US008052586B2

(12) **United States Patent**
Hahn

(10) **Patent No.: US 8,052,586 B2**
(45) **Date of Patent: Nov. 8, 2011**

(54) **LADDER BARREL WITH CAM LOCK**

(75) Inventor: **Christopher J. Hahn**, Longmont, CO (US)

(73) Assignee: **Hart Wood, Inc.**, Longmont, CO (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **12/686,182**

(22) Filed: **Jan. 12, 2010**

(65) **Prior Publication Data**

US 2010/0179038 A1 Jul. 15, 2010

Related U.S. Application Data

(60) Provisional application No. 61/144,375, filed on Jan. 13, 2009.

(51) **Int. Cl.**
A63B 26/00 (2006.01)

(52) **U.S. Cl.** **482/142**

(58) **Field of Classification Search** 482/35, 482/36, 131, 132, 142, 144, 95, 96, 140; 472/135, 136

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,396,341	A *	3/1946	Perry	472/116
2,673,736	A *	3/1954	Fiumedoro	482/142
4,398,713	A *	8/1983	Ellis	482/145
D284,597	S	7/1986	Smith et al.	
4,884,804	A	12/1989	Fenwick	
4,911,438	A	3/1990	Van Straaten	
5,066,005	A	11/1991	Luecke	
5,221,246	A *	6/1993	Torii	482/144
5,338,278	A	8/1994	Endelman	
6,371,895	B1	4/2002	Endelman et al.	
6,527,685	B2	3/2003	Endelman et al.	
6,692,418	B2 *	2/2004	Shahan	482/144
7,104,937	B2	9/2006	Arbuckle et al.	
7,179,207	B2	2/2007	Gerschefske	
7,288,053	B2	10/2007	Endelman et al.	
7,311,644	B2	12/2007	Hale	
7,452,313	B2 *	11/2008	Endelman	482/140
2006/0116262	A1 *	6/2006	Pandozy	482/142
2008/0015096	A1 *	1/2008	Isacowitz et al.	482/130
2008/0161173	A1 *	7/2008	Campanaro et al.	482/133
2010/0152004	A1 *	6/2010	Feltz	482/142

* cited by examiner

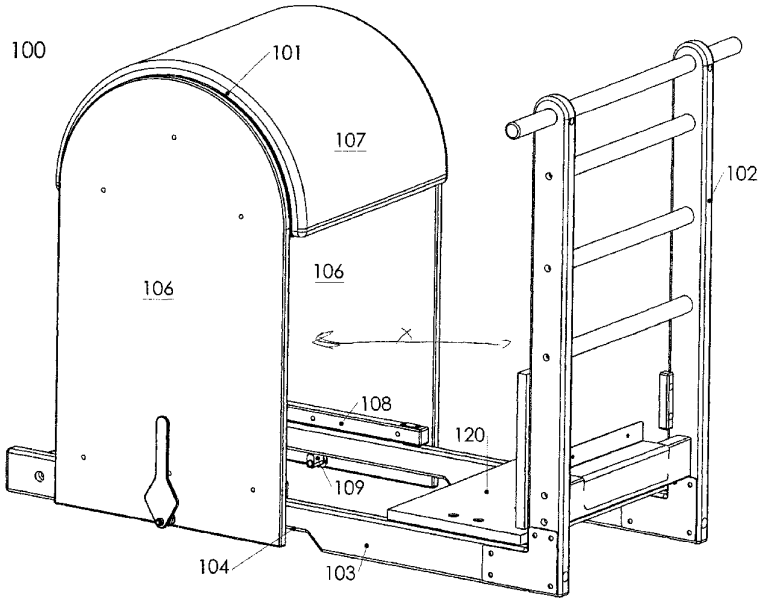
Primary Examiner — Allana Lewin

(74) *Attorney, Agent, or Firm* — Margaret Polson; Oppedahl Patent Law Firm LLC

(57) **ABSTRACT**

A ladder barrel for use in Pilates type exercise is disclosed. The adjustment mechanism to hold the barrel in place on the floor rail comprises a locking rail and a cam mechanism to press the locking rail into engagement with the floor rail, holding the barrel in position. The locking rail has spring biased plungers to hold it out of engagement with the floor rail when the cam is not engaged.

10 Claims, 8 Drawing Sheets



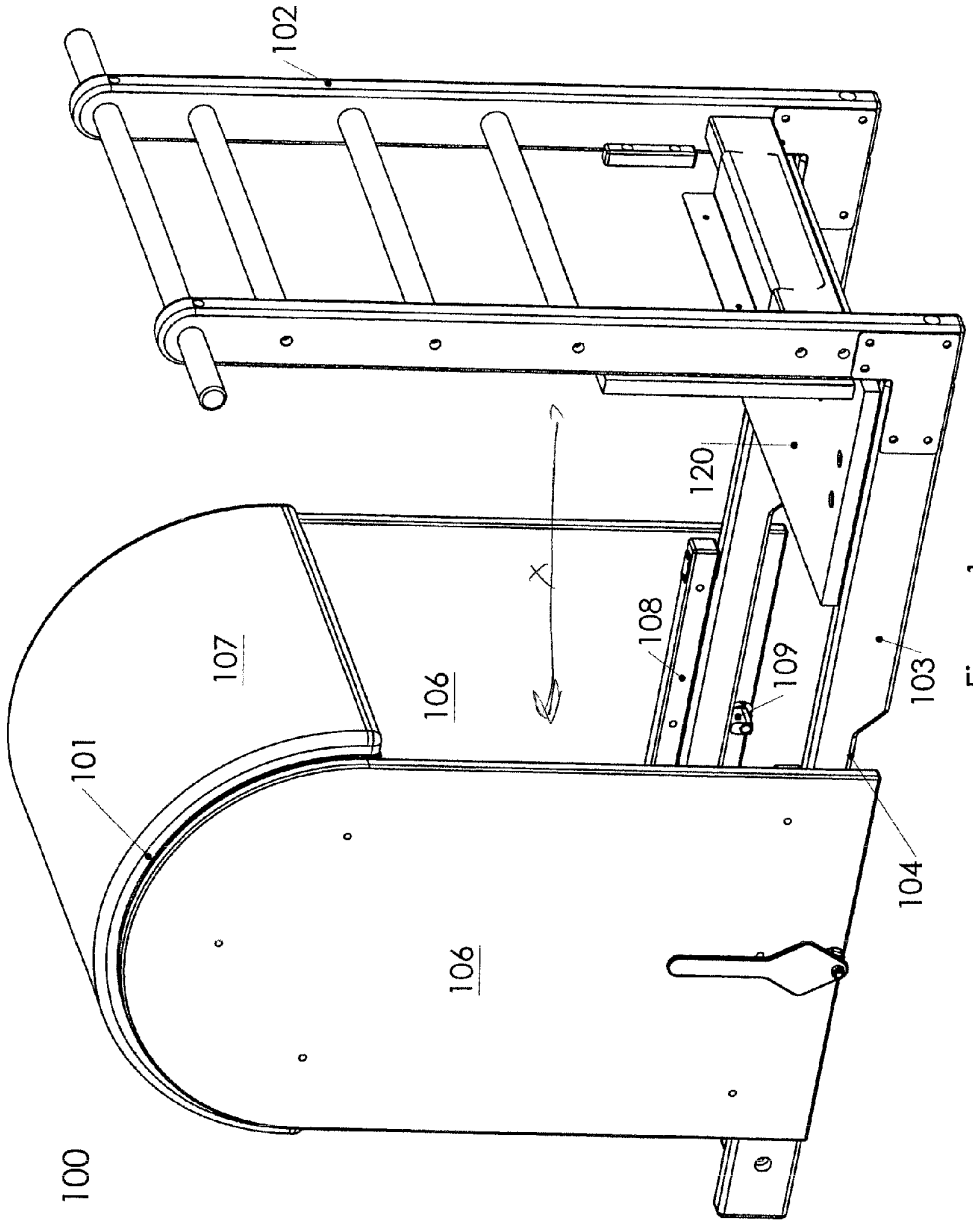


Figure 1

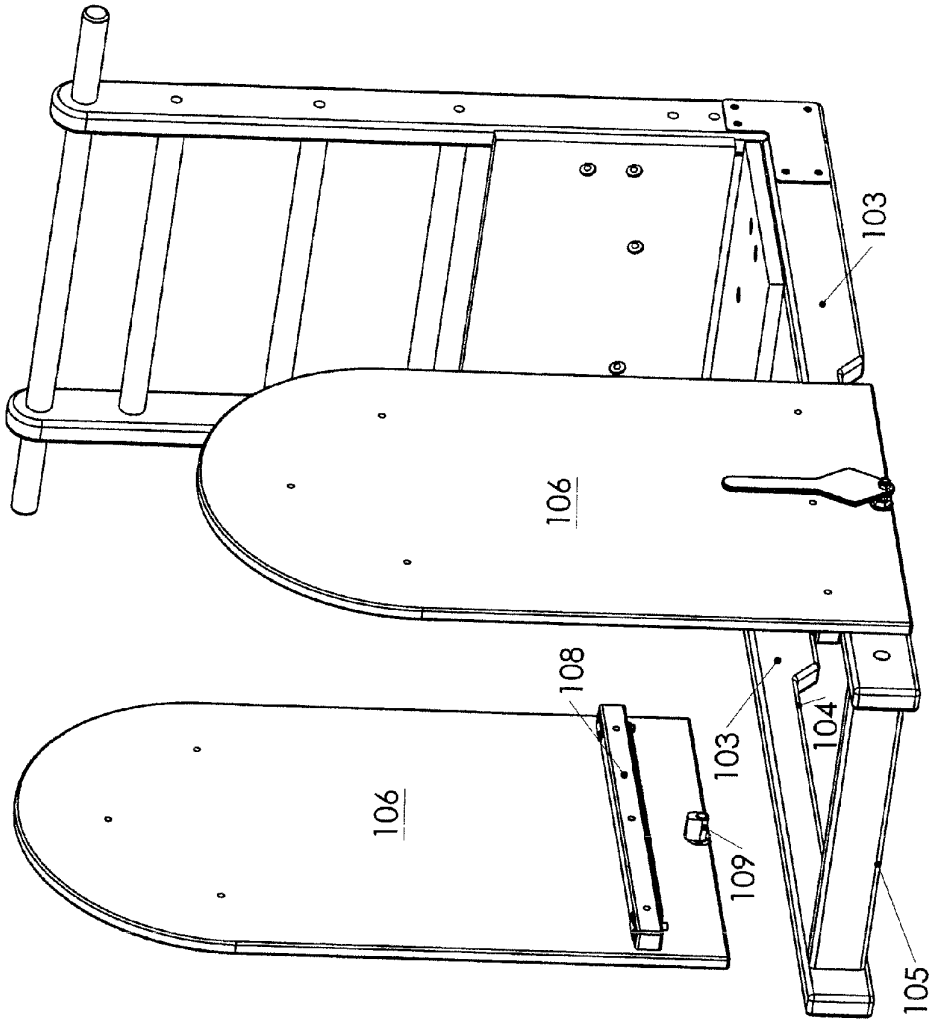


Figure 2

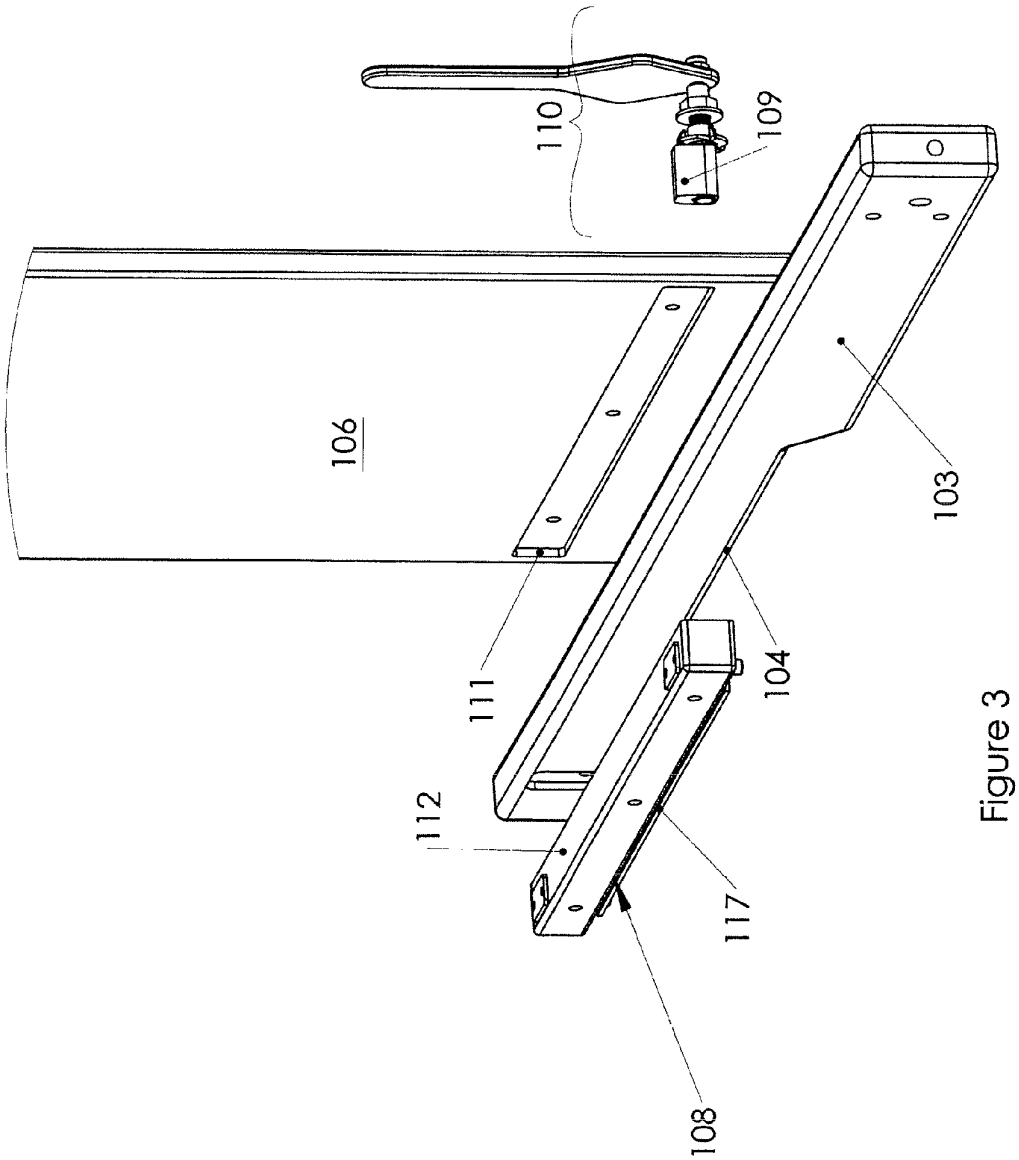


Figure 3

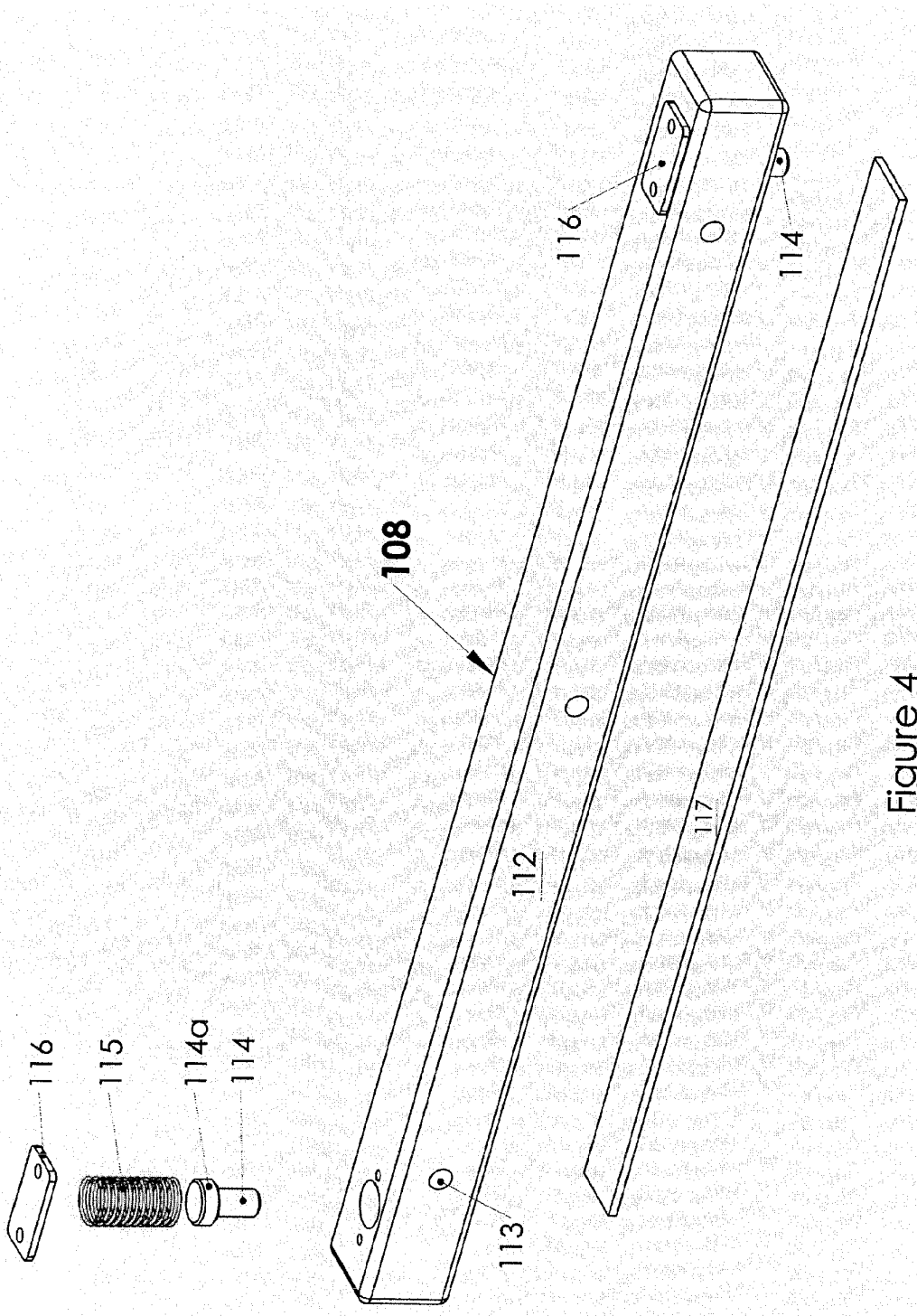


Figure 4

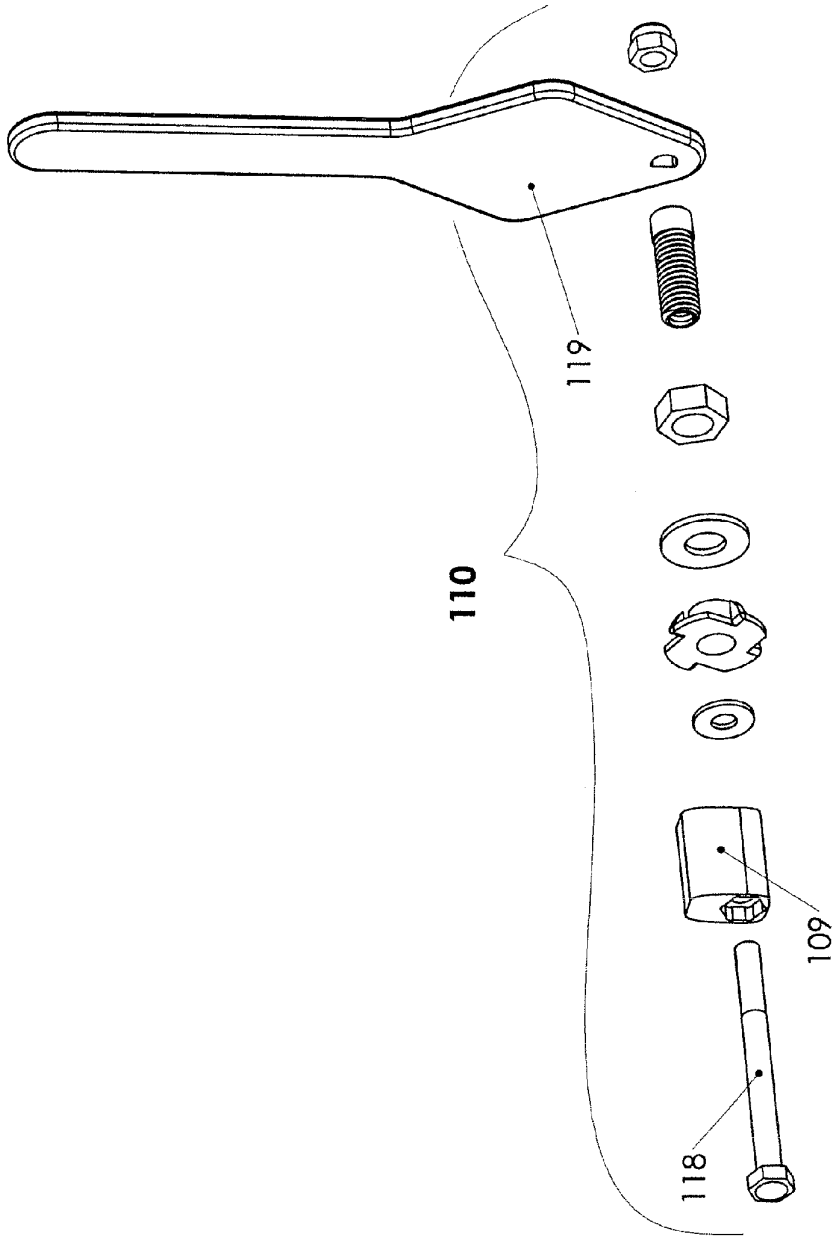


Figure 5

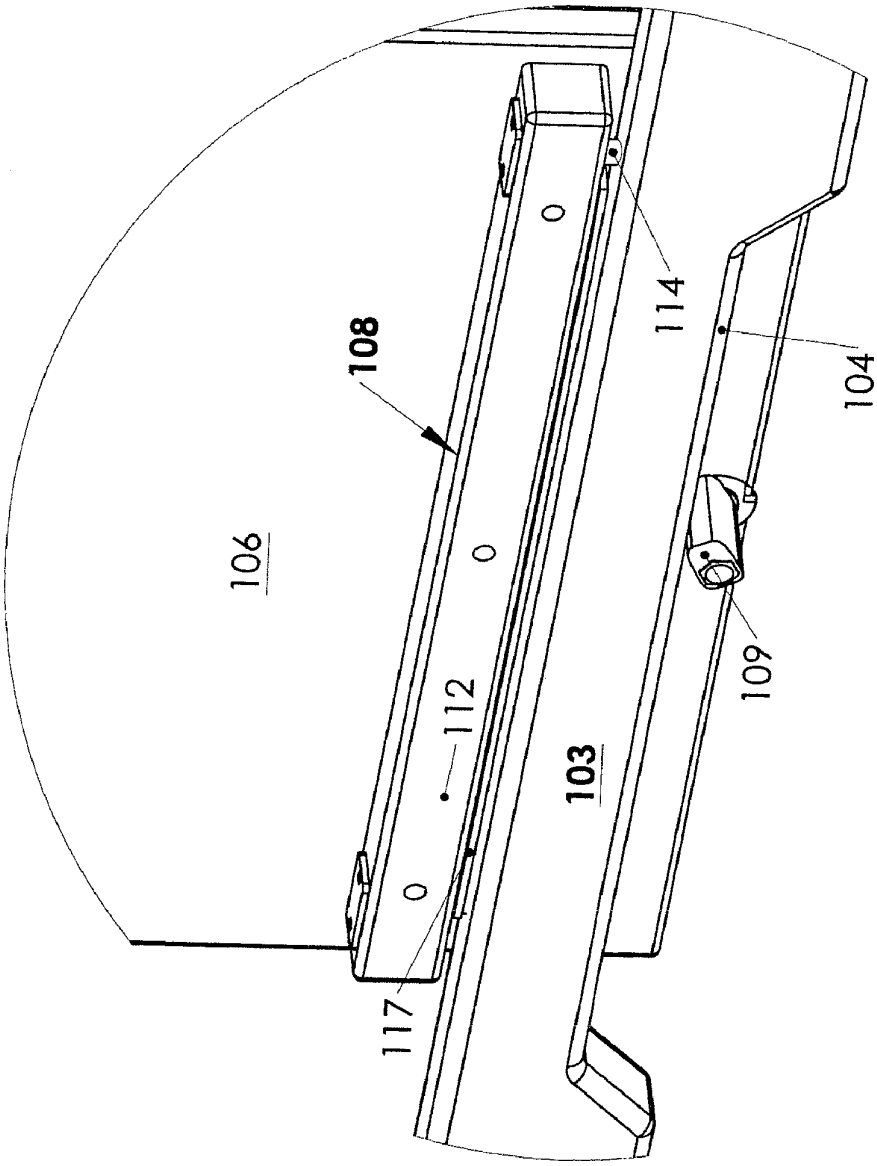


Figure 6

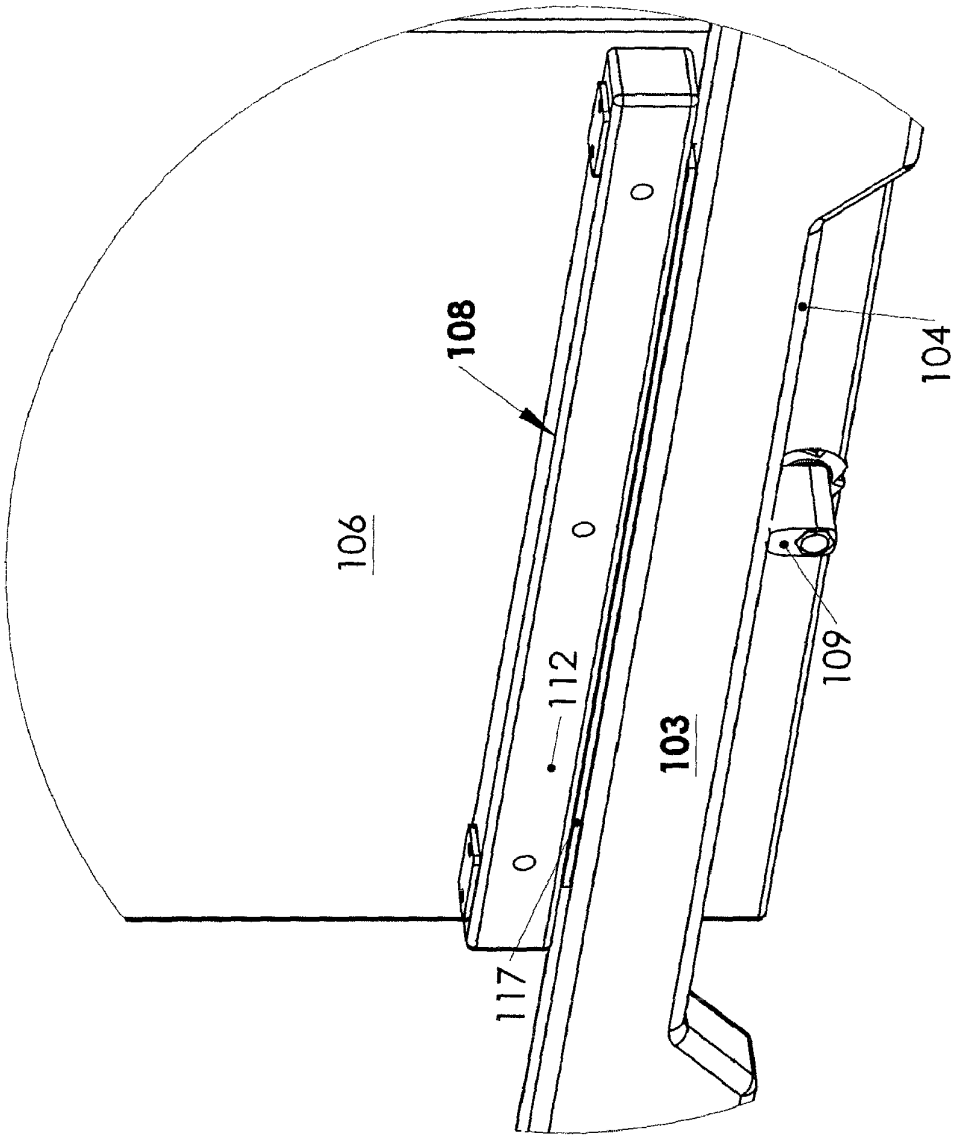


Figure 7

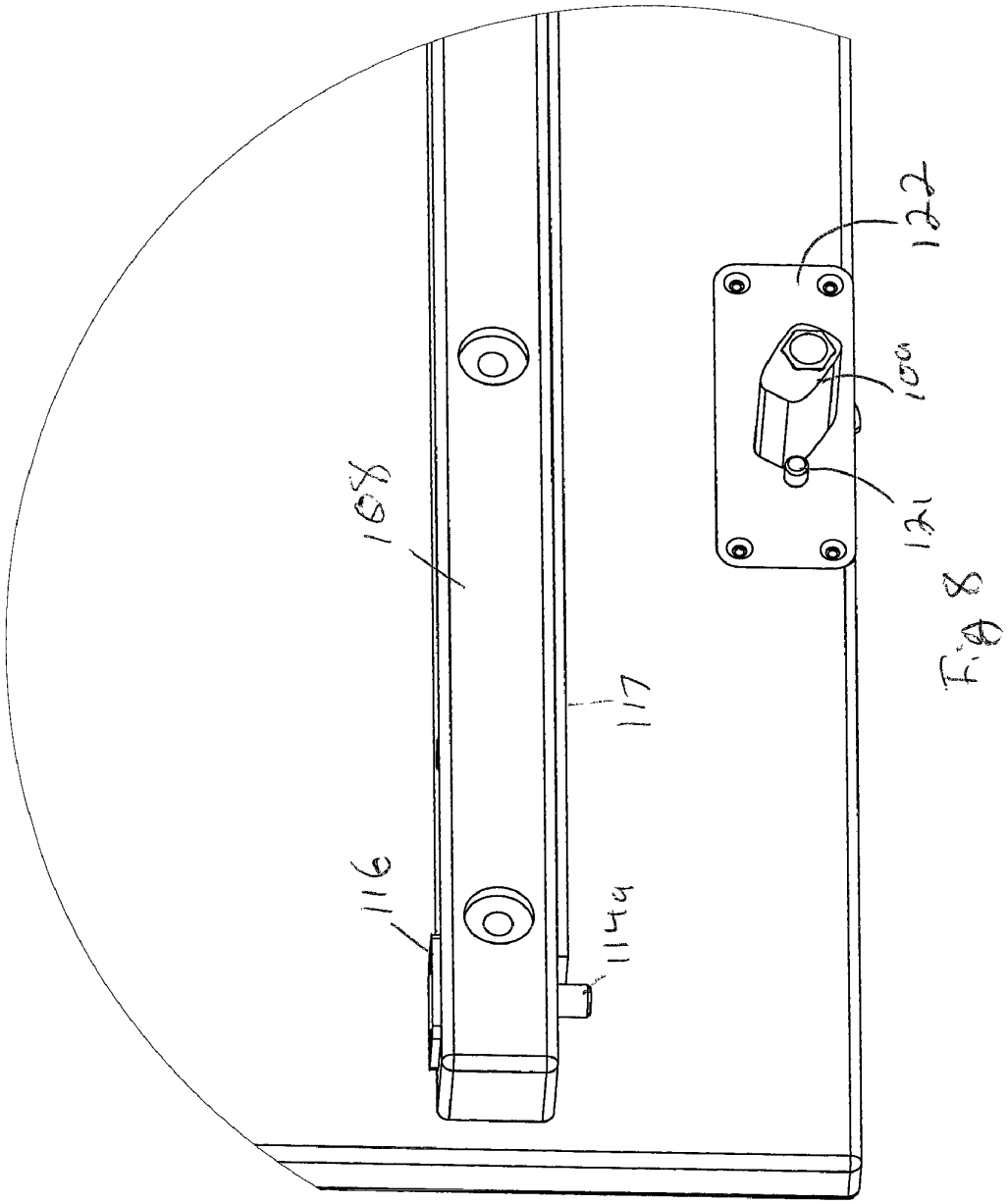


Fig 8

LADDER BARREL WITH CAM LOCK

CROSS REFERENCE APPLICATIONS

This application is a non-provisional application claiming the benefits of provisional application Ser. No. 61/144,375 filed Jan. 13, 2009.

BACKGROUND

Ladder barrels are a well known piece of exercise equipment, most often used in a Pilates type exercise program. In order to be usable by a number of people, it is well known in the art to make the ladder barrel **100** such that the distance between the barrel **101** and the ladder **102** can be varied by sliding the barrel along the floor rails **103**. In prior art ladder barrel (not shown) the barrel **101** is generally secured to the floor rails with threaded clamps. It is important that the barrel **101** be firmly secured in place, since any movement of the barrel during use could result in injury to a user. However, threaded clamps can be difficult to screw tight enough and, if screwed tight enough, can be difficult to unscrew.

The foregoing example of the related art and limitations related therewith are intended to be illustrative and not exclusive. Other limitations of the related art will become apparent to those of skill in the art upon a reading of the specification and a study of the drawings.

SUMMARY

One aspect of the present invention is to provide a ladder barrel that can be easily adjusted in a safe, secure manner.

The following embodiments and aspects thereof are described and illustrated in conjunction with systems, tools and methods which are meant to be exemplary and illustrative, not limiting in scope. In various embodiments, one or more of the above described problems have been reduced or eliminated, while other embodiments are directed to other improvements.

In addition to the exemplary aspects and embodiments described above, further aspects and embodiments will become apparent by reference to the accompanying drawings forming a part of this specification wherein like reference characters designate corresponding parts in the several views.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a back perspective view of a ladder barrel.

FIG. **2** is a partially exploded view of the barrel sides and floor rails.

FIG. **3** is a partially exploded view of the floor rail, cam lock, locking rail, and barrel side.

FIG. **4** is an exploded view of the locking rail.

FIG. **5** is an exploded view of the cam assembly.

FIG. **6** is a side view of the adjustment mechanism with the cam assembly in the unlocked position.

FIG. **7** is a side view of the adjustment mechanism with the cam assembly in the locked position.

FIG. **8** is a perspective view of an alternate embodiment of the cam assembly with stops for the cam.

Before explaining the disclosed embodiment of the present invention in detail, it is to be understood that the invention is not limited in its application to the details of the particular arrangement shown, since the invention is capable of other embodiments. Exemplary embodiments are illustrated in referenced figures of the drawings. It is intended that the embodiments and figures disclosed herein are to be considered illustrative rather than limiting. Also, the terminology used herein is for the purpose of description and not of limitation.

DETAILED DESCRIPTION OF THE DRAWINGS

Referring first to FIG. **1**, the ladder barrel **100** has a barrel **101** and ladder **102** connected with floor rails **103**. The barrel **101** slides on floor rails **103** to allow the user to adjust the distance X between the ladder **102** and barrel **101**. The ladder **102** is attached at one end of the floor rails **103**. The floor rails **103** have their height reduced by recess **104** along a portion of the length on the underside in order to accommodate the cam **109** in the depicted embodiment. Alternatively, the floor rail **103** could have feet at each end to control the amount of distance the barrel **101** could travel (not shown). The floor rails **103** are connected together at the end opposite the ladder **102** by end piece **105**, as shown in FIG. **2**. These end pieces **105** could also act as a stop on that end of the floor rails **103**. The board **120** is an optional piece that allows the user to change effective height of barrel by changing the surface that the user is standing on and is known in the art. The floor rail **103**, ladder **102** and end piece **105** form a rigid, rectangular frame that sits on the floor. The size of the rectangle will depend on the desired width of the ladder barrel and the range of length X desired in a given device.

The barrel **101** has two mirror image sides **106** and a top **107**. Each side **106** has on its lower inner surface a locking rail **108** and a rotatably mounted cam **109** which are parts of the adjustment mechanism, as discussed below. The locking rail **108** and the cam **109** are spaced vertically apart by a distance that is slightly larger the dimension of the floor rail **103** at the recess **104** as seen in FIGS. **1** and **2**. The two sides **106** are placed with the cam **109** and locking rail **108** in position in the recess **104** and are then held in place by top **107**.

Referring next to FIG. **3**, each side **106** has a recess **111** for precisely locating and maintaining the position of the locking rail **108**, where it is attached to the side **106**. The locking rail **108** must be in a fairly precise location relative to the cam **109** in order to properly engage the friction pad to produce a sufficient coefficient of friction to hold the barrel in a fixed position when being used by a person to perform various maneuvers on the ladder barrel **100**. The exact distance will depend on the thickness and coefficient of friction of the friction pad The recess **111** allows for the locking rail **108** to be installed in a set location. Other means of precisely locating the locking rail **108** relative to the cam **109** would work as well. The locking rail **108** can be attached with screws, nails, glue, welding or other known attachment mechanism. Alternatively, the body **112** of the locking rail **108** can be formed as part of the side **106**. The cam assembly **110** is rotatably mounted in hole (not shown) below the locking rail **108**. Alternately, the cam and the locking rail could be reversed, with the cam on top (not shown). The locking rail **108** has a body **112** with at least two spring-mechanism holes **113**, as seen in FIG. **4**. Plungers **114** are placed in the spring mechanism holes **113**, along with springs **115** and caps **116**. The plungers **114** are placed in the holes **113** with the spring **115** between the plunger **114** and the cap **116**. The top **114***a* of the plunger **114** is wider that the remainder of the plunger **114** in order to retain the plunger **117** in spring mechanism holes **113**. The holes **113** have a corresponding narrowing at the bottom to retain the top **114***a* in the holes **113**. The spring **115** acts to bias the plungers **114** to the extended position with at least a portion of the plungers **114** extending from the body **112** by a dimension greater than the thickness of the friction pad **117**. If desired the spring **115** could be replaced with

some other biasing means and the plungers **114** could be replaced with some other spacer, for example spheres. Other methods of mounting the plungers **114** such that they are biased to an extended position could be used as well.

The plungers **114** extend from the side of the body **112** that will be in contact with floor rail **103**. The extending portion of the plungers form feet. Friction pad **117** is placed along the bottom surface of the body **112** between the plungers **114**. Friction pad **117** is made from an elastic material, which is gum rubber in the depicted embodiment. It needs to be compressible, and have a sufficient coefficient of friction to function as discussed below.

FIG. **5** is an exploded view of the cam assembly **110**. The cam **109** is placed on a bolt **118** and attached to handle **119** with appropriate hardware. The remaining hardware both rotatably attaches the cam assembly perpendicularly to side **106** and comprises the axle against which the cam rotates. It is understood that there are any number of hardware configurations that could be used to form a functioning cam assembly **110**. The cam assembly must be sturdy enough to lock the barrel in place as described below and to function repeatedly without failing.

The side **106** mounted on side rail **103** is seen in FIG. **6**, with the cam **109** in the unlocked position. In this position, the springs push the plungers **114** out and against the top surface of rail **103**, disengaging the friction pad **117** such that it is either not in contact with the surface of the floor rail, or only in very minimal contact. This simultaneously lifts the barrel **100**, allowing it to be slid to a desired location along rails **103**.

When the desired location is reached, the handle **119** is turned, moving the cam **109** to the position shown in FIG. **7**. The cam **109** rotates within a vertical plane relative to the side rails, which is different than the prior art locking mechanisms. This is the locked position. In the locked position the friction pad **117** is compressed between the locking rail **108** and the side rail **103**, causing a substantial increase in the coefficient of friction between the two. As can be seen in FIGS. **6** and **7**, the cam **109** is rotated less than 90 degrees to move it from the locked to unlocked position in the depicted embodiment. Depending on the exact shape of the cam **109** and the configuration of the locking rail, the degree of rotation could be even less or could be as much as 180 degrees. This is significantly less than the more than 360 degrees of rotations (and often multiple compete rotations) needed in prior art clamping systems.

The handle **119** is shown as a lever in the depicted embodiment, which adds to the ease of operation. However a simple knob could be used as well, this would merely require greater force to turn. In this position the plungers **114** have been pressed up into the body **112** and the friction pad **117** is engaged under compression. The combination of the clamping pressure of the cam **109** and the increased coefficient of friction between the locking rail **108** and the floor rail **103** caused by the compressed friction pad **117** causes the barrel **101** to be held in a desired position at a chosen distance X from the ladder **102**. Once in a chosen position the user would perform whatever exercises are desired. If desired, the user could then change to position of barrel again to a new position to perform more exercises. The adjustment mechanism needs to be able to hold the barrel in position for the wide variety of exercises that can be performed on a ladder barrel and for a wide range user weights. Due to the leverage of the handle **119** and the increased coefficient of friction provided by the friction pad **117**, the force needed on the end of handle **119** to move cam **109** into the locked position is significantly less than the force needed to hold the barrel in place. Also, the user could operate the depicted embodiment of the handle **119** with a foot, as opposed to having to bend down to tighten screws or other prior art mechanisms. This allows adjustment of the ladder barrel **100** by users with a limited range of movement or limited hand strength.

An alternate embodiment of the cam mounting is shown in FIG. **8**. Stops **121** can be provided on each side of cam **109**, which controls the amount of rotation of handle **119**. This prevents the handle **119** from hitting the floor, which can damage the floor that the ladder barrel **100** is resting on. The stops **121** can be mounted directly on the side **106**, **107**, or on a plate **122** as shown in FIG. **8**. The exact location of the stops **121** that will prevent the handle **119** from hitting the floor will depend on the shape and size of the handle **119**.

While a number of exemplary aspects and embodiments have been discussed above, those of skill in the art will recognize certain modifications, permutations, additions and sub-combinations therefore. It is therefore intended that the following appended claims hereinafter introduced are interpreted to include all such modifications, permutations, additions and sub-combinations are within their true sprit and scope. Each apparatus embodiment described herein has numerous equivalents.

The terms and expressions which have been employed are used as terms of description and not of limitation, and there is no intention in the use of such terms and expressions of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed. Thus, it should be understood that although the present invention has been specifically disclosed by preferred embodiments and optional features, modification and variation of the concepts herein disclosed may be resorted to by those skilled in the art, and that such modifications and variations are considered to be within the scope of this invention as defined by the appended claims. Whenever a range is given in the specification, all intermediate ranges and subranges, as well as all individual values included in the ranges given are intended to be included in the disclosure.

In general the terms and phrases used herein have their art-recognized meaning, which can be found by reference to standard texts, journal references and contexts known to those skilled in the art. The above definitions are provided to clarify their specific use in the context of the invention.

I claim:

1. A ladder barrel comprising:

a base frame having side rails and two end pieces;

a ladder mounted at one end of the base frame;

a barrel slidably mounted on the side rails such that a distance X between the barrel and the ladder can be changed;

at least one cam mechanism and locking rail functioning together to fix the barrel on the side rails at a chosen distance X ;

the cam mechanism having a unlocked position and a locked position;

the cam mechanism being operated by a handle, and the locked and unlocked position being within 180 degrees of each other; and

a friction pad between the locking rail and base frame to increase the friction between the locking rail and the base frame.

2. The ladder barrel of claim **1** wherein the at least one cam mechanism and the locking rail are mounted on the barrel.

3. The ladder barrel of claim **1** wherein the locking rail further comprises at least one biasing mechanism functioning

hold the locking rail away from the base frame to disengage the friction pad when the cam mechanism in the unlocked position.

4. The ladder barrel of claim **1** wherein the cam mechanism is moved from the unlocked to the locked position using a lever.

5. The ladder barrel of claim **3**, wherein the biasing mechanism is at least one plunger biased to an extended position by at least one spring.

6. The ladder barrel of claim **5**, wherein the biasing mechanism is mounted on the locking rail and presses the plunger against the base frame.

7. The ladder barrel of claim **1**, wherein the locked and unlocked position of the cam are within 90 degrees of each other.

8. The ladder barrel of claim **1**, wherein the cam is located beneath the side rail and the locking rail is located above the side rail.

9. The ladder barrel of claim **1**, wherein the friction pad is compressed between the locking rail and the side rail when the cam is in the locked position.

10. The ladder barrel of claim **4** further comprising a stop to prevent the lever from moving beyond a desired amount of rotation.

* * * * *