

March 12, 1968

M. R. SHOWALTER

3,372,928

EXERCISING MACHINES OPERABLE INDEPENDENTLY OF
THE EXERCISING PERSON'S APPLIED FORCE

Filed Aug. 13, 1965

4 Sheets-Sheet 1

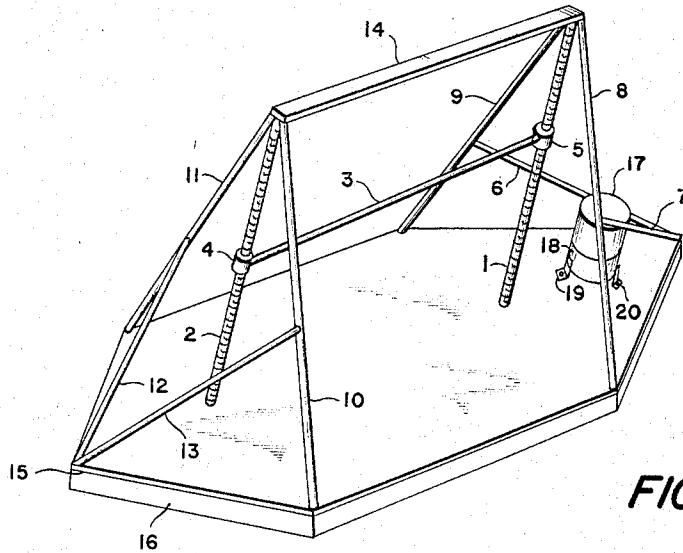


FIG. 1

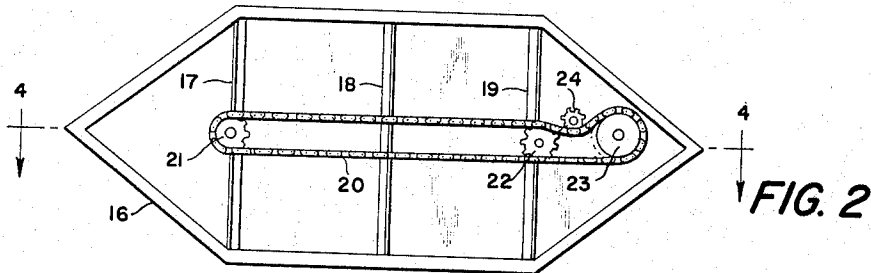


FIG. 2

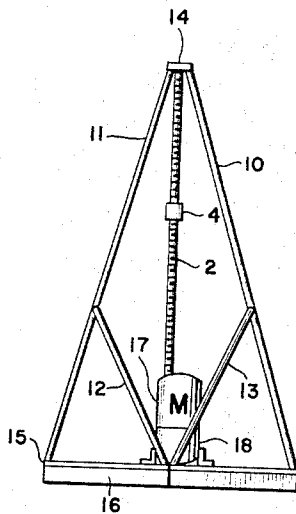
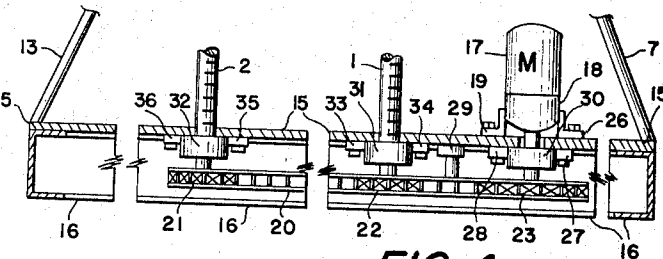


FIG. 4

FIG. 3

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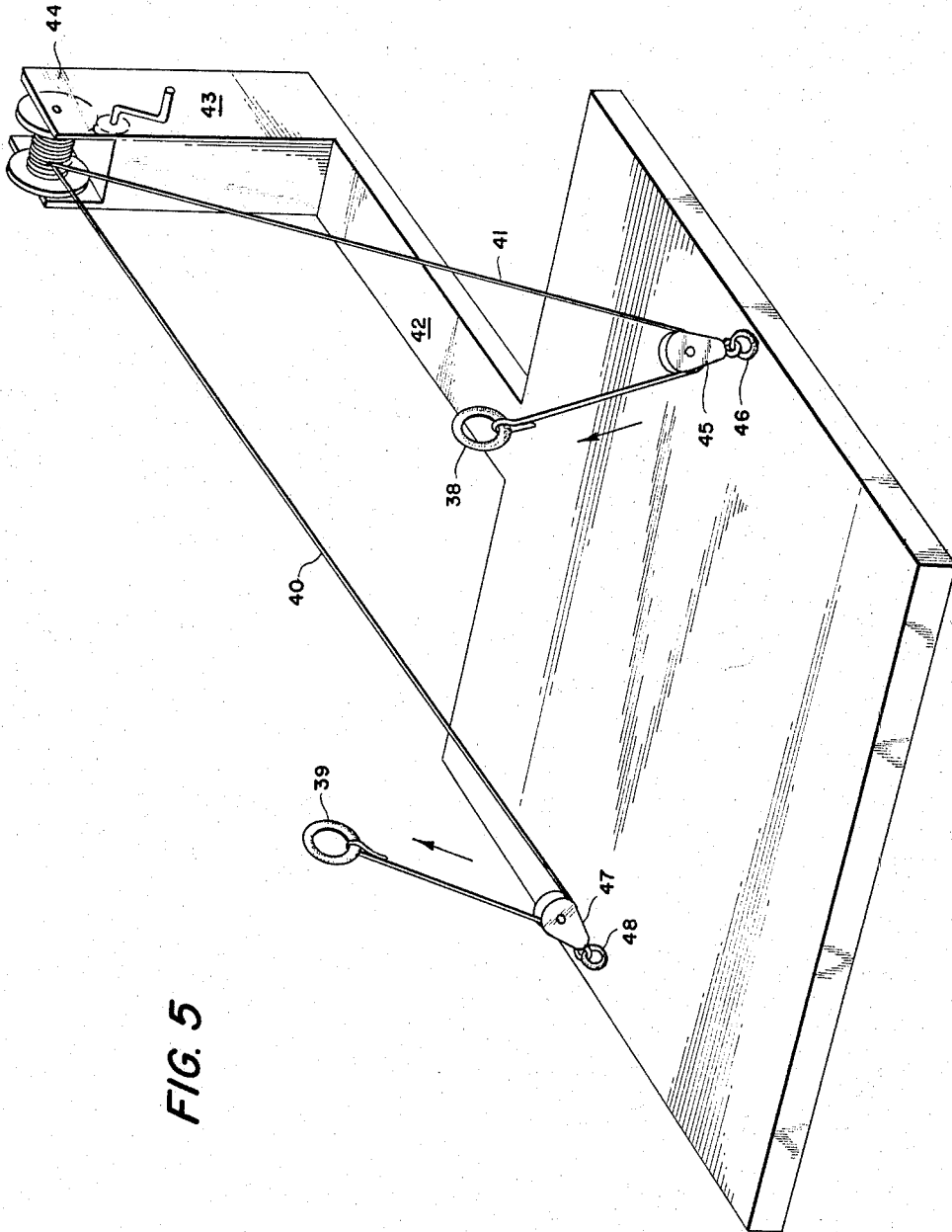


FIG. 5

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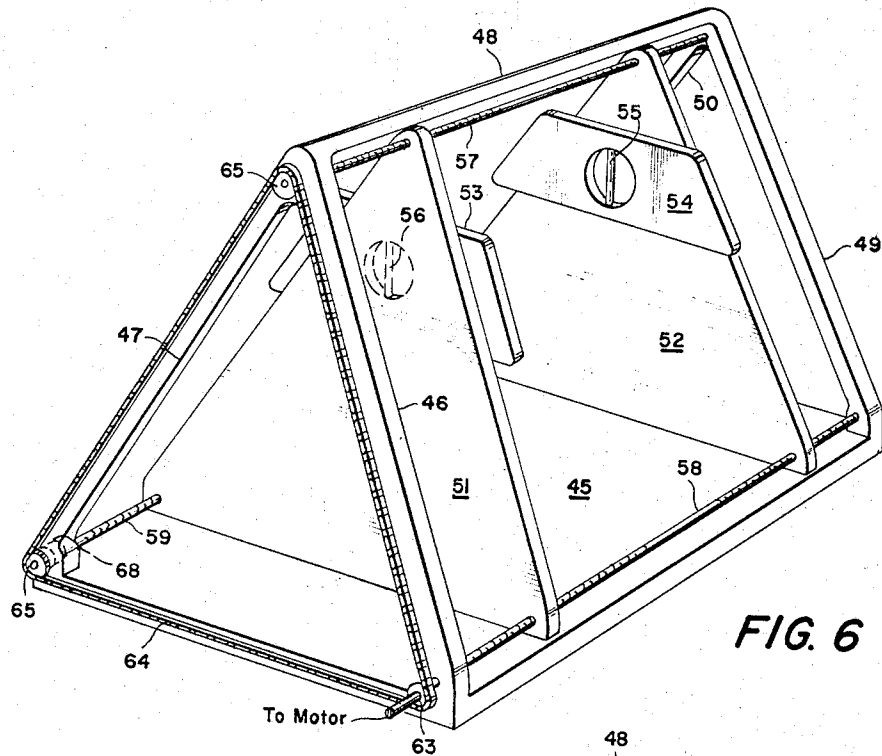


FIG. 6

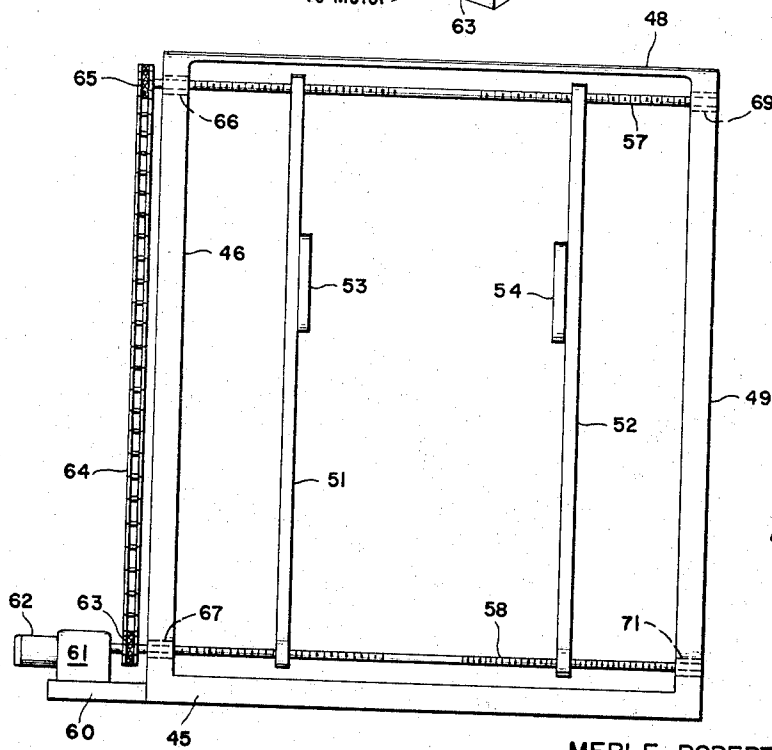


FIG. 7

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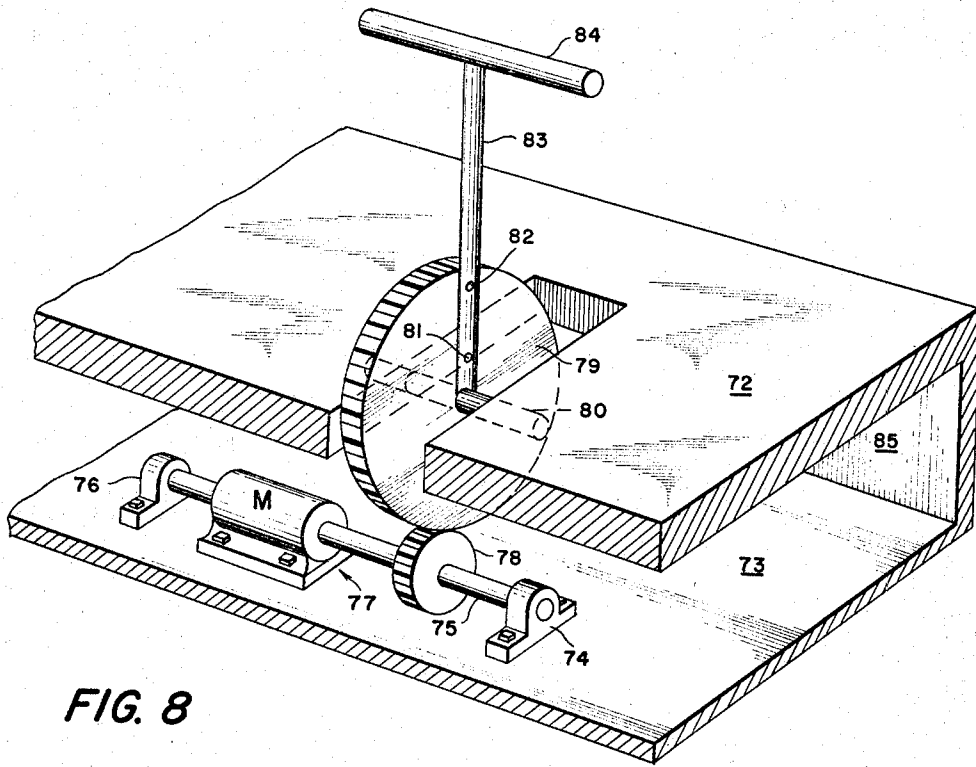


FIG. 8

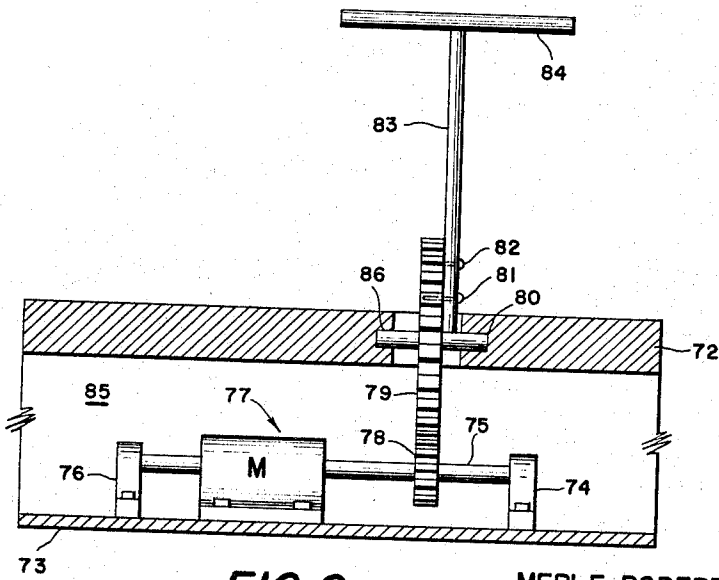


FIG. 9

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The present invention relates to improvements in exercise machines. The object of this invention is to provide exercise machines which combine the advantages of static exercise, commonly called isometrics, exercises against a spring or weight, commonly called isotonic, and other valuable benefits exclusive of either mode of exertion, in the invented process hereinafter referred to as isometronics. Isometronics is the process by which an object immovable by muscular exertion in the direction of exercise is moved, either with or against the direction of exertion independent of the muscular effort, while muscular effort is being exerted in the direction of exercise.

Isometronics make possible 100% exertion per movement, not possible with isotonic, combined with movement, not possible with isometrics. In addition, isometronics offers the added exertion of the forcible overcoming of a muscle against the direction of its force; a type of exercise not provided by either isometrics or isotonic.

Added advantages of isometronics are the lack of danger of falling weights and snapping springs, common to many isotonic movements.

The drawings show four devices utilizing the isometric process: a horizontal bar exercising machine, a ring exercise machine, a parallel plane exercising machine, and an arm wrestling exercising machine.

Referring now to the drawings, FIG. 1 is a perspective view of the horizontal bar isometric exercise device.

FIG. 2 is a view of the device shown in FIG. 1 showing an overview of the method of synchronizing the movement of the two screw jacks.

FIG. 3 is a side view of the device shown in FIG. 1, showing mainly the formation of the supporting structure.

FIG. 4 is a cutaway view of the device shown in FIG. 1 taken from FIG. 2 at section line 4-4, illustrating the manner of connection of the motor, reduction unit, bearing and drive sprocket by means of chain drive with the two screw jacks and their respective bearings and sprockets.

FIG. 5 is a perspective view of the ring-handle isometric exercise device.

FIG. 6 is a perspective view of the parallel planes isometric exercising device.

FIG. 7 is a side view of the device shown in FIG. 6.

FIG. 8 is a perspective view of the pivoting member isometric exercising device.

FIG. 9 is a side view of the device shown in FIG. 8. Like numerals refer to like parts throughout the several figures.

Referring now to the construction shown in FIGS. 1 through 4, there is a platform 15 upon which the user stands, said platform being supported by a base structure 16. Within base structure 16 are reinforcing pieces 17, 18, and 19. These members are rigidly connected to two reinforced supporting structures of braces, comprising frames 6, 7, 8, and 9 and frames 10, 11, 12 and 13 of which numerals 8, 9, 10, and 11 denote main braces and numerals 6, 7, 12, and 13 denote secondary cross braces. Frames 6, 7, 8, 9, and 10, 11, 12, 13, are rigidly joined at their tops by a crosspiece 14.

Within this base and reinforcing framework extend two

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vertical tandem screw jacks extending from holes in the base (connected with bearings 31 and 32) to the extreme ends of the crosspiece 14, and also connected to bearings at their insertions (not shown for reasons of space) in the crosspiece.

Engaged and supported at equal heights by the screw jacks are screw mountings 4 and 5. Screw mounting 4 is engaged to screw jack 2, while screw mounting 5 is engaged to screw jack 1. Rigidly connecting screw mountings 4 and 5 is horizontal exercise bar 3, which is held by the user and exerted against in various exercise positions during use of the machine. The rigid unit comprising screw mountings 4 and 5 and exercise bar 3 is adapted to be screwed upwards and downwards by the rotation of the tandem screw jacks 1 and 2. Modifications of the bar such as the providing of a rotating sleeve, addition of bearings at the connections between the exercise bar and screw mountings to allow the exercise bar to rotate, bending the bar or allowing the bar to be connected to a parallel bent bar to facilitate gripping, and various other modifications prevalent in the art of physical culture are not to be considered improvements on this invention.

The method of coordinating the rotation of screw jacks 1 and 2 can be seen in the sprocket and chain assembly. Sprocket 21, rigidly connected to screw jack 2, and sprocket 22, rigidly connected to reduction unit 18 which is in turn connected to power source 17, and idler sprocket 24 are joined by means of bicycle chain 20. The effect of this assembly is to assure that screw jacks 1 and 2 connected to screw jack sprockets 21 and 22, turn at all times in the same direction and at equal speeds in such manner that exercise bar 3 remains horizontal in all positions. Other means of accomplishing the same end, such as substituting belt drive for chain drive, the utilization of gears, or other means of drive are modifications obvious to the art of mechanics, and are not improvements over this device.

A more detailed discussion of the power transmission is power source 17, connected to reduction unit 18, which is secured to platform 15 by bracket and rivet constructions 19, 20 and 26. Power sprocket and power shaft assembly 23 passes through bearing 30 which is connected to platform 15 by bracket and rivet constructions 27 and 28. Power sprocket 23 is engaged to bicycle chain 20. Power from sprocket 23 is transmitted by means of chain 20 to screw jack sprocket and shaft assembly 22 which passes through bearing 3k, which is connected to platform 15 by means of bracket and rivet constructions 33 and 34. Screw jack sprocket and shaft assembly 22 is rigidly connected to screw jack 1. Power is also transmitted by means of chain 20 to screw jack sprocket and shaft assembly 21, which passes through bearing 32, which is connected to platform 15 by bracket and rivet constructions 35 and 36. Sprocket and shaft construction 21 is rigidly connected to screw jack 2. Various modifications of this construction are possible in addition to those previously mentioned. The power source can be any type of motor; electric, hydraulic or otherwise, or be hand driven, or, through modifications, foot driven. The devices to turn the power source on and off, to reverse its direction, to time its speed, to measure its strain, and various safety devices are obvious to the arts of mechanics, switches, and timers, and are not to be considered improvements over this device. It might also be possible to include a clutch device in the reduction unit, to permit the free movement of the sprocket chain assembly or to dismiss with the reduction unit altogether.

Referring generally to the device shown in FIGS. 1, 2, 3 and 4, it should be mentioned that other obvious means to accomplish the same ends suggest themselves, along with several obvious modifications. The exercise bar could be connected to bicycle chain loops rather than

screw jacks; the bar could be controlled by means of ropes or belts; or the bar could be controlled by hydraulic means. Also, any of these machines could be modified so that the dihedral angle formed between the plane of movement of the bar and the plane of the platform could be adjustable to angles other than 90 degrees. This might facilitate the execution of such exercises as the decline bench press. Pressure gauges to determine pressure on the bar might be added. Modifications of the platform, such as methods of securing the feet of the exercising user for various "pullup" motions, holes for the position of blocks for such exercises as squats and toe raises, holes to secure proper positioning of the bench or couch, and various markings and paddings of the platform are obvious to those skilled in the arts of mechanics and physical culture and are not to be considered improvements over this device.

Referring to the device shown in FIG. 5, a platform 37, on which the exerciser stands while exercising, is connected by means to a piece 42 to an upright structure 43 which supports a winch 44. Connected to the platform 37 are two pulleys, connected by means of ring bolts. Ring bolt 43 secures pulley 47 and ring bolt 46 secures pulley 45. Extending from winch 44 through pulley 45 to connection with ring handle 38 is rope 41. In like manner, extending from winch 44 through pulley 47 to connection with ring handle 39 is rope 40. Ropes 40 and 41 are to be of sufficient tensile strength to substantially resist longitudinal stress. Winch 44 is in this drawing hand powered, but it could obviously be powered by another power source. In this event, various obvious modifications as to switches, timing devices, stress gauges, and safety devices, similar to those referred to in the device shown in FIGS. 1-4, suggest themselves. Obviously, the type of pulley, and the method of connecting the pulley to the platform could be modified without invention. Also, the winch could be modified by using a double wind drum, or by a reel line guide device similar to those used on conventional fishing reels. The addition of added pulleys could modify the position of the winch, putting it at different relations to the platform, or perhaps putting it under a raised platform structure are obvious variations to anyone skilled in the art of mechanics.

Other variations of the device shown in FIG. 5 are the placing of the platform in other than horizontal planes and inverting the device, by placing the pulleys on a frame such as the reinforcement frame shown in FIGS. 1-4 and exerting force downward on the rings. It would also be possible to substitute a bar for rings 38-39. These modifications are obvious to anyone skilled in the art of exercise devices.

Referring now to the device shown in FIGS. 6 and 7, the base 45 is rigidly connected to triangular pieces 46 and 47 and triangular pieces 49 and 50, which are rigidly connected at the top by crosspiece 48.

Spanning between triangular units 46, 47, and 48, 50 are three counterwound screw jacks, 57, 58, and 59, said screw jacks being of equal pitch, with the left sides of all three jacks wound in the same direction, in opposition to the windings on the right side of all three jacks. I prefer to have the middle portions of all three jacks left blank, as shown on the diagram to provide automatic safety stops.

These three jacks 57, 58, and 59 pass through a triangular plane piece 51, which is rigidly connected to handpiece 53. Embedded in hand piece 53 is grip bar 56, as shown in FIG. 6. In like manner, jacks 57, 58 and 59 pass through triangular plane piece 52, which is rigidly connected to hand piece 54. Embedded in hand piece 54 is hand grip bar 55, as shown in FIG. 6. The holes through which screw jacks 57, 58, and 59 pass are threaded so that the triangular plane pieces 51, and 52 move as screw jacks 57, 58 and 59 rotate. Obviously triangular plane pieces 51 and 52 need not be solid, and may be of tubular, forged or cast construction. The hand grip bars 55 and

56 need not be vertical, and may be adapted to be connected to ropes, chains or other devices to facilitate pulling and gripping; spherical or other easily gripped structures could be added to pieces 53 and 54 to facilitate gripping. These and other modifications are obvious to those skilled in the art of exercise machines.

Screw jack 58 inserts in brace 49 with bearing 71 and inserts in brace 47 with bearing 67. Screw jack 57 inserts in the joint of braces 49 and 50 with bearing 69 and inserts in the joint of braces 46 and 47 with bearing 66. Screw jack 59 inserts in brace 50 with bearing 70 and inserts in brace 47 with bearing 68.

The screw jacks are synchronized to maintain pieces 51 and 52 parallel by the following sprocket and chain arrangement. A power source base 60, rigidly connected to main base 45 is connected to reduction unit 61, which is connected to power source 62 and sprocket and shaft assembly 63, which is rigidly connected through bearing 67 to screw jack 58. Bicycle chain 64 passes around sprocket and shaft assembly 63 passes to sprocket and shaft assembly 65, which is rigidly connected, through bearing 66, to screw jack 57. Bicycle chain 64 also passes around sprocket and shaft assembly 65, which is rigidly connected through bearing 68 to screw jack 59. Various obvious modifications of this construction suggest themselves. The power source could be hand driven, or foot driven, the reduction unit might be dispensed with, and a clutch unit might be added to allow the sprocket to move without interference from the power source. A gear mechanism might be substituted for the sprocket and chain mechanism. Various switches, timing devices and safety devices, similar to those discussed in reference to FIGS. 1-4 suggest themselves to anyone skilled in the arts of power control, mechanics, and exercise devices.

Various mechanisms which could be substituted for the three counterwound screw jacks, such as bicycle chain, gear, or hydraulic means suggest themselves to anyone skilled in the art of mechanics.

Referring to the device shown in FIGS. 8 and 9, main spur gear and shaft assembly 79 is embedded in elbow-support structure 72 by means of bearing 80 and 86. Rigidly connected by means of rivets 81 and 82 to main spur gear and shaft assembly 79 is shaft 83. Rigidly connected to shaft 83 is handle 84. Under elbow support 72 is mechanism base 73, on which is rigidly connected bearing and mounting assembly 76, and bearing and mounting assembly 74. Connecting elbow support 72 and mechanism base 73 is piece 85. Connected to bearings 74 and 76 and extending between said bearings is shaft 75. Engaging on shaft 75 is power source assembly 77. Rigidly connected to shaft 75, and engaging on main gear and shaft assembly 79 is spur gear 73. Various modifications of the device suggest themselves, such as the addition of a reduction unit, and the lengthening of the shaft 83, modification of handle 84 and modifications of support 72 to produce a quadriceps, femoris and hamstring muscle group exerciser. Such modifications are obvious to those skilled in the arts of exercise devices, mechanics and physical therapy.

In any of the devices in the foregoing specification, means are easily available to lock the object exerted against by the exerciser for isometric contraction exercise. In many cases, a power driven exerciser could be locked simply by turning off the power source. Many means of locking the mechanisms used in isometric exercisers are old in the art of mechanics, and are not to be considered improvements over any of these devices.

In the claims, the words "supporting surface" and "supporting structure," or similar phrases, recur. In any of the devices using isometrics, it is necessary that the structure which the person exercising stands on or braces against as he exerts force on the moving member (bar, plane, handle, or the like) be solid and truly stationary under the stress of exercise. This can be done either by a massive weight securing the exercise machine, or by

connecting the machine to a floor, heavy table, wall, ceiling, or similar structure, which then becomes a functional part of the supporting structure of the machine.

Humanly possible exertion should be interpreted to mean able to function unaffected by one hundred and fifty percent of the maximum exertion of any user who might reasonably be expected to use the machine. A machine specifically limited to physical therapy use would not be required to function unaffected by the force of which the world's strongest men are capable. A general use machine would, however, be required to function independently of any man's maximum exertion. For a horizontal bar exerciser analagous to the barbell to be independent of humanly possible force would mean to be unaffected by eighteen hundred pounds force, while for an arm wrestling machine two hundred pounds would be the ceiling of the unaffected operating range.

I claim:

1. A supporting surface, an exerciser mounted on said supporting surface and comprising first means for operative engagement by a portion of the human body, second means mounting said first means for back and forth movement in opposite directions, third means for selectively moving said first means in either of said directions and for movement between extreme positions both of which extreme positions are within reach of a person in contact with said supporting surface, and at a speed of movement substantially independent of humanly possible muscular exertion by the use on said first means in the direction of exercise.

2. Structure as stated in claim 1, including means by which said first means may be held immovable regardless of muscular force exerted on said member by the exerciser in a direction.

3. In an exerciser having movement speed substantially independent of humanly possible muscular exertion, structure as stated in claim 1, in which said first means is a horizontal bar.

4. Structure as stated in claim 3, including means by which said bar may be held immovable regardless of mus-

cular force exerted on said bar by the exerciser in a direction.

5. The structure of claim 1, wherein said first means is two handles adapted to be gripped by the hands, and said second means includes mechanism mounting said handles whereby during use they are substantially equidistant from said supporting structure.

6. The structure of claim 5, including means by which said handles may be held immovable regardless of muscular force exerted on said handles by the exercise in the direction of exercise.

7. The structure of claim 1, wherein said first means comprises two members adapted to be engaged by the human hand, and said second means includes mechanism mounting said members whereby they are moved at equal speed and in substantially opposite directions during use.

8. The structure of claim 7 including means whereby said shaft may be held stationary at a point of the motion of said members.

9. The structure of claim 1, wherein said first means comprises a pivoting shaft adapted to be engaged by a portion of the human body.

10. The structure of claim 9, including means whereby said shaft may be held stationary at a point of the motion of said shaft.

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