

May 1, 1951

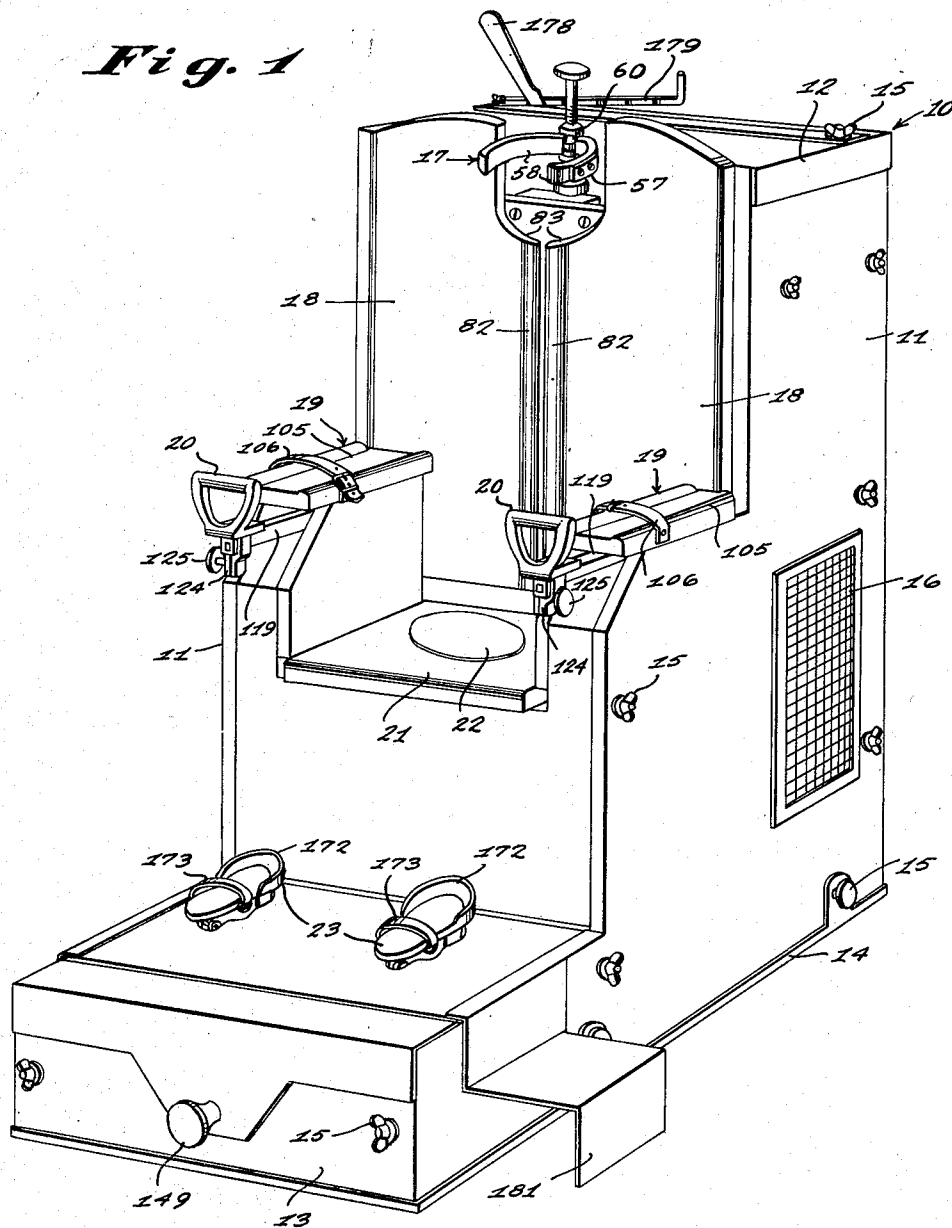
L. S. MARTINEZ
EXERCISING DEVICE

2,550,841

Filed Sept. 3, 1948

5 Sheets-Sheet 1

Fig. 1



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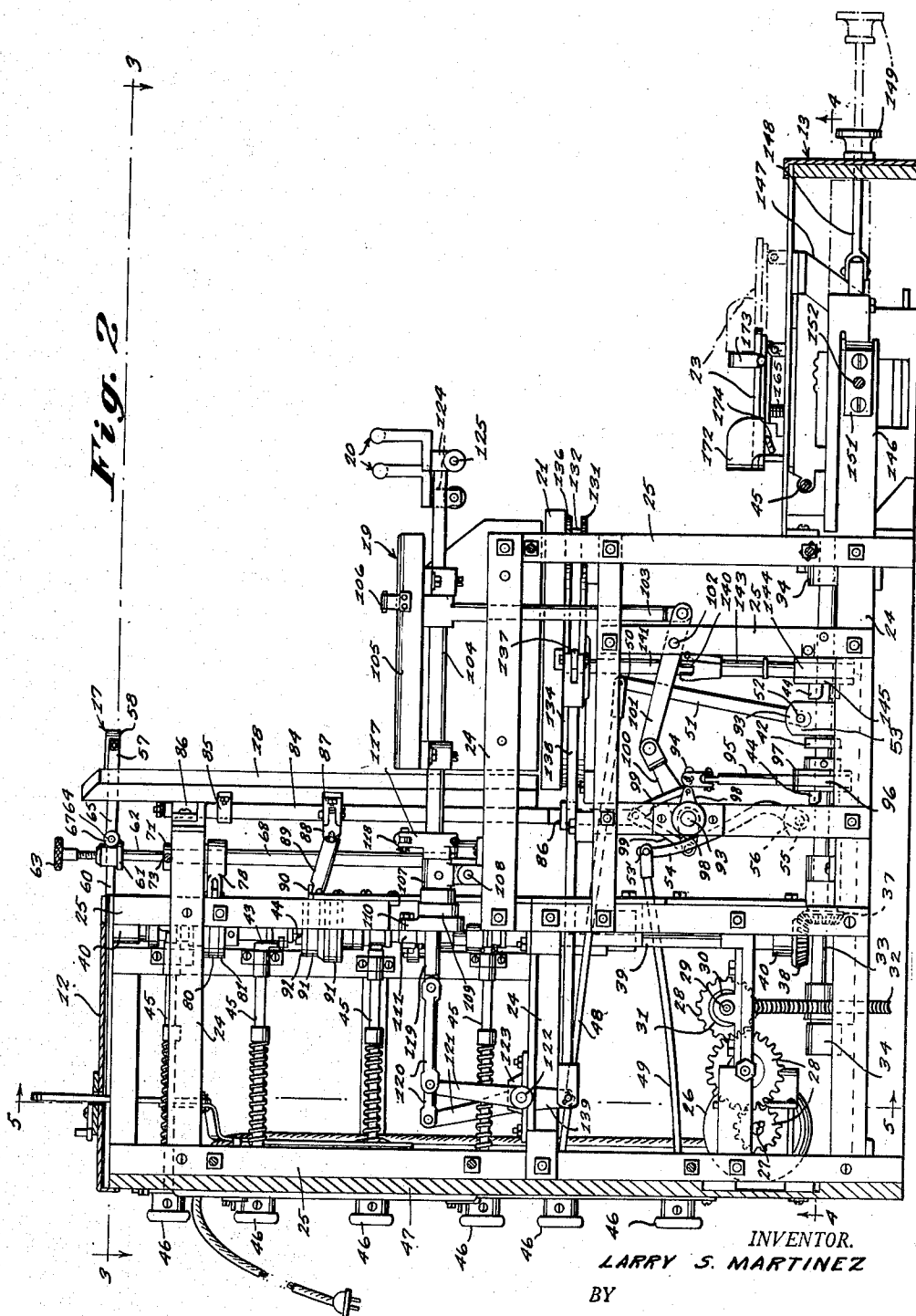
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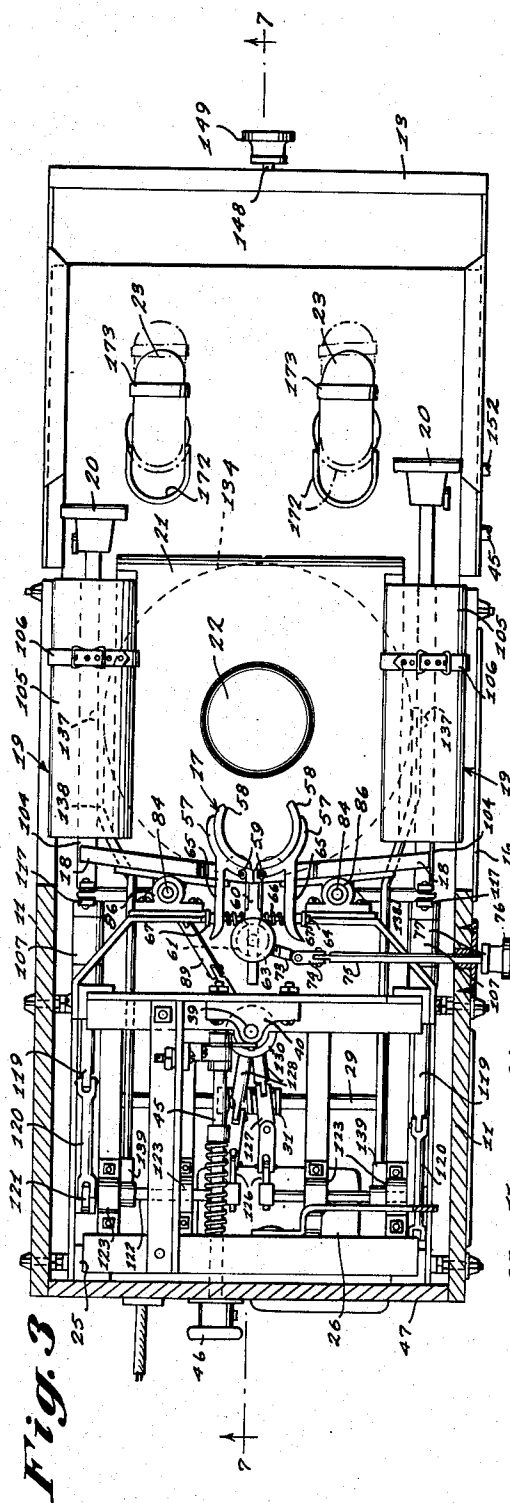
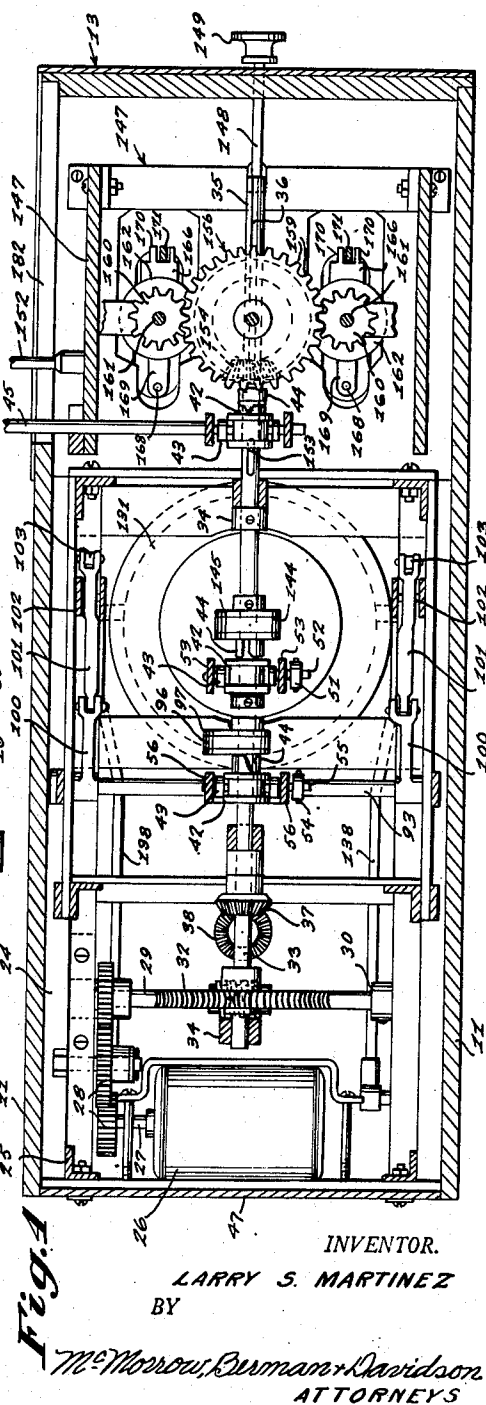
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5 Sheets-Sheet 3



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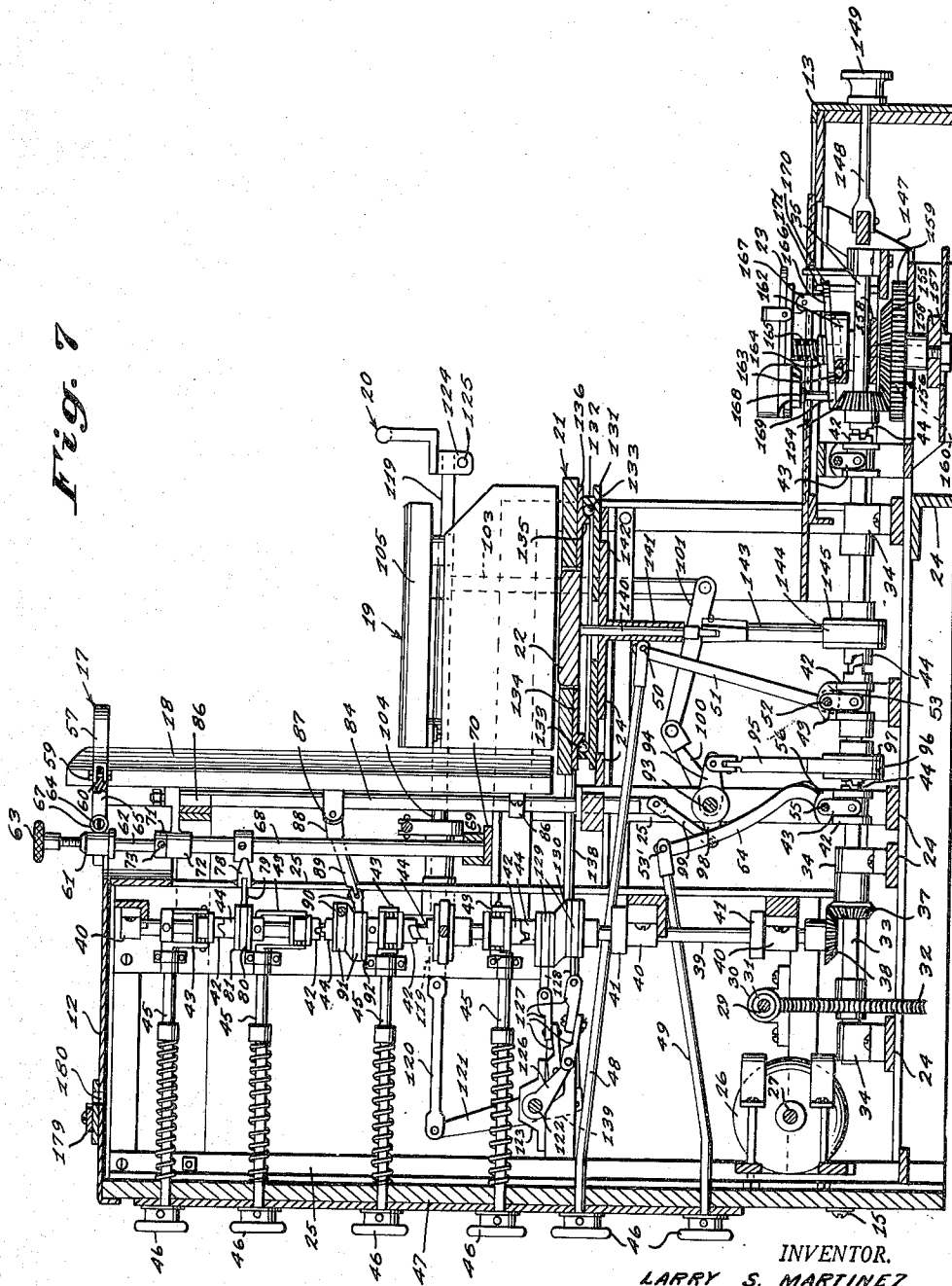
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Fig. 7



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UNITED STATES PATENT OFFICE

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EXERCISING DEVICE

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Application September 3, 1948, Serial No. 47,617

19 Claims. (Cl. 128—33)

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My invention relates to an exercising device, and more particularly to a power-driven exercising device in the form of a chair. Many invalids and semi-invalids are unable by reason of their infirmities to obtain adequate exercise for the treatment of their ailments, or for maintaining their general health. Likewise, certain muscular or other ailments will readily respond to proper manipulation and exercise. Heretofore, all of such manipulation and exercise has been accomplished manually by the physician in charge or his assistants. Moreover, the physical strain imposed upon the physician or his assistants in physically manipulating the afflicted part is extremely tiring and it is also extremely difficult to achieve a uniform manipulation or treatment throughout the entire period.

With the foregoing in view, it is an object of my invention to provide an improved power-driven exercising device.

A further object is to provide an improved power-driven exercising device capable of great flexibility in use, whereby it is adapted for performing a wide variety of exercising motions and transmitting said motions to one or more portions of a patient's body and extremities.

A further object is to provide an improved exercising chair including a power drive for a plurality of moving parts adapted to be moved in appropriate exercising movements; said moving parts being adapted to be used selectively either individually or in conjunction with any or all of the other moving parts, whereby to produce a wide variety of exercising effects.

A further object is to provide a plurality of novel power-driven exercising devices.

A further object is to provide a plurality of novel power-driven exercising devices, together with means for operating the same either individually or in various combinations and sub-combinations with one another.

A further object is to provide a plurality of improved power-driven exercising devices, novel combinations and sub-combinations thereof, together with means for varying the speed and phase of operation of the parts individually and collectively.

Other objects and advantages reside in the particular structure of the device, the structure of the several elements forming the same, combinations and sub-combinations of such elements, a means for actuating such elements, and the particular method or mode of operation, all of which will be readily apparent to those skilled in the art upon reference to the attached draw-

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ings in connection with the following specification, wherein the invention is shown, described and claimed.

In the drawings:

Figure 1 is a perspective view of what is now thought to be a preferred form of the invention;

Figure 2 is an elevational view from the left of Figure 1, parts being broken away and shown in longitudinal vertical section;

Figure 3 is a horizontal sectional view taken substantially on the plane of the line 3—3 of Figure 2;

Figure 4 is a horizontal sectional view taken substantially on the plane of the line 4—4 of Figure 2;

Figure 5 is a transverse vertical sectional view taken substantially on the plane of the line 5—5 of Figure 2;

Figure 6 is a rear view of the machine according to the invention, parts being broken away for clarity;

Figure 7 is a longitudinal vertical sectional view taken substantially on the plane of the line 7—7 of Figure 3.

Referring specifically to the drawings, wherein like reference characters have been used throughout the several views to designate like parts, and referring at first to Figure 1, 10 designates generally the machine according to the invention, which includes a frame to be described later, which may be enclosed by removable side wall sections 11, a top cover 12, a front wall section 13, and a base plate 14. The several covering elements just described may be secured to the frame by any suitable connectors, such as the wing-nuts 15. Likewise, the wall sections 11 may be provided with one or more removable panels 16 providing access to the interior of the device and for ventilating the same. The parts of the machine which are movable for the purpose of imparting an appropriate exercising motion to the patient comprise a headrest 17, a backrest which may comprise a pair of laterally-aligned upright backrest-providing sections 18, a pair of arm rests 19, a pair of hand grips 20, and a seat which may comprise a pair of seat sections 21 and 22. Likewise, there is preferably provided a pair of movable foot rests 23.

The exercising parts just described are adapted to have imparted thereto an appropriate exercising motion. Likewise, it is contemplated that the parts may be actuated individually to perform or impart an appropriate exercising motion to a patient or an extremity or portion of

his body. Likewise, it is contemplated that at times any of these exercising parts will be utilized in conjunction with one or more of the other parts simultaneously. Further, each part is capable of being operated at varying speeds and in different phase relation to other cooperating parts, whereby to accomplish compound motions having exercising characteristics over a wide range so as to accomplish a wide range of beneficial results.

Referring now to all figures of the drawings, it is apparent that the frame of the machine comprises any arrangement of vertical or horizontal frame members rigidly connected together in any manner to provide a firm base or frame for the device. For the purpose of clarity, the horizontal frame members have been designated by the reference characters 24, while the vertical frame members have been designated by the reference characters 25. The rear end of the frame has secured thereto in any manner an electric motor 26, the drive shaft 27 of which is operatively connected by any suitable reduction gearing 28 to a countershaft 29 extending transversely of the frame and journaled for rotation in journals or bearings 30. The countershaft 29 has fixed thereon a worm 31 which is in mesh with a worm gear 32 fixed to a drive shaft 33. The drive shaft 33 extends horizontally longitudinally of the frame adjacent the base plate 14 and its front and rear ends are journaled for rotation by journals 34 carried by the frame.

The front end of the drive shaft 33 extends forwardly of the front journal 34 and is thereafter unsupported to provide a shaft end 35. Such end 35 is formed with a longitudinally-extending spline groove 36 for a purpose to be apparent later. The drive shaft 33 has fixed thereon adjacent the worm gear 32 a bevel pinion 37 which is in mesh with a similar bevel pinion 38 fixed on the lower end of a vertically-directed drive shaft 39. The vertical drive shaft 39 is journaled in any suitable journals 40 secured to the frame and maintained in position by any suitable thrust collars 41 which may bear against certain of said journals 40. The vertical drive shaft 39 extends vertically just behind the backrest 18 and in rearwardly-spaced relation thereto. As is obvious from the foregoing, both shafts 33 and 39 are rotated simultaneously upon rotation of the motor drive shaft 27. In the embodiment shown, the two shafts rotate at the same speed.

Each of the shafts 39 and 33 has operatively associated therewith a plurality of clutches, whereby the movable exercising means are selectively and operatively connected to one or the other of the shafts. In view of the fact that such clutches are conventional and form no part of the invention apart from the combinations formed thereby, it will suffice to describe but a single one of them. Thus, each clutch includes a driving clutch member 42 which is rotatable with its respective shaft and slidable thereon, as by a pin-and-slot connection therewith. Any suitable fork 43 engages the driving clutch members 42 for actuating the clutch member longitudinally of its shaft into operative engagement with a driven clutch member 44 which is freely rotatable on the respective shaft. Certain of the forks 43 are fixed to horizontal shafts 45 journaled in the frame and having finger pieces 46 located outwardly of the frame for actuation

of the clutches upon rotation of the shafts 45. When the shafts 45 are rotated the forks 43 move the respective driving clutch members 42 longitudinally of their shafts into operative engagement with the driven shaft members 44. Thus, the upper group of four clutches associated with the vertical shaft 39 are journaled in a rear panel 47 of the frame. Likewise, the foremost clutch on the horizontal shaft 33 extends transversely of the frame and outwardly of one of the side panels 11 for actuation of the related clutch upon rotation of the shaft 45 for the same. Obviously, the same arrangement could be utilized for the two rearmost clutches on the horizontal shaft 33. However, it is considered desirable to locate the actuating knobs or handles 46 for these clutches on the rear panel 47. Consequently, the actuating shafts 48 and 49 for these two rearmost clutches are longitudinally slidable in the rear panel 47. The shaft 48 for the intermediate clutch on the horizontal drive shaft 33 is pivoted at its forward end, as at 50, to the upper end of a lever 51, the lower end of which is fixed to a pintle 52 journaled in a pair of laterally-spaced ears 53 on either side of the horizontal shaft 33. The ears 53 are fixed to the frame in any suitable manner, and the fork 43 for this clutch is fixed to the pintle 52. Thus, as the actuating shaft 48 for this clutch is moved to the left, Figure 2, the lever 51 is rocked about its pivot 50, whereby to project the driving clutch member 42 forwardly into engagement with the driven clutch member 44.

In like manner, the forward end of the actuating shaft 49 for the rearmost clutch on the horizontal shaft 33 is pivoted, as at 53, to the upper end of a lever 54. The lower end of the lever 54 is pivoted to a pintle 55 carried between spaced ears 56 fixed to the frame on either side of the horizontal shaft. The fork 43 for this clutch is fixed to the pintle 55.

The structure of the headrest 17 is best seen in Figures 1, 2, 3 and 7, and comprises a pair of horizontally-disposed arms 57, the inner surfaces of which are concave to receive the head therein. Such inner surfaces are preferably covered with any suitable padding 58 for comfort. The rear ends of the arms 57 are pivoted, as at 59, to the front end of a horizontally-disposed rod 60. The rear end of the horizontal rod 60 is preferably squared and slidably received for forward and rearward adjusting movement in the enlarged head 61 of a vertically-disposed rod 62. Any suitable means, such as the thumb screw 63, is threaded in the enlarged head 61 and engageable with the squared end of the shaft 60 to lock the same in an adjusted position relative to the head 61. Thus, the headrest 17 is adjustable forwardly and rearwardly relative to the frame. As best seen in Figure 3, the arms 57 each have fixed thereto a rearwardly-directed lever arm 65 which arms are provided with laterally-aligned apertures slidably receiving a cross-bolt 64 which is fixed to the horizontal rod 60 and extends laterally of each side thereof. Coil springs 66 surround each outwardly-directed bolt portion and bear against the inner surfaces of the lever arm 65, whereby to load the same laterally outwardly. Such outward movement tends to pivot the arms 57 inwardly toward each other on the pivots 59. Nuts 67 on the outer ends of the cross-bolt portions bear against the outer surfaces of the lever arms 65. By tightening or loosening the

nuts 67, the head-engaging arms 57 are moved inwardly or outwardly, whereby the headrest is adapted to fit heads of different sizes.

The vertical rod 62 is vertically slidable in a sleeve 68. The lower end of the sleeve 68 is supported for oscillation in a suitable journal 69 carried by a cross-frame member 70. The upper end of the sleeve 68 is formed with a collar 71 which rests atop any suitable journal 72 pivotally supporting the upper end of the sleeve. The journal 72 is fixed to the frame in any suitable manner. The collar 71 has threaded therein any suitable means, such as the set screw 73, which is engageable with the rod 62 to maintain the same in a vertically-adjusted relation relative to the sleeve 68, and, at the same time, to lock the rod 62 to the sleeve for oscillation therewith. As best seen in Figures 3 and 5, the set screw 73 is connected by means of a universal joint 74 to an actuating rod 75 for the set screw. The rod 75 is journaled for rotation, as at 77, in one of the side wall members 11. The free end of the rod 75 extends laterally outwardly of the frame and has an actuating knob or the like 76 fixed on the outer end thereof. As is readily apparent from the foregoing, by rotating the shaft 75, the set screw 73 may be loosened or tightened, whereby to permit vertical adjustment of the vertical rod 62 in the sleeve. Thus, the headrest 17 is adjustable to receive the heads of persons of different heights. As best seen in Figures 2 and 7, the sleeve 68 has fixed thereon between the bearings 69 and 72 a rocker arm 78. The free end of the rocker arm 78 is pivoted to the free end of an eccentric arm 79 which is fixed to and extends radially forwardly of an eccentric band 80. The band 80 is rotatably seated in the groove formed around the periphery of an eccentric 81 which is freely rotatable on the vertical drive shaft 39. Likewise, the driven clutch member 44 is fixed to the eccentric 81 so that when the driving clutch member is engaged with the driven clutch member, the eccentric 81 will be rotated with the shaft 39. The eccentric band 80 and eccentric arm 79 transmit oscillating movement to the sleeve 68 through the rocker arm 78 in a well known manner when the clutch is engaged. The effect of this movement is to rock a head engaged thereby from side to side relative to the attached body. Alternatively, with the other parts of the apparatus working and with the clutch for the headrest 17 disengaged, the headrest serves to hold a person's head in a relatively rigid position relative to the rest of the body.

The backrests 16 are substantially identical and extend vertically of the frame forwardly of the sleeve 68. The adjacent inner edges of the backrest sections 18 are provided with forwardly-projecting and vertically-extending ridges 82 comprising massaging surfaces. Such forward surfaces of the backrest sections 18 and also the ridges 82 are preferably padded in any suitable and/or well known manner. The upper adjacent edges of the backrest sections are cut away, as at 83, to permit the projection of the headrest 17 therethrough. The rear surfaces of the backrest sections 18 are fixed to oscillating shafts 84 by any suitable means 85. As will appear later, the shafts 84 are likewise vertically reciprocal relative to the frame for the machine. The shafts 84 are journaled for oscillation and vertical reciprocation in any suitable journals 86 fixed to the machine frame. Each shaft 84 has fixed thereto a rocker arm 87 which is connected by means of a universal joint 88 and a link 89 to an eccentric

lever 90 of an eccentric band 91. Each eccentric band 91 is pivoted in a peripheral groove of a double-eccentric 92. In this connection, it should be noted that the double-eccentric 92 is so formed that the grooves thereof are 180° offset relative to the axis of the vertical drive shaft 39 on which the eccentric is freely rotated. Thus, one eccentric arm 90 is constantly operating in an opposite direction from the related eccentric arm 90 for the other backrest section 18. Also, the eccentric 92 has a driven clutch element 44 fixed thereto which engages the driving clutch element 42 so that the backrest sections may be connected to the vertical shaft 39 for oscillation about the axis of the shaft 39. The universal joints 88 and links 89 provide for vertical reciprocation of the backrest sections 18 by means now to be described.

To reciprocate the backrest sections 18 vertically, there is provided a horizontal rock shaft 93 which extends transversely of the frame and which is journaled for oscillation in an opposed pair of vertical frame members 25. The rock shaft 93 is vertically spaced from the horizontal drive shaft 33 and includes a rocker arm 94 which is pivotally connected to an eccentric arm 95 for an eccentric band 96. The eccentric band 96 fits in the peripheral groove of an eccentric 97 freely rotatable on the shaft 33. As in the previous instances, the eccentric 97 includes a driven clutch element 44 engageable with a driving clutch element 42. Such clutch element is actuated by the shaft 43 slidable in the rear panel 47. The rock shaft 93 likewise has a pair of laterally-spaced rocker arms 98, the free ends of which are connected by means of connecting rods 99 to the lower ends of the shafts 84. In the embodiment illustrated, the rocker arms 98 are 180° offset relative to each other, whereby to reciprocate the backrest sections 18 simultaneously in opposite directions.

The rock shaft 93 also serves to oscillate the arm rests 19 in a horizontal direction by means now to be described. Thus, the rock shaft 93 has a pair of rocker arms 100 secured thereto adjacent each end thereof. The free ends of each rocker arm 100 is pivotally connected to the rear ends of a walking beam 101 which is pivoted, as at 102, to a vertical frame member 25. The forward end of each walking beam 101 is pivotally connected to the lower end of a push rod 103. The upper end of each push rod 103 is fixedly connected in any suitable manner to a horizontally-disposed sleeve 104. Each sleeve 104 has secured thereto an arm rest member 105 which is preferably channeled on its upper surface and a forward portion of which preferably includes a wrist strap 106, whereby a patient's wrists may be strapped to the arm rest sections 105. The channeled upper surfaces of the arm rest providing sections 105 are preferably padded to provide a comfortable engagement with the patient's arms. The rear end of each sleeve 104 is pivoted in a collar 107, which in turn is pivoted by a transverse pintle 108 to a horizontal frame member 24. Thus, as the rock shaft 33 is rocked, the rocker arm 100 through the walking beam 101 and push rod 103 oscillates the arm rests 19 about the axis of the pintles 108. It is seen from the foregoing that the rock shaft 93 not only is effective to oscillate the arm rests as aforesaid, but also vertically reciprocates the backrest providing sections 18. Thus, in the structure shown, if it is desired to operate the backrest 18 without operation of the arm rests 19, it is a

simple matter to disconnect the rocker arms 100 from the walking beams 101, whereby to inactivate the arm rests. It is noted that both of the rocker arms 100 are laterally aligned whereby the arm rests are oscillated about the pintles 108 simultaneously in the same directions.

The rear end of each sleeve 104 extends rearwardly through the collars 107 and each of such rear ends is formed to provide a bearing or journal 109. Likewise, one of such bearings or journals 109 is provided with a rocker arm 110, the free end of which is connected by a connecting rod 111 to the free end of an eccentric arm 112 of an eccentric band 113 which is pivoted in the peripheral groove of an eccentric 114 rotatable on the vertical drive shaft 39. The eccentric 114 includes a driven clutch element 44 engageable with a driving clutch element 42 actuated by one of the shafts 45 extending through the rear panel 47 of the device. The eccentric band 113 may also include an arm 115 diametrically opposite to the arm 112 to which is secured a coil spring 116. The opposite end of the coil spring 116 may be secured to the bearing 109 of the opposite sleeve 104. Such spring 116 serves to minimize vibration of the parts and it is to be understood that all of the previously-described eccentrics, as well as those to be described in the future, may be provided with similar springs for the same purpose. Just forwardly of each collar 107, each sleeve 104 is provided with a rocker arm 117 and such rocker arms are connected by a drag link 118, whereby both sleeves 104 are simultaneously oscillated about the axis of the sleeves 104 when the clutch for the eccentric 114 is engaged. Thus, it is apparent that the arm rests 19 may be oscillated simultaneously in two planes or separately in either plane by the actuating means therefor.

The hand grips 20 are mounted on the forward ends of a pair of slide rods 119, each of which is slidable in a sleeve 104 through the bearings 109. The rear ends of the slide rods 119 are connected by means of drag links 120 to the free ends of a pair of rocker arms 121 which are fixed on rock shafts 122. The rock shafts 122 extend transversely across the machine above the motor 26 and are journaled in any suitable bearings 123 fixed to horizontal frame members 24. The forward ends of the slide rods 119 extend forwardly of the sleeves 104 and are preferably squared to non-rotatably receive the hand grips 20 thereon. In this connection, it should be noted that each hand grip 20 includes a depending split sleeve 124, the free lower ends of which are connected together by any suitable screws or bolts 125. Thus, by loosening the screws or bolts 125, the hand grip members 20 may be slidable along the forward end of the slide rod 119 to adjust the grips to suit the particular needs of the case. It should be noted also, Figure 2, that the rocker arm 121 for the slide rods 119 are offset relative to each other so that the hand grips are movable out of phase with each other. It should be noted that there are two rock shafts 122, Figure 3, and that such shafts are axially aligned. The inner end of each rock shaft 122 includes a rocker arm 126. The free end of each rocker arm 126 is operatively connected by the universal joint-providing linkage 127 to the free ends of eccentric arms 128, each of which is fixed to an eccentric band 129 of an eccentric 130. The eccentric 130 is freely pivotal on the vertical drive shaft 39. The eccentric straps 129 ride in peripheral grooves formed on the eccentric 30, and it is preferred that each groove be offset about the shaft 39 in

180° offset relation relative to the other groove, whereby the rocker arms 126 are alternately operated in opposite directions. As has been previously noted, the eccentric 130 is provided with a driven clutch member 44 engaging a driving clutch element 42 actuated by one of the shafts 45 extending through the rear panel 47 of the frame. It is obvious from the foregoing that with the clutch for the eccentric 130 engaged, oscillation will be transmitted from the vertical drive shaft 39 to the rock shafts 122 and will be converted to reciprocal motion in the slide rods 119 by means of the rocker arms 121 and drag links 120. Thus, the hand grips 20 will be reciprocated substantially in a horizontal plane longitudinally of the seat 21.

Below the seat section 21, there is provided a substantially annular plate 131 which is fixed to suitable horizontal frame members 24 in any suitable manner. The plate 131 includes an upstanding annular flange 132 which comprises the lower race of a ball bearing including a plurality of balls 133. The under surface of the seat section 21 has secured thereto a substantially annular plate 134 which likewise includes a depending annular flange 135 defining the upper race of the ball bearing. The plate 134 likewise includes a radially-directed flange 136. The flange 136 has secured thereto on diametrically opposite sides thereof a pair of rocker arms 137, the outer ends of which are connected by means of drag links 138 to rocker arms 139 fixed to the rock shafts 122. Thus, as the rock shafts 122 are oscillated, as aforesaid, the motion is transmitted to the outer seat section 21 by means of the drag links 138, and rocker arms 137. It is apparent that the rock shafts 122 actuate the oscillation of the seat section 21 and also the reciprocation of the hand grips 20. Obviously, in the structure shown, if the hand grips are to be actuated without the seat being actuated, it is necessary to disconnect the drag links 138 from the rocker arms 139. However, it is also obvious that by providing an additional clutch on the vertical drive shaft 39 and an additional rock shaft such as the rock shaft 122, the seat could be oscillated independently of the hand grips.

The center seat section 22 is preferably circular, as shown, and includes a stem 140 depending therefrom axially thereof. The stem 140 is slidable in a vertically-disposed sleeve 141 fixed to and depending from a plate 142 secured to the under side of the lower race member 131. The free lower end of the stem 140 is pivotally connected to the free end of an eccentric arm 143 of an eccentric strap 144 which is freely rotatable in the peripheral groove of an eccentric 145. The eccentric 145 is freely pivotal on the horizontal drive shaft 33 and includes a driven clutch member 44 adapted to be engaged with a driving clutch member 42 by means of the lever 51 and the lever-actuating shaft 43. With the last-mentioned clutch engaged, it is obvious that rotation of the drive shaft 33 will cause vertical reciprocation of the center seat section 22 relative to the other seat section 21. In this connection, it should be noted that the upper surfaces of both seat sections 21 and 22 are preferably well padded for comfort.

The foot rests 23 are supported on a foot rest frame 147 which is slidable in opposed trackways provided by the forwardly-extending free ends 146 of the lowermost outside horizontal frame members 24. Such frame members are of angular configuration, as best seen in Figure

5. The handle 148 may be secured to the front end of the footrest frame 147, whereby the frame is adjustable forwardly and rearwardly relative to the main frame of the device. The hand grip 149 is formed on the free end of the handle 148, whereby the footrest frame is conveniently manipulated. The handle 148 may be slidably journaled in a front wall 13 of the main frame. Likewise, one of the rail-providing members 146 is provided with a block 151 through which is threaded a set screw 152 which extends through the related rail 146 into engagement with the footrest frame 147, whereby to provide means for locking the same in a forwardly or rearwardly-adjusted position relative to the main frame. The driving clutch member 42 for the footrest is provided with splines 153, Figure 4, which slidably engage the keyway or spline groove 36 on the forwardly-extending end 35 of the horizontal drive shaft 33. Thus, as the footrest frame 147 is moved forwardly and rearwardly, the clutch 42 together with the driven clutch member 44 therefor and the actuating shaft 45 slides forwardly and rearwardly along with the assembly. Likewise, such driven clutch member 44 is fixed to a pinion 154 which is likewise splined on the shaft end 35. Such pinion 154 is in constant mesh with bevel teeth 155 of a crown gear 156. The crown gear 156 includes a stub shaft 157, the upper and lower ends of which are journaled for rotation in upper and lower bearings 158 formed in the footrest frame 147. The crown gear 156 likewise has a series of radially-directed gear teeth 159 which are in constant mesh with the teeth of a pair of diametrically-opposed pinions 160 fixed on stub shafts 161 on either side of the crown gear. As best seen in Figure 4, the pinions 160 are laterally aligned, whereby to be driven in the same direction as the crown gear 156 rotates. The stub shafts 161 are journaled in appropriate bearings, not shown, above and below the pinions 160. Likewise, the shafts 161 extend upwardly above the uppermost bearing and have fixed thereon downwardly of the free ends thereof a cup-shaped ball bearing race 162, best seen in Figure 7. As shown in Figure 7, the races 162 have inclined top surfaces, whereby the ball bearings 163 are disposed at an angle to the horizontal. The ball bearings 163 provide anti-friction seats for a top race plate 164 which is resiliently held in engagement with the ball bearings 163 by means of an expansive spring 165 disposed concentrically about the upper free end of the shaft 161 and secured in compressive relation to the upper surface of the plate 164 in any suitable manner, as by a cotter pin, not shown. Each plate 164 has a forwardly-directed extension 166 which mounts a pair of laterally-spaced ears 167 thereon to which is pivoted the front end of each footrest 23. Each plate 164 likewise includes a rearward extension 169 which is slotted to receive the depending pin 168 of the rear portion of each footrest 23. As seen in Figure 4, the forward extensions 166 are formed with bifurcations 170 which freely receive therebetween vertically-disposed rigid members 171 fixed to the foot rest frame 147. The effect of this arrangement is to prevent rotation of the top race members or plates 164 as the inclined races 162 are rotated with the stub shafts 161. Thus, the plates 164 comprise wobble plates and have a wobble motion imparted thereto by the rotation of the races 162 in a well known manner. This wobbling motion is transmitted to the footrests 23, whereby to transmit a beneficial

exercising motion to the feet and ankle joints of a patient. Each footrest 23 includes a heel plate 172 and a toe strap 173. The toe straps 173 are preferably elastic. Likewise, the heel plates 172 are preferably adjustable longitudinally of the footrests 23 whereby to adjust them to fit feet of different sizes. Such an adjustment is illustrated in broken lines in Figure 3. Any suitable means, such as the set screw 174, Figure 2, may be utilized to lock the heel plates 172 in adjusted relation on the footrests 23. Thus, not only are the individual footrests 23 adjustable to receive feet of different sizes, but the footrests as a whole are adjustable toward and away from the seat sections 21 and 22, whereby to accommodate patients having legs of varying lengths.

Referring now to Figure 6, in conjunction with Figure 2, it will be noted that some of the actuating finger grips 46 for the rear panel 47 are provided with dogs 175 which engage in detent notches 176, whereby the finger grips may be locked in a clutch-engaging position. Obviously, all of the knobs 146 may be provided with similar dogs or other means for locking them in either the engaged or disengaged position.

The back panel 47 has secured thereto any suitable and/or well known form of rheostat 177 which is controlled by a switch lever 178 whereby to vary the speed of the motor 26 in a well known manner. The motor lever 178 may be locked in any adjusted position by means of a ratchet bar 179 extending horizontally across the top panel 12 for engagement with the motor lever. The cover 12 is, of course, slotted, as at 180, to accommodate the motor lever 178. A step 181 may be provided adjacent the region of the footrest platform 147 to facilitate patients entering and leaving the chair. The side panel 11, through which the actuating shaft 45 for the footrest clutch extends, is slotted, as at 182, to permit forward and rearward movement of the footrest frame 147.

As is apparent from the foregoing, the chair of the invention has incorporated therein nine separate and distinct exercising motions which comprise the oscillation of the headrest 17 on the axis of the sleeves 68, the oscillation of the backrests 18 about the axes of the sleeves 84, the oscillation of the arm rests 19 about the axes of the pintles 108, and also on the axes of the sleeves 104. Also, the other seat section 21 oscillates on the axis of the sleeve 141. Also, the backrests 18 are vertically reciprocable, as is the center seat section 22. Likewise, the hand grips 20 are horizontally reciprocable.

Finally, the footrests 23 have a wobble motion imparted thereto by the rotation of the stub shafts 161. Each of these motions may be used individually to accomplish a specific exercising motion, and each of these devices may be used with any or all of the other exercising devices whereby a virtually infinite number of combined exercising motions can be achieved simultaneously. The net effect of such combined motions is to accomplish exercises which could not be accomplished by any single element by itself. It should be noted, also, that all of the driving clutch members 42 of the several elements are fixed on the respective drive shafts 33 and 39 by means of set screws, whereby they may be adjusted around the shaft to accomplish a varied phase relation with every other driving clutch and the elements driven thereby. Likewise, all of the rocker arms are fixed to their rock shafts

by set screws, whereby they may be adjusted around their respective rock shafts so that the phase relationship of each rocker arm relative to all other rocker arms may be varied from a point where the elements work in phase to 180° out of phase or anywhere in between. Likewise, the driving races 162 for the footrests 23 are likewise secured to the stub shafts 161 by set screws, whereby they may be adjusted around such shafts to vary the phase relation in a similar manner. Thus, in the embodiment shown, the inclined races 162 may be in the same plane, in 180° out of phase relation, whereby they are oppositely inclined on any intermediate point. Likewise, the seat section 21 may have a side moving forwardly at the same time a related hand grip is moving forwardly, or, such side of the seat section may be moving rearwardly while a hand grip is moving forwardly. Obviously, these in-phase and out-of-phase relationships impart a substantially different exercising motion to the person being exercised. Thus, it is apparent that by varying the phase of the various working parts, by utilizing various combinations of working elements, a virtually unlimited number of exercising effects can be carried out by the single machine according to the invention. Also, it should be noted that the speed of the motor 26 may be varied through a wide range by means of the rheostat 177 so that relatively gentle up to relatively violent exercise may be imparted by the various moving parts. Obviously, the varying of the speed and the phase relationship of the several working parts can be carried out in a number of different ways. Likewise, the various exercising motions may be imparted to the elements by various means. Consequently, although I have shown and described what is now thought to be a preferred embodiment of the invention, it is to be understood that the same is susceptible of other forms and expressions. Therefore, I do not limit myself to the precise structure shown and described hereinabove except as hereinafter claimed.

I claim:

1. In an exercising chair, the combination with a relatively rigid chair frame mounting a motor thereon, of a chair seat mounted on said frame for oscillation about a vertical axis, said seat including an axially-disposed seat section mounted on said seat for non-oscillating vertical reciprocation, a pair of upwardly-directed and laterally-aligned backrests individually mounted on said frame for vertical reciprocation and for oscillation on vertical axes, a headrest mounted on said frame for oscillation about a vertical axis, a pair of arm rests individually mounted on said frame for oscillation about longitudinal and transverse horizontal axes, hand grips mounted on said arm rests for reciprocation longitudinally thereof, a pair of laterally-spaced footrests individually mounted on said frame for wobbling motion on vertical axes, separate actuating means for oscillating each of said seat, backrests, headrest, and arm rests, separate actuating means for reciprocating said hand grips, said seat sections and said backrests, actuating means for wobbling said footrests, driving means driven by said motor, and a separate connecting means operatively and selectively connecting each actuating means to said driving means for actuation thereby.

2. In an exercising chair, the combination with a relatively rigid chair frame mounting a motor thereon, of a chair seat mounted on said

frame for oscillation about a vertical axis, said seat including an axially-disposed seat section mounted on said seat for non-oscillating vertical reciprocation, a pair of upwardly-directed and laterally-aligned backrests individually mounted on said frame for vertical reciprocation and for oscillation on vertical axes, a headrest mounted on said frame for oscillation about a vertical axis, a pair of arm rests individually mounted on said frame for oscillation about longitudinal and transverse horizontal axes, hand grips mounted on said arm rests for reciprocation longitudinally thereof, a pair of laterally-spaced footrests individually mounted on said frame for wobbling motion on vertical axes, separate actuating means for oscillating each of said seat, backrests, headrest, and arm rests, separate actuating means for reciprocating said hand grips, said seat sections and said backrests, actuating means for wobbling said footrests, at least one drive shaft driven by said motor, a separate clutch for individually and selectively coupling each actuating means to said drive shaft, and means for separately and selectively actuating each clutch.

3. In an exercising chair, the combination with a relatively rigid chair frame mounting a motor thereon, of a chair seat mounted on said frame for oscillation about a vertical axis, a pair of upwardly-directed and laterally-aligned backrests individually mounted on said frame for vertical reciprocation and for oscillation on vertical axes, a headrest mounted on said frame for oscillation about a vertical axis, a pair of arm rests individually mounted on said frame for oscillation about longitudinal and transverse horizontal axes, hand grips mounted on said arm rests for reciprocation longitudinally thereof, separate actuating means for oscillating each of said seat, backrests, headrest and arm rests, separate actuating means for reciprocating said hand grips and said backrests, driving means driven by said motor, and a separate connecting means for separately and operatively connecting each actuating means to said driving means for actuation thereby.

4. In an exercising chair, the combination with a relatively rigid chair frame mounting a motor thereon, of a chair seat mounted on said frame for oscillation about a vertical axis, said seat including an axially-disposed seat section mounted on said seat for non-oscillating vertical reciprocation, a pair of upwardly-directed and laterally-aligned backrests individually mounted on said frame for vertical reciprocation and for oscillation on vertical axes, a headrest mounted on said frame for oscillation about a vertical axis, a pair of arm rests individually mounted on said frame for oscillation about longitudinal and transverse horizontal axes, hand grips mounted on said arm rests for reciprocation longitudinally thereof, separate actuating means for oscillating each of said seat, backrests, headrest and arm rests, separate actuating means for reciprocating said hand grips, said seat section and said backrests, driving means driven by said motor, and a separate connecting means for separately and operatively connecting each actuating means to said driving means for actuation thereby.

5. In an exercising chair, the combination with a relatively rigid chair frame mounting a motor thereon, of a chair seat mounted on said frame for oscillation about a vertical axis, a pair of upwardly-directed and laterally-aligned back-

rests individually mounted on said frame for vertical reciprocation and for oscillation on vertical axes, a headrest mounted on said frame for oscillation about a vertical axis, a pair of arm rests individually mounted on said frame for oscillation about longitudinal and transverse horizontal axes, hand grips mounted on said arm rests for reciprocation longitudinally thereof, a pair of laterally-spaced footrests individually mounted on said frame for wobbling motion on vertical axes, separate actuating means for oscillating each of said seat, backrests, headrest and arm rests, separate actuating means for reciprocating said hand grips and said backrests, actuating means for wobbling said footrests, driving means driven by said motor, and a separate connecting means for separately and operatively connecting each actuating means to said driving means for actuation thereby.

6. In an exercising device, the combination with a frame, a motor fixed on said frame, and a seat carried by said frame, of a pair of footrests, means mounting said footrests on said frame for individual wobbling movement on vertical axes, actuating means for wobbling said footrests, driving means driven by said motor, means for coupling and uncoupling said actuating means to and from said driving means, a second frame mounting said footrests, and means mounting said second frame on said first-mentioned frame for adjusting movement toward and away from said seat.

7. In an exercising device, the combination with a frame, a motor fixed on said frame, and a seat carried by said frame, of at least one arm rest mounted on said frame for oscillation about transverse and longitudinal horizontal axes, actuating means for oscillating said arm rest about a horizontal transverse axis, actuating means for oscillating said arm rest about a longitudinal horizontal axis, driving means driven by said motor, and a separate connecting means for separately and operatively connecting each actuating means to said driving means for actuation thereby.

8. In an exercising device, the combination with a frame, a motor fixed on said frame, and a seat carried by said frame, of at least one arm rest mounted on said frame for oscillation about transverse and longitudinal horizontal axes, a hand grip mounted on said arm rest for reciprocal movement longitudinally thereof, actuating means for oscillating said arm rest about a transverse horizontal axis, actuating means for oscillating said arm rest about a longitudinal horizontal axis, actuating means for reciprocating said hand grip relative to said arm rest, driving means driven by said motor, and a separate connecting means for separately and operatively connecting each actuating means to said driving means for actuation thereby.

9. In an exercising device, the combination with a frame, a motor fixed on said frame, and a seat carried by said frame, of a collar mounted on said frame for oscillation about a horizontal axis extending transversely of said frame, a sleeve pivoted in said collar for oscillation about a horizontal axis extending longitudinally of said frame, a rod reciprocable in said sleeve longitudinally of said frame, said rod including a free end extending forwardly of said sleeve and providing a hand grip, an arm rest fixed to said sleeve for oscillation therewith and with said collar, separate actuating means for oscillating

said collar and sleeve and for reciprocating said rod, driving means driven by said motor, and a separate connecting means for separately and operatively connecting each actuating means to said driving means for actuation thereby.

10. In an exercising device, the combination with a frame, a motor fixed on said frame, and a seat carried by said frame, of a collar mounted on said frame for oscillation about a horizontal axis extending transversely of said frame, a sleeve pivoted in said collar for oscillation about a horizontal axis extending longitudinally of said frame, a rod reciprocable in said sleeve longitudinally of said frame, said rod including a free end extending forwardly of said sleeve, a hand grip operatively connected to said free end of said rod for adjustment longitudinally thereof, an arm rest fixed to said sleeve for oscillation therewith and with said collar, separate actuating means for oscillating each of said collar and said sleeve, actuating means for reciprocating said rod relative to said sleeve, driving means driven by said motor, and a separate connecting means for separately and operatively connecting each actuating means to said driving means for actuation thereby.

11. In an exercising chair, the combination with a rigid frame mounting a motor thereon, of a seat mounted on said frame for oscillation about a vertical axis, said seat including a separate center section, means mounting said section on said seat for non-oscillating vertical reciprocation relative to said seat, actuating means for oscillating said seat, actuating means for reciprocating said section, driving means driven by said motor, and a separate connecting means for selectively and operatively connecting each actuating means to said driving means for actuation thereby.

12. In an exercising chair, the combination with a rigid frame mounting a motor thereon, of a seat mounted on said frame for oscillation about a vertical axis, said seat including a separate center section, means mounting said section on said seat for non-oscillating vertical reciprocation relative thereto, a pair of hand grips mounted on said frame on opposite sides of said seat for reciprocating movement in substantially parallel horizontal planes longitudinally of said seat, actuating means for oscillating said seat, actuating means for vertically reciprocating said seat section, actuating means for reciprocating said hand grips, driving means driven by said motor, and a separate connecting means for selectively and operatively connecting each actuating means to said driving means for actuation thereby.

13. In an exercising chair, the combination with a rigid frame mounting a motor thereon, of a seat mounted on said frame for oscillation about a vertical axis, a pair of hand grips mounted on said frame on opposite sides of said seat for reciprocating movement in substantially parallel horizontal planes longitudinally of said seat, a pair of footrests mounted on said frame forwardly of said seat for individual wobbling movement about vertical axes, actuating means for oscillating said seat, actuating means for reciprocating said hand grips, actuating means for wobbling said footrests, driving means driven by said motor, and a separate connecting means for selectively and operatively connecting each actuating means to said driving means for actuation thereby.

14. In an exercising chair, the combination

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with a relatively rigid chair frame mounting a motor thereon, of a plurality of moving parts, said parts including a chair seat mounted on said frame for oscillation about a vertical axis, said seat including an axially-disposed seat section mounted on said seat for non-oscillating vertical reciprocation, a pair of upwardly-directed and laterally-aligned backrests individually mounted on said frame for vertical reciprocation and for oscillation on vertical axes, a headrest mounted on said frame for oscillation about a vertical axis, a pair of arm rests individually mounted on said frame for oscillation about longitudinal and transverse horizontal axes, hand grips mounted on said arm rests for reciprocation longitudinally thereof, a pair of laterally-spaced footrests individually mounted on said frame for wobbling motion on vertical axes, a separate actuating means for each part for imparting motion thereto, driving means driven by said motor, a separate connecting means for selectively and operatively connecting each actuating means to said driving means for actuation thereby, and each actuating means including means for adjusting the same to vary the phase relationship of the part actuated thereby relative to that of each of the other actuated parts.

15. In an exercising device, the combination with a frame and a motor fixed on said frame, of a pair of seat sections carried by said frame for exercising movement relative to said frame and to each other, a separate actuating means for each section, said actuating means imparting exercising movement to each section, driving means driven by said motor, and means for coupling and uncoupling each of said actuating means to and from said driving means.

16. In an exercising chair, the combination with a chair frame mounting a motor thereon, of a plurality of moving parts mounted on said frame for exercising movement relative thereto and to one another, said parts including a chair seat, a backrest, a pair of arm rests, a pair of hand grips, a headrest, and a pair of footrests, a separate actuating means for each of the parts for imparting an exercising motion thereto, driving means driven by said motor, and a separate connecting means for simultaneously connecting each of said actuating means to said driving means for actuation thereby.

17. In an exercising chair, the combination with a chair frame mounting a motor thereon, of a plurality of moving parts mounted on said frame for exercising movement relative thereto and to one another, said parts including a chair seat, a backrest, a pair of arm rests, a pair of hand grips, a headrest, and a pair of footrests, a separate actuating means for each of the parts

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for imparting an exercising motion thereto, driving means driven by said motor, a separate connecting means for operatively connecting each of said actuating means to said driving means for actuation thereby, each moving part being adapted at times to be actuated alone and at times to be actuated in conjunction with at least one of the remaining moving parts.

18. In an exercising chair, the combination with a chair frame mounting a motor thereon, of a plurality of moving parts mounted on said frame for exercising movement relative thereto and to each other, a separate actuating means for each of the parts for imparting an exercising motion thereto, driving means driven by said motor, a separate connecting means for operatively connecting each of said actuating means to said driving means for actuation thereby, each moving part being adapted at times to be actuated alone and at times to be actuated in conjunction with at least one of the remaining moving parts.

19. In an exercising chair, the combination with a chair frame mounting a motor thereon, of a plurality of moving parts mounted on said frame for exercising movement relative thereto and to each other, a separate actuating means for each of the parts for imparting an exercising motion thereto, driving means driven by said motor, a separate connecting means for operatively connecting each of said actuating means to said driving means for actuation thereby, each moving part being adapted at times to be actuated alone and at times to be actuated in conjunction with at least one of the remaining moving parts, and each actuating means including means for adjusting the same to vary the phase relationship of the part actuated thereby relative to that of each of the other actuated parts.

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