

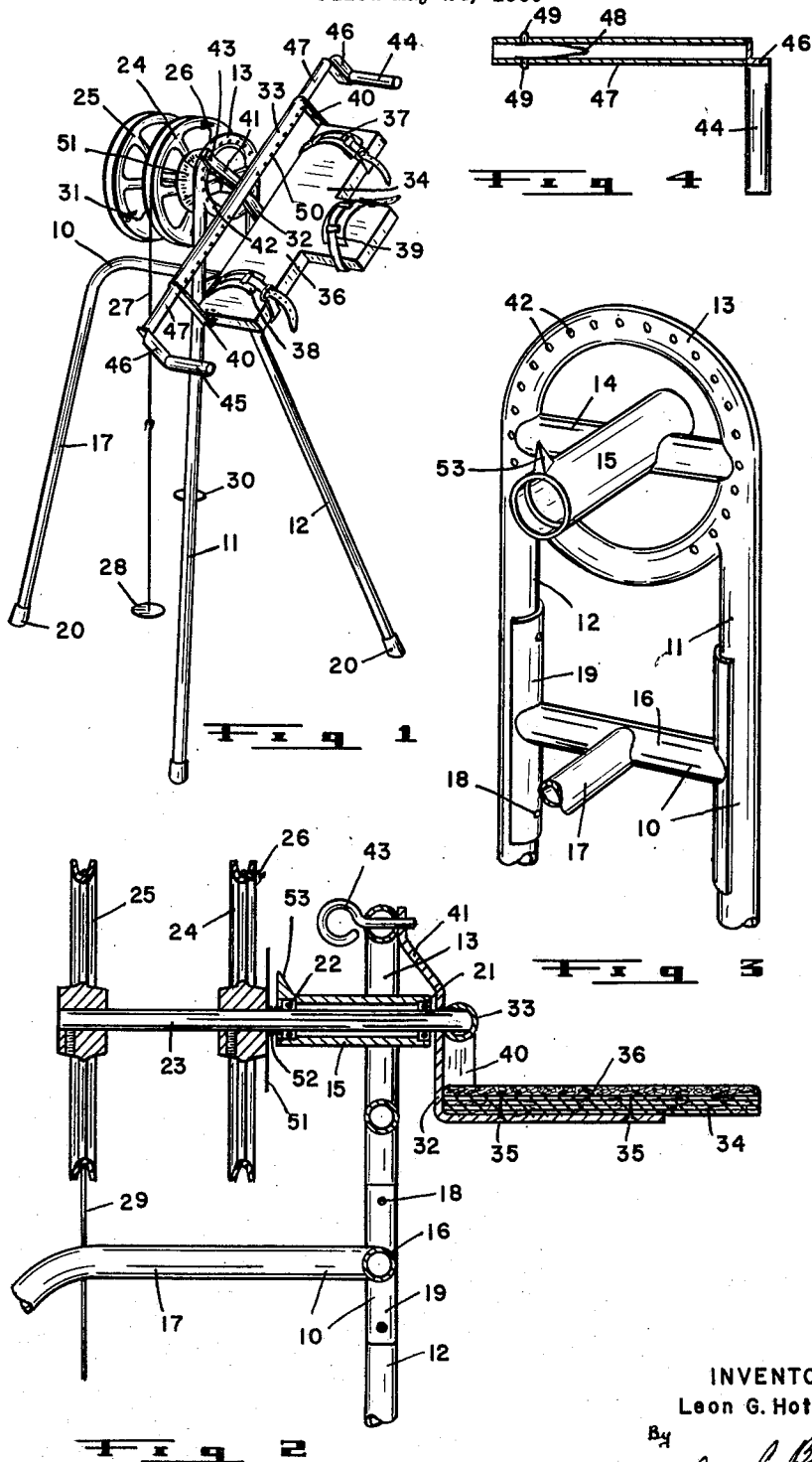
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SHOULDER EXERCISING MACHINES

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SHOULDER EXERCISING MACHINES
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The invention relates to an exercising device for assisting in the restoration of function of the shoulder joint, following injury, operative procedures or other medical conditions, such as subdeltoid, bursitis, calcification of supraspinatus tendon; or just plain shoulder arthritis.

A painful shoulder, due to any of the above, is a real disability for a patient, and many treatments may be suggested. For instance; physicians are prone to order short wave diathermy, and when this does not bring relief, will try novocain injection. The radiologist will advocate roentgen therapy. The surgeon tries irrigation of the burse, and then advocates exploration and drainage. Each of the above can be harmful.

Actually, the movement of shoulder rotation is only a part of the many complex movements associated with and performed by a normal arm and shoulder. However, the rotary motion thereof (Gleno-humeral rhythm), actuated by the shoulder muscles, forms a most integral part of the structure movement pattern, and the establishment of complete rotation, with the accompanying development of the rotator muscles, does constitute a good stable shoulder joint.

The principal object of the present invention is to provide a rotary shoulder exercising machine, with means thereon for aligning the longitudinal axis of the humerus (arm bone between the shoulder and the elbow) with the rotor shaft of the machine, for operation thereof by the rotator muscles of the shoulder, and so properly operate the shoulder joints, without injury to same.

A further object of the invention is to provide means for adjustably resisting the turning of said rotor shaft to give extra work to, and quickly strengthen the rotator muscles by said exercises.

A further object of the invention is to provide means on the machine for applying a graduated range of motion to the shoulder joints and muscles therefor, which range can be increased as the condition of the patient improves, or warrants.

A further object of the invention is to provide adjustments on the machine to accommodate the various lengths of forearms.

Still further objects of the invention are: to construct the machine in a simple effective manner for economic manufacture and assembly; easily understood self operation by the patient; and rugged to stand up under long usage and many years of helpful remedial rehabilitation.

With the above important, and other minor objects in view, which will become more apparent as the description proceeds, the invention consists essentially in the now to be described construction and arrangement of the various parts, reference being had to the accompanying drawings in which:

FIGURE 1 is a perspective view of the invention with the arm rest locked in an angular position.

FIGURE 2 is an enlarged vertical section centrally through the upper part of the machine.

FIGURE 3 is an enlarged perspective view of the bearing member integral with the machine frame.

FIGURE 4 is an enlarged horizontal section through the tubing of one of the hand grips.

In the drawings like characters of reference indicate corresponding parts in the several figures.

The frame 10 of the machine is tubular and three legged. The two front legs 11 and 12 taper outwardly toward the bottom, while their upper ends rise in parallel

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relation to connect and terminate in a circular bearing member 13, best shown in FIGURE 3. A short horizontal tube 14 crosses this member at the centre, and in turn supports a bearing sleeve 15 which is aligned centrally through the member. A lower horizontal cross tube 16 connects the vertical parallel parts of the legs 11 and 12. The third leg 17 extends rearwardly from the centre of this latter tube and then turns down to the floor to complete the frame. This third leg 17 can be released from the other two legs by removing the screws 18 holding the fastening plates 19. The bottoms of the legs are provided with rubber shoes 20 to prevent slippage.

The bearing sleeve 15 has each end thereof interiorly shouldered to receive bearing races 21 and 22, which in turn rotatably support a rotor shaft 23. The rotor shaft extends rearwardly from the bearing sleeve and carries a pair of spaced sheave pulleys 24 and 25 which turn therewith. The grooved periphery of the sheave 24 receives and is releasably secured at 26 to one end of a cable 27. The opposite end of the cable supports a weight carrier 28. Accordingly, when this latter sheave turns it will wind or unwind the cable to raise or lower the weight carrier. A number of weights (not shown) can be placed on the carrier to vary the load. In the same way, a cable 29, with weight carrier 30, is supported at 31 from the sheave pulley 25, but in the opposite direction. From the above construction it will be seen that, when the shaft 23 turns the sheaves, one weight carrier will go up while the other goes down.

The opposite end of the rotor shaft 23 projects forwardly from the bearing sleeve 15, passes centrally through the vertical leg of an L-shaped bracket 32 (see FIGURE 2) and into the centre of a cross tube 33, and is welded to both. The bottom horizontal leg of the L-shaped bracket underlies and is secured to a T-shaped arm rest 34 by screws 35, and such that the arm rest is offset from the centre of the shaft 23. This arm rest is suitably covered with fabric or leatherette 36, and each projection thereof is provided with a fastening strap 37, 38 and 39. Each lengthwise end of the arm rest is further supported by an anchoring member 40, one from each end of the cross tube 33. By this construction the arm rest can rock the rotor shaft, including the cross tube 33, and the back and forth motion will raise or lower the weight carriers. In so doing, the upper end 41 of the vertical bracket leg will partially swing around the bearing member 13 as a crank. Spaced holes 42 are provided through and around the member 13 such, that a locking pin 43 can be passed through one of said holes and will project sufficiently on the other side to limit the movement of the crank 41, and accordingly the arm rest. Or, it can pass through the crank, as shown, to lock same to the bearing member.

A pair of adjustable handles or grips 44 and 45 are provided, one at each end of arm rest 34. Each handle is welded at right angles to one end of a short angle 46, and the opposite end of the angle is welded at right angles to one end of a relatively short tubing 47. The opposite end of this latter tubing interiorly receives a semi-elliptic spring 48, each end of which carries an extending stud 49. Each stud projects through a hole in the side of the tubing 47. The cross tube 33 is provided with a series of spaced holes 50 therethrough therealong, so the tubings 47 can each be slid into opposite ends thereof and the studs of each will resiliently extend through one of said latter holes to hold same, while the handles are each positioned adjacent a longitudinal end of the arm rest. By merely finger pinching said studs back in, the tubings 47 can be released for sliding movement on the cross tube 33 to lock in one of the other holes 50.

In order to know the different angles at which the arm rest has turned in the exercises, a protractor, in the form of a disk 51, is mounted on the rotor shaft 23 and rests against the sheave 24, on the sleeve side thereof. A small coil spring 52 is also mounted on the rotor shaft, between the bearing 22 and the protractor, to resiliently hold same in place. A pointer 53 is formed integral with the bearing sleeve, positioned adjacent the protractor, and is adapted to register with the degree marks (not shown) thereon. From the above it will be seen that the pointer will register the degree of arm rest rotation, and if desired the operator can rotate the protractor, to slidably turn same against the resilient pressure of the spring, for any special setting desired thereof.

In operation, the patient sits on a chair (not shown) in front of the machine, and sideways thereto. If the right shoulder is to be exercised, the humerus (arm bone between shoulder and elbow) is placed on the arm rest 34, in alignment with the rotor shaft 23, and secured by the straps 39. The forearm is secured by the straps 38, and the hand will grasp the handle 45. If the left shoulder is to be exercised, the chair will face in the opposite direction and the forearm will be secured by the straps 37, and the handle 44 is grasped. The handles of course will be adjusted in or away to suit the length of the forearm.

The patient's rotator muscles can rotate the humerus, which in turn will rotate the arm rest and the rotor shaft, through the crank pressure of the forearm, thus raising one weight carrier and lowering the other. By placing suitable weights (not shown) on the carriers, resistance against the rotation can be adjustably regulated to suit the strength of the patient, and this will result in quick strengthening of his rotator muscles. As these muscles will most likely be weak and possibly sore to operate at the start, the weights can be applied lightly and the locking pin set for a limited rotation. As the muscles strengthen, the range of swing can be increased by changing the location of the locking pin, while further weight can be added to increase the resistance. If a progress chart is kept, the protractor will be very useful for accurately measuring the degree of rotation and so provide a perfect picture of the day to day advancement.

A further advantage of this machine is that it can be quickly assembled or dismantled. The sheaves 24 and 25 can be released from the rotor shaft 23 when dismantling. The protractor and spring 52 can then be withdrawn therefrom. The shaft, with arm rest 34, can then be drawn from the bearing sleeve 15 at the other end. As the leg 17 is also removable from the legs 11 and 12, all parts can be compactly positioned for packaging or shipping. The machine is simple but carefully designed for maximum service without unnecessary parts. It occupies a minimum of space. All essential adjustments have been provided for, and its exercising efficiency for shoulder joints and musculature therefor cannot be overrated.

While I have shown two sheaves 24 and 25 so weight resistance can be applied singly or jointly in either direction of shaft rotation, it will be appreciated that either sheave could be used alone, as the cables can be wound thereon either way, if time to make the changeover can be spared.

What I claim as my invention is:

1. A shoulder exercising machine, comprising: a frame supported member presenting a central bearing there-through; a shaft rotatably and horizontally mounted in and through said bearing and extending therefrom on either side thereof; a sheave secured on one extending

end of said shaft; a weight carrier for said machine; a cable having one end secured to said weight carrier and the other end fastened to and windable on said sheave for direct suspension of said weight carrier from said sheave; a rest supported directly on the opposite extending end of the shaft, in a plane parallel to but offset from the centreline thereof, for rotation of said rest around and with said shaft; said frame supported member having a circular plurality of spaced holes around the shaft; a crank carried by the shaft for rotation therewith and swinging movement over said holes; pin means for insertion in the holes to limit the arc swing of the crank and the rest; a pair of handles mounted on the rest end of the shaft and for movement therewith; each of said handles being positioned adjacent one of the longitudinal ends of the rest and adjustably movable toward and away from same, means for receiving weights on the weight carrier; and means on the rest for securing a human arm thereto, with the humerus thereof centrally aligned with the shaft and the forearm thereof positioned at right angles to the shaft, and such that the shoulder muscles can act through said humerus and said forearm to turn said shaft, while the hand thereof grasps one of said handles.

2. In a shoulder exercising machine, the combination of a supporting stand, a vertically disposed annular frame member supported by said stand, a horizontal bearing sleeve mounted concentrically in said frame member, a shaft rotatable in and projecting at both ends from said bearing sleeve, a pulley secured to one end portion of said shaft, a cable having one end thereof connected to said pulley and windable thereon, a weight supported by the other end of said cable whereby to rotatively bias said pulley and shaft in one direction, a cross tube secured midway of its ends to the other end portion of said shaft, brackets secured to and extending laterally from said cross tube, a T-shaped arm rest carried by said brackets, said arm rest being disposed in a plane parallel to said cross tube but radially offset from said shaft, strap means provided on said arm rest for attaching a human arm thereto, a pair of extensions slidably positioned in the end portions of said cross shaft, a pair of hand grips carried by the respective extensions and disposed adjacent the respective opposite ends of said arm rest, the end portions of said cross tube being formed with rows of apertures, leaf springs provided on said extensions inside of said cross tube, detents carried by said leaf springs and received selectively in said apertures whereby said extensions may be slidably adjusted in the cross tube to vary the distance of said hand grips from the ends of said arm rest, a lever secured to and projecting radially from said shaft, said lever having a free end portion movable over said frame member when said shaft is rotated, said frame member being provided with a plurality of circumferentially spaced openings, and pins selectively receivable in said openings, said pins being engageable by said free end portion of said lever to limit the extent of rotation of said shaft.

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