

[54] **PULL ROPE FRICTION TYPE  
EXERCISING DEVICE**

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[51] Int. Cl. ....A63b 21/00  
[58] Field of Search.....272/79 R, 79 A, 79 B, 79 C,  
272/79 D

[56] **References Cited**

**UNITED STATES PATENTS**

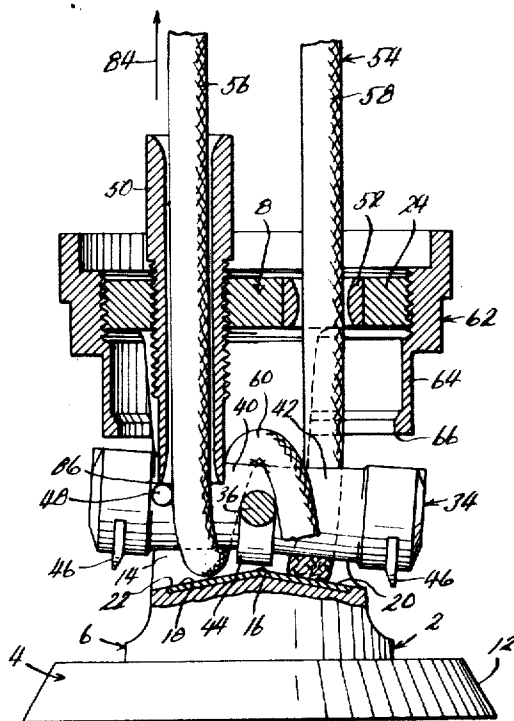
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[57] **ABSTRACT**

A pull rope exercising device including a rope extending in longitudinally running relation through a body member whereby a user may pull on either end thereof to effect said longitudinal movement, a pair of frictional clamping devices carried by said body member and operable by pulling tension on respectively opposite ends of said rope to clampingly engage said rope to resist yieldably the movement of the rope in the direction of pull, each of said clamping devices being independently adjustable, whereby the device may be set to provide different degrees of resistance to pull in respectively opposite directions.

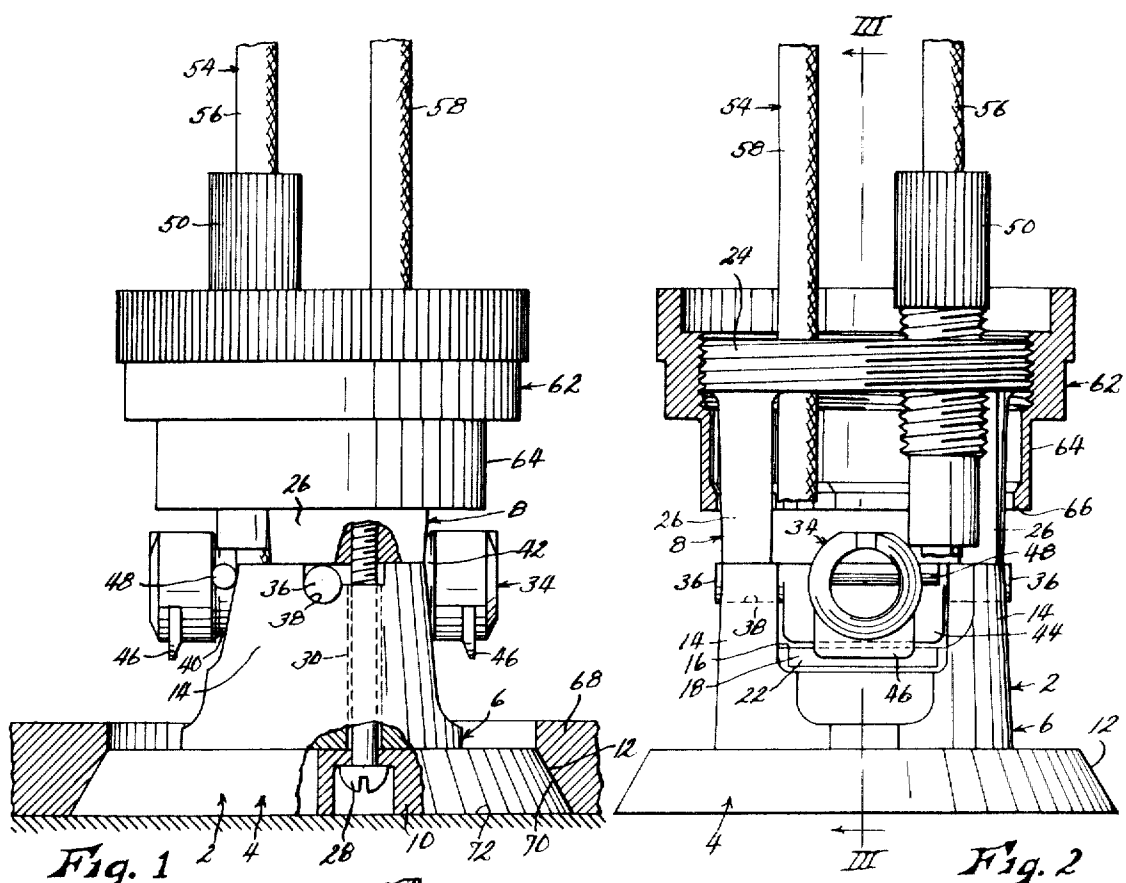
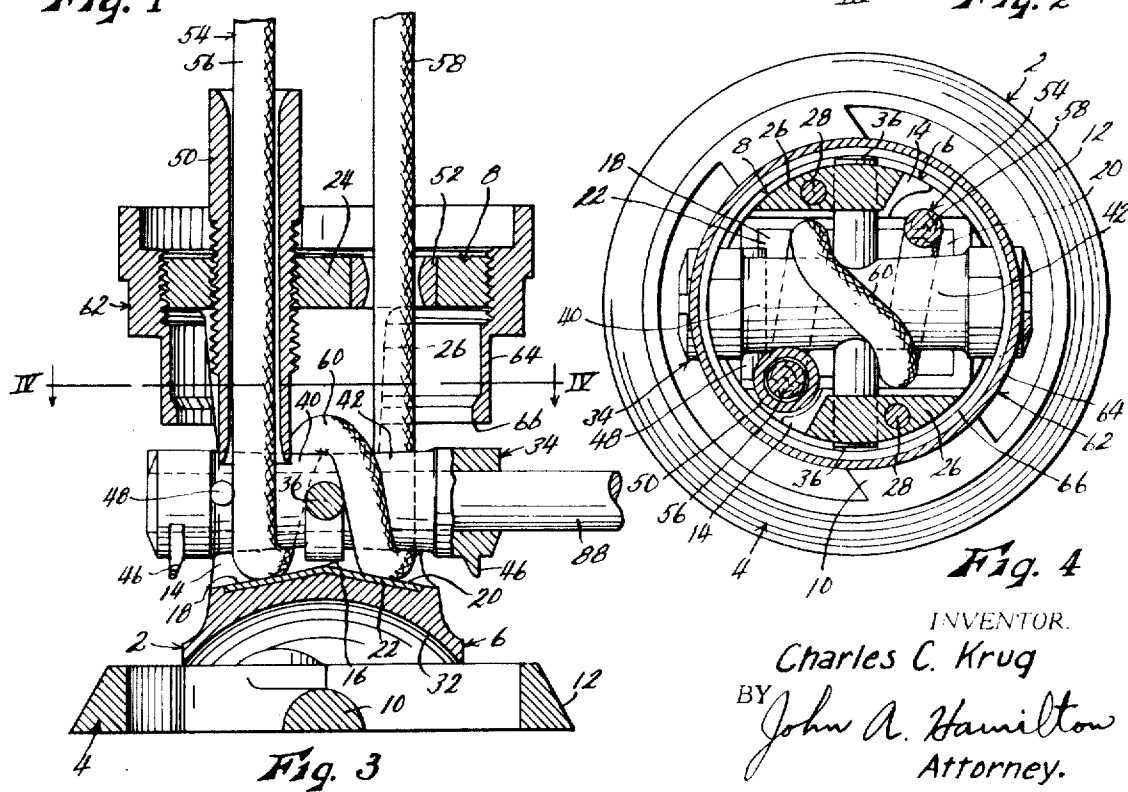
**9 Claims, 8 Drawing Figures**



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SHEET 1 OF 2



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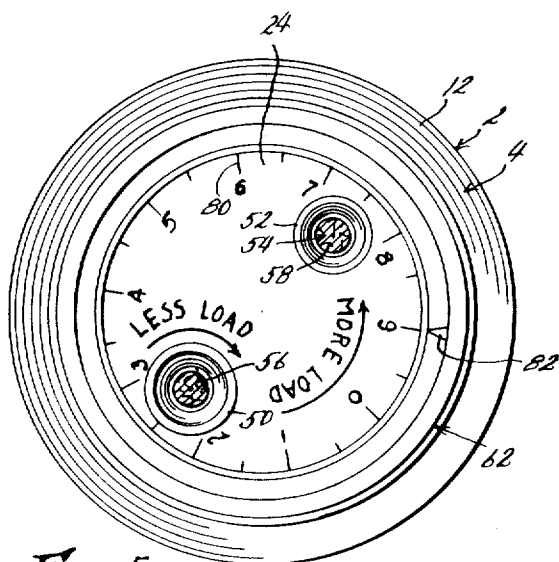


Fig. 5

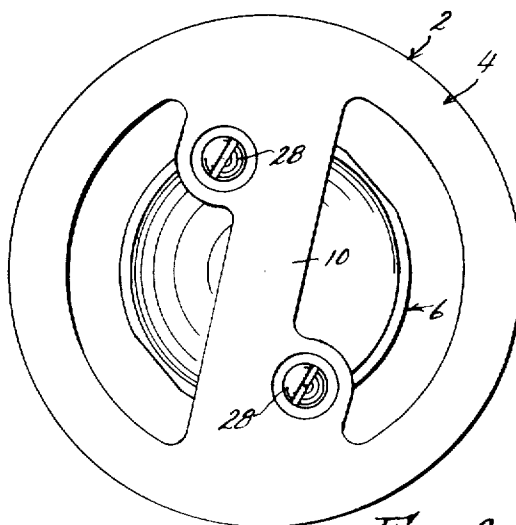


Fig. 6

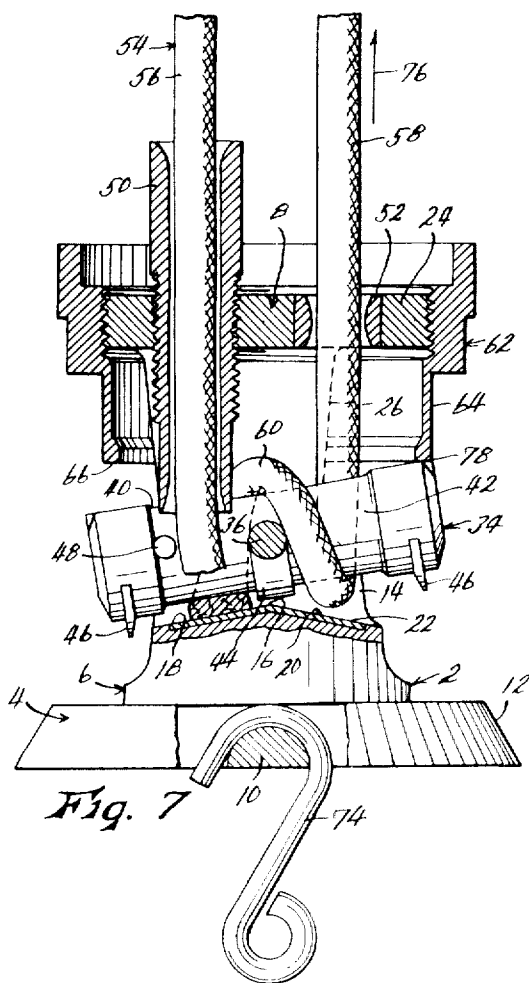


Fig. 7

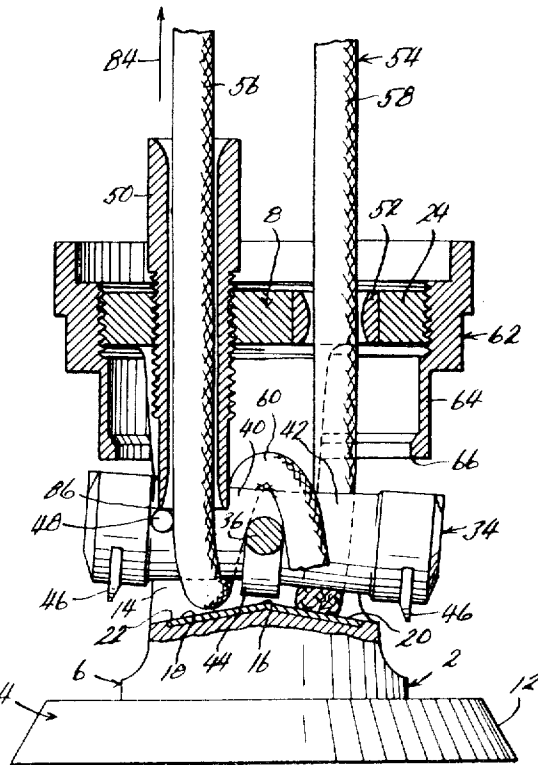


Fig. 8

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## PULL ROPE FRICTION TYPE EXERCISING DEVICE

This invention relates to new and useful improvements in exercising devices of the pull rope type, and is an improvement over the device shown in my own prior U.S. Pat. No. 3,498,608, issued Mar. 3, 1970.

Exercising devices of the pull rope type, in which a rope the opposite ends of which may be grasped and alternately pulled by a user, and the intermediate portion of which extends in longitudinally running relation through a suitably anchored body member including means for yieldably resisting lengthwise movement of the rope to adjustably variable degrees, have come into wide popularity. They are generally small; easily portable, adaptable for use in nearly any surroundings or circumstances, and sufficiently economical to render them easily available to amateurs for home use as well as to professional athletes.

However, all prior exercising devices of this type, including that shown in my own prior patent above referred to, have been such that an equal pulling load is required on each end of the rope to effect lengthwise movement thereof. That is, if a 100 pound pull is required on one end of the rope to move the rope in that direction, a 100 pound pull is also required on the opposite end of the rope to move the rope in the opposite direction. While this condition is acceptable in many cases, there are also circumstances in which it is not. Many persons have unequal strength in their right and left arms, or legs, or shoulders, or generally in any corresponding body members at opposite sides of their bodies. Such unequal strengths may be natural, or the results of injuries, partial paralysis, or the like. Such persons are generally completely incapable of using pull rope exercisers as they have previously existed, since while they may be able to pull one end of the rope with their stronger body member, they cannot pull and move the rope in the opposite direction with their weaker body member. Of course, many prior exercisers of this general type could be adjusted to require a sufficiently small rope pull that such a handicapped person could move it even with his weaker body member, but this would deprive his stronger body member of any benefit or exercise from the device, and also deprive the user of any sense of balanced and coordinated effort between the normal and relatively handicapped portions of his body. This balance and coordination is extremely important in the effective use of a pull rope exerciser as a therapeutic device for aiding persons with injured or partially paralyzed body members to regain the use and strength of said body members.

Accordingly, the object of the present invention is the provision of a pull rope exerciser of the general type described having means whereby the rope tension required to move said rope in respectively opposite directions can be adjusted independently. In this manner, the rope end requiring the stronger pull can be attached to the user's stronger or normal body member, and the rope end requiring the lesser pull can be attached to the user's weaker or handicapped body member, and the rope load then adjusted to a point that the user can pull the rope in alternately opposite directions with what will seem to him to be equal effort. This preserves his sense of balanced coordination between his normal and weakened body members. As the weakened body member regains strength, the required rope pull at the end thereof secured to the user's weaker body member can be correspondingly gradually increased until, ideally, the required rope pull in both directions is equal, and the handicapped body member has recovered full normal strength.

Another object is the provision of a pull rope exerciser of the character described having means operable, whenever desired, to adjust the required pull at both ends of the rope equally and simultaneously.

Other objects are simplicity and economy of construction, and efficiency and dependability of operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing, wherein:

FIG. 1 is an elevational view of a pull rope exercising device embodying the present invention, with portions broken away and shown in section, with the rocker in its neutral position, the device being shown in operative relationship to an anchoring board,

FIG. 2 is a left side view of the device as shown in FIG. 1, with portions broken away and shown in section,

FIG. 3 is a slightly irregular sectional view taken on line III—III of FIG. 2, with portions left in elevation and partially broken away, and showing an alternative mode of adjusting the rope pull,

FIG. 4 is a sectional view taken on line IV—IV of FIG. 3,

FIG. 5 is a top plan view of the device as shown in FIG. 1,

FIG. 6 is an inverted plan view of the device as shown in FIG. 1,

FIG. 7 is a view similar to FIG. 3, showing the position assumed by the parts when one end of the rope is pulled, and

FIG. 8 is a view similar to FIG. 7 showing the position assumed by the parts when the other end of the rope is pulled.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies generally to the body member of the device, said body member including a mounting ring 4, a lower body member 6, and an upper body member 8. Mounting ring 4 is disposed at the bottom of the body member. For convenience, the body member will be described as though its axis were generally vertical, with ring 4 disposed horizontally at the bottom thereof, although as will appear the body member may be utilized in any position. Mounting ring 4 is provided with an integral, generally diametric cross bar 10, and its external peripheral surface 12 is tapered upwardly in frusto-conical form, for a purpose which will presently appear.

Lower body member 6 is generally circular at its lower end, though of smaller diameter than ring 4, resting on cross bar 10 coaxially of said ring, and provides two upwardly extending transversely spaced apart legs 14. Between said legs, said lower body member presents an upwardly facing surface of inverted V-form, the apex 16 of said surface extending horizontally and transversely between legs 14, and the areas at transversely opposite sides of said apex forming planar bearing surfaces 18 and 20 respectively. Said bearing surfaces are planar, and are inclined equally but oppositely to the vertical axis of the body. Preferably, said bearing surfaces are formed by a sheet 22 of stainless steel or the like bent to an inverted V-form and set rigidly into lower body member 6. Bearing surfaces 18 and 20 are disposed well below the upper ends of legs 14.

Upper body member 8 constitutes a circular horizontal top plate 24 concentric with but of smaller diameter than ring 4, and a pair of vertically depending, transversely spaced apart legs 26. Legs 26 are vertically aligned with legs 14 of the lower body member, the lower ends of the former engaging the upper ends of the latter. Mounting ring 4, and lower and upper body members 6 and 8, are held rigidly in assembly by a pair of screws 28 (see FIGS. 1, 4, and 6) extending upwardly through mounting ring 4, through bores 30 provided therefor in the legs 14 of lower body member 6, and threaded into the lower ends of legs 26 of upper body member 8. The peripheral edge of top plate 24 is threaded, and the lower surface of lower body member 6 is concavely recessed as indicated at 32 (see FIG. 3) in order to provide central clearance between said lower body member and cross bar 10 of mounting ring 4, for a purpose which will presently appear.

A generally cylindrical, tubular rocker 34 extends generally horizontally between the corresponding leg pairs 14-26 of the body member, its longitudinal axis extending transversely to and above apex 16 of bearing surfaces 18 and 20. At its midpoint, said rocker is provided with integral, oppositely extending horizontal stub axles 36. Said axles are journaled in notches 38 formed therefor in the upper ends of legs 14 of the lower body member, and are retained therein by the legs 26 of the upper body member, which overlie said notches. The rocker may thus tilt pivotally in either direction from horizon-

tal on axles 36, with its horizontal position, as shown in FIG. 3, being referred to as its neutral position. The portions 40 and 42 of the rocker at the respectively opposite sides of the pivotal axis thereof defined by axles 36, and which respectively overlie bearing surfaces 18 and 20, are tapered conically toward the midpoint of the rocker. Said rocker is provided at its midpoint, in alignment with axles 36, with a depending lug 44 which extends closely adjacent, but does not engage, apex 16 of bearing surfaces 18 and 20. The transverse width of said lug is such as to maintain the rocker in centered relation between legs 14 of the lower member. The rocker is also provided adjacent each end thereof with a depending lug 46, lugs 44 and 46 having a purpose which will presently appear. Adjacent the end of the rocker overlying bearing surface 18, a pin 48 is affixed horizontally and transversely therein, extending transversely outwardly from one side of said rocker.

A tubular rope guide 50 is disposed vertically above pin 48, and is threadably engaged in top plate 24 for vertical adjustment therein. At certain times, as will appear, the lower end of said guide is disposed sufficiently low to engage and limit the upward movement of pin 48, and hence of the associated end of the rocker. Guide 50 is offset laterally of the rocker sufficiently that it does not engage or inhibit pivoting of the rocker itself, and pin 48 is so positioned that it engages the lower end of the guide only adjacent the peripheral edge thereof so as not to interfere with the passage of a rope through said guide. A rounded eyelet 52 set in top plate 24 provides another rope passage through said top plate, said eyelet being disposed above the opposite end portion 42 of the rocker (guide 50 being disposed above rocker end portion 40), and being offset laterally from said rocker at the side thereof opposite from guide 50.

A rope forming a part of the device is indicated at 54, a woven or braided nylon cord having been found satisfactory. Although it constitutes a single continuous length, it may for convenience be said to have two end portions 56 and 58 projecting upwardly from top plate 24, and an intermediate portion 60 wrapped around rocker 34. Starting with end portion 56, said rope extends downwardly through tubular guide 50, then passes under end portion 40 of the rocker so as to be disposed between said end portion and bearing surface 18, then passes over the top of the rocker at the midpoint thereof, then passes under end portion 42 of the rocker so as to be disposed between that end portion and bearing surface 20, and finally passes upwardly through eyelet 52 to form end portion 58 thereof. Said rope may of course be of any desired length, and may have handles, not shown, attached to the respective ends thereof for grasping by the user, by means of which he may pull alternately on the rope ends in the use of the device.

An adjusting ring 62 of generally cylindrical form is disposed coaxially with the body member, and is internally threaded for screw engagement with the periphery of top plate 24 of the body member. It is of smaller diameter than mounting ring 4. Said adjusting ring is provided with a coaxial depending cylindrical skirt 64 the diameter of which is slightly less than the axial length of rocker 34, and which is provided at its lower end with an internal peripheral flange 66. Flange 66 is disposed above rocker 34, and serves to engage and variably limit the upward movement of both ends of said rocker, depending on the elevation at which the adjusting ring has been set by screwing it upwardly or downwardly relative to plate 24. The external periphery of ring 62, as well as the upper end of rope guide 50, are knurled as shown to facilitate easy manual adjustment thereof.

Body member 2 must be firmly anchored while in use in order to resist the pulls exerted on the ends of rope 54. One anchoring means is shown in FIG. 1, and comprises a board 68 having an upwardly tapering hole 70 formed therein of a size to engage snugly the correspondingly tapered periphery 12 of mounting ring 4, as shown. Body member 2 is inserted upwardly through hole 70 until ring 4 engages therein, and the board and ring rested on the floor or other horizontal surface

72. The user may then stand on the board, which may of course be of any desired extent, with his feet disposed respectively at opposite sides of body member 2, and pull alternately upwardly on rope ends 56 and 58. In FIG. 7, a hook 74 is engaged about cross bar 10 of the mounting ring. Said hook may be secured in the floor, or in vertical walls, or to overhead frameworks, depending on the desired position of usage. Cross bar 10 also renders it convenient to anchor the body members by means of straps, chains, and the like.

In operation of the device, with body member anchored as just described or in any suitable manner; the user grasps rope ends 56 and 58, or handles affixed thereto, and pulls alternately thereon, or the rope ends are tied or otherwise fastened to portions of his body in such a manner that the desired exercise will exert pulling forces alternately on the rope ends. The pulling force on the rope tends to cause the rocker to "run" lengthwise through the body member, around rocker 34, but this movement of the rope is resisted by the frictional clamping of the rope between the rocker and bearing surfaces 18 or 20. When the rocker is in its horizontal or neutral position, as shown in FIG. 3, the rocker ends 40 and 42 are spaced equally from their associated bearing surfaces 18 and 20, and the rope, if it engages said bearing surfaces at all, does so only slightly, not with sufficient friction to materially resist free running of the rope. If the user then pulls on rope end 58, as indicated by arrow 76 in FIG. 7, the rope friction on rocker end 42 pivots that end of the rocker upwardly and moves the rope thereon away from bearing surface 20, and moves rocker end 40 closer to bearing surface 18 to compress or clamp the rope thereon therebetween, as shown. Thus, the rocker by virtue of its stub axle mounting serves as means to actuate frictional clamping on one side thereof and deactivate frictional clamping on the other side thereof. This action yieldably resists movement of the rope, causing an increase in the tension of rope end 58, which in turn increases the tilting load on the rocker and a greater compressive load on the rope. This action, which is so rapid that the user is not conscious of it, continues until the tilting of rocker 34 is arrested by some stop means, or in this case until rocker end 42 engages flange 66 of adjusting ring 62 at 78, after which rope movement can be continued under the load existing at that moment. This loading is rendered adjustable by turning adjusting ring 62 to adjust the elevation of flange 66 with respect to the rocker. Referring to FIG. 5, it will be seen that a scale 80 may be imprinted around the edge of top plate 24, to be read in conjunction with an index mark 82 mounted on the ring, as an aid in accurate presetting of the device to pre-determined loads. In this connection, it should be noted that the rope may, if desired, be wrapped twice around each end of the rocker, rather than once as shown. This provides a different "range" of adjustments, in that the rope is loaded compressively at two points rather than one, substantially doubling the effort required to pull the rope at any given position of rocker 34, and increasing the sensitivity of the adjustment provided by ring 62.

When the user then pulls on rope end 56, as indicated by arrow 84 in FIG. 8, the action is reversed, rocker end 40 being elevated and rocker end 42 being moved toward bearing surface 20 to compress or clamp the rope therebetween, as shown. In this case, the eventual position of rocker 34 may be also determined when rocker end 40 engages flange 66 of the adjusting ring. In this case, the pulling force required to move the rope when pulling on the respectively opposite ends thereof will be equal, the rope being compressed between rocker end 42 and bearing surface 20 to the same degree that it was previously compressed between rocker end 40 and bearing surface 18. However, according to the present invention the motion of rocker 34 under the tension of rope end 56 may be arrested before rocker end 40 engages flanges 66, by the engagement of pin 48 of the rocker with the lower end of guide 50, acting as a stop, at a point designated by the numeral 86 in FIG. 8. This results in the fact that the rope is clamped or compressed to a lesser extent when rope end 56 is pulled, as in

FIG. 8, then when rope end 58 is pulled, as in FIG. 7, so that rope end 56 can be pulled more easily, with less load, than rope end 58. The differential between the loads required to pull the respective ends of the rope can be adjusted by turning rope guide 50 to change the elevation of its lower end with respect to rocker pin 48. The conical shape of rocker ends 40 and 42, or those portions thereof about which the rope is wrapped, tends to cause the rope to move toward the midpoint of the rocker as the rope is pulled, so that the portion of the rope being compressed is wedged toward said midpoint between the rocker and the operative bearing surface to the same degree each time the rope is pulled. Since the rocker is not usually parallel to the operative bearing surface, but provides a tapered opening therebetween, and since variations of the placement of the rope in this opening could cause changes in the required rope pull, this provision is valuable in providing an equal pull each time the rope is pulled. Lug 44 prevents any possibility that the rope could slip over the apex 16 between the bearing surfaces, and lugs 46 prevent any possibility that the rope might slip off of either end of the rocker.

It will be seen that while the load required to pull rope end 56 can be rendered less than that required to pull rope end 58, it can never require more. This is true since as guide 50 is turned to be retracted upwardly to increase the pull load required on rope end 56, it will eventually reach a position at which rocker end 40 engages flange 66 instead of pin 48 engaging guide 50. At this point the pull load required on both ends of the rope is equal, and guide 50 becomes inoperative as a stop. This prevents possible reversal of the differential of forces required to pull the rope ends, which would not be desirable. Also, it permits the device to be set positively to require equal loads at both ends of the rope, which is desirable in many normal usages of the device.

The provision of a pull rope exerciser wherein the load required to pull the respectively opposite ends of the rope may be independently and unequally adjusted has several advantages. As previously discussed, it permits use of the device by persons whose respective arms, or legs, or other corresponding body members are temporarily of unequal strength due to injury, partial paralysis, or the like. The weakened body member grasps or is connected to rope end 56, while the corresponding stronger or normal body member is grasped by or attached to rope end 58. Then, with the pull load differential properly set, the user may pull the rope ends alternately in the normal manner with the sensation of exerting equal effort on both ends of the rope, thus preserving the valuable sense of balanced coordination between his weaker and stronger body members. As his weakened body members gradually regains strength, guide 50 may from time to time be adjusted to require successively greater pull loads on rope end 56, until ideally his affected corresponding body members are of equal strength.

The possibility of unequal pull loads also renders the device useful for exercising a single body member, for example an injured arm or leg. This may be done by attaching rope end 58 to the body member, with adjusting ring 62 set to provide the desired load, while training rope end 56 over a set of pulleys, not shown, and attaching a weight to the extreme end thereof in such a manner that it acts by gravity to exert a pull on rope end 56, with guide 50 set to require little or no load, at least no more than can easily be overcome by the weight. The device may also be set to provide a two-directional exercise for a single body member, this being sometimes desirable, and the movements of some body members in one direction being powered by stronger muscles than those powering their movement in opposite directions. In this case, both ends of rope 54 are attached to said body member, so that rope end 58 resists movement of the body member in its direction of greater strength, and rope end 56 resists movement of the body member in its direction of lesser strength. A system of pulleys, not shown, over which the rope may be trained, may be required to guide the ropes properly in this application.

The device may also be used in coach-controlled athletic exercises. For example, in a running exercise, either end of the rope may be secured to a belt or harness worn by the athlete and a rod 88 of any desired length (see FIG. 3) may be inserted into the hollow interior of rocker 34. The athlete may then be required to run against any rope load, which the coach controls by manipulation of rod 88. In this case, adjusting ring 62 and guide 50 are normally so far retracted as to be totally inoperative as stops limiting or determining the rope load, in order that the coach may have sole control of the load, except of course that the coach may prefer to set the stops to limit the rope pull to some maximum he does not wish to exceed.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention.

What I claim and desire to protect by Letters Patent is:

1. A pull rope exercising device comprising:

- a. a body member,
- b. a length of rope passing through said body member for lengthwise running movement therethrough, both ends of said rope extending outwardly from said body member and adapted to have pulling forces applied thereto,
- c. a pair of friction devices carried by said body member and operable respectively to apply friction to said rope to resist said lengthwise running movement of said rope in respectively opposite directions,
- d. actuating means operable by a pulling force on either end of said rope to actuate the friction device resisting movement of said rope in that direction and to deactivate the other of said friction devices, and
- e. a pair of adjusting means each operable to adjust the degree of friction applied to said rope by one of said friction devices, said adjusting means being independently operable whereby said device may be set to require unequal rope loads to move said rope in relatively opposite directions.

2. An exercising device as recited in claim 1 wherein one of said adjusting means is operable to adjust both of said friction devices equally, and wherein the other of said adjusting means is operable to override said one adjusting means to limit the degree of friction applied to said rope by only one of said friction devices.

3. An exercising device as recited in claim 2 wherein the degree of friction applied to said rope by both of said friction devices is regulated equally by said one adjusting means, and wherein said other adjusting means is operable only to further reduce the friction applied to said rope by the friction device controlled thereby.

4. An exercising device as recited in claim 1 wherein each of said friction devices includes a bearing surface fixed in said body member and a member carried movably in said body member for movement toward said bearing surface, said rope passing between said member and said bearing surface, and said member being engaged by said rope whereby to be moved toward said bearing surface by tension on said rope in one direction, whereby to clamp said rope frictionally therebetween to resist lengthwise movement thereof, and to be moved away from said bearing surface by tension on said rope in the opposite direction, and wherein said adjusting means constitutes a pair of independently adjustable stops each operable to limit the motion of one of said movable members toward its associated bearing surface.

5. An exercising device as recited in claim 4 wherein one of said stops is operable to limit the movement of both of said movable members toward their associated bearing surfaces, and wherein the other of said stops is operable to further limit the movement of only one of said movable members toward its associated bearing surface.

6. An exercising device as recited in claim 4 with the addition of manually actuated means operable to regulate the movement of said movable members of said friction devices independently of the operation of said stops.

7. An exercising device as recited in claim 4 wherein the said movable members of said friction devices constitute the respectively opposite end portions of a generally cylindrical rocker pivoted in said body member at its midpoint on a transverse axis, said rope being wound about said rocker to pass around one end portion thereof, then cross over the midpoint thereof and around the other end portion thereof, the end portions of said rope extending transversely from said rocker in the same general direction, said bearing surfaces being disposed respectively adjacent the respective end portions of said rocker at the side thereof opposite to the direction of extension of the rope ends from said rocker, whereby portions of said rope pass between each end portion of said rocker and its associated bearing surface, and are adapted to be selectively frictionally clamped therebetween responsively to tilting of said rocker in relatively opposite directions, and wherein said

stops constitute members adjustably secured to said body member and each operable to limit variably the tilting of said rocker in one direction.

8. An exercising device as recited in claim 6 wherein one of said stop members may be positioned to limit the pivoting of said rocker equally in either direction from a central or neutral position with respect to said bearing surfaces, and wherein the other of said stop members may be positioned to further limit the pivoting of said rocker in only one direction from said neutral position.

9. An exercising device as recited in claim 6 with the addition of manually actuated means operable to regulate the tilting motion of said rocker independently of the action of said stops.

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