

[54] LEG MUSCLE EXERCISE APPARATUS

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[58] Field of Search 272/58, 90, 81; 128/70, 128/71, 84 R, 25 R

[56] References Cited
UNITED STATES PATENTS

2,472,391	6/1949	Albizu	272/81
3,117,782	1/1964	Johnston	272/58
3,149,630	9/1964	Schmidt	128/84 R
3,612,042	10/1971	Fry	128/25 R

FOREIGN PATENTS OR APPLICATIONS

18,916	1895	Great Britain	128/25 R
334,255	1930	Great Britain	272/80

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[57] ABSTRACT

An apparatus for exercising the thigh, hamstring, and groin muscles, including structure for applying a pre-determined weight to the upwardly extending leg to thereby stretch the hamstring and thigh muscles of a person lying on his back. The weights are attached to the person's upwardly extending ankle by use of a cord and pulley system, and a one-way clutch enables the lifting of the weights by use of a cord with the hands and arms, then transferring the force of the weights to the leg to be exercised, thereby relieving the arms of the task of applying the force to the leg. A pair of pads are resiliently retained in laterally spaced relation so that a person using the device may position the pads between his knees and force them together against the resilient force to exercise his leg and groin muscles. A lazy tong device connected to the resilient arms has a curved plate adapted to engage the user's abdomen to enable the user to apply greater resistance to movement of the pads, as desired.

8 Claims, 4 Drawing Figures

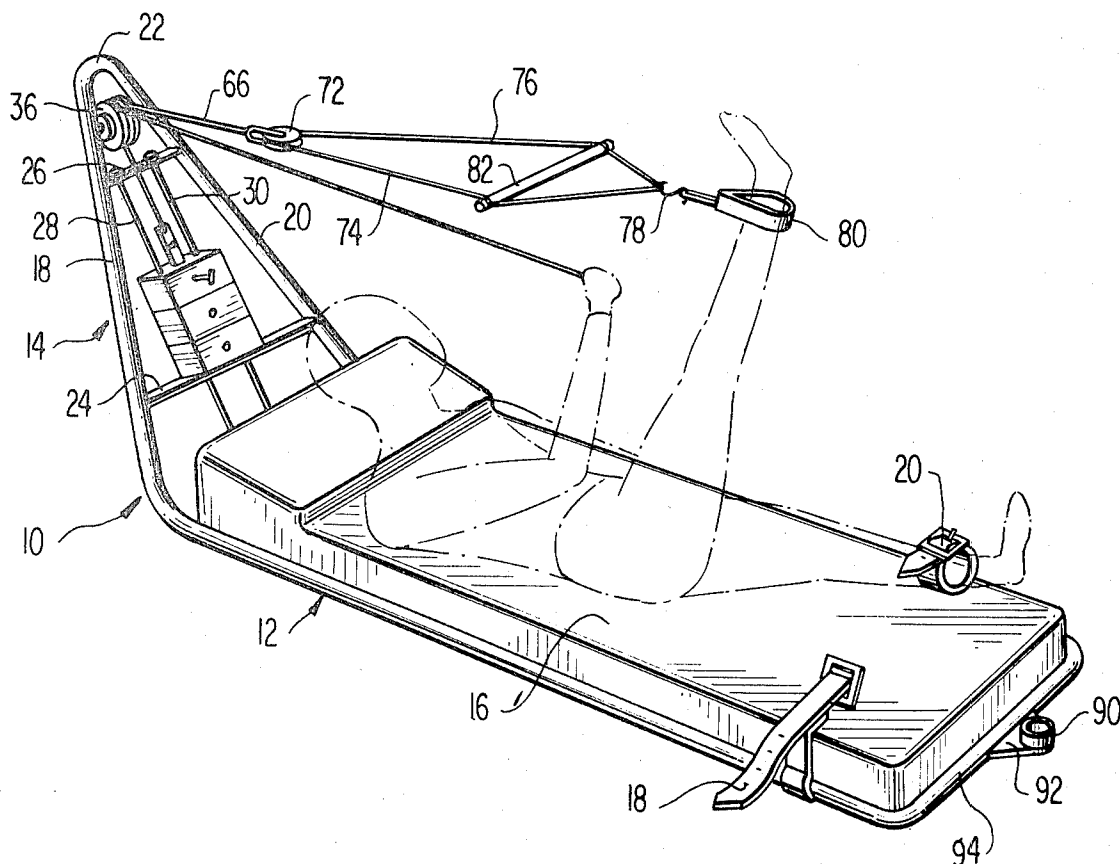


FIG. 1

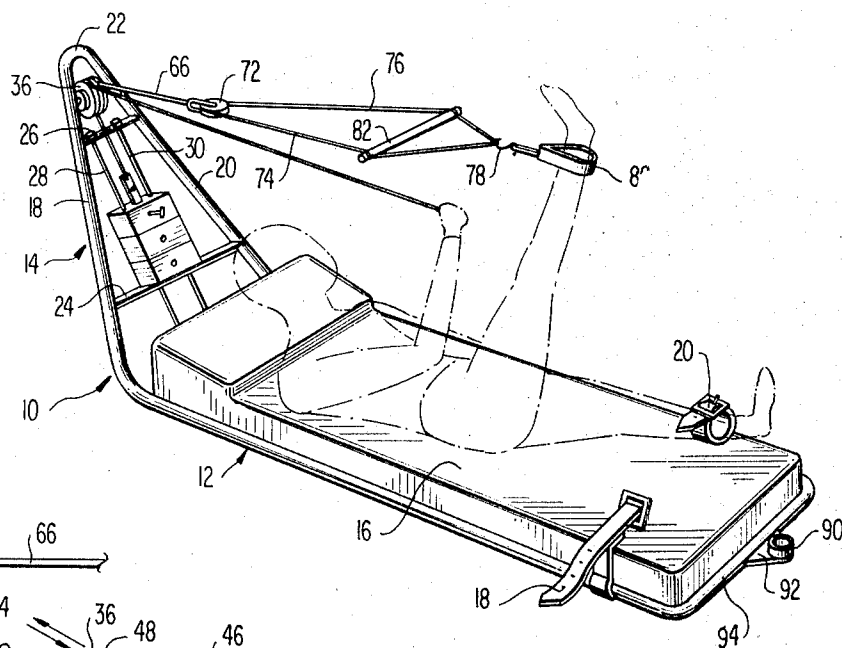
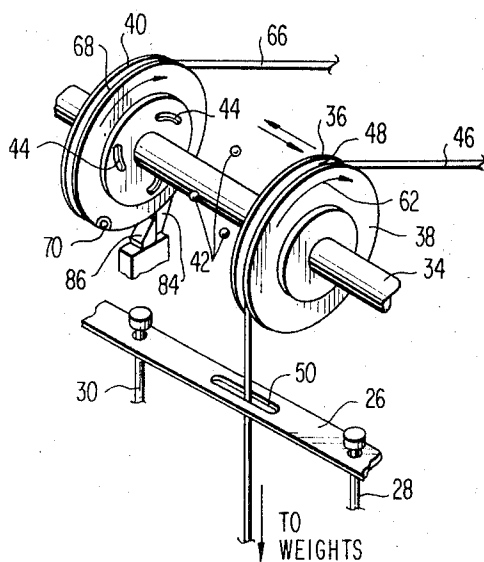


FIG. 2

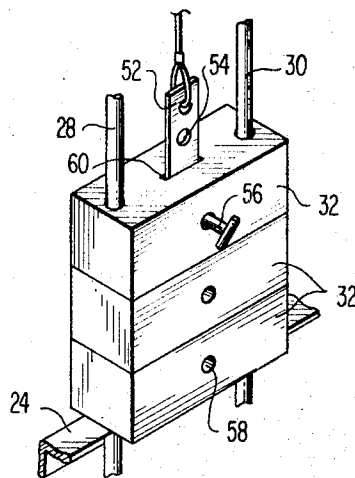


FIG. 3

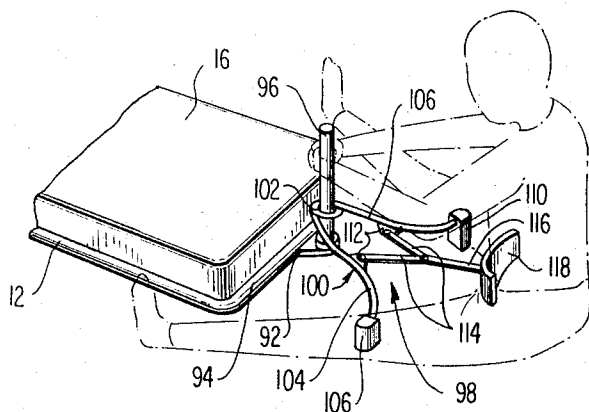


FIG. 4

LEG MUSCLE EXERCISE APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to exercise apparatus, and more particularly to an exercise device especially useful for athletes to exercise weak or injured thigh, hamstring and groin muscles.

2. Description of the Prior Art

Numerous devices have been developed for assisting in the forced exercise of the leg muscles, and particularly of the upper leg and groin muscles. Such devices are frequently employed by athletes to promote rapid recovery from injured muscles. Conventionally, these prior art devices are intended to apply a force to the leg tending to stretch the muscles by the forced lifting or bending of the legs at the hip joint.

One prior art device for exercising the legs is illustrated in U.S. Pat. No. 3,117,782. This device employs a harness consisting of a system of cords and pulleys to enable a person to use the arm muscles, while lying in a prone position, to stretch the leg muscles. This is accomplished by applying force with the arms to lift the legs and pull them toward the user's head as he lies on his back. In this device, all of the force applied to or by the legs must be derived from or resisted by the arms, and is very fatiguing because of the awkward position required of the arms. In the use of this prior art device, it is difficult, if not impossible, to accurately estimate the amount of force applied. This is particularly important when intentionally stretching an injured muscle because of the risk of inflicting greater injury. Further, neither this nor other prior art devices of which applicant is aware has made adequate provision for exercising the groin muscles which frequently become injured in strenuous athletic contests such as football. Accordingly, it is a primary object of the present invention to provide an improved leg muscle exercising apparatus.

Another object is to provide an improved leg muscle exercising apparatus which a person can employ without an assistant, and which can be employed to reliably apply the desired tension or stress to the hamstring and thigh muscles.

Another object is to provide such an apparatus which can be employed to exercise the groin muscles while the person exercising remains in a seated, comfortable position.

SUMMARY OF THE INVENTION

In the attainment of the foregoing and other objects, an important feature of the present invention resides in the use of movable weights to apply a direct load to the leg to thereby exercise the hamstring and thigh muscles. This is accomplished by providing means for lifting fixed weights with the arms by use of a pulley and cord attached to the weights, then releasing the cord held in the hand to permit the weights to apply a force, through a second cord and harness assembly, to the leg. The device may use a one-way clutch to shift the weight from the cord held by the athlete's hand to the cord and harness attached to the leg, thereby assuring relaxation of the leg muscles during the lifting of the weights. The apparatus is used while the athlete is lying in a supine position with the leg to be exercised raised and con-

nected to a harness including a cord extending over a pulley positioned above and behind his head. The weights employed are located below the pulleys and are attached to a cord extending over a second pulley to a position to be grasped by the athlete's hands. The apparatus includes a frame adapted to be positioned directly on the floor or upon an exercise table, as desired.

The apparatus also includes a hairpin-shaped spring member having outwardly projecting pads on the distal ends of the spring which are adapted to be positioned between the athlete's legs, while in a sitting position, with the pads engaging the legs in the vicinity of the knee. While in the sitting position, the athlete moves his legs toward and away from one another against the resistance of the spring member, and the extent of the force or resistance of the spring is varied by a lazy tong attachment including a bumper member which engages the athlete's abdomen enabling him to exert force resisting the closing movement of the pads on the spring.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the present invention will become apparent from the following detailed description, taken in conjunction with the drawings, in which:

FIG. 1 is a perspective view of the exercising apparatus according to the present invention, with the groin muscle exercising portion removed and with the manner of using the apparatus to exercise the hamstring and thigh muscles being illustrated by a person shown in phantom;

FIG. 2 is an enlarged, exploded, fragmentary view of a portion of the apparatus shown in FIG. 1;

FIG. 3 is a further enlarged fragmentary view of the weight members shown in FIG. 1; and

FIG. 4 is a perspective view illustrating use of the apparatus to exercise the groin muscles.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings in detail, the exercise apparatus according to the present invention is indicated generally by the reference numeral 10 and includes a frame having a horizontal base portion 12 and an upwardly inclined stanchion or head portion 14. The frame is preferably made up of a length of steel tubing bent and welded into the desired configuration with the generally rectangular base portion 12 supporting a resilient pad or mattress 16 upon which a person lies while using the apparatus. A pair of leg restraining straps 18, 20 are provided, one at each side of the base portion 12 of the frame, adjacent the lower end thereof, for restraining one leg, if desired or necessary, while exercising the other leg.

As best seen in FIG. 1, the head portion 14 of the frame consists of a pair of legs 18, 20 inclined upwardly and away from the head of the user and joined at their apex in an arcuate section 22. A horizontal structural angle member 24 extends between and is rigidly welded to the legs 18, 20, near the base thereof, and a second horizontal structural member in the form of a flat bar 26 extends between the legs 18, 20 at a point spaced substantially above the angle 24. A pair of elongated guide rods 28, 30 are slidably received in spaced openings in the bar 26 and angle 24, and a plurality of weights 32, preferably in the form of rectangular steel

bars, are slidably mounted on the rods 28, 30 and normally rest on the angle member 24.

A shaft 34 is mounted on and extends between legs 18, 20 at a position above the bars 26 and rotatably supports a one-way clutch assembly 36. Clutch assembly 36 comprises a pair of pulleys 38, 40 supported on the shaft 34 in close, face-to-face relation with a plurality of spherical balls 42 mounted therebetween in tapered arcuate grooves 44 on the face of pulley 40. Those elements are shown in FIG. 2 in an expanded condition to more clearly illustrate the operation of the device, it being understood that the pulleys 38, 40 are normally resiliently urged toward one another and retained in closely spaced relation as illustrated in FIG. 1. The structure and operation of the one-way clutch is conventional except that the basic elements (pulleys) have a groove formed around their outer periphery for receiving and guiding a cord thereover.

A first cord 46 is positioned in the groove 48 of the pulley 38 and extends downwardly therefrom through an elongated slot 50 in the bar 26 to have its lower end attached to an elongated flat bar 52. The bar 52 has a plurality of apertures 54 formed therein at spaced positions along its length to receive a pin 56 which is adapted to extend through a horizontal opening 58 in the weights 32 to thereby releasably attach one or more of the weights to the bar 54. As seen in FIG. 3, the weights have elongated vertical slots 60 extending downwardly through the central portion to admit the end of the bar 52 so that, when the pin 56 is in position, pulling of the cord 46 in the direction of arrows 62 (FIG. 2) will cause the weights attached to the bar 54 to slide upwardly along the guide pins 28, 30.

A second cord 66 is positioned within a groove 68 in the pulley 40 and has one end fixed, as at 70, to the pulley. The other end of cord 66 is attached, by suitable connector means 72 to a pair of cords 74, 76 adapted to be connected, through a hook 78 to a collar 80 adapted to fit around the ankle of the person using the device. An adjustable bar 82 extends between the cords 74, 76 for adjusting, within limits, the length of the harness assembly as desired.

In order to use the device, a person positions himself in a supine position on the pad 16 and positions the collar 80 over the leg to be exercised. If desired, the other leg may be held down by the straps 18, 20. The person then grasps the free end of the cord 46 and pulls, rotating the pulley 38 of the one-way clutch 36 to lift the attached weight 32. The spherical balls 42 permit free rotation of the pulley 38 relative to the pulley 40 in the direction of arrow 62. Upon lifting the weight 32 to the desired height, normally into contact with the bar 26, the user then releases the cord 46 and the weight tends to rotate the pulley 38 counterclockwise. The spherical balls 42 immediately become wedged in the tapered grooves 44 to lock the pulley 40 to the pulley 38 so that any downward movement of the weight 32, acting through the clutch assembly 36 and cord 66, will pull the attached leg upward, applying a known, predetermined force to the leg stretching the thigh and hamstring muscles. As the weight slides down the guide rods 28, 30, thereby pulling the user's leg upward a fixed, predetermined distance, the cord 46 will also be returned to its original position. If desired, after the weight has fully receded, the leg can be left in this position for a short time or, alternatively, the arm can then be used to again lift the weight by pulling on the cord

46. In this case, since the leg is initially in a strained position, the pulley 40 will be rotated with the pulley 38 by the weight of the leg as applied through the cord 66. To prevent dropping the leg too low, and to always apply the same force and stretching action to the leg muscles, a stop member 84 on pulley 40 is positioned to engage a rigid stop 86 on the frame 12. Thus, when the leg is lowered to the point that the two stops are in contact, any additional movement lifting the weight will result only in the pulley 38 being rotated.

Referring now to FIGS. 1 and 4, it is seen that, at the foot end of the frame 12, a socket 90 is rigidly mounted, as by a bracket 92 on the tubular frame member 94. Socket 90 is adapted to telescopingly receive and support the lower end of a rigid post member 96 which, in turn, acts as a pivot and support for a groin muscle exercising spring assembly 98.

The groin muscle exercising apparatus consists of an elongated spring rod member 100 bent into a generally V-shaped configuration with a single coil 102 at the apex of the V joining the two legs 104, 106, with the cord 102 being adapted to be received over the upwardly projecting end of the post 96. The distal ends of the rods 104, 106 have mounted thereon a pair of resilient pads 108, 110 respectively adapted to engage the inside portion of the user's thighs near the knees when the user is in a sitting position with his legs outstretched and wide-spread. The opposed arms 104, 106 each have a bracket 112 mounted on their inwardly directed surfaces, and a pair of bars 114 have one end mounted, respectively, on the brackets 110. The bars 114 each have their other end pivotally connected to a third bar 116 which, in turn, is connected to a padded, curved bumper member 118 adapted to engage the abdomen of the person using the device.

To exercise the groin muscles employing this apparatus, the user positions himself either on the pad 16 or on the floor facing the apparatus in the sitting position as illustrated in phantom in FIG. 4. With the legs spread wide apart and outstretched, the pads 108, 110 are compressed together slightly and positioned between the thighs adjacent the knees so that the spring member 100 resiliently urges the legs to the wide-spread position. At the same time, the pad 118 is positioned against the abdomen and the user may grasp the upwardly extending end of the post 96 in his hands. He then moves his legs together against the resilient force of the spring arms 104, 106 to exercise the groin muscles. Movement of the pads 108, 110 toward one another actuates the lazy tong-like bars 114, 116, pushing the pad 118 more firmly against the user's abdomen, thereby increasing the resistance of the spring as the legs are moved more closely together. If it is desired to apply greater force tending to spread the pads 108, 110, the user can pull with his arms on the post 96. Similarly, the force applied through the lazy tong assembly can readily be varied, within limits, by flexing or other movement of the abdomen. The procedure is repeated as many times as necessary to adequately exercise the groin muscles.

It is apparent that various modifications of the above-described apparatus could readily be made without departing from the true nature of the invention. For example, coil springs or the like could readily be substituted for the illustrated weights for applying the force to the cord 66, and resilient spring means or stop means could be employed in place of the lazy tong mechanism

for varying the force required to compress or deflect the spring member 100. Accordingly, while I have disclosed and described a preferred embodiment of my invention, I wish it understood that I do not intend to be restricted solely thereto, but that I do intend to include all embodiments thereof which would be apparent to one skilled in the art and which come within the spirit and scope of my invention.

I claim:

1. In a leg muscle exercising apparatus including a horizontal platform upon which a user may lie in a supine position and an upwardly extending stanchion at one end of said platform adapted to support a harness assembly for applying lifting and stretching forces to an upwardly lifted leg of the user lying on said platform, the improvement wherein said harness assembly comprises, pulley means rotatably mounted on said stanchion at a position substantially above said platform, a first cord mounted on said pulley means and having one end extending in the direction of said platform in position to be grasped and pulled by said user, a second cord having one end adapted to be connected to the raised leg of said user, means connecting the other end of the second cord to said first cord for movement therewith in a direction tending to raise and thereby stretch the muscles of the user's leg when the leg is attached to said second cord, manually energized moveable force applying means, and means connecting said force applying means to the other end of said first cord whereby manually pulling on said one end thereof energizes said force applying means and upon release thereof said force applying means applies a predetermined force tending to raise the user's leg which is attached to said second cord.

2. The leg muscle exercising apparatus as defined in claim 1 wherein said moveable force applying means comprises a plurality of weight members superimposed on top of one another, and wherein said means for releasably connecting said force applying means comprises means for releasably connecting any one of the individual weights to said first cord whereby the weights stacked thereabove are constrained to move upwardly with the attached weights when said one end of said first cord is pulled by said user.

3. The leg muscle exercising apparatus as defined in claim 2 wherein said stanchion is inclined upwardly and away from said horizontal platform, and further comprises guide means for guiding said weights along an inclined path along said stanchion.

4. The leg muscle exercising apparatus as defined in claim 1 wherein said means connecting said other end

of said second cord for movement with said first cord comprises one-way clutch means, said pulley being operably connected with said clutch means.

5. The leg muscle exercising apparatus as defined in claim 4 wherein said one-way clutch means comprises first and second clutch plate members mounted in opposed cooperating relation for rotation upon a shaft mounted on said stanchion, said first clutch plate having a groove around its outer periphery for receiving said first cord to rotate said first plate, said second cord having its other end connected to said second clutch plate for movement therewith.

6. The leg muscle exercising apparatus as defined in claim 5 wherein said moveable force applying means comprises a plurality of weight members superimposed on top of one another, and said means for releasably connecting said force applying means comprises means for releasably connecting any one of the individual weights to said first cord whereby the weights stacked thereabove are constrained to move upwardly with the attached weight.

7. The leg muscle exercising apparatus as defined in claim 6 further comprising strap means on said platform for releasably connecting one of the user's legs thereto while the other is being exercised.

8. A leg muscle exercising apparatus including a horizontal platform upon which a user lies in a supine position and an upwardly extending stanchion at one end of said platform adapted to support a harness assembly for applying lifting and stretching forces to an upwardly lifted leg of the user lying on said platform, the improvement wherein said harness assembly comprises, pulley means rotatably mounted on said stanchion at a position substantially above said platform, a first cord extending over said pulley means and having one end extending in the direction of said platform in position to be grasped and pulled by said user, a second cord having one end adapted to be connected to the raised leg of said user, means connecting the other end of said second cord to said first cord for movement therewith in a direction tending to raise and thereby stretch the muscles of the user's leg when the leg is attached to said second cord, weight means positioned below said pulley means, and means for releasably connecting said weight means to the other end of said first cord whereby manually pulling on said one end thereof by the hand will raise said weight means and upon release thereof said weight means will apply a predetermined force tending to raise the user's leg attached to said second cord.

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