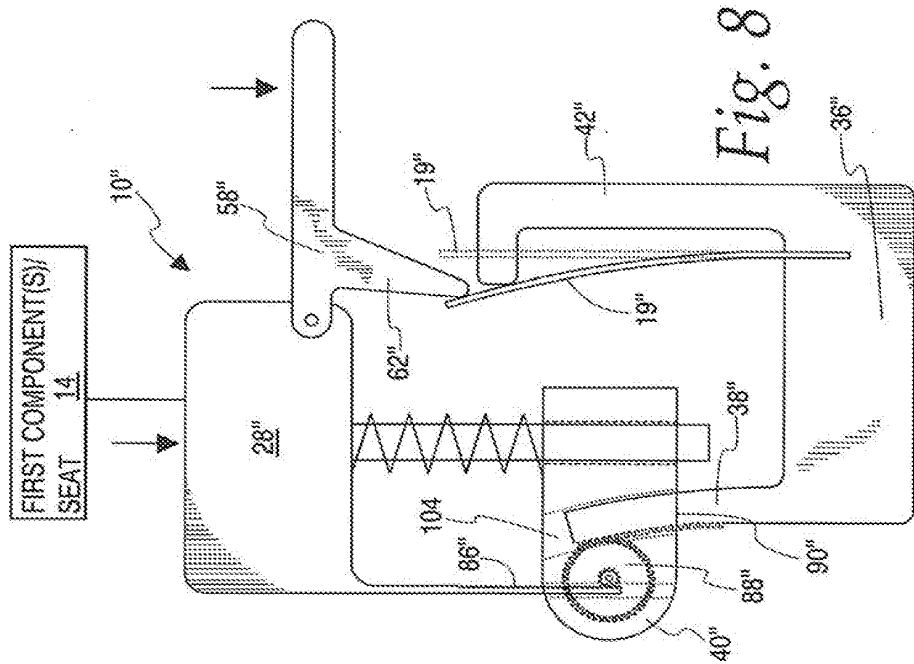
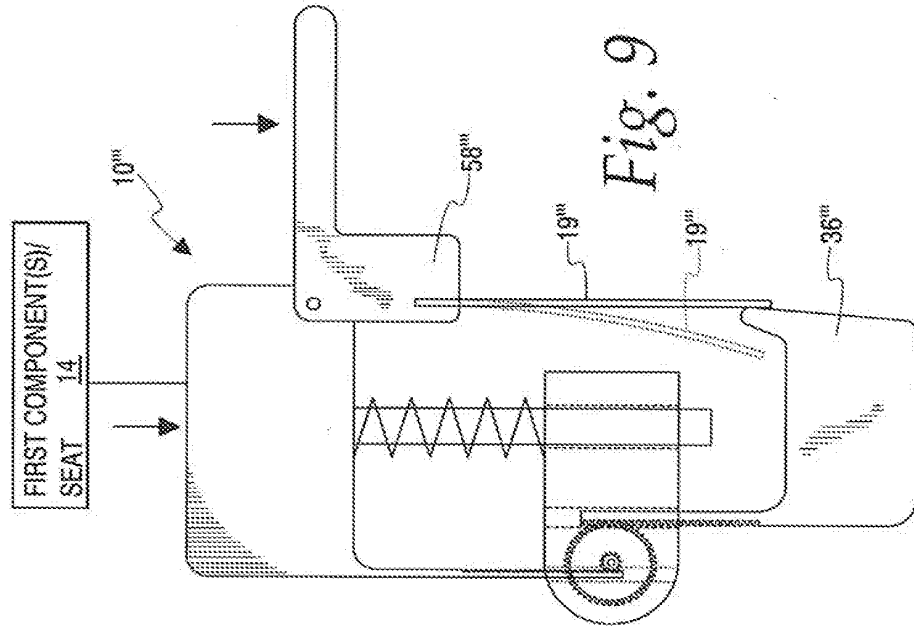
[00117] The examples herein of spring assembly/spring construction should not be viewed as limiting. Different spring types and combinations are contemplated. For example, the springs may be curved, coiled with different turn diameter and rise, hybrid shapes, concentric arrangements, etc. Coil springs, or the like, may produce forces under either compression or tension.

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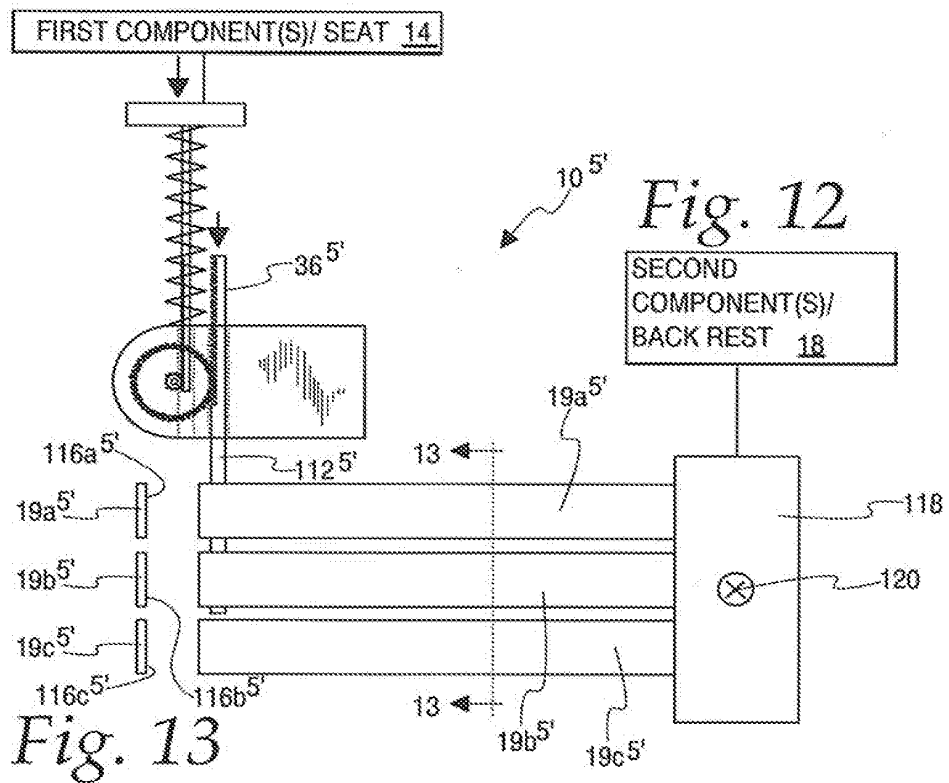
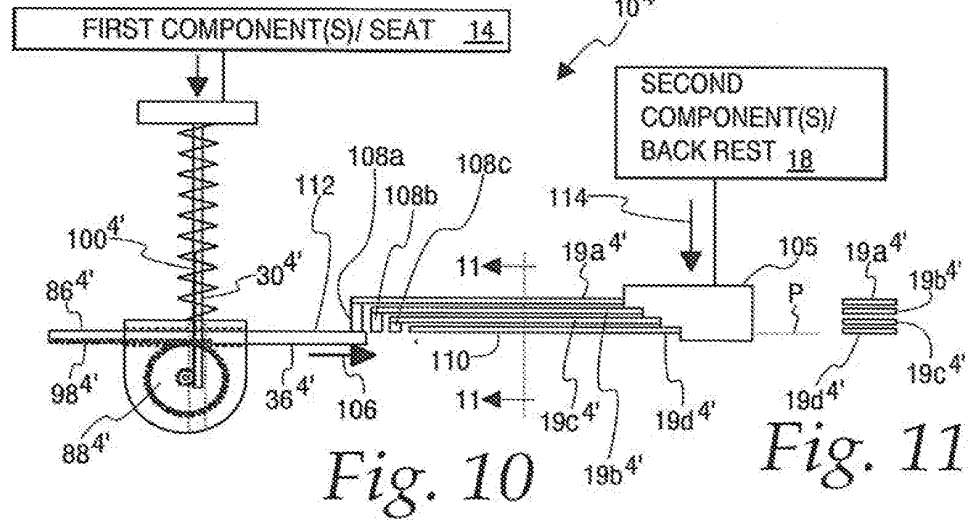
[00118] The foregoing disclosure of specific embodiments is intended to be illustrative of the broad concepts comprehended by the invention.

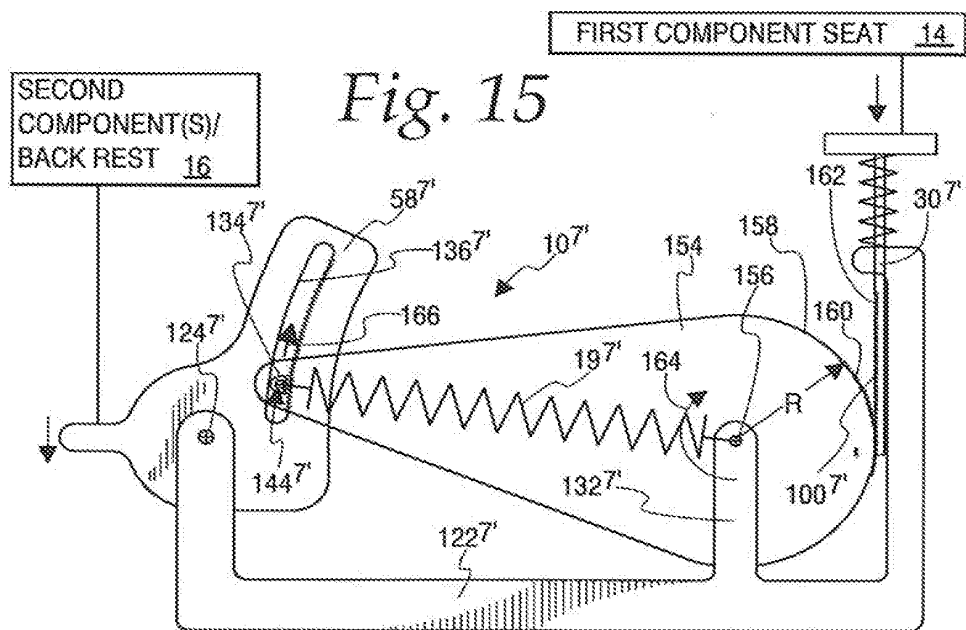
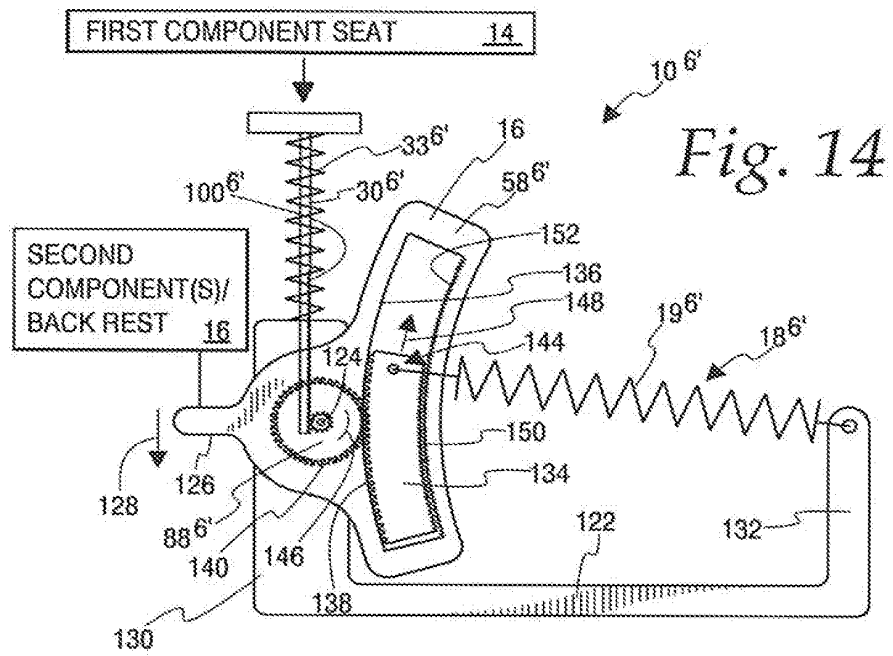






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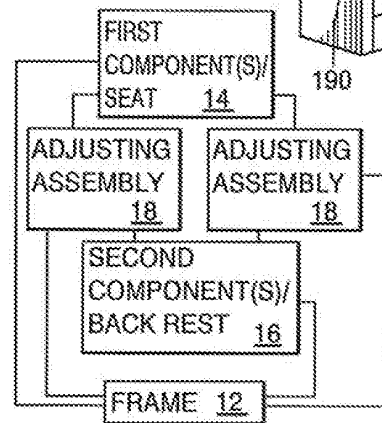
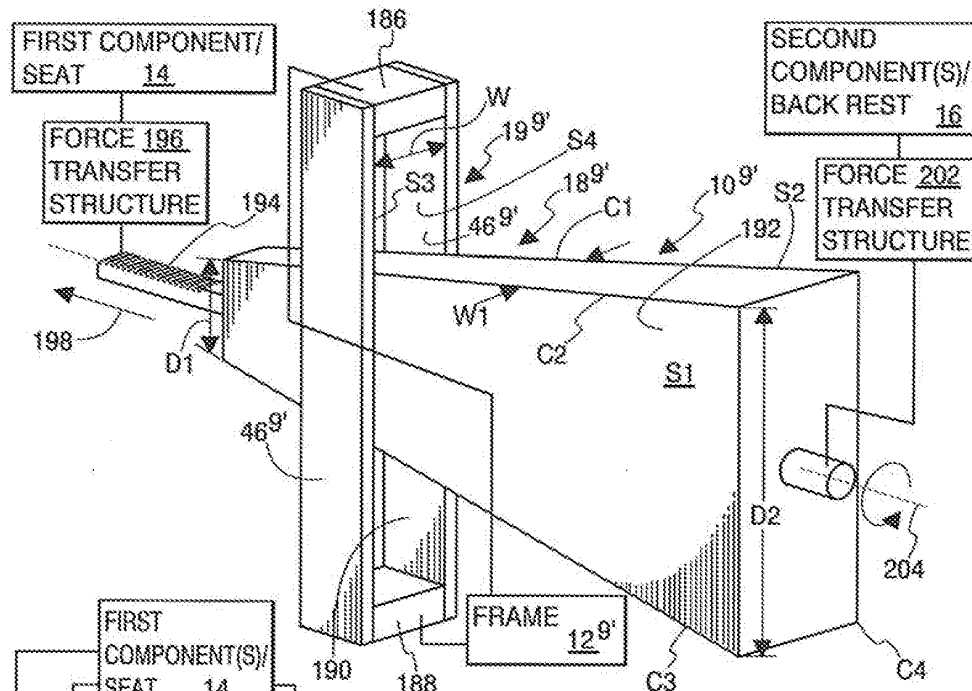
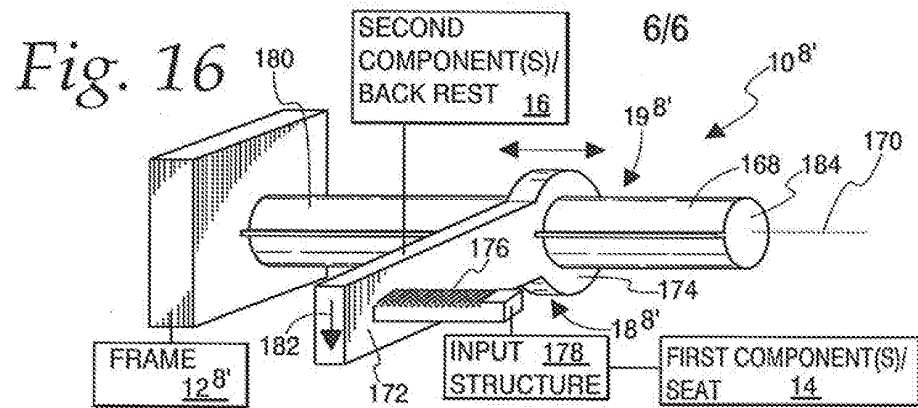


Fig. 17

Fig. 18

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As the below named inventor, I hereby declare that:

This declaration
is directed to:

The attached application, or

United States application or PCT international application number 15/040,735filed on February 10, 2016

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

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

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

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LEGAL NAME OF INVENTORInventor: Aaron DeJule

Date (Optional) _____

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Title of
 Invention

APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING
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As the below named inventor, I hereby declare that:

This declaration
 is directed to:



The attached application, or



United States application or PCT international application number 15/040,735

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LEGAL NAME OF INVENTOR

Inventor: Scott Padiak

Date (Optional): _____

Signature: Scott Padiak

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Invention****APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING
CHARACTERISTICS**

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The attached application, or

United States application or PCT international application number 15/040,735filed on February 10, 2016

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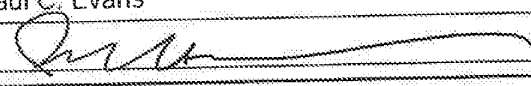
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LEGAL NAME OF INVENTORInventor: Paul C. Evans

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Examiner Name		
Attorney Docket Number	DEJ10730P00072US	

3	20150123441		2015-05-07	Duke
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5	20090261637		2009-10-22	Schmitz
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First Named Inventor	Aaron DeJule
Art Unit	
Examiner Name	
Attorney Docket Number	DEJ10730P00072US

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See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

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A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/John S. Mortimer/	Date (YYYY-MM-DD)	2019-05-10
Name/Print	John S. Mortimer	Registration Number	30407

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.



Espacenet

Bibliographic data: DE3700447 (A1) — 1988-07-21

Seat.

Inventor(s): HANSEN ECKHARD [CH] ± (HANSEN,ECKHARD)

Applicant(s): VOGT BUEROMOEBEL [DE] ± (VOKO-FRANZ VOGT & CO)

Classification: - **international:** A47C1/031; A47C1/032; A47C3/025; A47C3/026;
 (IPC1-7): A47C1/031; A47C9/02
 - **cooperative:** A47C1/03255; A47C1/03272; A47C1/03294;
A47C31/126

Application number: DE19873700447 19870109

Priority number(s): DE19873700447 19870109

Also published as: AT62385 (T) AU1014888 (A) AU602043 (B2) BR8800051 (A)
CA1278995 (C) more

Abstract not available for DE3700447 (A1)

Abstract of corresponding document: EP0277474 (A1)

The seat is intended to have automatic adjustment, which is dependent on the body weight, of the restoring force of the inclination mechanism and the backrest mechanism. The seat part (2) is mounted on the seat support (5) so as to be adjustable in height by means of a parallelogram link arrangement (9, 10) counter to the pretensioning force of a spring element (16). Furthermore, the backrest support (4) is mounted swivellably on the seat support, swivelling of the backrest support (4) taking place counter to the pretensioning force of the spring element (16). The seat can be used, for example, as office furniture, as a seat in a vehicle, or in the household.

①9 BUNDESREPUBLIK
DEUTSCHLAND



DEUTSCHES
PATENTAMT

⑫ **Offenlegungsschrift**
⑪ **DE 3700447 A1**

⑤1 Int. Cl. 4:
A47 C 1/031
A 47 C 9/02

⑳1 Aktenzeichen: P 37 00 447.6
⑳2 Anmeldetag: 9. 1. 87
⑳3 Offenlegungstag: 21. 7. 88

Behörden Eigentum

DE 3700447 A1

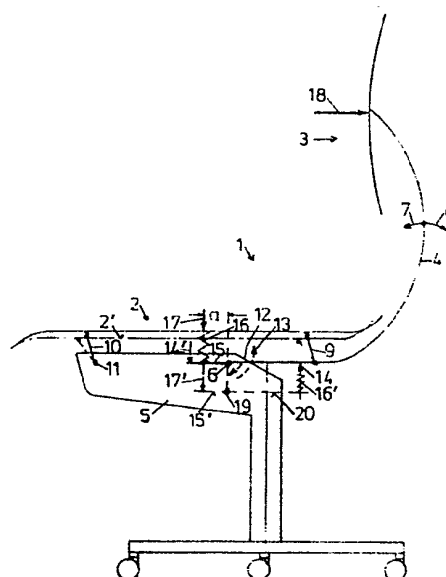
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Missling, A., Dipl.-Ing., Pat.-Anw., 6300 Gießen

⑦2 Erfinder:
Hansen, Eckhard, St. Margrethen, CH

⑤4 Sitzmöbel

Es wird ein Sitzmöbel, insbesondere Bürostuhl, Sessel o. dgl. vorgeschlagen, bei welchem sich die erforderliche Gegenkraft zur Verstellung der Rückenlehnenneigung in Abhängigkeit vom Gewicht der Benutzerperson selbständig einstellt. Hierfür wird mittels einer auf ein Hebelsystem wirkenden Druckfeder (16) ein Gegenmoment (13) erzeugt, hervorgerufen durch die Vorspannung der Druckfeder (16) in Abhängigkeit der Gewichtskraft (17) (hierzu Zeichnung).



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1. Sitzmöbel, insbesondere Bürostuhl, Sessel o. dgl., bestehend aus einem, an einem Sitzträger angelenkten Sitzteil und einem, vorzugsweise an einem Rückenträger abgestützten Rückenteil, dessen Rückenneigungsverstellung gegen eine verstellbare Gegenkraft erfolgt, dadurch gekennzeichnet, daß das Körpergewicht (17) der Benutzerperson über die Belastung des Sitzteils (2) erfaßbar ist und daß die erforderliche Anlehnkraft (18) zur Rücken-

neigungsverstellung des Rückenteils (3) sich in Abhängigkeit der Gewichtskraft (17) der Benutzerperson verstellt.

2. Sitzmöbel nach Anspruch 1, dadurch gekennzeichnet, daß die durch Belastung des Sitzteils (2) infolge der Gewichtskraft (17) eintretende Sitzteil-Abwärtsbewegung unmittelbar oder über ein Hebelgestänge mittelbar auf eine Feder im Sinne einer Federvorspannung übertragbar ist und daß die Feder ein Gegendrehmoment (13) gegen die Rücken-

neigungsverstellung des Rückenträgers (4) erzeugt.

3. Sitzmöbel nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß der Rückenträger (4) am Sitzträger (5) über ein Festlager (6) als Drehlager angelenkt ist und daß eine Druckfeder (16, 24) über einen Hebelarm (15, 25) ein Gegenmoment (13) um das Drehlager (6) erzeugt, wobei der Hebelarm (a) die Größe des Gegenmoments (13) und damit die notwendige Andrückkraft (18) zur Rücken-

neigungsverstellung der Rückenlehne (3) bestimmt.

4. Sitzmöbel nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß eine unterhalb des Sitzteils (2) angeordnete vertikale Druckfeder (16) auf einen, um das Festlager (6) des Rückenträgers (4) drehenden horizontalen Hebelarm (15) im Abstand (a) einwirkt, zur Erzeugung eines Gegenmoments (13) gegen die Rückenneigungsverstellung.

5. Sitzmöbel nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß die Abwärtsbewegung des Sitzteils (2) auf ein im vorderen Bereich des Sitzträgers (5) gelagertes Hebelgestänge (26, 27) übertragbar ist, daß die Kippbewegung des Hebelgestänges (26, 27) um den festen Anlenkpunkt (28) ein Zusammendrücken der vorzugsweise quer gelagerten Druckfeder (24) bewirkt, die sich am hinteren, um den Drehpunkt des Festlagers (6) drehenden Hebelarm (25) abstützt.

6. Sitzmöbel nach einem oder mehreren der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Sitzteil (2) über eine Biegezone (21) mit dem Rückenteil (3) zur Bildung einer durchgehenden Sitzschale verbunden ist.

Beschreibung

Die Erfindung betrifft ein Sitzmöbel, insbesondere Bürostuhl, Sessel o. dgl., bestehend aus einem, an einem Sitzträger angelenkten Sitzteil und einem, vorzugsweise an einem Rückenträger abgestützten Rückenteil, dessen Rückenneigungsverstellung gegen eine verstellbare Gegenkraft erfolgt.

Sitzmöbel, insbesondere Bürostühle, bestehen aus einer Sitzfläche mit an dieser angelenkten Rückenlehne, wobei Sitzfläche und/oder Rückenlehne in ihrer Neigung verstellbar sind. Einfache Bürostühle weisen meist nur eine, an einem Rückenträger befestigte, höhenverstellbare Rückenlehne auf, die ggf. federnd am Sitz be-

stigt ist. Komfortable Bürostühle besitzen meist durchgehende Sitzschalen, die vom Sitzbereich in den Rückenbereich hinein führen, wobei die Rückenlehne über einen mehr oder weniger kompliziert aufgebauten Rückenträger gehalten und geführt ist. Aus der DE-AL 35 20 188 des Anmelders ist eine derartige Sitzmechanik bekannt. In der vom Anmelder vorgeschlagenen Anmeldung P 36 42 796.9 ist die Bauweise mit einer durchgehenden Sitzschale wiedergegeben, wobei zwischen Sitzteil und Rückenteil eine flexible Biegezone vorhanden ist.

Bei den bekannten Stuhlgeometrien ist es vorgesehen, daß die Verstellung der Rückenlehne um einen Winkel von ca. 5° nach vorn und ca. 15° bis 20° nach hinten erfolgt. Dies geschieht in Abhängigkeit einer Abwärtsbewegung und Neigungsverstellung des Sitzteils. Die Rückenneigungsverstellung erfolgt dabei gegen den Druck einer, mittels einer manuellen Verstelleinrichtung vorspannbaren Gegenfeder. Der Gegendruck der Rückenlehne kann demnach stufenlos mittels eines Handrads o. dgl. verstellt werden, um eine individuelle Anpassung an die Benutzerperson zu schaffen. So muß der Gegendruck der Rückenlehne bei großen und schweren Personen infolge des größeren Körpergewichts stärker ausgeführt werden, als bei leichten kleineren Personen.

Der Erfindung liegt die Aufgabe zugrunde, eine automatische Anpassung der Gegenkraft der Rückenneigungsverstellung in Abhängigkeit der Benutzerperson zu schaffen.

Diese Aufgabe wird ausgehend von einem Sitzmöbel der einleitend bezeichnenden Art erfindungsgemäß dadurch gelöst, daß das Körpergewicht der Benutzerperson über die Belastung des Sitzteils erfaßbar ist und daß die erforderliche Anlehnkraft zur Rückenneigungsverstellung des Rückenteils sich in Abhängigkeit der Gewichtskraft der Benutzerperson verstellt.

Durch die in den Unteransprüchen aufgeführten Maßnahmen sind vorteilhafte Weiterbildungen und Verbesserungen des im Hauptanspruch angegebenen Gegenstands angegeben.

Der erfindungsgemäße Sitz, insbesondere Bürostuhl hat gegenüber den bekannten Einrichtungen den Vorteil, daß eine automatische Anpassung der Gegenkraft der Rückenlehnenverstellung in Abhängigkeit des Körpergewichts der Benutzerperson erfolgt. Dies beruht auf dem prinzipiellen Gedanken, daß das Körpergewicht bei der Belastung des Sitzteils erfaßt wird und die Gegenkraft der Rückenneigungsverstellung des Rückenteils in Abhängigkeit des Körpergewichts regelbar ist. Bei einer leichteren Person ist demnach die Gegenkraft der Rückenneigungsverstellung geringer, als bei einer schweren Benutzerperson. Ein umständliches Hantieren an einem Verstellrad zur Anpassung der Rückenlehnen-gegenkraft ist deshalb nicht erforderlich.

Gemäß der Weiterbildung der Erfindung nach den Unteransprüchen erfolgt die Anpassung der Gegenkraft des Rückenteils über eine Hebelmechanik in Verbindung mit einer Feder, insbesondere einer Druckfeder. Die Druckfeder wird hierbei durch das Körpergewicht zusammengedrückt, d. h. vorgespannt und die Rückenlehnenverstellung erfolgt dann gegen diese vorgespannte Feder. Vorzugsweise führt dabei der Rückenträger eine Drehbewegung um einen festen Drehpunkt am Sitzträger durch. Dieser Drehbewegung wirkt die vorgespannte Druckfeder über ein Hebelsystem entgegen. Dabei ist es unbeachtlich, wie die Feder an der Stuhlmechanik angebracht ist. Maßgeblich ist nur die Erzeugung eines Gegendrehmoments gegen die Rück-

kenneigungsverstellung in Abhängigkeit von der Vorspannung der Feder. Anstelle einer Druckfeder kann bei entsprechender Anbringung bzw. Anlenkung auch eine Zugfeder oder Drehfeder o. dgl. verwendet werden.

Die in den Unteransprüchen aufgeführten Ausführungsvarianten können deshalb durch weitere erfindungsgemäße Varianten ergänzt werden, bei welchen ein Gegendrehmoment gegen die Rückeneneigungsverstellung des Rückenteils in Abhängigkeit der Gewichtsbelastung geschaffen wird.

Vorteilhafte und zweckmäßige Ausführungsbeispiele der Erfindung sind in der Zeichnung dargestellt und in der nachfolgenden Beschreibung näher erläutert. Es zeigen

Fig. 1a) und b) die Anordnung eines Stuhls mit vertikaler Druckfeder und vom Sitzteil getrenntem und durchgehendem Rückteil und

Fig. 2a) und b) eine Anordnung mit horizontaler Druckfeder mit vom Sitzteil getrenntem und durchgehendem Rückenteil.

Der in der Fig. 1a) dargestellte Sitz (1) besteht aus einem Sitzteil (2) und einem Rückenteil (3), welches über einen Rückenträger (4) am Sitzträger (5) befestigt ist.

Das Festlager (6) bildet dabei den Drehpunkt zur Durchführung einer Rückeneneigungsverstellung der Rückenlehne (3). Diese erfolgt üblicherweise um ca. 5° nach vorn (Pfeil 7) und ca. 15° bis 20° nach hinten (Pfeil 8). Zur Durchführung einer Punktsynchronmechanik entsprechend den in der Beschreibungseinleitung genannten Druckschriften ist das Sitzteil (2) in seinem hinteren Bereich mit einem Verbindungsgestänge (9) mit dem Rückenträger (4) derart verbunden, daß eine Neigungsverstellung der Rückenlehne gleichzeitig eine Neigungsverstellung und Abwärtsbewegung des Sitzteils (2) zur Folge hat. Im vorderen Bereich ist das Sitzteil (2) unmittelbar oder über ein Verbindungsgestänge (10) mittelbar mit einem festen Anlenkpunkt (11) am Sitzträger (5) verbunden.

Die Neigungsverstellung des Rückenteils (3) nach hinten (Pfeil 8) erfolgt um den Drehpunkt des Festlagers (6). Dies ergibt eine Drehbewegung des Rückenträgers (4) im Uhrzeigersinn gemäß Pfeil (12). Um eine Gegenkraft gegen die Neigungsverstellung der Rückenlehne (3) zu erzeugen, muß ein Gegenmoment gemäß Pfeil (13) um den Drehpunkt (6) erzeugt werden. Dies kann beispielsweise durch eine nach oben auf den Rückenträger wirkende Kraft entsprechend Pfeil (14) erfolgen. Dies könnte beispielsweise durch eine — ggf. verstellbare — Druckfeder geschehen. Verlängert man den Rückenträger (4) über den Drehpunkt des Festlagers (6) hinaus, so entsteht ein Hebelarm (15), an dem ebenfalls eine von oben nach unten gerichtete Kraft (Pfeil 14') angreifen kann, um ein Gegenmoment entsprechend Pfeil (13) zu erzeugen.

Erfindungsgemäß wird das Gegenmoment (Pfeil 13) dadurch erzeugt, daß zwischen Sitzteil (2) und Hebelarm (15) eine Druckfeder (16) angeordnet ist, die bei Belastung des Sitzteils (2) durch das Gewicht der Benutzerperson (17) vorgespannt wird. Die Anlennkraft (18) gegen das Rückenteil (3) ist deshalb unmittelbar proportional zur Gewichtskraft (17) auf das Sitzteil (2). Eine hohe Gewichtskraft (17) erzeugt ein großes Gegendrehmoment (13) und damit ist eine größere Anlennkraft (18) erforderlich, um die Rückeneneigung (Pfeil 8) und damit eine Drehbewegung entsprechend Pfeil (12) durchzuführen.

Die Anordnung der Feder (16) muß stets ein Gegendrehmoment entsprechend Pfeil (13) erzeugen, wobei

die Gewichtskraft (17) eine Vorspannung der Feder (16) in Abhängigkeit des Körpergewichts erzeugt.

Die Auswahl der Druckfeder (16) sowie der Hebelarm (a), d. h. der Abstand der Druckfeder (16) zum Drehpunkt (6) bestimmen die Größe des Gegendrehmoments (13).

In Fig. 1a) ist strichpunktiert eine Alternativausführung des prinzipiellen Erfindungsgedankens eingezeichnet. Hierzu wird die Gewichtskraft (17) als Hebelkraft (17') auf einen Hebelarm (15') übertragen, der um ein Festlager (19) am Sitzträger (5) dreht. Am gegenüberliegenden Hebelarm (20) ist die Druckfeder (16') gelagert, die eine nach oben gerichtete Kraft (14) auf den Rückenträger (4) im Sinne eines Gegenmoments (13) auslöst. Dabei ist die Gewichtskraft (17) stets maßgebend für die Vorspannung der Druckfeder (16) bzw. (16'). Die Hebelarme (15') bzw. (20) werden zur Erzeugung des geeigneten Gegenmoments (13) ausgewählt.

Eine alternative Ausführungsform der Erfindung ist in Fig. 1b) dargestellt. Gleiche Teile sind mit gleichen Bezugszeichen versehen. In Abwandlung zu Fig. 1a) ist in Fig. 1b) das Rückenteil (3) über eine Biegezone (21) mit dem Sitzteil (2) verbunden, so daß sich eine durchgehende Sitzschale bildet. Das um den Drehpunkt bzw. Festlager (6) gebildete Hebelsystem ist als Winkelarm (15'') ausgebildet bestehend aus einem L-förmigen Winkel an dessen unterem horizontalen Schenkel (22) die Druckfeder (16) zur Erzeugung des Gegenmoments (13) angreift. Der Hebelarm um den Drehpunkt (6) ist mit (a) gekennzeichnet.

Zwischen dem am Sitzträger (5) ortsfesten Anlenkpunkt (11) und dem einen Ende des Schenkels (22) ist ein Blockierelement (23) eingebaut, welches zur Festlegung der Rückenlehnenverstellung in eine beliebige, vom Benutzer gewünschte Stellung ermöglicht. Zur Anlenkung dieses Blockierelements (23) ist der Hebelarm (15'') als L-förmiger Winkel ausgebildet.

Die in den Fig. 2a) und b) dargestellten Ausführungsbeispiele zeigen eine den Fig. 1a) und b) entsprechende Stuhlanordnung. Die Anordnung einer Druckfeder (24) zur Erzeugung eines Gegenmoments (13) um den Drehpunkt des Festlagers (6) ist horizontal gewählt. Hierbei greift die Druckfeder (24) auf einem vom Drehpunkt (6) abgewinkelten Hebelarm (25) an, um ein Gegenmoment (13) gegenüber der Neigungsverstellung (Pfeil 8) zu erzeugen.

Die Vorspannung der Druckfeder (24) durch die Gewichtskraft (17) der Benutzerperson erfolgt über ein Hebelgestänge (26, 27) um den Drehpunkt (28), der gleichzeitig mit dem vorderen ortsfesten Anlenkpunkt (11) übereinstimmen kann. Zwischen vorderem Festpunkt bzw. Drehpunkt (28) und Hebelarmende (25) ist wiederum ein Blockierelement (23) zur Festlegung einer bestimmten Rückeneneigung angeordnet.

In Fig. 2a) bewirkt eine Gewichtskraft (17) eine Drehbewegung des Hebelgestänges (26, 27) um den Drehpunkt (28) (siehe gestrichelte Linie) und damit ein Zusammendrücken der Druckfeder (24). Die hiermit erzeugte Vorspannkraft (29) wirkt auf den Hebelarm (25) mit dem Hebelarm (a) und erzeugt ein Gegenmoment entsprechend Pfeil (13). Die Anlennkraft (18) gegen das Rückenteil (3) zur Erzeugung einer Rückeneneigungsverstellung muß deshalb um so größer sein, je größer die Gewichtskraft (17) ist, um das Gegenmoment (13) zu überwinden.

Die Darstellung in Fig. 2b) entspricht derjenigen in Fig. 2a), jedoch mit durchgehender Sitzschale mit Biegezone (21).

Sofern man in den Fig. 1a) bis 2b) das Verbindungs-
gestänge (9) zwischen Sitzteil (2) und Rückenträger (4)
anordnet, führt der Stuhl eine Synchronbewegung bei
der Rückenneigungsverstellung aus, d. h. eine Neigungs-
verstellung der Rückenlehne hat gleichzeitig eine Nei-
gungsverstellung bzw. Absenkung des Sitzteils zur Fol-
ge. Ist dies nicht erwünscht, kann man das Verbindungs-
gestänge auch direkt zwischen dem Sitzteil (2) und dem
Sitzträger (5) anordnen, wie in Fig. 2a) mit Bezugszei-
chen (9') angeordnet.

In den Figuren ist die abgesenkte Stellung des Sitz-
teils (2) gestrichelt mit Bezugszeichen (2') dargestellt.

Die Erfindung ist nicht auf die dargestellten Ausführ-
ungsbeispiele beschränkt. Sie umfaßt auch vielmehr al-
le fachmännischen Weiterbildungen ohne eigenen erfin-
derischen Gehalt. Hierbei ist es stets wesentlich, ein von
der Gewichtskraft (17) abhängiges Gegenmoment ge-
gen die Rückenneigungsverstellung zu erzeugen, wobei
mittels einer Federkraft, sei es Druckfeder, Zugfeder
oder Drehfeder, das Gegenmoment erzeugt wird.

FILE: 100-10111

3700447

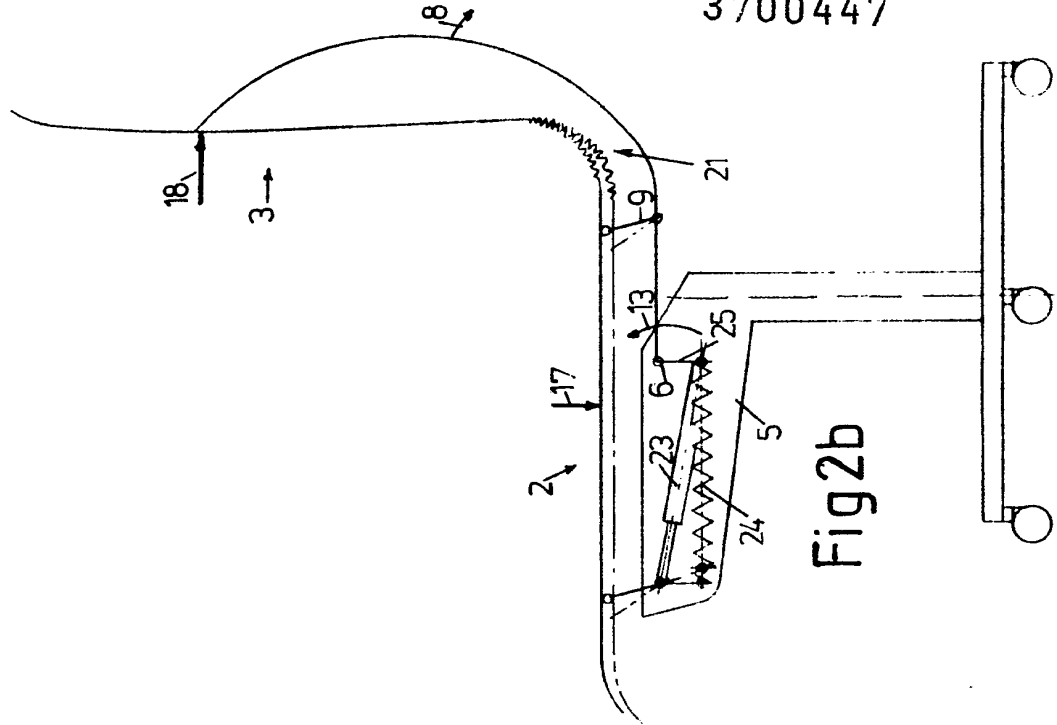


Fig 2b

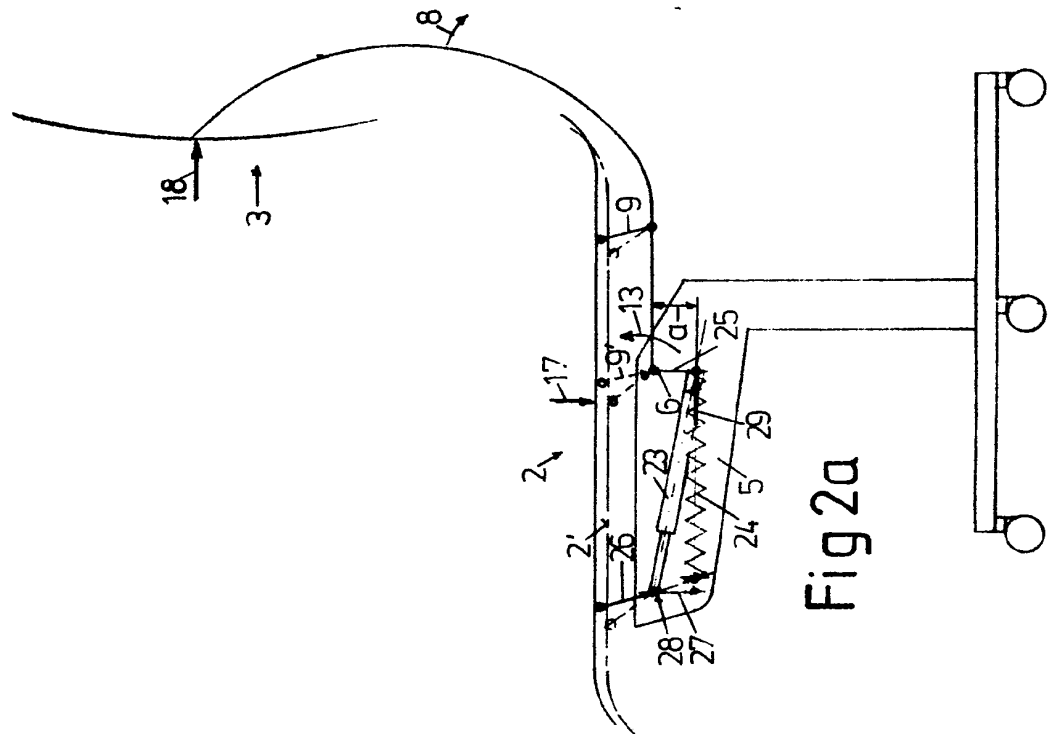


Fig 2a

Under the Paperwork Reduction Act of 1995 no persons are required to respond to a collection of information unless it displays a valid OMB control number

FEE TRANSMITTAL		Complete if known	
		Application Number	Unassigned
		Filing Date	Herewith
☒ Applicant asserts small entity status. See 37 CFR 1.27.		First Named Inventor	Aaron DeJule
☐ Applicant certifies micro entity status. See 37 CFR 1.29. Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.		Examiner Name	
		Art Unit	
TOTAL AMOUNT OF PAYMENT	(\$)	Practitioner Docket No.	DEJ10730P00072US

METHOD OF PAYMENT (check all that apply)

☐ Check ☒ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☒ Deposit Account Deposit Account Number: 23-0785 Deposit Account Name: WOOD PHILLIPS

For the above-identified deposit account, the Director is hereby authorized to (check all that apply):

☒ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☒ Charge any additional fee(s) or underpayment of fee(s) under 37 CFR 1.16 and 1.17 ☒ Credit any overpayment of fee(s)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES (U = undiscounted fee; S = small entity fee; M = micro entity fee)

Application Type	FILING FEES			SEARCH FEES			EXAMINATION FEES			Fees Paid (\$)
	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	U (\$)	S (\$)	M (\$)	
Utility	300	150*	75	660	330	165	760	380	190	785.00
Design	200	100	50	160	80	40	600	300	150	
Plant	200	100	50	420	210	105	620	310	155	
Reissue	300	150	75	660	330	165	2,200	1,100	550	
Provisional	280	140	70	0	0	0	0	0	0	

* The \$150 small entity status filing fee for a utility application is further reduced to \$75 for a small entity status applicant who files the application via EFS-Web.

2. EXCESS CLAIM FEES

Fee Description	Undiscounted Fee (\$)	Small Entity Fee (\$)	Micro Entity Fee (\$)
Each claim over 20 (including Reissues)	100	50	25
Each independent claim over 3 (including Reissues)	460	230	115
Multiple dependent claims	820	410	205

Total Claims 22 -20 or HP = 2 x 50 = 100 **Fee Paid (\$)**

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims 1 -3 or HP = 0 x = **Fee Paid (\$)**

HP = highest number of independent claims paid for, if greater than 3.

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is \$400 (\$200 for small entity) (\$100 for micro entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee (\$)	Fee Paid (\$)
_____	_____	_____ / 50 = _____ (round up to a whole number) x _____	_____	_____

4. OTHER FEE(S)

Non-English specification, \$130 fee (no small or micro entity discount) _____

Non-electronic filing fee under 37 CFR 1.16(t) for a utility application, \$400 fee (\$200 small or micro entity) _____

Other (e.g., late filing surcharge): _____

SUBMITTED BY			
Signature	/John S. Mortimer	Registration No. (Attorney/Agent) 30,407	Telephone 312-876-1800
Name (Print/Type)	John S. Mortimer	Date May 10, 2019	

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
Application Number:				
Filing Date:				
Title of Invention:		APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		
First Named Inventor/Applicant Name:		Aaron DeJule		
Filer:		John Stirling Mortimer/Alicia Diaz		
Attorney Docket Number:		DEJ10730P00072US		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380
Pages:				
Claims:				
CLAIMS IN EXCESS OF 20	2202	2	50	100
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				885

Electronic Acknowledgement Receipt	
EFS ID:	35975421
Application Number:	16408650
International Application Number:	
Confirmation Number:	8329
Title of Invention:	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS
First Named Inventor/Applicant Name:	Aaron DeJule
Customer Number:	32116
Filer:	John Stirling Mortimer/Alicia Diaz
Filer Authorized By:	John Stirling Mortimer
Attorney Docket Number:	DEJ10730P00072US
Receipt Date:	10-MAY-2019
Filing Date:	
Time Stamp:	11:39:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$885
RAM confirmation Number	051019INTEFSW00009099230785
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal of New Application	DEJ72Trans.PDF	286414	no	2
			a87636e93eb8f36e41b23a0ab531eab8f7b84aca		
Warnings:					
Information:					
2	Application Data Sheet	DEJ72ADS.PDF	1823011	no	9
			2bfbcc2392db08760dc7dcdcaebd28f6c2764e8232		
Warnings:					
Information:					
3		DEJ72App.pdf	211846	yes	33
			ca370d823e31413daa041e3dd8f71dd44b4081be		
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Abstract		33	33	
	Claims		28	32	
	Specification		1	27	
Warnings:					
Information:					
4	Drawings-only black and white line drawings	DEJ72Draw.pdf	594859	no	6
			9c5bc96512f09c5d78aaf4f8c05c59a50709bb86		
Warnings:					
Information:					
5	Oath or Declaration filed	DEJ72Dec.pdf	292160	no	3
			75ba0b6947af8235fa5b3a612144ddc9d6cd1a85		

Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	DEJ72SB08.PDF	1034710 804b4ba2986d34001651ac6919cd69b89e2615dd	no	5
Warnings:					
Information:					
7	Foreign Reference	DE3700447A1.pdf	483835 657bf5c902315cd5af9cf6dd9442be744f3d40a1	no	7
Warnings:					
Information:					
8	Fee Worksheet (SB06)	DEJ72FeeTrans.PDF	218784 183f98eb6c61083efe30c0fe0207422bde2fb500	no	2
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	36875 36b40c8729b96eb4a01c55a5a142800bc00b5363	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			4982494		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
16/408,650	05/10/2019	3636	885	DEJ10730P00072US	22	1

CONFIRMATION NO. 8329

FILING RECEIPT



0000000108372231

32116
WOOD, PHILLIPS, KATZ, CLARK & MORTIMER
500 W. MADISON STREET
SUITE 1130
CHICAGO, IL 60661

Date Mailed: 05/22/2019

Receipt is acknowledged of this non-provisional utility patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF FIRST INVENTOR, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection.

Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please submit a written request for a corrected Filing Receipt, including a properly marked-up ADS showing the changes with strike-through for deletions and underlining for additions. If you received a "Notice to File Missing Parts" or other Notice requiring a response for this application, please submit any request for correction to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections provided that the request is grantable.

Inventor(s)

Aaron DeJule, River Forest, IL;
Scott Padiak, Glance, IL;
Paul C. Evans, Bellaire, MI;

Applicant(s)

Aaron DeJule, River Forest, IL;
Scott Padiak, Glance, IL;
Paul C. Evans, Bellaire, MI;

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 15/040,735 02/10/2016 PAT 10292498
which claims benefit of 62/114,706 02/11/2015

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

Permission to Access Search Results: Yes

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

If Required, Foreign Filing License Granted: 05/21/2019

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/408,650**

Projected Publication Date: To Be Determined - pending completion of Corrected Papers

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Title

APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS

Preliminary Class

297

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

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

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

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

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

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

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, <http://www.stopfakes.gov>. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific

page 2 of 4

countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

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Title 35, United States Code, Section 184
Title 37, Code of Federal Regulations, 5.11 & 5.15

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NOT GRANTED

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

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/408,650	
APPLICATION AS FILED - PART I							
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A	
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A	
TOTAL CLAIMS (37 CFR 1.16(j))	22	minus 20 = 2	x 50	= 100	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *	x 230	= 0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
			TOTAL	885		TOTAL	
* If the difference in column 1 is less than zero, enter "0" in column 2.							
APPLICATION AS AMENDED - PART II							
AMENDMENT A	(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	OR	ADDITIONAL FEE(\$)
	Independent (37 CFR 1.16(h))	*	Minus	***	=	OR	
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
						TOTAL ADD'L FEE	
AMENDMENT B	(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY
		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		RATE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	OR	ADDITIONAL FEE(\$)
	Independent (37 CFR 1.16(h))	*	Minus	***	=	OR	
	Application Size Fee (37 CFR 1.16(s))					OR	
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR	
						TOTAL ADD'L FEE	
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.							



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/408,650	05/10/2019	Aaron DeJule	DEJ10730P00072US

CONFIRMATION NO. 8329

FORMALITIES LETTER



OC000000108372232

32116
WOOD, PHILLIPS, KATZ, CLARK & MORTIMER
500 W. MADISON STREET
SUITE 1130
CHICAGO, IL 60661

Date Mailed: 05/22/2019

NOTICE TO FILE CORRECTED APPLICATION PAPERS

Filing Date Granted

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given **TWO MONTHS** from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
 - The application contains a section in the specification containing the brief description of the figures, but is missing the description of Figure(s) **18** as required by 37 CFR 1.74 and 37 CFR 1.77(b)(9). A brief description of each drawing figure presented is required to satisfy this requirement.
 - To add a brief description of a figure, a proper substitute specification in compliance with 37 CFR 1.121(b)(3) and 1.125, providing a brief description of each drawing figure presented, must be submitted. See also 37 CFR 1.77(b)(9).

Note: If applicant wishes to delete the undescribed figure, replacement sheets must be submitted to renumber the figure(s) consecutively.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies must be received in the USPTO within the set time period or must include a proper Certificate of Mailing or Transmission under 37 CFR 1.8 with a mailing or transmission date within the set time period. For more information and a suggested format, see Form PTO/SB/92 and MPEP 512.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web, including a copy of this Notice and selecting the document description "Applicant response to Pre-Exam Formalities Notice".
<https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html>

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at <http://www.uspto.gov/ebs>.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/lphan/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	APPARATUS WITH WEIGHT RESPONSIVE
AARON DEJULE et al.	)	CHANGEABLE ADJUSTING CHARACTERISTICS
	)	
	)	Confirmation No. 8329
	)	
Serial No. 16/408,650	)	Group Art Unit 3636
	)	
Filed: May 10, 2019	)	Examiner:

STATEMENT ACCORDING TO 37 C.F.R. 1.125

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

Sir:

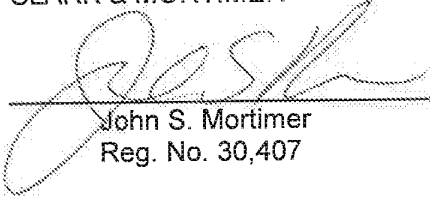
A substitute specification (both clean and marked up copies) is being submitted herewith. As required in the Notice to File Corrected Application Papers, the substitute specification has been amended to include a description of Fig. 18. As the specification now includes a brief description of all drawing figures as originally submitted with the application, no replacement drawings are believed to be required. The substitute specification includes no new matter. If any fees are required with the filing of this paper, authorization is given to charge such fees to Deposit Account No. 23-0785.

Respectfully submitted,

WOOD, PHILLIPS, KATZ,
CLARK & MORTIMER

June 5, 2019

By


John S. Mortimer
Reg. No. 30,407

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Suite 1130
Chicago, IL 60661-2562
(312) 876-2113

APPARATUS WITH WEIGHT RESPONSIVE
CHANGEABLE ADJUSTING CHARACTERISTICS

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] This invention relates to apparatus upon which variable weight is applied during normal use and, more particularly, to an apparatus having at least one part with different adjusting characteristics during normal use depending upon the particular applied weight.

BACKGROUND ART

[0002] A very significant percentage of furniture sold commercially has an ability to be adjusted/reconfigured to accommodate users with different body types and demands. As one example, task chairs are routinely engineered so that a single design can be offered with a substantial amount of versatility in terms of how it can be adapted to size and weight of different individuals so as to optimize function and comfort level.

[0003] In a typical task chair construction, a wheeled frame supports a vertically adjustable seat. A back rest is integrated into the frame and/or seat so that it can be tilted or reclined to accommodate a user's normal movements and/or to allow inclined back positions to be comfortably maintained by the user's upper torso weight as he/she is sitting. The task chairs may be made with or without armrests. When utilized, armrests are

commonly made to be at least vertically adjustable to allow comfortable support for a user that may be different depending upon the particular user's build and/or the task(s) to be performed using the chair.

[0004] Reconfigurable designs are also commonly incorporated into seating used for leisure activities. Reading chairs and sectional pieces on modular furniture commonly have such an adjusting capability.

[0005] With a single design, performance of a particular seating apparatus will be different depending upon the weight of a user. For example, a heavier individual may be able to comfortably urge a back rest towards an inclined position and comfortably maintain potentially a number of different, desired, inclined positions within a range. On the other hand, a lighter individual with the same design may have to engage in a more unnatural movement and constantly exert a pressure on the seat back to prevent it from returning to its normal upright position, generally maintained through some sort of biasing mechanism.

[0006] Similar tilt features may be integrated into the seat itself with a user's weight affecting how the mechanisms will operate.

[0007] One industry solution to the above problem is to provide manual adjusting capabilities whereby biasing forces on movable components can be changed. For example, a mechanism has been incorporated that allows a user to change a spring force on a back rest to be more compatible with that user's weight.

[0008] Tilt and tension adjustment is typically achieved by rotating a knob or pulling a lever, which loads a spring. Once the chair is optimally adjusted, the user can recline to a comfortable backward distance. However, to optimize balance, the user must iteratively lean back and adjust. This

process of adjusting tension and tilt by pulling a lever or turning a knob may require many rotations or pulls depending on the weight of the previous user, resulting in potentially wasted time and imperfect adjustments.

[0009] With the multitude of different manual adjusting capabilities currently in existing furniture designs, user operation is becoming more complicated. Even a basic task chair often has multiple actuators which a user is required to manually operate to customize a chair for his/her purposes. Oftentimes, such mechanisms are confusing to users who may default to simply using a chair in its current configuration, even if not optimally configured. This problem is aggravated when persons routinely move from chair to chair during a typical work day in certain office environments in which there are group meetings, training, collaboration at different locations, sharing of resources such as at computer stations, etc. This same sharing of chairs occurs in classrooms, libraries, open plan offices, etc.

[0010] The current demand for versatility may demand integration of adjusting mechanisms on even base line furniture. To control manufacturing costs, the quality of many of these mechanisms, and potentially the overall chair, may be compromised.

[0011] The challenges of providing customizable adjusting systems, while demonstrated in the chair environment above, is not so limited. Many different apparatus use adjusting components that rely on a certain balance that may be affected by a variable weight application encountered in normal use. As but one example, desktop mechanisms are now evolving which allow a user to elevate a work surface so that he/she has the option of either sitting or standing while working on a computer or performing other routine

work day tasks. Ideally, a user has the ability to raise and lower the work surface in a range, and to maintain a desired position, without having to operate any locking or adjusting mechanisms. Given that different jobs require placement of different items on the work surface, the applied weight on the work surface may vary considerably, which makes a generic design difficult to practically construct.

[0012] These problems are contended with also in different environments and with different types of equipment outside of the furniture arena. In any environment wherein components are adjustable, designers strive to design systems so that they are affordable, reliable, and user friendly. Balancing these often competing objectives remains an ongoing challenge.

SUMMARY OF THE INVENTION

[0013] In one form, the invention is directed to a reconfigurable apparatus for seating a user. The reconfigurable apparatus has a frame, a seat, a back rest, and an adjusting assembly. The seat is mounted on the frame and movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position into which the seat moves from the first position as an incident of a user sitting on the seat. A user sitting on the seat can bear against the back rest with his/her back to produce a leaning force that changes an angular orientation of the back rest relative to the frame. The apparatus is configured so that a first leaning force is required to be applied to the back rest to change the angular orientation of the back rest from a starting angular position relative to

the frame with no user sitting in the seat. The adjusting assembly has a plurality of gears that cooperate and move relative to each other as an incident of the seat moving from the first position into the loaded position to thereby increase a resistance to changing of the angular orientation of the back rest from the starting angular position. As an incident of a user sitting on the seat, a leaning force greater than the first leaning force is required to change the angular position of the back rest from the starting angular position.

[0014] In one form, the plurality of gears includes a first rack gear and first pinion gear. The first rack gear and first pinion gear cooperate with, and are movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

[0015] In one form, the plurality of gears includes a second rack gear and a second pinion gear. The second rack gear and second pinion gear cooperate with, and are movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

[0016] In one form, the reconfigurable apparatus has an elongate spring bar with a length. The elongate spring bar resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part.

[0017] In one form, as an incident of the seat being changed from the first position into the loaded position, the fulcrum part is caused to move along the length of the elongate spring bar so as to thereby increase a force required to bend the elongate spring bar about the fulcrum part and as an incident thereof increase the leaning force required to change the angular orientation of the back rest.

[0018] In one form, the plurality of gears are configured so that the seat moves a first distance between the first and loaded positions. The fulcrum part moves greater than the first distance along the length of the fulcrum bar in response to the same movement of the seat relative to the frame.

[0019] In one form, the back rest is mounted directly to the frame.

[0020] In one form, the back rest is mounted directly to the seat.

[0021] In one form, the back rest follows movement of the seat as the seat is changed from the first position into the loaded position.

[0022] In one form, the back rest is attached to and movable relative to the seat.

[0023] In one form, the sitting apparatus is a chair.

[0024] In one form, the frame has wheels that support the chair on a subjacent surface.

[0025] In one form, the chair has a pair of armrests.

[0026] In one form, the chair is a task chair.

[0027] In one form, the plurality of gears includes first and second gears that each turns around an axis. The first and second gears have different diameters.

[0028] In one form, the first and second gears turn around different axes.

[0029] In one form, the first and second gears turn around the same axis.

[0030] In one form, the reconfigurable apparatus has at least one spring bar that is bent under forces applied by a user to the reconfigurable apparatus to resist reconfiguration of a part of the reconfigurable apparatus.

[0031] In one form, the at least one spring bar includes a plurality of spring bars.

[0032] In one form, at least one of the spring bars is an elongate spring bar with a length. The elongate spring bar resists reconfiguration of the reconfigurable apparatus by being bent transversely to the length of the elongate spring bar.

[0033] In one form, the reconfigurable apparatus has an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part. The seat moves a first distance between the first and loaded positions. The first and second rack and pinion gears are configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

[0034] In one form, the seat moves a first distance between the first and loaded positions. The plurality of gears includes first and second gear pairs configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035] Fig. 1 is a schematic representation of a reconfigurable apparatus, according to the present invention;

[0036] Fig. 2 is a side elevation view of a task chair, that is one representative form of apparatus as shown in Fig. 1, and incorporating an adjusting assembly according to the present invention;

[0037] Fig. 3 is a partially schematic representation of one specific form of adjusting assembly, integrated into the apparatus in Figs. 1 and 2;

[0038] Fig. 4 is a fragmentary view of a part of the adjusting assembly in Fig. 3, which utilizes a leaf spring, and from a different perspective;

[0039] Fig. 5 is an enlarged, fragmentary view of a modified form of a leaf spring utilized on the apparatus in Figs. 3 and 4;

[0040] Fig. 6 is an enlarged, fragmentary, elevation view of a linkage, modified from a corresponding linkage as used on the apparatus in Figs. 3 and 4;

[0041] Figs. 7-16 are partially schematic representations of apparatus incorporating different forms of adjusting assemblies, according to the invention; [[and]]

[0042] Fig. 17 is a schematic representation of a further modified form of reconfigurable apparatus, according to the present invention; and

[0043] Fig. 18 is a schematic representation of adjusting assemblies, according to the invention, acting between separate components on a frame.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0044] In Fig. 1, a reconfigurable apparatus, according to the present invention, is shown in schematic form at 10. The apparatus 10 consists of a frame 12 and at least a first component 14 on the frame 12 upon which a force is applied in a first manner in using the apparatus 10 for its intended purpose.

[0045] At least a second component 16 is provided on the frame 12 and is movable relative to the at least first component and/or the frame 12. A force can be applied in a second manner upon the at least second component to reconfigure the apparatus 10 by moving the at least second component 16 relative to the at least first component and/or the frame 12.

[0046] An adjusting assembly 18 cooperates between the at least first component 14 and the at least second component 16 and is configured so that, as an incident of the force being applied in the first manner changing, the force applied in the second manner required to reconfigure the apparatus 10 changes.

[0047] The adjusting assembly 18 includes a spring assembly 19. The spring assembly 19 is configured to exert a force that resists movement of the at least second component 16 that varies as a magnitude of the force applied in the first manner varies.

[0048] The generic showing of the apparatus 10 is intended to encompass a wide range of different products and different applications. The inventive concepts can be used in virtually any system or apparatus wherein its normal intended use requires the application of a force on a first component and wherein that force on the first component impacts a force

required to be applied to a second component to reconfigure the apparatus as contemplated during use.

[0049] While not intended to be limiting, the detailed description herein will be focused upon furniture and, more particularly, a chair construction. This application of the inventive concepts is intended to be exemplary in nature only and should not be viewed as limiting the inventive concepts to the specific type of apparatus described in detail herein. Further, the schematic showing in Fig. 1 is intended to encompass not only a wide range of different systems/apparatus, but different forms of components and their interaction for each such system/apparatus.

[0050] For example, interlocking toothed components are described, in exemplary forms below. The invention contemplates not only different types of toothed components, such as gears, differential gears, epicyclic gears, rack and pinion arrangements, etc., but also virtually an unlimited number of different interengaging components, such as sprockets and chains, pulleys and cables, mechanisms using levers, pistons, different types of linkages, etc.

[0051] In Fig. 2, one exemplary apparatus 10 is shown in the form of a task chair, in this case without armrests. Of course, armrests might be incorporated and might also have parts thereof movable in different manners depending upon the weight of the user, as hereinafter explained.

[0052] The chair 10 has a wheeled frame 12 with a vertically extending pedestal assembly 20. The first component 14 is in the form of a conventional- type seat with an upwardly facing user support surface 22. In this case, the aforementioned force applied in the first manner is the weight

of the user exerted downwardly on the support surface 22 as he/she sits on the chair 10.

[0053] A corresponding second component 16 is in the form of a back rest against which a seated user leans to exert the aforementioned force in the second manner to reconfigure the chair 10. That is, the back rest moves relative to the frame 12 and first component 14, as the user leans back and forth while seated, generally in a manner as indicated by the double-headed arrow 23.

[0054] The adjusting assembly 18, as shown schematically in Fig. 2, acts between the first component/seat 14 and second component/back rest 16 directly and/or through the frame 12. The adjusting assembly 18 may be added to the frame 12 by attachment thereto, virtually anywhere thereon, or integrated therein, as by being constructed within a hollow 24 on the pedestal assembly 20.

[0055] The chair 10 may incorporate one or more adjusting features other than one that permits reconfiguration by changing the angle of the second component/back rest 16. The adjusting assembly 18 may be integrated into the mechanisms associated with these other features. Alternatively, the other features may operate without effect by the adjusting assembly 18.

[0056] For purposes of simplicity, the second component/back rest 16 will be shown as repositionable relative to the first component/seat 14 to reconfigure the chair 10 by movement of the second component/back rest 16 relative to the first component/seat 14 and frame 12 around a pivot axis 26. This particular connection should not be viewed as limiting.

[0057] Exemplary specific forms of the adjusting assembly 18 will now be described. As noted above, virtually an unlimited number of different variations of adjusting assembly are contemplated within the generic showing of Figs. 1 and 2. These specific forms are exemplary in nature only. These particular mechanisms will also be described with respect to the apparatus in the form of a chair as shown in Fig. 2. Again, the particular nature of the apparatus is not limited to a chair or furniture, although it has particular applicability in this category of product.

[0058] In Figs. 3 and 4, the first component/seat 14 (hereinafter referred to only as the representative chair "seat 14") is integrated into a support 28 that has a depending post 30 that is slidable guidingly vertically, as indicated by the double-headed arrow 32, in a guide channel 34 on the frame 12. A biasing assembly, shown in one exemplary form as a coil spring 33, normally biasably urges the seat 14 upwardly relative to the frame 12.

[0059] A generally U-shaped member 36 has one leg 38 of the "U" mounted on a frame part 40. The other leg 42 of the "U" has an offset bracing end 44.

[0060] For purposes of simplicity, the support 28 and member 36 can be considered to be part of the frame 12 and/or the adjusting assembly 18. Similarly, the component 58 can be considered to be part of the back rest 16 and/or the adjusting assembly 18.

[0061] The spring assembly 19 in this embodiment is in the form of a leaf spring. The leaf spring 19 has an elongate body 46 with a length L between spaced ends 48, 50, a width W, and a thickness T.

[0062] The leaf spring end 19 is anchored in the member 36 to project in cantilever fashion vertically upwardly therefrom. In this embodiment, the

body 46 of the leaf spring 19 is preloaded so that it naturally assumes the dotted line shape and position.

[0063] The bracing end 44 of the member 36 is bifurcated, as seen in Fig. 4, with spaced edges 52 (one shown) at the extremity of the bracing end 44 engageable with one surface 54 of the leaf spring body 46 to maintain the body 46 in the straight vertical orientation, as shown in Fig. 3.

[0064] A part of the second component/back rest 16 (hereafter referred to only as the representative chair "back rest 16") is connected to the support 28 for movement relative thereto around the axis 26 as seen in Fig. 2. As a user situated on the seat 14 leans against the back rest 16, a force is generated as shown by the arrow 56 on the back rest component 58 that tends to pivot the component 58 in the direction of the arrow 60 around the axis 26.

[0065] The component 58 is configured so that an edge 61 on a cantilevered part 62 thereof bears against the leaf spring surface 54. In the depicted state, this produces a force upon the leaf spring body 46, at a location A along the length of the body 46, that tends to bend the body 46 in the direction of the arrow 64 around a fulcrum location at 66 where the body 46 projects away from the part of the member 36 in which it is anchored. The leaf spring 19 thus biasably resists movement of the component 58, and the back rest 16 of which the component 58 is a part, with a first force.

[0066] The configuration in Fig. 3, while it could show a starting state without any force application on the seat 14, is also representative of the overall state of the apparatus 10 with an individual of a first weight seated thereon. This is an equilibrium position for the chair 10 resulting from the balancing of the user's weight and the upward biasing force generated by the

spring 33 acting between the frame 12 and the seat 14 through the support 28.

[0067] In the event that an individual of greater weight assumes a sitting position on the seat 14, the support 28 and component 58 will translate further downwardly against the force of the spring 33, which causes the edge 61 on the back rest component 58 to bear upon the leaf spring 19 at a location below the location A. As a result, a shorter moment arm is established between the location where the edge 61 on the part 62 contacts the surface 54 and the fulcrum location at 66. Thus, the leaf spring 19 has an effectively shorter length, whereby a greater force is required to be applied to the leaf spring 19 to effect bending thereof as would in turn allow movement of the back rest 16 to reconfigure the chair 10.

[0068] To stabilize the support 28, a depending arm 70 thereon connects to the frame part 40 through a link 72. One link end 74 moves about an axis 76 that is fixed relative to the frame part 40. The other link end 78 pivotally connects to the arm 70 for movement about an axis 80.

[0069] The bifurcated configuration of the leg 42 allows the part 62 on the component 58 to move in an opening 82 through the region at the offset bracing end 44 so that the member 36 does not interfere with the back rest component 58 as the back rest component 58 lowers under increasing user weight.

[0070] Accordingly, an increase in the weight of a user causes the leaf spring 19 to produce a greater resistance to movement of the back rest 16 relative to the frame 12. As a result, the chair is self-adjusting. The parts thereof can be engineered so that a desired relationship between the user's

weight and the force required to move the back rest 16 are appropriately established.

[0071] In designing the chair 10 using a leaf spring component, the leaf spring body 46 may have a uniform cross-sectional shape as viewed orthogonally to its length. Alternatively, this shape may be non-uniform over at least a portion of its length. For example, as shown for a portion of the length of a modified form of body 46a, as shown in Fig. 5, the cross-sectional area varies progressively.

[0072] Tapering the cross-sectional area of the leaf spring over its length may allow further tuning of performance. Thickened regions may be provided to produce larger resistance forces for users at the higher weight end of the functional range.

[0073] The leaf spring material may be metal, plastic, a composite, etc. The leaf spring may be straight, curved, with changing cross-sectional shapes, etc. Changing shapes, pre-loading, changing dimensions, etc., are just examples of options that might be practiced to design and tune the adjusting assemblies so that they adapt more appropriately to users throughout a workable user weight range.

[0074] In a still further modified form of the structure in Fig. 3, as shown in Fig. 6, the link 72a, corresponding to the link 72, can be connected to the frame 12 for pivoting movement about an axis 84 between its ends 74a, 78a. Accordingly, as the arm 70a moves downwardly under increasing user weight, link 72a pivots around the axis 84 so that the member 36a simultaneously moves upwardly. Thus, for each incremental movement of the seat 14 downwardly, there is a greater movement of the edge 61 on the

part 62 toward the fulcrum location 66 for the leaf spring 19 than occurs with the design in Figs. 3 and 4.

[0075] In Fig. 7, a modified form of chair is shown at 10', with elements corresponding to those in Figs. 3 and 4 identified with like reference numerals and a "' " designation.

[0076] The chair 10' has a back rest component 58' that acts against a leaf spring 19' that is anchored in a component 36'.

[0077] In this embodiment, the leaf spring body 46' is mounted at a slight angle α to vertical. Accordingly, the part 62' of the component 58' tends to bind more with the leaf spring 19' as it slides downwardly thereagainst under increasing user weight. This binding creates frictional forces that augment the upward balancing force produced by the spring 33'.

[0078] Additionally, the chair 10' utilizes cooperating toothed elements 86, 88, 90 that interact to cause movement of the frame part 40', arm 70' and leg 38' relative to each other and the frame part 40' that replicates the relative movement that occurs with corresponding elements in the embodiment shown in Figs. 3 and 4. The toothed element 88 is in the form of a differential pinion that turns around an axis 92. Larger and smaller diameter toothed portions 94, 96, respectively, engage toothed racks 98, 100, respectively on the leg 38' and arm 70'. Turning of the toothed element 88 in the direction of the arrow 102 under increasing user weight causes simultaneous upward movement of the member 36' and downward movement of the support 28'.

[0079] In Fig. 8, a further modified form of chair, according to the present invention, is shown at 10". The chair 10" incorporates a back rest component 58" that interacts with a leaf spring 19" and leg 42" in the same

way that the corresponding components interact on the chair 10 in Figs. 3 and 4.

[0080] Further, the chair 10" incorporates toothed elements 86", 88", 90" which function essentially in the same manner as the corresponding components on the chair 10' in Fig. 7. The primary difference between these embodiments is that the leg 38" has a curved shape that moves in a complementarily-curved channel 104 on the frame part 40". Whereas the support 28' associated with the seat 14 and member 36' move relative to each other in parallel, straight paths, the member 36" moves in a curved path, as dictated by the curvature of the leg 38" and cooperating channel 104. This curvature nominally matches the curved shape of the leaf spring 19" which is pre-loaded from the dotted line position to the operative, solid line position in Fig. 8. Accordingly, the relative movement of the member 36" and support 28" causes the part 62" that engages the leaf spring 19" to generally follow the pre-loaded curvature of the leaf spring 19".

[0081] In a further modified form of chair, as shown at 10''' in Fig. 9, the basic construction of Figs. 3 and 7 is utilized with the exception that the leaf spring 19''' is fixedly mounted to the component 58''' and acts against the member 36''', i.e., this component arrangement is reversed from that in the earlier embodiments. The leaf spring 19''' is pre-loaded from the dotted line position into the solid line position which is maintained by the abutment thereof to the member 36'''.

[0082] In Figs. 10 and 11, a further modified form of chair, according to the invention, is shown at 10⁴. In this embodiment, multiple leaf springs 19a⁴, 19b⁴, 19c⁴, 19d⁴ are utilized, each with an end anchored in a block 105.

[0083] In this embodiment, the post 30^{4'} has a toothed rack 100^{4'} that cooperates with a toothed, differential pinion element 88^{4'}, that cooperates in turn with a toothed rack 98^{4'} making up part of a toothed element 86^{4'} on a member 36^{4'}.

[0084] Downward movement of the post 30^{4'} under the weight applied to the seat 14 causes the toothed rack 100^{4'} and toothed element 88^{4'}, and separately the toothed elements 88^{4'}, 86^{4'}, to interact to translate the member 36^{4'} in the direction of the arrow 106.

[0085] As the weight on the seat 14 is increased, the member 36^{4'} will move continuously in the direction of the arrow 106 to successively engage free ends of angled extensions 108a, 108b, 108c at the ends of leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, successively. The extensions 108a, 108b, 108c and one surface 110 on the leaf spring 19d^{4'} reside in a reference plane P. As user applied weight increases, a surface 112 on the member 36^{4'} moves along this plane P to successively engage the extensions 108a, 108b, 108c and eventually the surface 110, whereby the surface 112 defines separate fulcrum locations, corresponding to the fulcrum location 66, for the free ends of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'}. In other words, the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} are successively operatively engaged under increasing user weight. As a result, the resistance force to the applied leaning force on the back rest 18 in the direction of the arrow 114 is generated by some or all of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} as they are borne against the surface 112 under the user leaning force.

[0086] It is important to point out that the rack and pinion components are not restricted to any specific orientation. The cooperating rack and pinion

components may be oriented in virtually any orientation that can be adapted to cause movement of the associated parts in the same manner.

[0087] Further, one or all of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} could be pre-loaded or in curved tracks.

[0088] In an alternative form of the basic structure in Figs. 10 and 11, as shown for the chair 10^{5'} in Figs. 12 and 13, the member 36^{5'} vertically advanced, or advanced in another direction, is caused to interact with some, or all, of a plurality, and in this case three, leaf springs 19a^{5'}, 19b^{5'}, 19c^{5'}, which are arranged to be substantially coplanar, as opposed to stacked as the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} are on the chair 10^{4'}.

[0089] Under an increasing user weight on the seat 14, a surface 112^{5'} on the member 36^{5'} engages successively against surfaces 116a^{5'}, 116b^{5'}, 116c^{5'}. As shown in Fig. 12, the particular exemplary weight causes engagement of the surface 112^{5'} with only two of the leaf springs 19a^{5'}, 19b^{5'}.

[0090] The leaning force on the back rest 18 is applied on an actuator 118 in a direction into the page, as indicated by the "X" at 120. Resistance to the leaning force is generated in the same manner for the chair 10^{5'} as for the chair 10^{4'} but with the different arrangement of leaf springs.

[0091] In an alternative form, each of the leaf springs in Figs. 12 and 13 might be substituted for by coil springs, compression/tension springs, or a torsion rod of the type described in an additional embodiment below. One or more springs might be utilized. More springs allow for finer control. Each spring can be individually tuned.

[0092] In Fig. 14, a further modified form of chair, according to the invention, is shown at 10^{6'}. A post 30^{6'} has a toothed rack 100^{6'} that

cooperates with a differential pinion/toothed element 88^{6'}. The toothed element 88^{6'} moves together with a component 58^{6'} that is part of the back rest 16 or otherwise moves in response to movement thereof. The component 58^{6'} is mounted for pivoting movement relative to a frame part 122 around an axis 124 as the post 30^{6'} raises and lowers as different weight forces are applied to and removed from the seat 14.

[0093] The leaning force on the back rest 16 is applied to an arm 126 on the component 58^{6'} in the direction of the arrow 128.

[0094] The frame part 122 has a "U" shape with spaced legs 130, 132. The component 58^{6'} is mounted on the leg 130.

[0095] The toothed element 88^{6'} cooperates with a separate toothed element 134 that moves guidingly in a channel 136 on the component 58^{6'}. In this embodiment, the toothed element 134 and cooperating channel 136 have a curved shape so that the toothed element 134 is movable guidingly in an arcuate path. A row of teeth 138 on one side of the toothed element 134 engage teeth 140 on the toothed element 88^{6'} so that the toothed element 134 moves back and forth within the channel 136 as the toothed element 88^{6'} is rotated in opposite directions around its axis 124.

[0096] The adjusting assembly 18^{6'} in this embodiment consists of an elongate spring assembly 19^{6'}, in this particular embodiment shown as a coil spring under tension. The spring 19^{6'} is connected between an end location at 144 on the toothed element 134 and the leg 132 on the frame part 122.

[0097] As a user sits on the seat 14, without leaning against the back rest 16, the post 30^{6'} moves against the force of the spring 33^{6'} downwardly, thereby turning the toothed element 88^{6'} in the direction of the arrow 146, which causes the toothed element 134 to move in the direction of the arrow

148 in the channel 136. The precise position of the toothed element 134 in the channel 136 is dictated by the weight of the user.

[0098] Once the user is seated and leans back against the back rest 16, separate teeth 150, 152, on the toothed element 134 and component 58⁶, within the channel 136, engage, thereby to fix the position of the toothed element 134 within the channel 136.

[0099] Under an applied leaning force in the direction of the arrow 128 on the arm 126, the component 58⁶, and the associated back rest 16, tend to pivot around the axis 124, which is resisted by the force in the spring 142. Because the distance between the axis 124 and end location 144 where the resistant spring force is applied is increased with increasing weight of a user, the resistant force generated by the coil spring 19⁶ is likewise increased.

[00100] The chair 10⁷ in Fig. 15 operates on the same basic principles as the chair 10⁶ in Fig. 14.

[00101] More particularly, a toothed element 134⁷ moves in a channel 136⁷ having an arcuate shape. A coil spring 19⁷ connects between the toothed element 134⁷ and a leg 132⁷ on a U-shaped frame part 122⁷.

[00102] The primary difference between the structure in Fig. 15, compared to that in Fig. 14, is that the toothed element 134⁷ is part of, and moves with, an elongate component 154 that is pivoted about an axis 156 that is the approximate location at which the spring 19⁷ connects to the leg 132⁷. The component 154 has a curved edge 158 with a constant radius R centered on the axis 156. That edge 158 has teeth 160 which mesh with teeth 162 on a post 30⁷ that has a toothed rack 100⁶ where the teeth 162 are located.

[00103] Increased weight of a user on the seat 14 pivots the component 154 in the direction of the arrow 164 around the axis 156 to move the toothed element 134⁷ in the direction of the arrow 166 in the channel 136⁷. In so doing, the distance between the spring mount location at 144⁷ on the toothed element 134⁷ and the pivot axis 124⁷ for the component 58⁷ increases, thereby to cause an increase in the resistance to tilting of the back rest 16 in the same manner as occurs with the chair 10⁶.

[00104] In Fig. 16, a further modified form of chair is shown at 10⁸ wherein the spring assembly 19⁸ includes an elongate torsion component 168 with a lengthwise axis 170. The adjusting assembly 18⁸ further includes an actuating component 172 that has a portion 174 keyed to the periphery of the torsion component 168 to move slidingly axially therealong in the same angular orientation. With the torsion component 168 fixed in relationship to the frame 12⁸, a user's weight on the seat 14 causes movement of the actuating component 172 through cooperation between a toothed rack 176 thereon and intermediate input structure 178 of suitable construction. Increased weight on the seat 14 causes the actuating component 172 to shift closer to a base 180 of the torsion component 168 closer to where it is anchored to the frame 12⁸.

[00105] A leaning force on the back rest 16 is applied to the torsion component generally in the direction of the arrow 182, tending to turn the torsion component 168 around the axis 170. For the back rest 16 to reposition, the torsion component 168 must be twisted around the axis 170. This twisting action is resisted to a greater degree with the actuating component 172 closer to the base 180 under a heavier user weight.

[00106] On the other hand, with the actuating component 172 shifted towards its free end 184, as occurs with a lighter user, the torsion component 168 can be more readily twisted about its length and the axis 170.

[00107] In Fig. 17, a still further modified form of chair, according to the invention, is shown at 10^{9'} with an adjusting assembly 18^{9'} cooperating between a seat 14 and back rest 16. A spring assembly 19^{9'} is mounted to a frame 12^{9'} and consists of separate leaf springs with bodies 46^{9'} each with spaced ends supported by blocks 186, 188 on the frame 12^{9'}. With this arrangement, the bodies 46^{9'} and blocks 186, 188 cooperatively extend around an opening 190 with a width W.

[00108] An elongate, wedge-shaped actuating component 192 with a uniform width W1, slightly less than the width W, extends through the opening 190.

[00109] A toothed rack 194 is provided on the actuating component 192 and moves therewith. In response to a weight force being applied to the seat 14, and through an appropriate force transfer structure 196, the toothed rack 194 and actuating component 192 are shifted in the direction of the arrow 198.

[00110] By reason of the wedge shape, the actuating component 192 has oppositely facing actuating surfaces S1, S2, each with one dimension D1 at one end and a larger dimension D2 at its opposite end, that abut to, or reside adjacent to, facing surfaces S3, S4, respectively, on the bodies 46^{9'}. As the actuating component 192 shifts in the direction of the arrow 198, a progressively larger area of the surfaces S1, S2 confronts the leaf spring bodies 46^{9'}.

[00111] The back rest 16 imparts a force to the actuating component 192 through a suitable force transfer structure at 202 tending to turn the actuating component 192 around an axis 204.

[00112] Accordingly, a user leaning force generates a force on the actuating component 192 that bears the surfaces S1, S2 simultaneously against the surfaces S3, S4 of the leaf spring bodies 46^{9'} between the spaced supported ends. The larger the area of the surfaces S1, S2 in contact with the bodies 46^{9'}, the more resistant the bodies 46^{9'} are to deformation. This translates into a greater resistance to the repositioning of the back rest 16 for a larger weight application on the seat 14.

[00113] Further, as the actuating component 192 turns around the axis 204, the force transfer between the actuating component 192 and bodies 46^{9'} occurs primarily at corners C1, C2, C3, C4 of the actuating component 192, which bear against reinforced and thus more rigid parts of the bodies 46^{9'} adjacent to the blocks 186, 188 as more user weight is applied. Thus, greater resistance to back rest movement results.

[00114] In a still further alternative form, as shown in Fig. 18, multiple adjusting assemblies 18 are utilized between a cooperating first component(s)/seat 14 and second component(s)/back rest 16 on a frame 12.

[00115] Ideally, the apparatus/chair 10 will adapt to users weighing as much as 350 pounds, or more. While one spring assembly might be designed for a total desired weight range to be accommodated, two or more spring assemblies might be utilized and their function and operation coordinated.

[00116] Further, different spring assemblies might be utilized with coordinated operation. For example, one spring assembly may cover a

range of 30-175 pounds with a second spring assembly operational for user weights in the range of 175-350 pounds. More springs/spring assemblies might be added to further split up the weight ranges.

[00117] The spring assemblies may be designed in relationship to seat movement. For example, one spring assembly may be operational for 0-.5" of seat movement with a separate spring assembly operational for seat movement of 0.5"-1", where 1" is the seat movement for the maximum weight for which the apparatus is designed.

[00118] The examples herein of spring assembly/spring construction should not be viewed as limiting. Different spring types and combinations are contemplated. For example, the springs may be curved, coiled with different turn diameter and rise, hybrid shapes, concentric arrangements, etc. Coil springs, or the like, may produce forces under either compression or tension.

[00119] The foregoing disclosure of specific embodiments is intended to be illustrative of the broad concepts comprehended by the invention.

CLAIMS

1. A reconfigurable apparatus for seating a user, the reconfigurable apparatus comprising:

a frame;

a seat mounted on the frame and movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position into which the seat moves from the first position as an incident of a user sitting on the seat;

a back rest against which a user sitting on the seat can bear his/her back to produce a leaning force that changes an angular orientation of the back rest relative to the frame,

the apparatus configured so that a first leaning force is required to be applied to the back rest to change the angular orientation of the back rest from a starting angular position relative to the frame with no user sitting in the seat; and

an adjusting assembly comprising a plurality of gears that cooperate and move relative to each other as an incident of the seat moving from the first position into the loaded position and configured to thereby increase a resistance to changing of the angular orientation of the back rest from the starting angular position,

whereby as an incident of a user sitting on the seat a leaning force greater than the first leaning force is required to change the angular position of the back rest from the starting angular position.

2. The reconfigurable apparatus for seating a user according to claim 1 wherein the plurality of gears comprises a first rack gear and first

pinion gear, the first rack gear and first pinion gear cooperating with, and movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

3. The reconfigurable apparatus for seating a user according to claim 2 wherein the plurality of gears comprises a second rack gear and a second pinion gear, the second rack gear and second pinion gear cooperating with, and movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

4. The reconfigurable apparatus according to claim 1 wherein the reconfigurable apparatus comprises an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part.

5. The reconfigurable apparatus for seating a user according to claim 4 wherein as an incident of the seat being changed from the first position into the loaded position the fulcrum part is caused to move along the length of the elongate spring bar so as to thereby increase a force required to bend the elongate spring bar about the fulcrum part and as an incident thereof increase the leaning force required to change the angular orientation of the back rest.

6. The reconfigurable apparatus for seating a user according to claim 5 wherein the plurality of gears are configured so that the seat moves a first distance between the first and loaded positions and the fulcrum part

moves greater than the first distance along the length of the fulcrum bar in response to a same movement of the seat relative to the frame.

7. The reconfigurable apparatus for seating a user according to claim 1 wherein the back rest is mounted directly to the frame.

8. The reconfigurable apparatus for seating a user according to claim 1 wherein the back rest is mounted directly to the seat.

9. The reconfigurable apparatus for seating a user according to claim 8 wherein the back rest follows movement of the seat as the seat is changed from the first position into the loaded position.

10. The reconfigurable apparatus for seating a user according to claim 8 wherein the back rest is attached to and movable relative to the seat.

11. The reconfigurable apparatus for seating a user according to claim 1 wherein the sitting apparatus comprises a chair.

12. The reconfigurable apparatus for seating a user according to claim 11 wherein the frame comprises wheels that support the chair on a subjacent surface.

13. The reconfigurable apparatus for seating a user according to claim 11 wherein the chair comprises a pair of armrests.

14. The reconfigurable apparatus for seating a user according to claim 11 wherein the chair is a task chair.

15. The reconfigurable apparatus for seating a user according to claim 1 wherein the plurality of gears comprises first and second gears that each turns around an axis and the first and second gears have different diameters.

16. The reconfigurable apparatus for seating a user according to claim 15 wherein the first and second gears turn around different axes.

17. The reconfigurable apparatus for seating a user according to claim 15 wherein the first and second gears turn around a same axis.

18. The reconfigurable apparatus for seating a user according to claim 1 wherein the reconfigurable apparatus comprises at least one spring bar that is bent under forces applied by a user to the reconfigurable apparatus to resist reconfiguration of a part of the reconfigurable apparatus.

19. The reconfigurable apparatus for seating a user according to claim 18 wherein the at least one spring bar comprises a plurality of spring bars.

20. The reconfigurable apparatus for seating a user according to claim 19 wherein at least one of the spring bars comprises an elongate spring bar with a length and the elongate spring bar resists reconfiguration of

the reconfigurable apparatus by being bent transversely to the length of the elongate spring bar.

21. The reconfigurable apparatus for seating a user according to claim 3 wherein the reconfigurable apparatus comprises an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part, the seat moves a first distance between the first and loaded positions, and the first and second rack and pinion gears are configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

22. The reconfigurable apparatus for seating a user according to claim 4 wherein the seat moves a first distance between the first and loaded positions and the plurality of gears comprises first and second gear pairs configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

ABSTRACT OF THE DISCLOSURE

[00120] A reconfigurable apparatus for seating a user and having: a frame; a seat movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position; a back rest with a changeable angular orientation relative to the frame; and an adjusting assembly having a plurality of gears that move relative to each other as an incident of the seat moving from the first position into the loaded position to thereby cause an increase in resistance to changing of the angular orientation of the back rest.

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1	Applicant Response to Pre-Exam Formalities Notice	16408650_Statement_125.pdf	43525 1ebac4de95f607efacc07c6ef313db41ade803b2	no	1

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APPARATUS WITH WEIGHT RESPONSIVE
CHANGEABLE ADJUSTING CHARACTERISTICS

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

[0001] This invention relates to apparatus upon which variable weight is applied during normal use and, more particularly, to an apparatus having at least one part with different adjusting characteristics during normal use depending upon the particular applied weight.

BACKGROUND ART

[0002] A very significant percentage of furniture sold commercially has an ability to be adjusted/reconfigured to accommodate users with different body types and demands. As one example, task chairs are routinely engineered so that a single design can be offered with a substantial amount of versatility in terms of how it can be adapted to size and weight of different individuals so as to optimize function and comfort level.

[0003] In a typical task chair construction, a wheeled frame supports a vertically adjustable seat. A back rest is integrated into the frame and/or seat so that it can be tilted or reclined to accommodate a user's normal movements and/or to allow inclined back positions to be comfortably maintained by the user's upper torso weight as he/she is sitting. The task chairs may be made with or without armrests. When utilized, armrests are

commonly made to be at least vertically adjustable to allow comfortable support for a user that may be different depending upon the particular user's build and/or the task(s) to be performed using the chair.

[0004] Reconfigurable designs are also commonly incorporated into seating used for leisure activities. Reading chairs and sectional pieces on modular furniture commonly have such an adjusting capability.

[0005] With a single design, performance of a particular seating apparatus will be different depending upon the weight of a user. For example, a heavier individual may be able to comfortably urge a back rest towards an inclined position and comfortably maintain potentially a number of different, desired, inclined positions within a range. On the other hand, a lighter individual with the same design may have to engage in a more unnatural movement and constantly exert a pressure on the seat back to prevent it from returning to its normal upright position, generally maintained through some sort of biasing mechanism.

[0006] Similar tilt features may be integrated into the seat itself with a user's weight affecting how the mechanisms will operate.

[0007] One industry solution to the above problem is to provide manual adjusting capabilities whereby biasing forces on movable components can be changed. For example, a mechanism has been incorporated that allows a user to change a spring force on a back rest to be more compatible with that user's weight.

[0008] Tilt and tension adjustment is typically achieved by rotating a knob or pulling a lever, which loads a spring. Once the chair is optimally adjusted, the user can recline to a comfortable backward distance. However, to optimize balance, the user must iteratively lean back and adjust. This

process of adjusting tension and tilt by pulling a lever or turning a knob may require many rotations or pulls depending on the weight of the previous user, resulting in potentially wasted time and imperfect adjustments.

[0009] With the multitude of different manual adjusting capabilities currently in existing furniture designs, user operation is becoming more complicated. Even a basic task chair often has multiple actuators which a user is required to manually operate to customize a chair for his/her purposes. Oftentimes, such mechanisms are confusing to users who may default to simply using a chair in its current configuration, even if not optimally configured. This problem is aggravated when persons routinely move from chair to chair during a typical work day in certain office environments in which there are group meetings, training, collaboration at different locations, sharing of resources such as at computer stations, etc. This same sharing of chairs occurs in classrooms, libraries, open plan offices, etc.

[0010] The current demand for versatility may demand integration of adjusting mechanisms on even base line furniture. To control manufacturing costs, the quality of many of these mechanisms, and potentially the overall chair, may be compromised.

[0011] The challenges of providing customizable adjusting systems, while demonstrated in the chair environment above, is not so limited. Many different apparatus use adjusting components that rely on a certain balance that may be affected by a variable weight application encountered in normal use. As but one example, desktop mechanisms are now evolving which allow a user to elevate a work surface so that he/she has the option of either sitting or standing while working on a computer or performing other routine

work day tasks. Ideally, a user has the ability to raise and lower the work surface in a range, and to maintain a desired position, without having to operate any locking or adjusting mechanisms. Given that different jobs require placement of different items on the work surface, the applied weight on the work surface may vary considerably, which makes a generic design difficult to practically construct.

[0012] These problems are contended with also in different environments and with different types of equipment outside of the furniture arena. In any environment wherein components are adjustable, designers strive to design systems so that they are affordable, reliable, and user friendly. Balancing these often competing objectives remains an ongoing challenge.

SUMMARY OF THE INVENTION

[0013] In one form, the invention is directed to a reconfigurable apparatus for seating a user. The reconfigurable apparatus has a frame, a seat, a back rest, and an adjusting assembly. The seat is mounted on the frame and movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position into which the seat moves from the first position as an incident of a user sitting on the seat. A user sitting on the seat can bear against the back rest with his/her back to produce a leaning force that changes an angular orientation of the back rest relative to the frame. The apparatus is configured so that a first leaning force is required to be applied to the back rest to change the angular orientation of the back rest from a starting angular position relative to

the frame with no user sitting in the seat. The adjusting assembly has a plurality of gears that cooperate and move relative to each other as an incident of the seat moving from the first position into the loaded position to thereby increase a resistance to changing of the angular orientation of the back rest from the starting angular position. As an incident of a user sitting on the seat, a leaning force greater than the first leaning force is required to change the angular position of the back rest from the starting angular position.

[0014] In one form, the plurality of gears includes a first rack gear and first pinion gear. The first rack gear and first pinion gear cooperate with, and are movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

[0015] In one form, the plurality of gears includes a second rack gear and a second pinion gear. The second rack gear and second pinion gear cooperate with, and are movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

[0016] In one form, the reconfigurable apparatus has an elongate spring bar with a length. The elongate spring bar resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part.

[0017] In one form, as an incident of the seat being changed from the first position into the loaded position, the fulcrum part is caused to move along the length of the elongate spring bar so as to thereby increase a force required to bend the elongate spring bar about the fulcrum part and as an incident thereof increase the leaning force required to change the angular orientation of the back rest.

[0018] In one form, the plurality of gears are configured so that the seat moves a first distance between the first and loaded positions. The fulcrum part moves greater than the first distance along the length of the fulcrum bar in response to the same movement of the seat relative to the frame.

[0019] In one form, the back rest is mounted directly to the frame.

[0020] In one form, the back rest is mounted directly to the seat.

[0021] In one form, the back rest follows movement of the seat as the seat is changed from the first position into the loaded position.

[0022] In one form, the back rest is attached to and movable relative to the seat.

[0023] In one form, the sitting apparatus is a chair.

[0024] In one form, the frame has wheels that support the chair on a subjacent surface.

[0025] In one form, the chair has a pair of armrests.

[0026] In one form, the chair is a task chair.

[0027] In one form, the plurality of gears includes first and second gears that each turns around an axis. The first and second gears have different diameters.

[0028] In one form, the first and second gears turn around different axes.

[0029] In one form, the first and second gears turn around the same axis.

[0030] In one form, the reconfigurable apparatus has at least one spring bar that is bent under forces applied by a user to the reconfigurable apparatus to resist reconfiguration of a part of the reconfigurable apparatus.

[0031] In one form, the at least one spring bar includes a plurality of spring bars.

[0032] In one form, at least one of the spring bars is an elongate spring bar with a length. The elongate spring bar resists reconfiguration of the reconfigurable apparatus by being bent transversely to the length of the elongate spring bar.

[0033] In one form, the reconfigurable apparatus has an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part. The seat moves a first distance between the first and loaded positions. The first and second rack and pinion gears are configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

[0034] In one form, the seat moves a first distance between the first and loaded positions. The plurality of gears includes first and second gear pairs configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035] Fig. 1 is a schematic representation of a reconfigurable apparatus, according to the present invention;

[0036] Fig. 2 is a side elevation view of a task chair, that is one representative form of apparatus as shown in Fig. 1, and incorporating an adjusting assembly according to the present invention;

[0037] Fig. 3 is a partially schematic representation of one specific form of adjusting assembly, integrated into the apparatus in Figs. 1 and 2;

[0038] Fig. 4 is a fragmentary view of a part of the adjusting assembly in Fig. 3, which utilizes a leaf spring, and from a different perspective;

[0039] Fig. 5 is an enlarged, fragmentary view of a modified form of a leaf spring utilized on the apparatus in Figs. 3 and 4;

[0040] Fig. 6 is an enlarged, fragmentary, elevation view of a linkage, modified from a corresponding linkage as used on the apparatus in Figs. 3 and 4;

[0041] Figs. 7-16 are partially schematic representations of apparatus incorporating different forms of adjusting assemblies, according to the invention;

[0042] Fig. 17 is a schematic representation of a further modified form of reconfigurable apparatus, according to the present invention; and

[0043] Fig. 18 is a schematic representation of adjusting assemblies, according to the invention, acting between separate components on a frame.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0044] In Fig. 1, a reconfigurable apparatus, according to the present invention, is shown in schematic form at 10. The apparatus 10 consists of a frame 12 and at least a first component 14 on the frame 12 upon which a force is applied in a first manner in using the apparatus 10 for its intended purpose.

[0045] At least a second component 16 is provided on the frame 12 and is movable relative to the at least first component and/or the frame 12. A force can be applied in a second manner upon the at least second component to reconfigure the apparatus 10 by moving the at least second component 16 relative to the at least first component and/or the frame 12.

[0046] An adjusting assembly 18 cooperates between the at least first component 14 and the at least second component 16 and is configured so that, as an incident of the force being applied in the first manner changing, the force applied in the second manner required to reconfigure the apparatus 10 changes.

[0047] The adjusting assembly 18 includes a spring assembly 19. The spring assembly 19 is configured to exert a force that resists movement of the at least second component 16 that varies as a magnitude of the force applied in the first manner varies.

[0048] The generic showing of the apparatus 10 is intended to encompass a wide range of different products and different applications. The inventive concepts can be used in virtually any system or apparatus wherein its normal intended use requires the application of a force on a first component and wherein that force on the first component impacts a force

required to be applied to a second component to reconfigure the apparatus as contemplated during use.

[0049] While not intended to be limiting, the detailed description herein will be focused upon furniture and, more particularly, a chair construction. This application of the inventive concepts is intended to be exemplary in nature only and should not be viewed as limiting the inventive concepts to the specific type of apparatus described in detail herein. Further, the schematic showing in Fig. 1 is intended to encompass not only a wide range of different systems/apparatus, but different forms of components and their interaction for each such system/apparatus.

[0050] For example, interlocking toothed components are described, in exemplary forms below. The invention contemplates not only different types of toothed components, such as gears, differential gears, epicyclic gears, rack and pinion arrangements, etc., but also virtually an unlimited number of different interengaging components, such as sprockets and chains, pulleys and cables, mechanisms using levers, pistons, different types of linkages, etc.

[0051] In Fig. 2, one exemplary apparatus 10 is shown in the form of a task chair, in this case without armrests. Of course, armrests might be incorporated and might also have parts thereof movable in different manners depending upon the weight of the user, as hereinafter explained.

[0052] The chair 10 has a wheeled frame 12 with a vertically extending pedestal assembly 20. The first component 14 is in the form of a conventional- type seat with an upwardly facing user support surface 22. In this case, the aforementioned force applied in the first manner is the weight

of the user exerted downwardly on the support surface 22 as he/she sits on the chair 10.

[0053] A corresponding second component 16 is in the form of a back rest against which a seated user leans to exert the aforementioned force in the second manner to reconfigure the chair 10. That is, the back rest moves relative to the frame 12 and first component 14, as the user leans back and forth while seated, generally in a manner as indicated by the double-headed arrow 23.

[0054] The adjusting assembly 18, as shown schematically in Fig. 2, acts between the first component/seat 14 and second component/back rest 16 directly and/or through the frame 12. The adjusting assembly 18 may be added to the frame 12 by attachment thereto, virtually anywhere thereon, or integrated therein, as by being constructed within a hollow 24 on the pedestal assembly 20.

[0055] The chair 10 may incorporate one or more adjusting features other than one that permits reconfiguration by changing the angle of the second component/back rest 16. The adjusting assembly 18 may be integrated into the mechanisms associated with these other features. Alternatively, the other features may operate without effect by the adjusting assembly 18.

[0056] For purposes of simplicity, the second component/back rest 16 will be shown as repositionable relative to the first component/seat 14 to reconfigure the chair 10 by movement of the second component/back rest 16 relative to the first component/seat 14 and frame 12 around a pivot axis 26. This particular connection should not be viewed as limiting.

[0057] Exemplary specific forms of the adjusting assembly 18 will now be described. As noted above, virtually an unlimited number of different variations of adjusting assembly are contemplated within the generic showing of Figs. 1 and 2. These specific forms are exemplary in nature only. These particular mechanisms will also be described with respect to the apparatus in the form of a chair as shown in Fig. 2. Again, the particular nature of the apparatus is not limited to a chair or furniture, although it has particular applicability in this category of product.

[0058] In Figs. 3 and 4, the first component/seat 14 (hereinafter referred to only as the representative chair "seat 14") is integrated into a support 28 that has a depending post 30 that is slidable guidingly vertically, as indicated by the double-headed arrow 32, in a guide channel 34 on the frame 12. A biasing assembly, shown in one exemplary form as a coil spring 33, normally biasably urges the seat 14 upwardly relative to the frame 12.

[0059] A generally U-shaped member 36 has one leg 38 of the "U" mounted on a frame part 40. The other leg 42 of the "U" has an offset bracing end 44.

[0060] For purposes of simplicity, the support 28 and member 36 can be considered to be part of the frame 12 and/or the adjusting assembly 18. Similarly, the component 58 can be considered to be part of the back rest 16 and/or the adjusting assembly 18.

[0061] The spring assembly 19 in this embodiment is in the form of a leaf spring. The leaf spring 19 has an elongate body 46 with a length L between spaced ends 48, 50, a width W, and a thickness T.

[0062] The leaf spring end 19 is anchored in the member 36 to project in cantilever fashion vertically upwardly therefrom. In this embodiment, the

body 46 of the leaf spring 19 is preloaded so that it naturally assumes the dotted line shape and position.

[0063] The bracing end 44 of the member 36 is bifurcated, as seen in Fig. 4, with spaced edges 52 (one shown) at the extremity of the bracing end 44 engageable with one surface 54 of the leaf spring body 46 to maintain the body 46 in the straight vertical orientation, as shown in Fig. 3.

[0064] A part of the second component/back rest 16 (hereafter referred to only as the representative chair "back rest 16") is connected to the support 28 for movement relative thereto around the axis 26 as seen in Fig. 2. As a user situated on the seat 14 leans against the back rest 16, a force is generated as shown by the arrow 56 on the back rest component 58 that tends to pivot the component 58 in the direction of the arrow 60 around the axis 26.

[0065] The component 58 is configured so that an edge 61 on a cantilevered part 62 thereof bears against the leaf spring surface 54. In the depicted state, this produces a force upon the leaf spring body 46, at a location A along the length of the body 46, that tends to bend the body 46 in the direction of the arrow 64 around a fulcrum location at 66 where the body 46 projects away from the part of the member 36 in which it is anchored. The leaf spring 19 thus biasably resists movement of the component 58, and the back rest 16 of which the component 58 is a part, with a first force.

[0066] The configuration in Fig. 3, while it could show a starting state without any force application on the seat 14, is also representative of the overall state of the apparatus 10 with an individual of a first weight seated thereon. This is an equilibrium position for the chair 10 resulting from the balancing of the user's weight and the upward biasing force generated by the

spring 33 acting between the frame 12 and the seat 14 through the support 28.

[0067] In the event that an individual of greater weight assumes a sitting position on the seat 14, the support 28 and component 58 will translate further downwardly against the force of the spring 33, which causes the edge 61 on the back rest component 58 to bear upon the leaf spring 19 at a location below the location A. As a result, a shorter moment arm is established between the location where the edge 61 on the part 62 contacts the surface 54 and the fulcrum location at 66. Thus, the leaf spring 19 has an effectively shorter length, whereby a greater force is required to be applied to the leaf spring 19 to effect bending thereof as would in turn allow movement of the back rest 16 to reconfigure the chair 10.

[0068] To stabilize the support 28, a depending arm 70 thereon connects to the frame part 40 through a link 72. One link end 74 moves about an axis 76 that is fixed relative to the frame part 40. The other link end 78 pivotally connects to the arm 70 for movement about an axis 80.

[0069] The bifurcated configuration of the leg 42 allows the part 62 on the component 58 to move in an opening 82 through the region at the offset bracing end 44 so that the member 36 does not interfere with the back rest component 58 as the back rest component 58 lowers under increasing user weight.

[0070] Accordingly, an increase in the weight of a user causes the leaf spring 19 to produce a greater resistance to movement of the back rest 16 relative to the frame 12. As a result, the chair is self-adjusting. The parts thereof can be engineered so that a desired relationship between the user's

weight and the force required to move the back rest 16 are appropriately established.

[0071] In designing the chair 10 using a leaf spring component, the leaf spring body 46 may have a uniform cross-sectional shape as viewed orthogonally to its length. Alternatively, this shape may be non-uniform over at least a portion of its length. For example, as shown for a portion of the length of a modified form of body 46a, as shown in Fig. 5, the cross-sectional area varies progressively.

[0072] Tapering the cross-sectional area of the leaf spring over its length may allow further tuning of performance. Thickened regions may be provided to produce larger resistance forces for users at the higher weight end of the functional range.

[0073] The leaf spring material may be metal, plastic, a composite, etc. The leaf spring may be straight, curved, with changing cross-sectional shapes, etc. Changing shapes, pre-loading, changing dimensions, etc., are just examples of options that might be practiced to design and tune the adjusting assemblies so that they adapt more appropriately to users throughout a workable user weight range.

[0074] In a still further modified form of the structure in Fig. 3, as shown in Fig. 6, the link 72a, corresponding to the link 72, can be connected to the frame 12 for pivoting movement about an axis 84 between its ends 74a, 78a. Accordingly, as the arm 70a moves downwardly under increasing user weight, link 72a pivots around the axis 84 so that the member 36a simultaneously moves upwardly. Thus, for each incremental movement of the seat 14 downwardly, there is a greater movement of the edge 61 on the

part 62 toward the fulcrum location 66 for the leaf spring 19 than occurs with the design in Figs. 3 and 4.

[0075] In Fig. 7, a modified form of chair is shown at 10', with elements corresponding to those in Figs. 3 and 4 identified with like reference numerals and a "' " designation.

[0076] The chair 10' has a back rest component 58' that acts against a leaf spring 19' that is anchored in a component 36'.

[0077] In this embodiment, the leaf spring body 46' is mounted at a slight angle α to vertical. Accordingly, the part 62' of the component 58' tends to bind more with the leaf spring 19' as it slides downwardly thereagainst under increasing user weight. This binding creates frictional forces that augment the upward balancing force produced by the spring 33'.

[0078] Additionally, the chair 10' utilizes cooperating toothed elements 86, 88, 90 that interact to cause movement of the frame part 40', arm 70' and leg 38' relative to each other and the frame part 40' that replicates the relative movement that occurs with corresponding elements in the embodiment shown in Figs. 3 and 4. The toothed element 88 is in the form of a differential pinion that turns around an axis 92. Larger and smaller diameter toothed portions 94, 96, respectively, engage toothed racks 98, 100, respectively on the leg 38' and arm 70'. Turning of the toothed element 88 in the direction of the arrow 102 under increasing user weight causes simultaneous upward movement of the member 36' and downward movement of the support 28'.

[0079] In Fig. 8, a further modified form of chair, according to the present invention, is shown at 10". The chair 10" incorporates a back rest component 58" that interacts with a leaf spring 19" and leg 42" in the same

way that the corresponding components interact on the chair 10 in Figs. 3 and 4.

[0080] Further, the chair 10" incorporates toothed elements 86", 88", 90" which function essentially in the same manner as the corresponding components on the chair 10' in Fig. 7. The primary difference between these embodiments is that the leg 38" has a curved shape that moves in a complementarily-curved channel 104 on the frame part 40". Whereas the support 28' associated with the seat 14 and member 36' move relative to each other in parallel, straight paths, the member 36" moves in a curved path, as dictated by the curvature of the leg 38" and cooperating channel 104. This curvature nominally matches the curved shape of the leaf spring 19" which is pre-loaded from the dotted line position to the operative, solid line position in Fig. 8. Accordingly, the relative movement of the member 36" and support 28" causes the part 62" that engages the leaf spring 19" to generally follow the pre-loaded curvature of the leaf spring 19".

[0081] In a further modified form of chair, as shown at 10''' in Fig. 9, the basic construction of Figs. 3 and 7 is utilized with the exception that the leaf spring 19''' is fixedly mounted to the component 58''' and acts against the member 36''', i.e., this component arrangement is reversed from that in the earlier embodiments. The leaf spring 19''' is pre-loaded from the dotted line position into the solid line position which is maintained by the abutment thereof to the member 36'''.

[0082] In Figs. 10 and 11, a further modified form of chair, according to the invention, is shown at 10⁴. In this embodiment, multiple leaf springs 19a⁴, 19b⁴, 19c⁴, 19d⁴ are utilized, each with an end anchored in a block 105.

[0083] In this embodiment, the post 30^{4'} has a toothed rack 100^{4'} that cooperates with a toothed, differential pinion element 88^{4'}, that cooperates in turn with a toothed rack 98^{4'} making up part of a toothed element 86^{4'} on a member 36^{4'}.

[0084] Downward movement of the post 30^{4'} under the weight applied to the seat 14 causes the toothed rack 100^{4'} and toothed element 88^{4'}, and separately the toothed elements 88^{4'}, 86^{4'}, to interact to translate the member 36^{4'} in the direction of the arrow 106.

[0085] As the weight on the seat 14 is increased, the member 36^{4'} will move continuously in the direction of the arrow 106 to successively engage free ends of angled extensions 108a, 108b, 108c at the ends of leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, successively. The extensions 108a, 108b, 108c and one surface 110 on the leaf spring 19d^{4'} reside in a reference plane P. As user applied weight increases, a surface 112 on the member 36^{4'} moves along this plane P to successively engage the extensions 108a, 108b, 108c and eventually the surface 110, whereby the surface 112 defines separate fulcrum locations, corresponding to the fulcrum location 66, for the free ends of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'}. In other words, the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} are successively operatively engaged under increasing user weight. As a result, the resistance force to the applied leaning force on the back rest 18 in the direction of the arrow 114 is generated by some or all of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} as they are borne against the surface 112 under the user leaning force.

[0086] It is important to point out that the rack and pinion components are not restricted to any specific orientation. The cooperating rack and pinion

components may be oriented in virtually any orientation that can be adapted to cause movement of the associated parts in the same manner.

[0087] Further, one or all of the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} could be pre-loaded or in curved tracks.

[0088] In an alternative form of the basic structure in Figs. 10 and 11, as shown for the chair 10^{5'} in Figs. 12 and 13, the member 36^{5'} vertically advanced, or advanced in another direction, is caused to interact with some, or all, of a plurality, and in this case three, leaf springs 19a^{5'}, 19b^{5'}, 19c^{5'}, which are arranged to be substantially coplanar, as opposed to stacked as the leaf springs 19a^{4'}, 19b^{4'}, 19c^{4'}, 19d^{4'} are on the chair 10^{4'}.

[0089] Under an increasing user weight on the seat 14, a surface 112^{5'} on the member 36^{5'} engages successively against surfaces 116a^{5'}, 116b^{5'}, 116c^{5'}. As shown in Fig. 12, the particular exemplary weight causes engagement of the surface 112^{5'} with only two of the leaf springs 19a^{5'}, 19b^{5'}.

[0090] The leaning force on the back rest 18 is applied on an actuator 118 in a direction into the page, as indicated by the "X" at 120. Resistance to the leaning force is generated in the same manner for the chair 10^{5'} as for the chair 10^{4'} but with the different arrangement of leaf springs.

[0091] In an alternative form, each of the leaf springs in Figs. 12 and 13 might be substituted for by coil springs, compression/tension springs, or a torsion rod of the type described in an additional embodiment below. One or more springs might be utilized. More springs allow for finer control. Each spring can be individually tuned.

[0092] In Fig. 14, a further modified form of chair, according to the invention, is shown at 10^{6'}. A post 30^{6'} has a toothed rack 100^{6'} that

cooperates with a differential pinion/toothed element 88^{6'}. The toothed element 88^{6'} moves together with a component 58^{6'} that is part of the back rest 16 or otherwise moves in response to movement thereof. The component 58^{6'} is mounted for pivoting movement relative to a frame part 122 around an axis 124 as the post 30^{6'} raises and lowers as different weight forces are applied to and removed from the seat 14.

[0093] The leaning force on the back rest 16 is applied to an arm 126 on the component 58^{6'} in the direction of the arrow 128.

[0094] The frame part 122 has a "U" shape with spaced legs 130, 132. The component 58^{6'} is mounted on the leg 130.

[0095] The toothed element 88^{6'} cooperates with a separate toothed element 134 that moves guidingly in a channel 136 on the component 58^{6'}. In this embodiment, the toothed element 134 and cooperating channel 136 have a curved shape so that the toothed element 134 is movable guidingly in an arcuate path. A row of teeth 138 on one side of the toothed element 134 engage teeth 140 on the toothed element 88^{6'} so that the toothed element 134 moves back and forth within the channel 136 as the toothed element 88^{6'} is rotated in opposite directions around its axis 124.

[0096] The adjusting assembly 18^{6'} in this embodiment consists of an elongate spring assembly 19^{6'}, in this particular embodiment shown as a coil spring under tension. The spring 19^{6'} is connected between an end location at 144 on the toothed element 134 and the leg 132 on the frame part 122.

[0097] As a user sits on the seat 14, without leaning against the back rest 16, the post 30^{6'} moves against the force of the spring 33^{6'} downwardly, thereby turning the toothed element 88^{6'} in the direction of the arrow 146, which causes the toothed element 134 to move in the direction of the arrow

148 in the channel 136. The precise position of the toothed element 134 in the channel 136 is dictated by the weight of the user.

[0098] Once the user is seated and leans back against the back rest 16, separate teeth 150, 152, on the toothed element 134 and component 58^{6'}, within the channel 136, engage, thereby to fix the position of the toothed element 134 within the channel 136.

[0099] Under an applied leaning force in the direction of the arrow 128 on the arm 126, the component 58^{6'}, and the associated back rest 16, tend to pivot around the axis 124, which is resisted by the force in the spring 142. Because the distance between the axis 124 and end location 144 where the resistant spring force is applied is increased with increasing weight of a user, the resistant force generated by the coil spring 19^{6'} is likewise increased.

[00100] The chair 10^{7'} in Fig. 15 operates on the same basic principles as the chair 10^{6'} in Fig. 14.

[00101] More particularly, a toothed element 134^{7'} moves in a channel 136^{7'} having an arcuate shape. A coil spring 19^{7'} connects between the toothed element 134^{7'} and a leg 132^{7'} on a U-shaped frame part 122^{7'}.

[00102] The primary difference between the structure in Fig. 15, compared to that in Fig. 14, is that the toothed element 134^{7'} is part of, and moves with, an elongate component 154 that is pivoted about an axis 156 that is the approximate location at which the spring 19^{7'} connects to the leg 132^{7'}. The component 154 has a curved edge 158 with a constant radius R centered on the axis 156. That edge 158 has teeth 160 which mesh with teeth 162 on a post 30^{7'} that has a toothed rack 100^{6'} where the teeth 162 are located.

[00103] Increased weight of a user on the seat 14 pivots the component 154 in the direction of the arrow 164 around the axis 156 to move the toothed element 134⁷ in the direction of the arrow 166 in the channel 136⁷. In so doing, the distance between the spring mount location at 144⁷ on the toothed element 134⁷ and the pivot axis 124⁷ for the component 58⁷ increases, thereby to cause an increase in the resistance to tilting of the back rest 16 in the same manner as occurs with the chair 10⁶.

[00104] In Fig. 16, a further modified form of chair is shown at 10⁸ wherein the spring assembly 19⁸ includes an elongate torsion component 168 with a lengthwise axis 170. The adjusting assembly 18⁸ further includes an actuating component 172 that has a portion 174 keyed to the periphery of the torsion component 168 to move slidingly axially therealong in the same angular orientation. With the torsion component 168 fixed in relationship to the frame 12⁸, a user's weight on the seat 14 causes movement of the actuating component 172 through cooperation between a toothed rack 176 thereon and intermediate input structure 178 of suitable construction. Increased weight on the seat 14 causes the actuating component 172 to shift closer to a base 180 of the torsion component 168 closer to where it is anchored to the frame 12⁸.

[00105] A leaning force on the back rest 16 is applied to the torsion component generally in the direction of the arrow 182, tending to turn the torsion component 168 around the axis 170. For the back rest 16 to reposition, the torsion component 168 must be twisted around the axis 170. This twisting action is resisted to a greater degree with the actuating component 172 closer to the base 180 under a heavier user weight.

[00106] On the other hand, with the actuating component 172 shifted towards its free end 184, as occurs with a lighter user, the torsion component 168 can be more readily twisted about its length and the axis 170.

[00107] In Fig. 17, a still further modified form of chair, according to the invention, is shown at 10⁹ with an adjusting assembly 18⁹ cooperating between a seat 14 and back rest 16. A spring assembly 19⁹ is mounted to a frame 12⁹ and consists of separate leaf springs with bodies 46⁹ each with spaced ends supported by blocks 186, 188 on the frame 12⁹. With this arrangement, the bodies 46⁹ and blocks 186, 188 cooperatively extend around an opening 190 with a width W.

[00108] An elongate, wedge-shaped actuating component 192 with a uniform width W1, slightly less than the width W, extends through the opening 190.

[00109] A toothed rack 194 is provided on the actuating component 192 and moves therewith. In response to a weight force being applied to the seat 14, and through an appropriate force transfer structure 196, the toothed rack 194 and actuating component 192 are shifted in the direction of the arrow 198.

[00110] By reason of the wedge shape, the actuating component 192 has oppositely facing actuating surfaces S1, S2, each with one dimension D1 at one end and a larger dimension D2 at its opposite end, that abut to, or reside adjacent to, facing surfaces S3, S4, respectively, on the bodies 46⁹. As the actuating component 192 shifts in the direction of the arrow 198, a progressively larger area of the surfaces S1, S2 confronts the leaf spring bodies 46⁹.

[00111] The back rest 16 imparts a force to the actuating component 192 through a suitable force transfer structure at 202 tending to turn the actuating component 192 around an axis 204.

[00112] Accordingly, a user leaning force generates a force on the actuating component 192 that bears the surfaces S1, S2 simultaneously against the surfaces S3, S4 of the leaf spring bodies 46^{9'} between the spaced supported ends. The larger the area of the surfaces S1, S2 in contact with the bodies 46^{9'}, the more resistant the bodies 46^{9'} are to deformation. This translates into a greater resistance to the repositioning of the back rest 16 for a larger weight application on the seat 14.

[00113] Further, as the actuating component 192 turns around the axis 204, the force transfer between the actuating component 192 and bodies 46^{9'} occurs primarily at corners C1, C2, C3, C4 of the actuating component 192, which bear against reinforced and thus more rigid parts of the bodies 46^{9'} adjacent to the blocks 186, 188 as more user weight is applied. Thus, greater resistance to back rest movement results.

[00114] In a still further alternative form, as shown in Fig. 18, multiple adjusting assemblies 18 are utilized between a cooperating first component(s)/seat 14 and second component(s)/back rest 16 on a frame 12.

[00115] Ideally, the apparatus/chair 10 will adapt to users weighing as much as 350 pounds, or more. While one spring assembly might be designed for a total desired weight range to be accommodated, two or more spring assemblies might be utilized and their function and operation coordinated.

[00116] Further, different spring assemblies might be utilized with coordinated operation. For example, one spring assembly may cover a

range of 30-175 pounds with a second spring assembly operational for user weights in the range of 175-350 pounds. More springs/spring assemblies might be added to further split up the weight ranges.

[00117] The spring assemblies may be designed in relationship to seat movement. For example, one spring assembly may be operational for 0-.5" of seat movement with a separate spring assembly operational for seat movement of 0.5"-1", where 1" is the seat movement for the maximum weight for which the apparatus is designed.

[00118] The examples herein of spring assembly/spring construction should not be viewed as limiting. Different spring types and combinations are contemplated. For example, the springs may be curved, coiled with different turn diameter and rise, hybrid shapes, concentric arrangements, etc. Coil springs, or the like, may produce forces under either compression or tension.

[00119] The foregoing disclosure of specific embodiments is intended to be illustrative of the broad concepts comprehended by the invention.

CLAIMS

1. A reconfigurable apparatus for seating a user, the reconfigurable apparatus comprising:

a frame;

a seat mounted on the frame and movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position into which the seat moves from the first position as an incident of a user sitting on the seat;

a back rest against which a user sitting on the seat can bear his/her back to produce a leaning force that changes an angular orientation of the back rest relative to the frame,

the apparatus configured so that a first leaning force is required to be applied to the back rest to change the angular orientation of the back rest from a starting angular position relative to the frame with no user sitting in the seat; and

an adjusting assembly comprising a plurality of gears that cooperate and move relative to each other as an incident of the seat moving from the first position into the loaded position and configured to thereby increase a resistance to changing of the angular orientation of the back rest from the starting angular position,

whereby as an incident of a user sitting on the seat a leaning force greater than the first leaning force is required to change the angular position of the back rest from the starting angular position.

2. The reconfigurable apparatus for seating a user according to claim 1 wherein the plurality of gears comprises a first rack gear and first

pinion gear, the first rack gear and first pinion gear cooperating with, and movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

3. The reconfigurable apparatus for seating a user according to claim 2 wherein the plurality of gears comprises a second rack gear and a second pinion gear, the second rack gear and second pinion gear cooperating with, and movable relative to, each other as an incident of the seat moving from the first position into the loaded position.

4. The reconfigurable apparatus according to claim 1 wherein the reconfigurable apparatus comprises an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part.

5. The reconfigurable apparatus for seating a user according to claim 4 wherein as an incident of the seat being changed from the first position into the loaded position the fulcrum part is caused to move along the length of the elongate spring bar so as to thereby increase a force required to bend the elongate spring bar about the fulcrum part and as an incident thereof increase the leaning force required to change the angular orientation of the back rest.

6. The reconfigurable apparatus for seating a user according to claim 5 wherein the plurality of gears are configured so that the seat moves a first distance between the first and loaded positions and the fulcrum part

moves greater than the first distance along the length of the fulcrum bar in response to a same movement of the seat relative to the frame.

7. The reconfigurable apparatus for seating a user according to claim 1 wherein the back rest is mounted directly to the frame.

8. The reconfigurable apparatus for seating a user according to claim 1 wherein the back rest is mounted directly to the seat.

9. The reconfigurable apparatus for seating a user according to claim 8 wherein the back rest follows movement of the seat as the seat is changed from the first position into the loaded position.

10. The reconfigurable apparatus for seating a user according to claim 8 wherein the back rest is attached to and movable relative to the seat.

11. The reconfigurable apparatus for seating a user according to claim 1 wherein the sitting apparatus comprises a chair.

12. The reconfigurable apparatus for seating a user according to claim 11 wherein the frame comprises wheels that support the chair on a subjacent surface.

13. The reconfigurable apparatus for seating a user according to claim 11 wherein the chair comprises a pair of armrests.

14. The reconfigurable apparatus for seating a user according to claim 11 wherein the chair is a task chair.

15. The reconfigurable apparatus for seating a user according to claim 1 wherein the plurality of gears comprises first and second gears that each turns around an axis and the first and second gears have different diameters.

16. The reconfigurable apparatus for seating a user according to claim 15 wherein the first and second gears turn around different axes.

17. The reconfigurable apparatus for seating a user according to claim 15 wherein the first and second gears turn around a same axis.

18. The reconfigurable apparatus for seating a user according to claim 1 wherein the reconfigurable apparatus comprises at least one spring bar that is bent under forces applied by a user to the reconfigurable apparatus to resist reconfiguration of a part of the reconfigurable apparatus.

19. The reconfigurable apparatus for seating a user according to claim 18 wherein the at least one spring bar comprises a plurality of spring bars.

20. The reconfigurable apparatus for seating a user according to claim 19 wherein at least one of the spring bars comprises an elongate spring bar with a length and the elongate spring bar resists reconfiguration of

the reconfigurable apparatus by being bent transversely to the length of the elongate spring bar.

21. The reconfigurable apparatus for seating a user according to claim 3 wherein the reconfigurable apparatus comprises an elongate spring bar having a length and that resists changing of the angular orientation of the back rest from the starting position by bending against a fulcrum part, the seat moves a first distance between the first and loaded positions, and the first and second rack and pinion gears are configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

22. The reconfigurable apparatus for seating a user according to claim 4 wherein the seat moves a first distance between the first and loaded positions and the plurality of gears comprises first and second gear pairs configured so that as an incident of the seat moving from the first position into the loaded position there is relative movement of the elongate spring bar and fulcrum along the length of the elongate spring bar a distance different than the first distance.

ABSTRACT OF THE DISCLOSURE

[00120] A reconfigurable apparatus for seating a user and having: a frame; a seat movable relative to the frame between: a) a first position in which the seat resides with no user sitting on the seat; and b) a loaded position; a back rest with a changeable angular orientation relative to the frame; and an adjusting assembly having a plurality of gears that move relative to each other as an incident of the seat moving from the first position into the loaded position to thereby cause an increase in resistance to changing of the angular orientation of the back rest.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 16/408,650			
APPLICATION AS FILED - PART I									
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)		
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	75		N/A			
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	330		N/A			
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	380		N/A			
TOTAL CLAIMS (37 CFR 1.16(j))	22	minus 20 =	*	2	x 50 =	100			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 =	*		x 230 =	0.00			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00					
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00					
* If the difference in column 1 is less than zero, enter "0" in column 2.				TOTAL	885	TOTAL			
APPLICATION AS AMENDED - PART II									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	x	=
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
TOTAL ADD'L FEE								TOTAL ADD'L FEE	
AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x	=	x	=
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x	=	x	=
	Application Size Fee (37 CFR 1.16(s))								
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								
TOTAL ADD'L FEE								TOTAL ADD'L FEE	
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
16/408,650	05/10/2019	3636	885	DEJ10730P00072US	22	1

CONFIRMATION NO. 8329

UPDATED FILING RECEIPT

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Date Mailed: 06/07/2019

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Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 15/040,735 02/10/2016 PAT 10292498
which claims benefit of 62/114,706 02/11/2015

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.) - None.

Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access Application via Priority Document Exchange: Yes

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The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 16/408,650**

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Early Publication Request: No

**** SMALL ENTITY ****

Title

APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS

Preliminary Class

297

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

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

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

NOT GRANTED

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

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The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop

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UNITED STATES PATENT AND TRADEMARK OFFICE

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

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
16/408,650	05/10/2019	Aaron DeJule	DEJ10730P00072US

CONFIRMATION NO. 8329

32116
WOOD, PHILLIPS, KATZ, CLARK & MORTIMER
500 W. MADISON STREET
SUITE 1130
CHICAGO, IL 60661

PUBLICATION NOTICE



OC000000111071879

Title: APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS

Publication No. US-2019-0274433-A1

Publication Date: 09/12/2019

NOTICE OF PUBLICATION OF APPLICATION

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

The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Public Records Division. The Public Records Division can be reached by telephone at (571) 272-3150 or (800) 972-6382, by facsimile at (571) 273-3250, by mail addressed to the United States Patent and Trademark Office, Public Records Division, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <https://portal.uspto.gov/pair/PublicPair>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/408,650	05/10/2019	Aaron DeJule	DEJ10730P00072US	8329
32116 7590 12/26/2019 WOOD, PHILLIPS, KATZ, CLARK & MORTIMER 500 W. MADISON STREET SUITE 1130 CHICAGO, IL 60661			EXAMINER BRINDLEY, TIMOTHY J	
			ART UNIT 3636	PAPER NUMBER
			NOTIFICATION DATE 12/26/2019	DELIVERY MODE ELECTRONIC

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

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

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@woodphillips.com

DETAILED ACTION

Election/Restriction

1. No claim(s) appear generic to the following disclosed patentably distinct species:

Species I: Figs. 3-4;

Species II: Fig. 5;

Species III: Fig. 6;

Species IV: Fig. 7;

Species V: Fig. 8;

Species VI: Fig. 9;

Species VII: Fig. 10;

Species VIII: Fig. 11;

Species IX: Fig. 12;

Species X: Fig. 13;

Species XI: Fig. 14;

Species XII: Fig. 15;

Species XIII: Fig. 16

2. The species are independent or distinct because as disclosed the different species have mutually exclusive characteristics for each identified species. In addition, these species are not obvious variants of each other based on the current record.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species, or a single grouping of patentably indistinct species, for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable.

There is a search and/or examination burden for the patentably distinct species as set forth above because at least the following reason(s) apply:

- *the species or groupings of patentably indistinct species require a different field of search (e.g. searching different classes/subclasses or electronic resources, or employing different search strategies or search queries.)*

Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or a grouping of patentably indistinct species to be examined even though the requirement may be traversed (37 CFR 1.143) **and (ii) identification of the claims encompassing the elected species** or grouping of patentably indistinct species, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

The election may be made with or without traverse. To preserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the election of species requirement, the election shall be treated as an election without traverse. Traversal must be presented at the time of election in order to be considered timely. Failure to timely traverse the requirement will result in the loss of right to petition under 37 CFR 1.144. If claims are added after the election, applicant must indicate which of these claims are readable on the elected species or grouping of patentably indistinct species.

Should applicant traverse on the ground that the species, or groupings of patentably indistinct species from which election is required, are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the species unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103 or pre-AIA 35 U.S.C. 103(a) of the other species.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141.

3. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be corrected in compliance with 37 CFR 1.48(a) if one or more of the

currently named inventors is no longer an inventor of at least one claim remaining in the application. A request to correct inventorship under 37 CFR 1.48(a) must be accompanied by an application data sheet in accordance with 37 CFR 1.76 that identifies each inventor by his or her legal name and by the processing fee required under 37 CFR 1.17(i).

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMOTHY J BRINDLEY whose telephone number is (571)270-7231. The examiner can normally be reached on Mon-Fri, 9am-5pm.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Dunn can be reached on 5712726670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

Application/Control Number: 16/408,650
Art Unit: 3636

Page 5

/TIMOTHY J BRINDLEY/
Primary Examiner, Art Unit 3636

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	APPARATUS WITH WEIGHT RESPONSIVE
	)	CHANGEABLE ADJUSTING
AARON DEJULE	)	CHARACTERISTICS
	)	
	)	Examiner: Timothy J. Brindley
Serial No. 16/408,650	)	
	)	Group Art Unit 3636
Filed: May 10, 2019	)	
	)	Confirmation No. 8329

RESPONSE

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

Sir:

This is a response to the Office Action dated December 26, 2019, in which the Examiner has required an election of species.

Applicant elects to prosecute claims directed to what the Examiner has identified as Species VI (Fig. 9). Applicant makes the election with traverse.

Claims 1-6, 8-15, 17, 18, and 20-22 are readable on the elected species.

Applicant respectfully submits that a search encompassing the elected species would encompass the prior art material to the non-elected species.

Withdrawal of the election requirement and an early and favorable action
on the merits are requested.

Respectfully submitted,

WOOD, PHILLIPS, KATZ,
CLARK & MORTIMER

By /John S. Mortimer/
John S. Mortimer
Reg. No. 30,407

Dated: May 26, 2020

500 West Madison Street
Suite 1130
Chicago, IL 60661-2562
(312) 876-2113

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)		Docket Number (Optional) DEJ10730P00072US
Application Number 16/408,650	Filed May 10, 2019	
For APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		
Art Unit 3636	Examiner Timothy J. Brindley	

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above-identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	<u>Fee</u>	<u>Small Entity Fee</u>	<u>Micro Entity Fee</u>	
☐ One month (37 CFR 1.17(a)(1))	\$200	\$100	\$50	\$ _____
☒ Two months (37 CFR 1.17(a)(2))	\$600	\$300	\$150	\$ <u>300.00</u>
☐ Three months (37 CFR 1.17(a)(3))	\$1,400	\$700	\$350	\$ _____
☐ Four months (37 CFR 1.17(a)(4))	\$2,200	\$1,100	\$550	\$ _____
☐ Five months (37 CFR 1.17(a)(5))	\$3,000	\$1,500	\$750	\$ _____

- ☒ Applicant asserts small entity status. See 37 CFR 1.27.
- ☐ Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.
- ☐ A check in the amount of the fee is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to
Deposit Account Number 23-0785.
- ☒ Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

- ☐ applicant.
- ☒ attorney or agent of record. Registration number 30,407.
- ☐ attorney or agent acting under 37 CFR 1.34. Registration number _____.

/John S. Mortimer/

Signature

May 26, 2020

Date

John S. Mortimer

Typed or printed name

312-876-1800

Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

☐ * Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public, which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop PCT, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal				
Application Number:		16408650		
Filing Date:		10-May-2019		
Title of Invention:		APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		
First Named Inventor/Applicant Name:		Aaron DeJule		
Filer:		John Stirling Mortimer/Linda Bowen		
Attorney Docket Number:		DEJ10730P00072US		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description		Fee Code	Quantity	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension - 2 months with \$0 paid	2252	1	300	300
Miscellaneous:				
Total in USD (\$)				300

Electronic Acknowledgement Receipt	
EFS ID:	39541108
Application Number:	16408650
International Application Number:	
Confirmation Number:	8329
Title of Invention:	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS
First Named Inventor/Applicant Name:	Aaron DeJule
Customer Number:	32116
Filer:	John Stirling Mortimer/Linda Bowen
Filer Authorized By:	John Stirling Mortimer
Attorney Docket Number:	DEJ10730P00072US
Receipt Date:	26-MAY-2020
Filing Date:	10-MAY-2019
Time Stamp:	18:12:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$300
RAM confirmation Number	E20205PI13108552
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Response to Election / Restriction Filed	16408650_Response.pdf	83061	no	2
			9e88f659521298d464b5bbcd970ed02c06abd5211		
Warnings:					
Information:					
2	Extension of Time	16408650_EOT.PDF	145554	no	2
			de84884958f5c8d29df64c178b032df2a8e15bb		
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30932	no	2
			1e671b5aa9f6d5d41ff28daad4f3e1c3771d337		
Warnings:					
Information:					
Total Files Size (in bytes):			259547		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



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NOTICE OF ALLOWANCE AND FEE(S) DUE

32116 7590 09/21/2020
WOOD, PHILLIPS, KATZ, CLARK & MORTIMER
500 W. MADISON STREET
SUITE 1130
CHICAGO, IL 60661

EXAMINER

BRINDLEY, TIMOTHY J

ART UNIT

PAPER NUMBER

3636

DATE MAILED: 09/21/2020

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/408,650	05/10/2019	Aaron DeJule	DEJ10730P00072US	8329

TITLE OF INVENTION: APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	12/21/2020

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Maintenance fees are due in utility patents issuing on applications filed on or after Dec. 12, 1980. It is patentee's responsibility to ensure timely payment of maintenance fees when due. More information is available at www.uspto.gov/PatentMaintenanceFees.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

32116 7590 09/21/2020
WOOD, PHILLIPS, KATZ, CLARK & MORTIMER
500 W. MADISON STREET
SUITE 1130
CHICAGO, IL 60661

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

_____ (Typed or printed name)
_____ (Signature)
_____ (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/408,650	05/10/2019	Aaron DeJule	DEJ10730P00072US	8329

TITLE OF INVENTION: APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	12/21/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
BRINDLEY, TIMOTHY J	3636	297-285000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

1 _____

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2 _____

3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. Fees submitted: ☐ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies _____

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☐ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. _____

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. **NOTE:** If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____

Date _____

Typed or printed name _____

Registration No. _____



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/408,650	05/10/2019	Aaron DeJule	DEJ10730P00072US	8329
32116	7590	09/21/2020	EXAMINER	
WOOD, PHILLIPS, KATZ, CLARK & MORTIMER 500 W. MADISON STREET SUITE 1130 CHICAGO, IL 60661			BRINDLEY, TIMOTHY J	
			ART UNIT	PAPER NUMBER
			3636	

DATE MAILED: 09/21/2020

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.** Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

<i>Notice of Allowability</i>	Application No. 16/408,650	Applicant(s) DeJule et al.	
	Examiner TIMOTHY J BRINDLEY	Art Unit 3636	AIA (FITF) Status Yes

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Claims filed 5/10/19.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.

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

3. ☒ The allowed claim(s) is/are 1-22. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to **PPHfeedback@uspto.gov**.

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

Certified copies:

a) ☐ All b) ☐ Some *c) ☐ None of the:

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

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

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

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)	5. ☐ Examiner's Amendment/Comment
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>5/10/19</u> .	6. ☒ Examiner's Statement of Reasons for Allowance
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material ____.	7. ☐ Other ____.
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date ____.	

/TIMOTHY J BRINDLEY/ Primary Examiner, Art Unit 3636	
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Allowable Subject Matter

1. Claims 1-22 are allowed.
2. The following is an examiner's statement of reasons for allowance: The prior art reference of Machate et al. (US 4,962,962) teaches a backrest tiltable relative to the seat part wherein the weight of the user on the seat simultaneously adjusts force required to tilt the backrest (fig. 1; Col. 5, lines 1-6), but does not teach wherein the adjustment takes places by way of an adjustment assembly having a plurality of gears. Link (US 7,600,814) teaches a backrest tiltable relative to the seat part wherein the resistance of the backrest may be adjusted based on the weight of the user by way of an adjustment assembly having a plurality of gears, however, the adjustment is done manually prior to a user being seat. The prior art therefore fails to show an adjustment assembly using gears for adjusting the backrest tilt resistance based on the weight/force applied to the seat at the time of sitting.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMOTHY J BRINDLEY whose telephone number is (571)270-7231. The examiner can normally be reached on Mon-Fri, 9am-5pm.

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

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Dunn can be reached on 5712726670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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

/TIMOTHY J BRINDLEY/
Primary Examiner, Art Unit 3636

<i>Notice of References Cited</i>	Application/Control No. 16/408,650	Applicant(s)/Patent Under Reexamination DeJule et al.	
	Examiner TIMOTHY J BRINDLEY	Art Unit 3636	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	CPC Classification	US Classification
*	A	US-7600814-B2	10-2009	Link; Werner	A47C1/03255	297/300.2
*	B	US-4761033-A	08-1988	Lanuzzi; Max	A47C1/03255	297/300.3
	C					
	D					
	E					
	F					
	G					
	H					
	I					
	J					
	K					
	L					
	M					

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	CPC Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

U.S. Patent and Trademark Office
PTO-892 (Rev. 01-2001)

Notice of References Cited

Part of Paper No. 20200915

<i>Index of Claims</i> 	Application/Control No. 16/408,650	Applicant(s)/Patent Under Reexamination DeJule et al.
	Examiner TIMOTHY J BRINDLEY	Art Unit 3636

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

CLAIMS										
☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM			DATE							
Final	Original	09/15/2020								
	1	=								
	2	=								
	3	=								
	4	=								
	5	=								
	6	=								
	7	=								
	8	=								
	9	=								
	10	=								
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	15	=								
	16	=								
	17	=								
	18	=								
	19	=								
	20	=								
	21	=								
	22	=								

Issue Classification 	Application/Control No. 16/408,650	Applicant(s)/Patent Under Reexamination DeJule et al.
	Examiner TIMOTHY J BRINDLEY	Art Unit 3636

CPC						
Symbol					Type	Version
A47C	/	7	/	44	F	2013-01-01
A47C	/	7	/	445	I	2013-01-01
A47C	/	1	/	03266	I	2013-01-01
A47C	/	1	/	03277	I	2013-01-01
A47C	/	31	/	126	I	2013-01-01
A47C	/	7	/	441	I	2013-01-01
A47C	/	7	/	443	I	2013-01-01
A47C	/	7	/	4454	I	2018-08-01

CPC Combination Sets				
Symbol	Type	Set	Ranking	Version
/				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	22	
/TIMOTHY J BRINDLEY/ Primary Examiner, Art Unit 3636	15 September 2020	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	2, 14

Issue Classification 	Application/Control No. 16/408,650	Applicant(s)/Patent Under Reexamination DeJule et al.
	Examiner TIMOTHY J BRINDLEY	Art Unit 3636

INTERNATIONAL CLASSIFICATION			
CLAIMED			
A47C		1	032
A47C		7	44

NON-CLAIMED			

US ORIGINAL CLASSIFICATION	
CLASS	SUBCLASS

CROSS REFERENCES(S)						
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					

NONE		Total Claims Allowed:	
(Assistant Examiner)		22	
(Date)			
/TIMOTHY J BRINDLEY/		15 September 2020	
Primary Examiner, Art Unit 3636			
(Primary Examiner)		(Date)	
		O.G. Print Claim(s)	O.G. Print Figure
		1	2, 14

<i>Issue Classification</i> 	Application/Control No. 16/408,650	Applicant(s)/Patent Under Reexamination DeJule et al.
	Examiner TIMOTHY J BRINDLEY	Art Unit 3636

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47															
CLAIMS															
Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original

NONE (Assistant Examiner) (Date)		Total Claims Allowed: 22	
/TIMOTHY J BRINDLEY/ Primary Examiner, Art Unit 3636 (Primary Examiner) (Date)		15 September 2020 O.G. Print Claim(s)	O.G. Print Figure 2, 14

<i>Search Notes</i> 	Application/Control No. 16/408,650	Applicant(s)/Patent Under Reexamination DeJule et al.
	Examiner TIMOTHY J BRINDLEY	Art Unit 3636

CPC - Searched*		
Symbol	Date	Examiner
A47C7/445	09/15/2020	TJB
A47C7/441	09/15/2020	TJB
A47C1/03277	09/15/2020	TJB
A47C1/03266	09/15/2020	TJB

CPC Combination Sets - Searched*		
Symbol	Date	Examiner

US Classification - Searched*			
Class	Subclass	Date	Examiner

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

Search Notes		
Search Notes	Date	Examiner
Inventor Name Search	09/15/2020	TJB

Interference Search			
US Class/CPC Symbol	US Subclass/CPC Group	Date	Examiner
	PG-Pub Text Search - See Interference Search Printout	09/15/2020	TJB

/TIMOTHY J BRINDLEY/ Primary Examiner, Art Unit 3636	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	2	"4962962".pn.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2020/09/15 10:53
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S1	403	A47C7/445.cpc.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/06/20 18:42
S2	407	A47C7/441.cpc.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/06/20 18:42
S3	291	A47C1/03277.cpc.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/06/20 18:43
S4	513	A47C1/03266.cpc.	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/06/20 18:43
S5	183	A47C1/03277.cpc. and leaf	US-PGPUB; USPAT; EPO; JPO	OR	OFF	2018/06/20 18:47
S6	2	("2009/0261637").URPN.	USPAT	OR	OFF	2018/06/21 10:00
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S8	3	("2008/0088163").URPN.	USPAT	OR	OFF	2018/06/21 10:58
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S12	2	("2009/0261637").URPN.	USPAT	OR	OFF	2018/12/18 10:05
S13	91	("3989297" "4411469" "4744600" "4758045").PN. OR ("4911501").URPN.	US- PGPUB; USPAT; USOCR	OR	OFF	2018/12/18 10:15
S14	109	(frame and (user or occupant) and weight and (component or backrest or seatback) and force and relative).clm.	US- PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2018/12/20 11:00
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S24	12	"42536741".FMID.	US- PGPUB; USPAT; FPRS; JPO	OR	OFF	2020/06/09 10:38
S25	85	("20020109384" "20030137171" "20040195883" "20040245827" "20060202530" "20070210634" "2818911" "4077596" "4387876" "4479679" "4653806" "4709963" "4711491" "4761033" "4763950" "4840426" "4889385" "4892354" "4911501" "4966411" "5029940" "5046780" "5056866" "5080318" "5121934" "5224758" "5288138" "5333368" "5348372" "5375912" "5397165" "5486035" "5511759" "5547252" "5551674" "5653806" "5658045" "5660439" "5765914" "5806930"	US- PGPUB; USPAT; USOCR	OR	OFF	2020/06/09 10:39

	"5810440" "5909924" "5909974" "5918935" "5979984" "6015187" "6085153" "6086153" "6582018" "6582019" "6709056" "7036882" "7165811" "7497515" "7857390").PN. OR ("8025334").URPN.				
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9/15/2020 11:53:44 AM

C:\Users\tbrindley\Documents\EAST\Workspaces\16408650.wsp

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

PTO/SB/08a (02-18)

Approved for use through 11/30/2020. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number	
	Filing Date	
	First Named Inventor	Aaron DeJule
	Art Unit	
	Examiner Name	
	Attorney Docket Number	DEJ10730P00072US

U.S.PATENTS						Remove
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	4962962		1990-10-16	Machate et al.	
	2	4911501		1990-03-27	Decker	
	3	6250715		2001-06-26	Caruso	
	4	8025334		2011-09-27	Schmitz et al.	
If you wish to add additional U.S. Patent citation information please click the Add button.						Add
U.S.PATENT APPLICATION PUBLICATIONS						Remove
Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
	1	20160100691		2016-04-14	Masunaga	
	2	20120025574		2012-02-02	Wilkinson	

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Aaron DeJule
Art Unit	
Examiner Name	
Attorney Docket Number	DEJ10730P00072US

3	20150123441		2015-05-07	Duke
4	20130169017		2013-07-04	Masunaga
5	20090261637		2009-10-22	Schmitz
6	20090267394		2009-10-29	Bock
7	20080088163		2008-04-17	Sander
8	20060202530		2006-09-14	Lin

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FOREIGN PATENT DOCUMENTS

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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	37 00447	DE	A1	1987-01-09	VOKO		×

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NON-PATENT LITERATURE DOCUMENTS

[Remove](#)

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		
	First Named Inventor	Aaron DeJule	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	DEJ10730P00072US	

	1		
If you wish to add additional non-patent literature document citation information please click the Add button Add			
EXAMINER SIGNATURE			
Examiner Signature	/TIMOTHY J BRINDLEY/		Date Considered 09/15/2020
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number	
Filing Date	
First Named Inventor	Aaron DeJule
Art Unit	
Examiner Name	
Attorney Docket Number	DEJ10730P00072US

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

See attached certification statement.

The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/John S. Mortimer/	Date (YYYY-MM-DD)	2019-05-10
Name/Print	John S. Mortimer	Registration Number	30407

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

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

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

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Bibliographic Data

Application No: 16/408,650

Foreign Priority claimed: ☐ Yes ☒ No

35 USC 119 (a-d) conditions met: ☐ Yes ☐ No

☐ Met After Allowance

Verified and Acknowledged:

/TIMOTHY J BRINDLEY/

Examiner's Signature

Initials

Title:

APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE
ADJUSTING CHARACTERISTICS

FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
05/10/2019	297	3636	DEJ10730P00072US
RULE			

APPLICANTS

INVENTORS

Aaron DeJule, River Forest, IL, UNITED STATES

Scott Padiak, Glance, IL, UNITED STATES

Paul C. Evans, Bellaire, MI, UNITED STATES

CONTINUING DATA

This application is a CON of 15040735 02/10/2016 PAT 10292498

15040735 has PRO of 62114706 02/11/2015

FOREIGN APPLICATIONS

IF REQUIRED, FOREIGN LICENSE GRANTED**

05/21/2019

**** SMALL ENTITY ****

STATE OR COUNTRY

UNITED STATES

ADDRESS

WOOD, PHILLIPS, KATZ, CLARK & MORTIMER

500 W. MADISON STREET

SUITE 1130

CHICAGO, IL 60661

UNITED STATES

FILING FEE RECEIVED

\$885

EAST Search History

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S16	42	(frame and (user or occupant) and weight and (component or backrest or seatback) and force and relative and (adjust or adjusting or adjustment)).clm.	US-PGPUB; USPAT	OR	OFF	2018/12/20 11:07
S17	109	(frame and (user or occupant) and weight and (component or backrest or seatback) and force and relative).clm.	US-PGPUB; USPAT	OR	OFF	2018/12/20 11:07

9/15/2020 11:53:53 AM

C:\Users\tbrindley\Documents\EAST\Workspaces\16408650.wsp

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	APPARATUS WITH WEIGHT RESPONSIVE
	)	CHANGEABLE ADJUSTING
AARON DEJULE	)	CHARACTERISTICS
	)	
	)	Examiner: Timothy J. Brindley
Serial No. 16/408,650	)	
	)	Group Art Unit 3636
Filed: May 10, 2019	)	
	)	Confirmation No. 8329

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

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

Sir:

In the September 21, 2020 Office Action, the Examiner has set forth a Statement of Reasons for Allowance.

In paragraph 2 under the heading "Allowable Subject Matter", the Examiner has identified certain limitations that are not disclosed in certain prior art references noted. Applicant respectfully submits that the patentability of each claim must be determined by considering the combination of all limitations.

Respectfully submitted,

WOOD, PHILLIPS, KATZ,
CLARK & MORTIMER

By /John S. Mortimer/

John S. Mortimer
Reg. No. 30,407

Dated: September 22, 2020

500 West Madison Street
Suite 1130
Chicago, IL 60661-2562
(312) 876-2113

Electronic Acknowledgement Receipt	
EFS ID:	40627950
Application Number:	16408650
International Application Number:	
Confirmation Number:	8329
Title of Invention:	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS
First Named Inventor/Applicant Name:	Aaron DeJule
Customer Number:	32116
Filer:	John Stirling Mortimer/Linda Bowen
Filer Authorized By:	John Stirling Mortimer
Attorney Docket Number:	DEJ10730P00072US
Receipt Date:	22-SEP-2020
Filing Date:	10-MAY-2019
Time Stamp:	13:33:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Post Allowance Communication - Incoming	16408650_Comments.pdf	39211	no	1
			e6c83c29b7a4bd0cf9ec0019d56a7c5f0869e3b		

Warnings:

Information:	
Total Files Size (in bytes):	39211
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.	

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), by mail or fax, or via EFS-Web.

By mail, send to: Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

By fax, send to: (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 3 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Name: Use Block 1 for any change of address)

33116 7529 09/11/2020
WOOD, PHILLIPS, KATZ, CLARK & MORTIMER
500 W. MADISON STREET
SUITE 1130
CHICAGO, IL 60661

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being transmitted to the USPTO via EFS-Web or by facsimile to (571) 273-2885, on the date below.

Linda Bowen (Typed or printed name)
Linda Bowen (Signature)
December 16, 2020 (Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/408,650	05/10/2019	Aaron DeJule	DE110730PG0072US	8329

TITLE OF INVENTION: APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	\$500	\$0.00	\$0.00	\$500	12/21/2020

EXAMINER	ART UNIT	CLASS-SUBCLASS
BRINDLEY, TIMOTHY J	3636	297-285000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-09 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

(1) The names of up to 3 registered patent attorneys or agents OR, alternatively,

(2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1. Wood, Phillips, Katz,

2. Clark & Mortimer

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document must have been previously recorded, or filed for recordation, as set forth in 37 CFR 3.11 and 37 CFR 3.81(a). Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

Aaron DeJule

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

River Forest, IL

Please check the appropriate assignee category or categories (will not be printed on the patent) ☒ Individual ☐ Corporation or other private group entity ☐ Government4a. Fees submitted: ☒ Issue Fee ☐ Publication Fee (if required) ☐ Advance Order - # of Copies

4b. Method of Payment: (Please first reapply any previously paid fee shown above)

☒ Electronic Payment via EFS-Web ☐ Enclosed check ☐ Non-electronic payment by credit card (Attach form PTO-2038)

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment to Deposit Account No. 23-0785

5. Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

☐ Applicant asserting small entity status. See 37 CFR 1.27

☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment. NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature: *John S. Mortimer*
Typed or printed name: John S. Mortimer

Date: 12/16/20

Registration No. 30,407

Electronic Patent Application Fee Transmittal				
Application Number:		16408650		
Filing Date:		10-May-2019		
Title of Invention:		APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS		
First Named Inventor/Applicant Name:		Aaron DeJule		
Filer:		John Stirling Mortimer/Linda Bowen		
Attorney Docket Number:		DEJ10730P00072US		
Filed as Small Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
UTILITY APPL ISSUE FEE	2501	1	500	500

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				500

Electronic Acknowledgement Receipt	
EFS ID:	41408858
Application Number:	16408650
International Application Number:	
Confirmation Number:	8329
Title of Invention:	APPARATUS WITH WEIGHT RESPONSIVE CHANGEABLE ADJUSTING CHARACTERISTICS
First Named Inventor/Applicant Name:	Aaron DeJule
Customer Number:	32116
Filer:	John Stirling Mortimer/Linda Bowen
Filer Authorized By:	John Stirling Mortimer
Attorney Docket Number:	DEJ10730P00072US
Receipt Date:	16-DEC-2020
Filing Date:	10-MAY-2019
Time Stamp:	17:44:31
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	DA
Payment was successfully received in RAM	\$500
RAM confirmation Number	E2020BFH45350579
Deposit Account	
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:	

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	16408650_Issue_Fee.pdf	109297	no	1
			fd8130610ea518ef40315bce1e89cf3d2b3249a		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30632	no	2
			bc47261983bf90d612fce9f71300e8e2e4d62fa1		
Warnings:					
Information:					
Total Files Size (in bytes):			139929		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
16/408,650	01/19/2021	10893753	DEJ10730P00072US	8329

32116 7590 12/29/2020

WOOD, PHILLIPS, KATZ, CLARK & MORTIMER
500 W. MADISON STREET
SUITE 1130
CHICAGO, IL 60661

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Aaron DeJule, River Forest, IL;
Scott Padiak, Glance, IL;
Paul C. Evans, Bellaire, MI;

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