United States Patent [19]

Webb

[11] **3,782,722**

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[54] **VARIABLE FRICTION-RESISTANCE ROPE EXERCISING DEVICE**

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[52] **U.S. Cl.**..... **272/79 A,** 272/DIG. 5, 188/65.1

[51] **Int. Cl.**..... **A63b 21/00**

[58] **Field of Search**..... 272/DIG. 3, 79 A, 272/82; 242/154; 188/65.2, 65.3, 65.4; 182/190, 191, 192, 193

[56] **References Cited**

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3,197,204	7/1965	Holkesvick et al.	272/79 A
3,411,776	11/1968	Holkesvick et al.	272/79 A
3,506,262	4/1970	Wade	272/79 A
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Assistant Examiner—William R. Browne
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[57] **ABSTRACT**

A variable friction-resistance rope exercising device having a shaft with an eyelet at one end and a turn knob mounted at the other end. The knob has apertures therethrough to enable free ends of a rope to be threaded through the apertures, a rope is spiralled around the shaft and through the eyelet so that a user can pull alternately on the ends against the friction developed between the rope and the shaft. The knob is spring biased outwardly away from the eyelet to connect with the shaft so that no rotation of the knob with respect to the shaft will be permitted during the pulling on the free ends of the rope. To increase the number of turns of the rope on the shaft the knob is pushed inwardly against the bias of a spring to disconnect the knob from the shaft and then the knob is rotated. When it is desired to release the frictional resistance, the user holds onto the knob and pulls on both free ends of the rope to pull the shaft toward the knob compressing the spring to disconnect the shaft from the knob.

6 Claims, 8 Drawing Figures

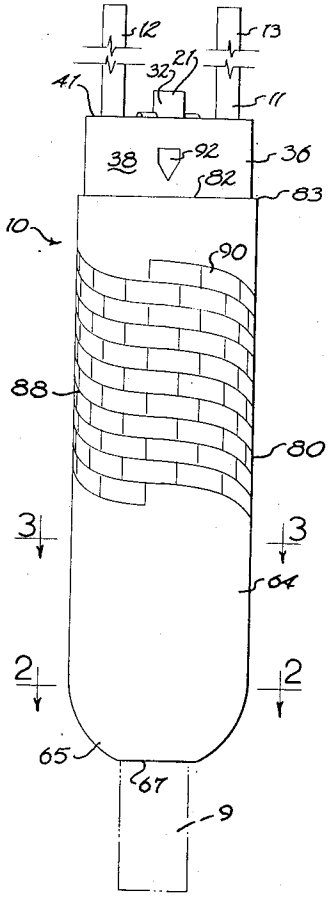


FIG 1

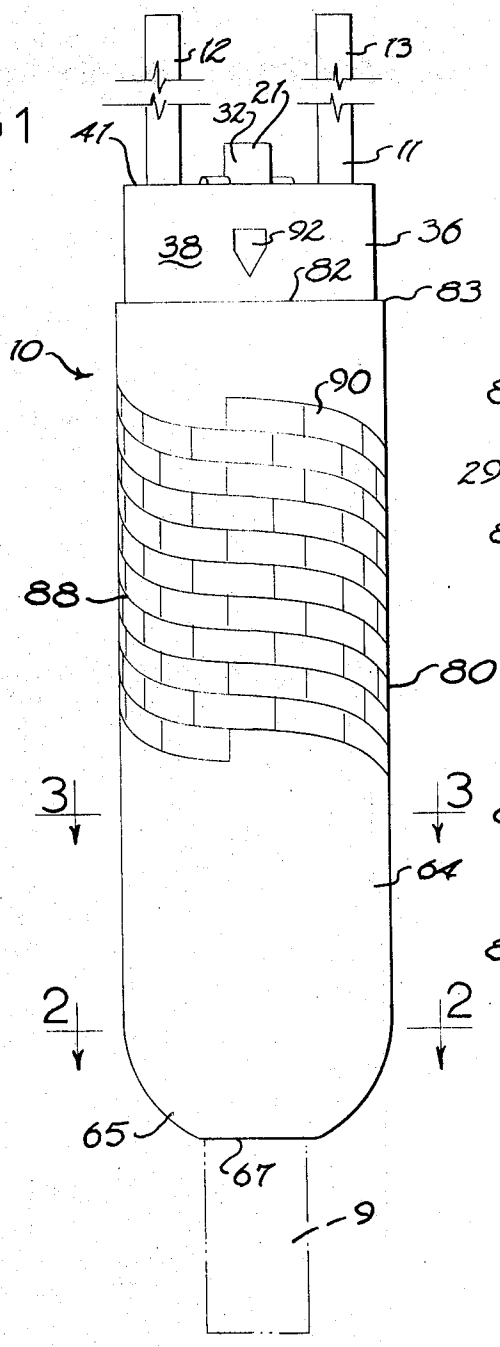


FIG 2

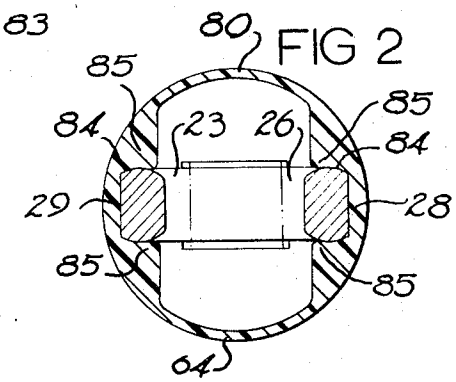


FIG 3

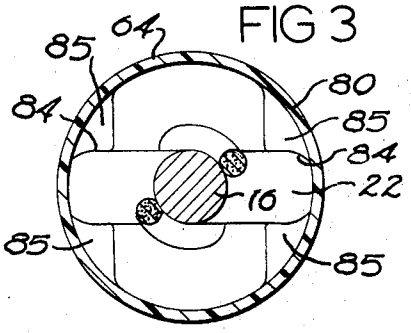


FIG 4

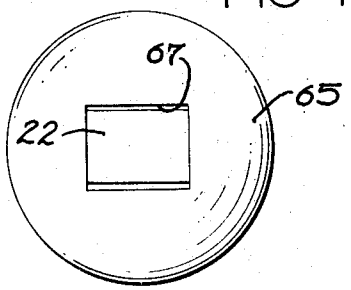
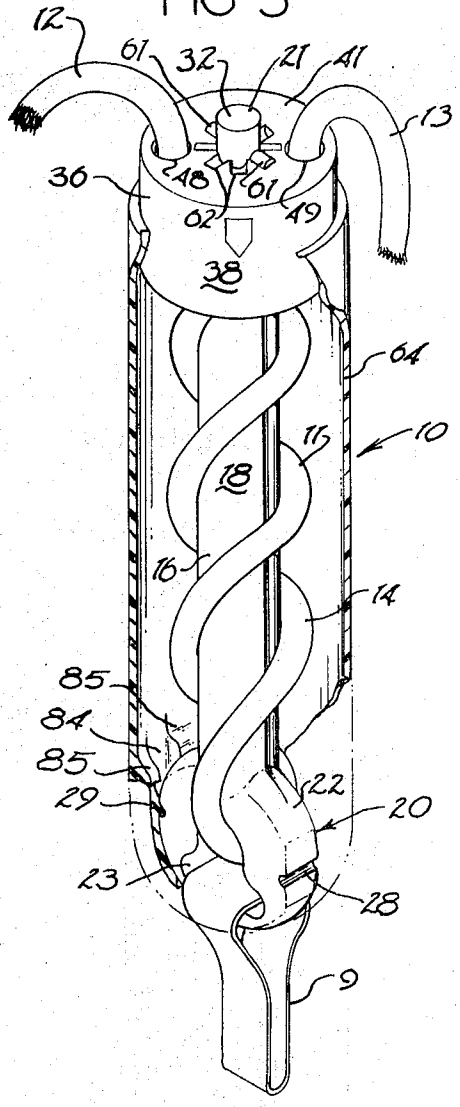


FIG 5



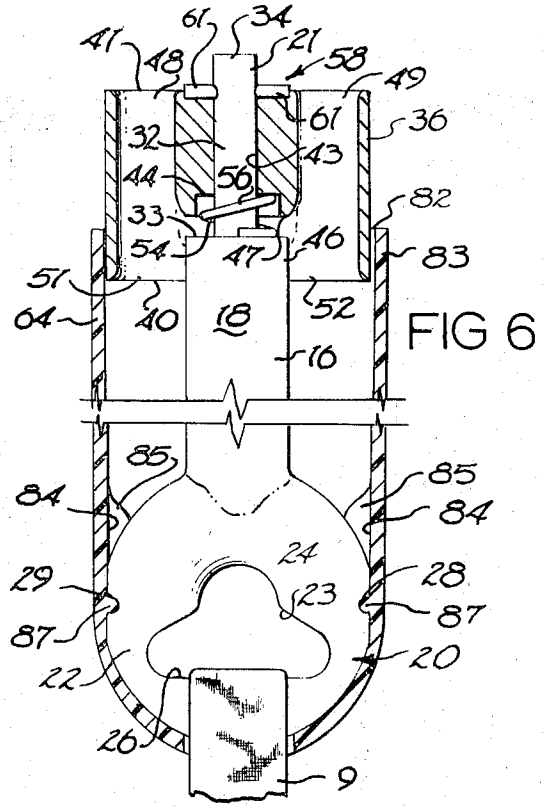


FIG 6

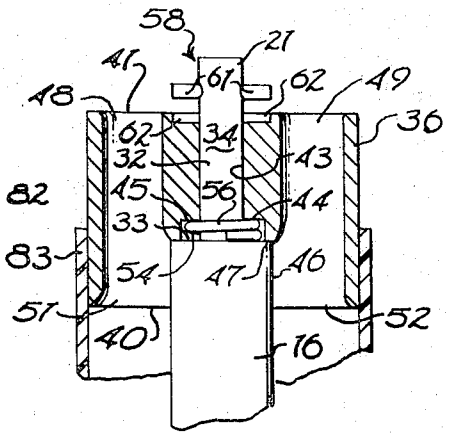
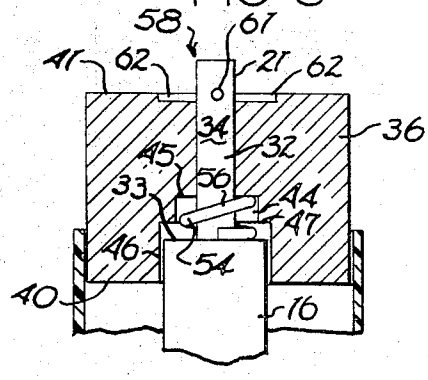


FIG 7

FIG 8



VARIABLE FRICTION-RESISTANCE ROPE EXERCISING DEVICE

BACKGROUND OF THE INVENTION

This invention relates to friction-resistance devices and more particularly to exercising devices utilizing the friction-resistance principle.

Friction-resistance devices have been known and utilized at least since the 19th Century. U.S. Pat.--Boucherville No. 147,828 (1874), Brooke No. 303,052 (1884), Van Scoy No. 425,716 (1890), Ross No. 434,888 (1890), Leffelman No. 779,550 (1905), disclose the use of the friction-resistant principle in rope brakes for fire escape mechanisms. The purpose and functions of such devices is to impede without arresting the movement of a rope relative to the device by causing it to pass around a metal shaft or post.

With the advent of the industrial society and the availability of more leisure time, it has been desirable to utilize the friction-resistant principle in exercising devices. Examples of exercising devices that utilize the friction-resistant principle are illustrated in U.S. Pat. Nos. 3,197,204; 3,411,776; 3,460,392; 3,462,142; 3,498,608; 3,506,262, 3,519,269; 3,510,132; 3,532,189; 3,550,449; and 3,591,174. All of these devices utilize the well-known concept of wrapping a section of a rope around a shaft or drumlike element in which the amount of resistance friction increases with the grip angle of the rope and the number of turns in which the rope is wrapped around the shaft.

One of the principal objects of this invention is to provide a variable resistance rope exercising device that varies the rope-shaft friction-resistance. The device can be easily returned to its original position without having to backstep the device through each of the stages through which it has progressed.

An additional object of this invention is to provide a unique rope exercising device utilizing the friction-resistance principle in which a resistance varying mechanism is utilized which will not release during the exercising operation.

A further object of this invention is to provide a exercising device using the variable resistance principle in which the device is relatively inexpensive to manufacture and is quite reliable to operate.

These and other objects and advantages of this invention will become apparent upon the reading of the following detailed description of a preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of this invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a side view of a variable-resistance rope exercising device embodying the principal features of this invention;

FIG. 2 is a transverse cross-sectional view taken along line 2—2 in FIG. 1;

FIG. 3 is a transverse cross-sectional view taken along line 3—3 in FIG. 1;

FIG. 4 is an end view of the rope exercising device;

FIG. 5 is a fragmentary cut-away perspective view illustrating the interior of the device;

FIG. 6 is a condensed longitudinal cross-sectional view specifically illustrating a releasable locking mechanism with the rope removed;

FIG. 7 is a fragmentary enlarged longitudinal view of the releasable locking mechanism shown in a release position; and

FIG. 8 is a view similar to FIG. 7 except showing the releasable locking mechanism in a lock position however rotated from the orientation illustrated in FIGS. 6 and 7.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

Now referring to the drawings, there is illustrated in FIG. 1 a variable friction-resistance rope exercising device generally designated by the numeral **10** that is supported by support means **9** in the form of a strap which may be hooked or attached to a rigid structure during use. Exercising device **10** includes a rope **11** having an end section **12** and an end section **13** with a continuous intermediate section **14.** The exercising device **10** is operated by pulling on either end section **12, 13** and slowly moving the rope through the device at preset pulling force levels. The exercising device **10** is designed to be able to vary the friction-resistance exerted on the rope to increase or decrease the pulling force required to pull the rope through the exercising device.

One of the principal elements of the exercising device **10** is an elongated shaft **16** (FIGS. **5** and **6**) that has an exterior cylindrical surface **18** between ends **20** and **21.** The end **20** has an eyelet **22** formed thereon having an eyelet hole **23** extending therethrough transverse to the axis of the shaft. The eyelet hole **23** has a rope receiving portion **24** and a contiguous strap receiving portion **26.** Transverse grooves **28** and **29** are formed in the side of the eyelet **22** transverse to the axis of the shaft. The grooves **28** and **29** are diametrically opposed to each other.

The shaft end **21** has a stub section **32** having a reduced diameter forming a shaft shoulder **33.** The reduced stub section **32** has a cylindrical bearing surface **34.**

An additional important feature of the exercising device **10** is a knob **36** that is mounted on the end **21** of the shaft for rotation or turning about the shaft axis and for axial movement on the reduced stub section in a limited stroke. The knob **36** has a cylindrical shape with a cylindrical exterior surface **38** extending between end surfaces **40** and **41.** The end surface **40** faces the eylet end **21.** The knob **36** has a longitudinal or axial bore **43** formed therein to receive the stub section **32** of the shaft to enable the knob to turn or rotate about the shaft axis and to enable the knob to move (slide) to a limited degree axially on the reduced stub. The knob **36** has a counterbore **44** (FIGS. **6** and **8**) formed in the end surface **40** coaxially with the bore **43** forming a first knob shoulder **45.** The diameter of the counterbore **44** is less than the diameter of the shaft **16.** A second counterbore **46** is formed in the end surface **40** coaxially with the bore **43** forming a second shoulder **47.** The second counterbore **46** has a diameter slightly greater than the diameter of the shaft **16** so that a portion of the knob **36** extends toward the eyelet end **21** forward of the shaft shoulder **33** to cover the shaft shoulder. The end surface **40** is forward of the shaft shoulder **33.**

The knob **36** has rope guide apertures **48** and **49** (FIGS. **5–8**) extending therethrough in an axial direction with the shaft axis diametrically opposed from each other. The guide apertures **48** and **49** have flared

openings **51** and **52** respectively communicating with the end surface **40.**

The exercising device **10** includes spring means **54** (FIGS. **6–8**) operatively positioned between the shaft and the knob to bias the knob outwardly to an extended axial position. Specifically the spring means includes a compression spring **56** mounted about the stub section **32** with one end engaging the shaft shoulder **33** and the other end engaging the shoulder **45** of the knob. The compression spring **56** biases the knob **36** in an axial direction to the extended position. By pushing the knob **36** against the action of the spring to compress the spring **56,** one is able to move the knob to a limited degree axially toward the eyelet end **21.**

One of the principal features of this invention is the provision of a releasable locking means **58** operatively interconnecting the shaft and the knob **36** for locking the knob to the shaft at various angular settings of the knob when the knob is in the extended axial position and for enabling the knob to be turned relative to the shaft to other angular settings when the knob is pushed from the extended position toward the eyelet end against the bias of the spring **56.**

The releasable locking means **58** include mating elements on the shaft and the knob in which the mating elements engage each other when the knob is in the extended axial position. Specifically, the mating elements include one or more radial projections **61** affixed to the end of the shaft **21** and projecting radially outward from the bearing surface **54.** Specifically in this embodiment the radial projection **61** includes a pin that extends diametrically through the end **21** providing two radial projections at its end. The corresponding mating elements include angularly spaced grooves **62** formed in the end surface **41** in which the angularly spaced grooves **62** correspond to the desired number of knob settings in one revolution.

The exercising device **10** includes a shroud **64** that encloses the shaft **16.** The shroud **64** includes a reduced end **65** (FIGS. **1** and **4**) that encloses the eyelet end **20.** The reduced end **65** has a strap opening **67** to enable the strap to extend outward for attaching to a rigid support. The shroud **64** has a tubular section **80** that extends from the reduced end **65** to an open end **82** terminating adjacent the knob **36.** The open end **82** is encircled by a rim **83.** To prevent the shroud **64** from rotating relative to the shaft, the interior of the shroud **64** is provided with longitudinal diametrically opposed grooves or slots **84** formed by shoulders **85** to receive the eyelet **22** (FIGS. **2** and **3**). Within the slots **84,** transverse ribs **87** (FIG. **6**) are provided to snap into the grooves **28** and **29** during assembly to prevent the shroud **64** from moving axially with respect to the shaft **16.**

Indicia means **88** (FIG. **1**) is included on the exterior of the shroud **64** adjacent the open end **82** and on the knob **36** to visually display the angular position of the knob with respect to the shaft so that a user of the exercising device will have an indication of the frictional resistance setting. Specifically, the indicia includes an annular scale **90** circumscribing the open end **82** and a pointer **92** formed on the cylindrical surface **38** of the knob **36** with the pointer **92** facing the scale **90.**

During the operation of the exercising device the rope **11** is threaded through the exercising device with the continuous intermediate section **14** extending through one of the guide apertures **48** or **49** and along the shaft surface in a first flight and with a second flight interconnected to the first flight through the eyelet hole **23** and extending in the opposite axial direction from the eyelet **22** along the shaft **16** and out through the other guide aperture. The end sections **12** and **13** extend outward from the knob **36** to enable the user to grab or hold onto one of the end sections **12** and **13.**

During the use of the exercising device **10,** the knob **36** is originally positioned at a zero orientation in which the rope flights are in a rather straight line between the guide apertures **48** and **49** and the eyelet **22.** To apply frictional resistance to the rope, the operator pushes the knob **36** inwardly toward the eyelet end **22** to disengage the radial projections **61** from the grooves **62** to enable the knob to be turned to a desired angular orientation. As the knob **36** is turned, the flights are formed in a spiral orientation about the shaft to increase the frictional engagement between the shaft and the rope. The greater the angular displacement from the zero setting, the greater the frictional resistance. Stated in another way; the greater the grip angle of the rope to the shaft axis the greater frictional-resistance one will have to overcome when pulling on one of the rope ends. To increase the force required to pull the rope through the exercising device one merely pushes the knob in and rotates it in a desired direction to increase the resistance. When it is desired to release the frictional resistance, the operator merely holds onto the knob and pulls on both end sections **12** and **13** simultaneously to cause the rope to pull the shaft toward the knob **36** compressing the spring **56** to release the releasable locking means **58.** When the releasable locking means **58** is released the shaft will rotate rapidly until the zero position is obtained. In this manner it is relatively easy to clear the device and to begin the exercises at a lower level.

It should be understood that the above described embodiment is simply illustrative of the principles of this invention and that numerous other embodiments may be readily devised by those skilled in the art. Therefore, only the following claims are intended to define this invention.

What is claimed is:

1. A variable friction-resistance rope exercising device, comprising:

a friction shaft having an eyelet formed at one end thereof;

a control knob connected to the other end of the shaft for turning movement relative to the shaft about the shaft axis and for limited axial movement relative to the shaft along the shaft axis;

a spring means positioned between the shaft and the knob for biasing the knob axially away from the eyelet end to an extended axial position;

said knob having two rope guide apertures extending axially therethrough;

a single continuous section of rope having one flight extending into one of the apertures and along and in frictional engagement with the shaft between the knob and the eyelet in one axial direction and a second flight interconnecting the first flight through the eyelet and extending back along and in frictional engagement with the shaft in the other axial direction and out through the other guide aperture so that as the control knob is turned with respect to the shaft from a zero angular setting the rope flights will automatically, spirally wind about

the shaft varying the sliding frictional-resistance between the rope and the shaft in relation to the degree of angular displacement of the knob from the zero angular setting; and

a means for connecting the knob and the shaft, during an exercise program by the knob being forced to an extended axial position away from the eyelet under bias of the spring means thus enabling the knob to turn freely on to the shaft and for disconnecting the knob and the shaft by manually pushing the knob inwardly from the extended position toward the eyelet against the biasing of the spring means so that turning of the knob when connected to the shaft will vary the number of turns of rope and thus vary the frictional-resistance between the shaft and the rope.

2. The exercising device as defined in claim **1** wherein the other end of the shaft has a reduced diameter stub section having a shaft shoulder and wherein the knob has a bore therein slidably receiving the stub section to enable the knob to be turned and pushed axially on the reduced diameter section of the shaft, said knob having a first counterbore formed therein forming a knob shoulder opposing the shaft shoulder and wherein the spring means includes a compression spring mounted about the reduced diameter section of the shaft and bearing against said shoulders to bias the knob to the extended axial position.

3. The exercising device as defined in claim **2** wherein the means for connecting and disconnecting the knob from the shaft includes mating elements on the stub section of the shaft and the knob which engage each other when the knob is in the extended axial position and which are disengage from each other when the knob is pushed to compress the spring and thereby move the knob from the extended axial position to enable the knob to be turned freely.

4. The exercising device as defined in claim **3** wherein the mating elements include a radial projection on the stub section of the shaft and a plurality of matching angularly spaced grooves in the knob for receiving the radial projection when the knob is in the extended axial position.

5. The exercising device as defined in claim **1** wherein the shaft has a prescribed diameter and wherein the knob has a second counterbore formed therein with a diameter slightly greater than the diameter of the shaft with a portion of the knob surrounding the counterbore and extending toward the eyelet and beyond the shoulder shaft.

6. The exercising device as defined in claim **1** further comprising a shroud encloses the eyelet and surrounds the shaft and terminates in a rim adjacent the knob in which the rim has a scale thereon corresponding to an angular knob setting and wherein the knob has a pointer means thereon opposite the scale for indicating the frictional-resistance of the device at various knob settings.

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