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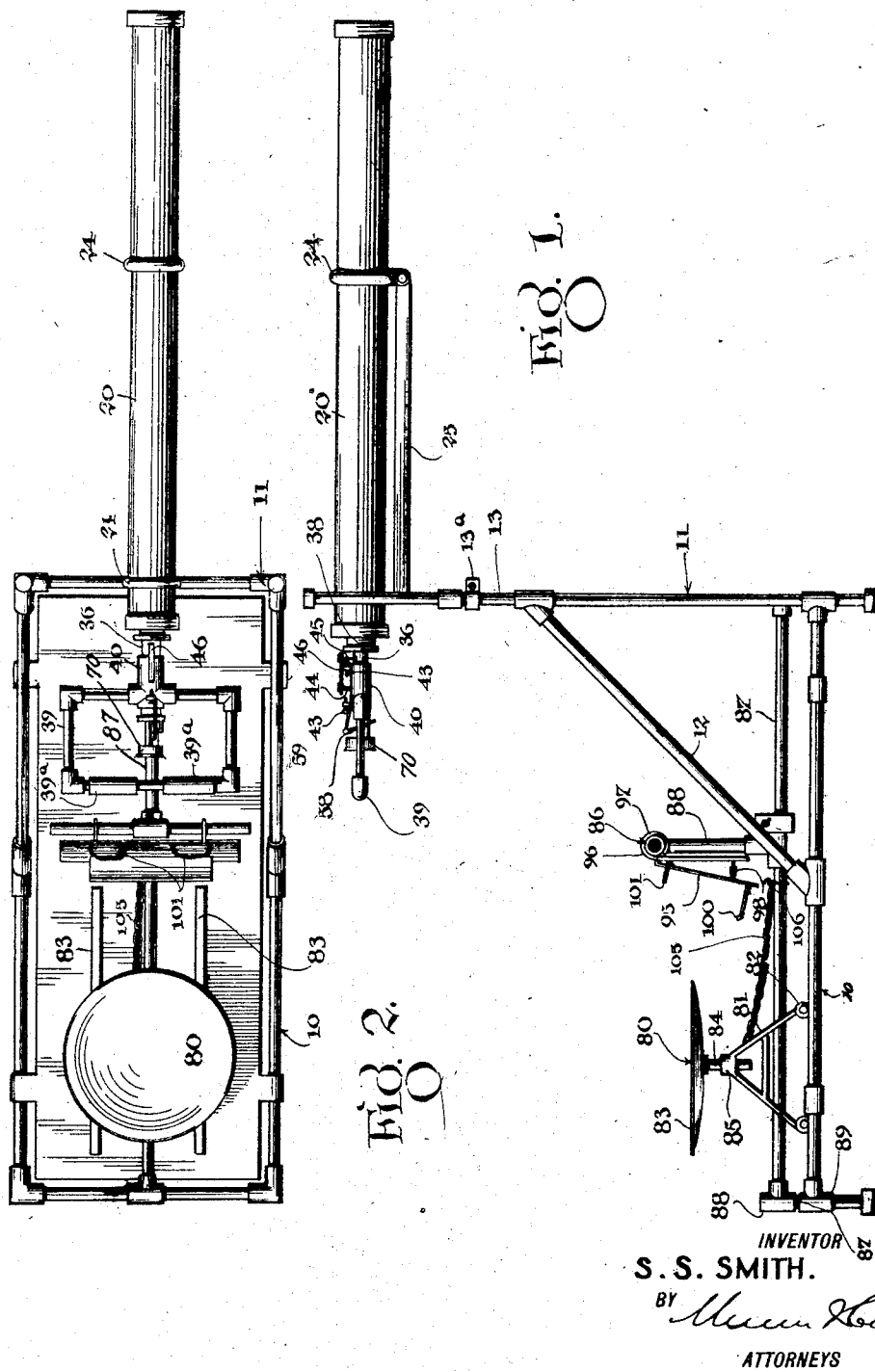
S. S. SMITH

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HUMAN EXERCISER AND STRENGTH TESTER

Filed Dec. 1, 1922

7 Sheets-Sheet 1



Sept. 7, 1926.

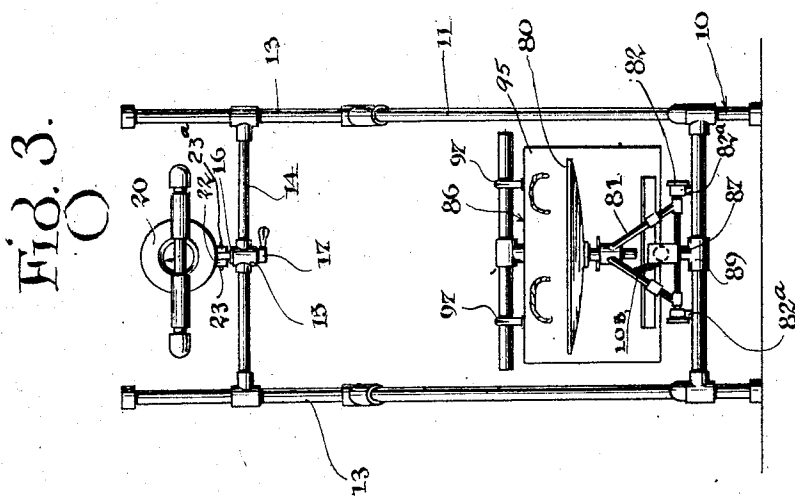
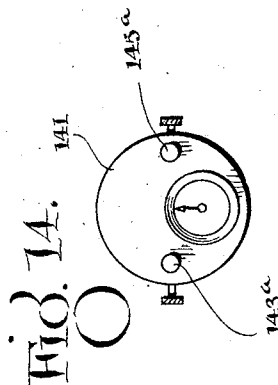
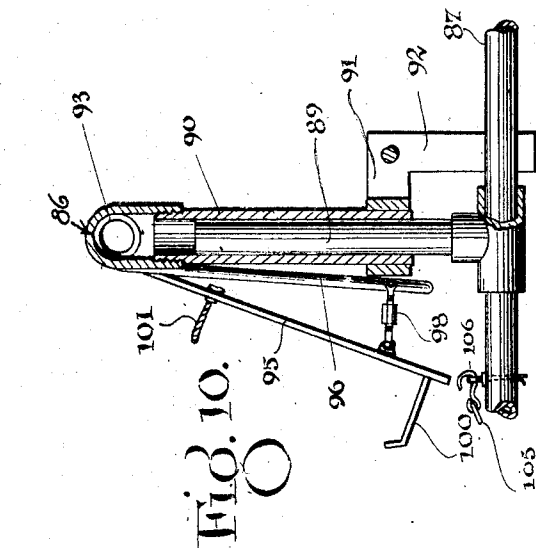
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HUMAN EXERCISER AND STRENGTH TESTER

Filed Dec. 1, 1922

7 Sheets-Sheet 2



WITNESSES

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Sept. 7, 1926.

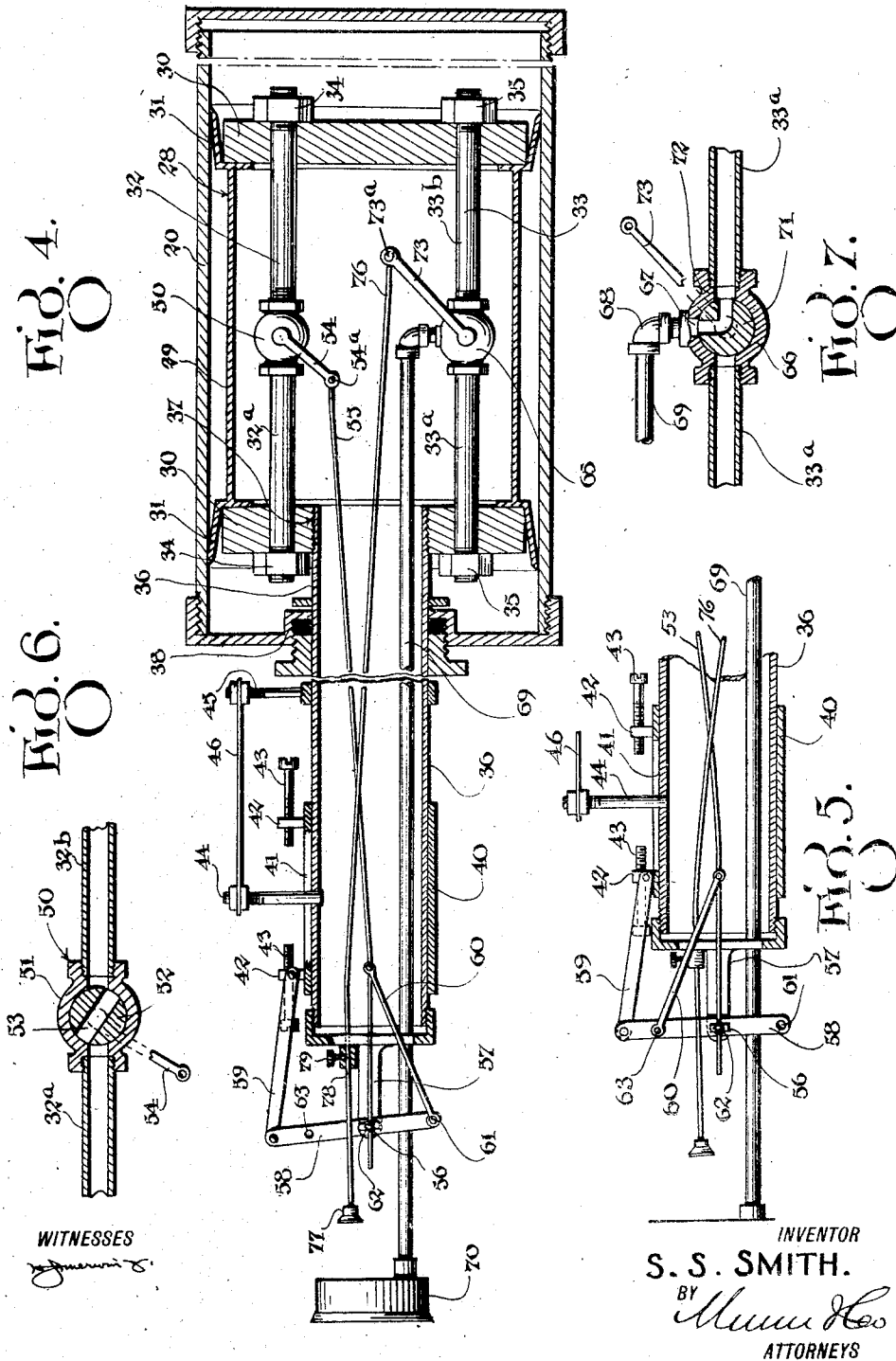
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HUMAN EXERCISER AND STRENGTH TESTER

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Sept. 7, 1926.

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HUMAN EXERCISER AND STRENGTH TESTER

Filed Dec. 1, 1922

7 Sheets-Sheet 4

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HUMAN EXERCISER AND STRENGTH TESTER

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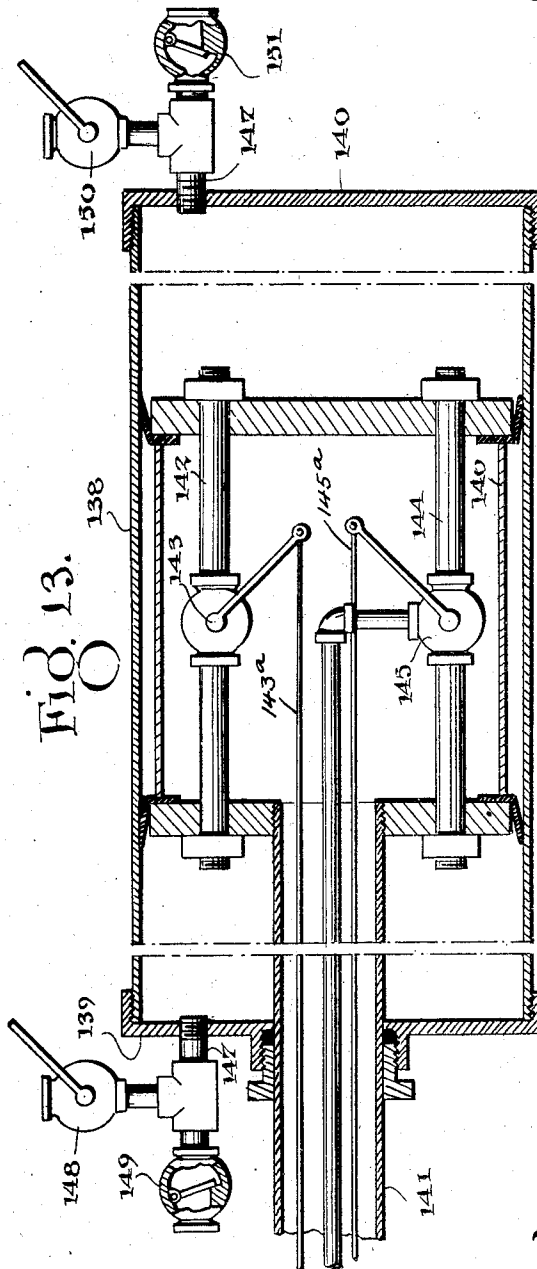


Fig. 13.

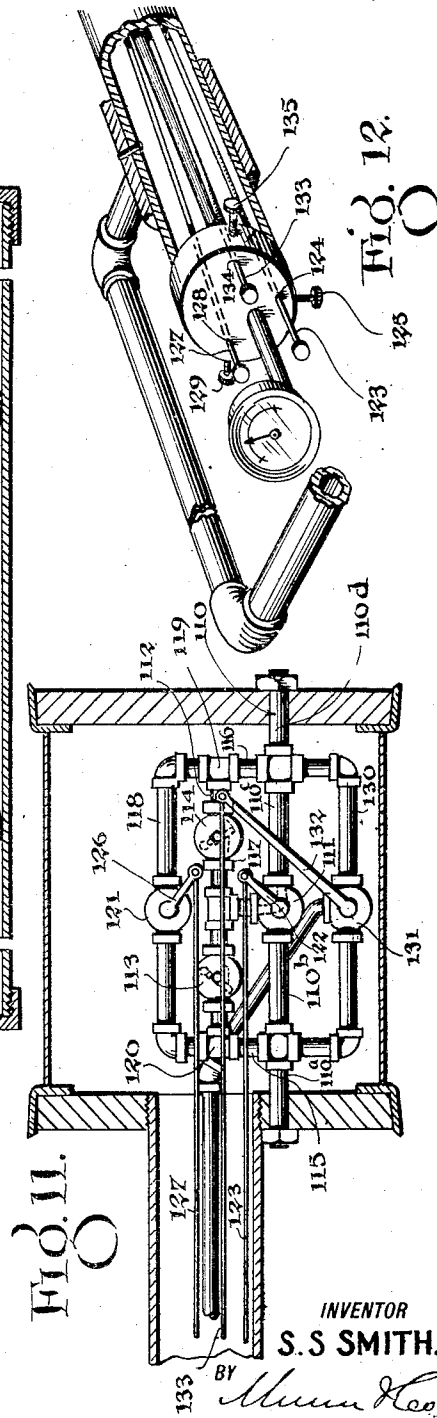


Fig. 12.

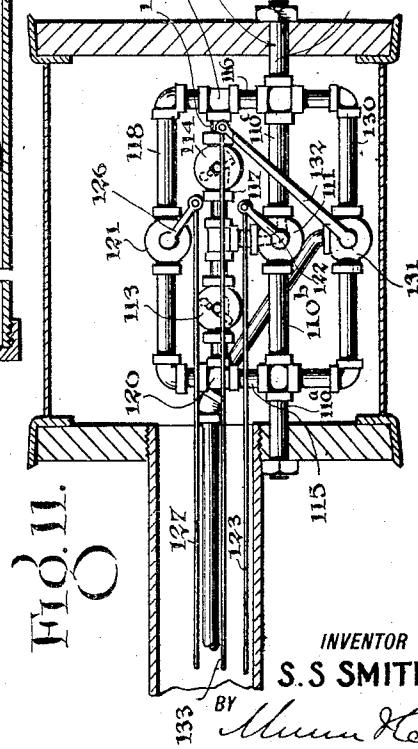


Fig. 11.

WITNESSES

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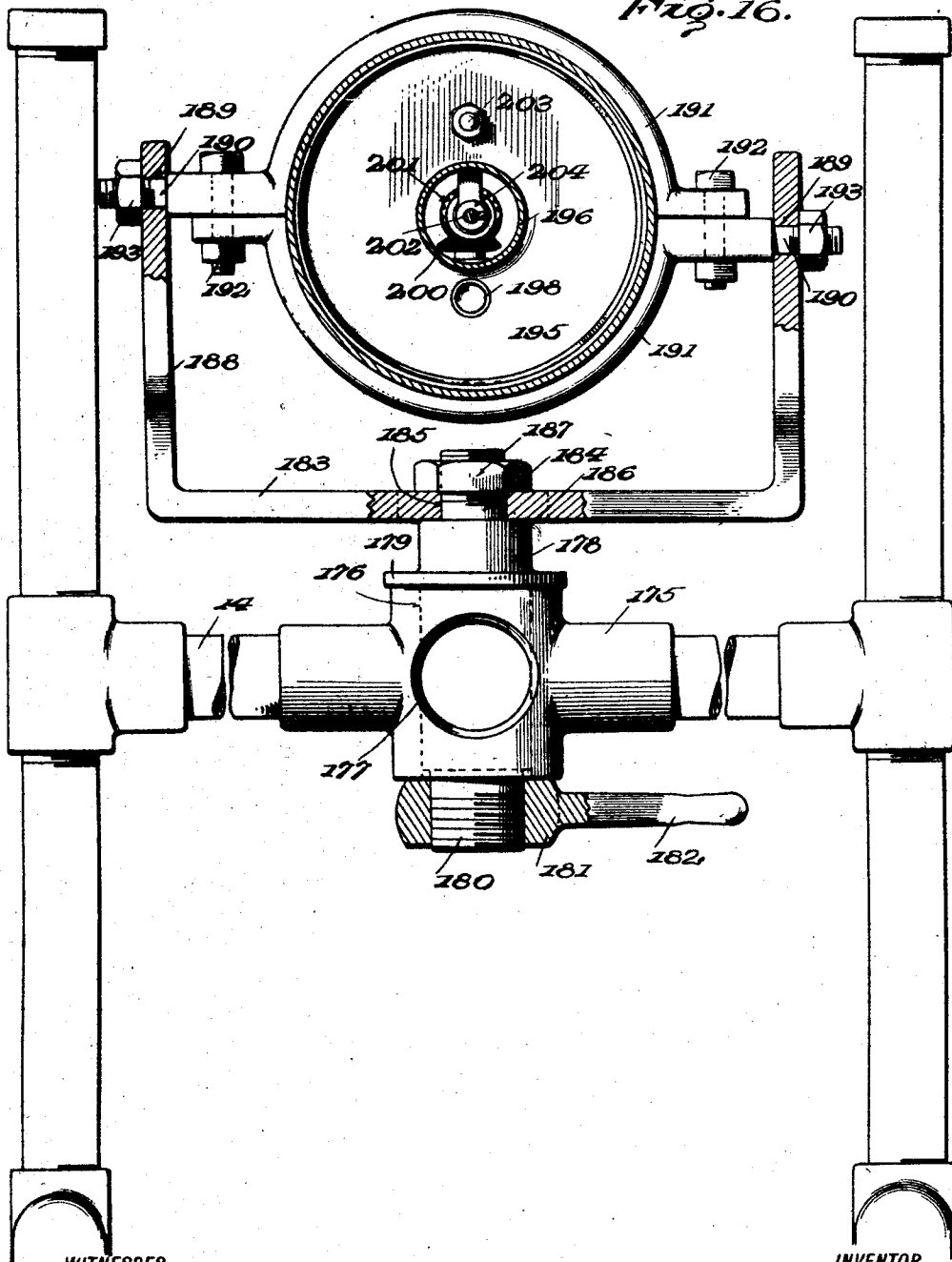
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HUMAN EXERCISER AND STRENGTH TESTER

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Fig. 16.



WITNESSES

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HUMAN EXERCISER AND STRENGTH TESTER

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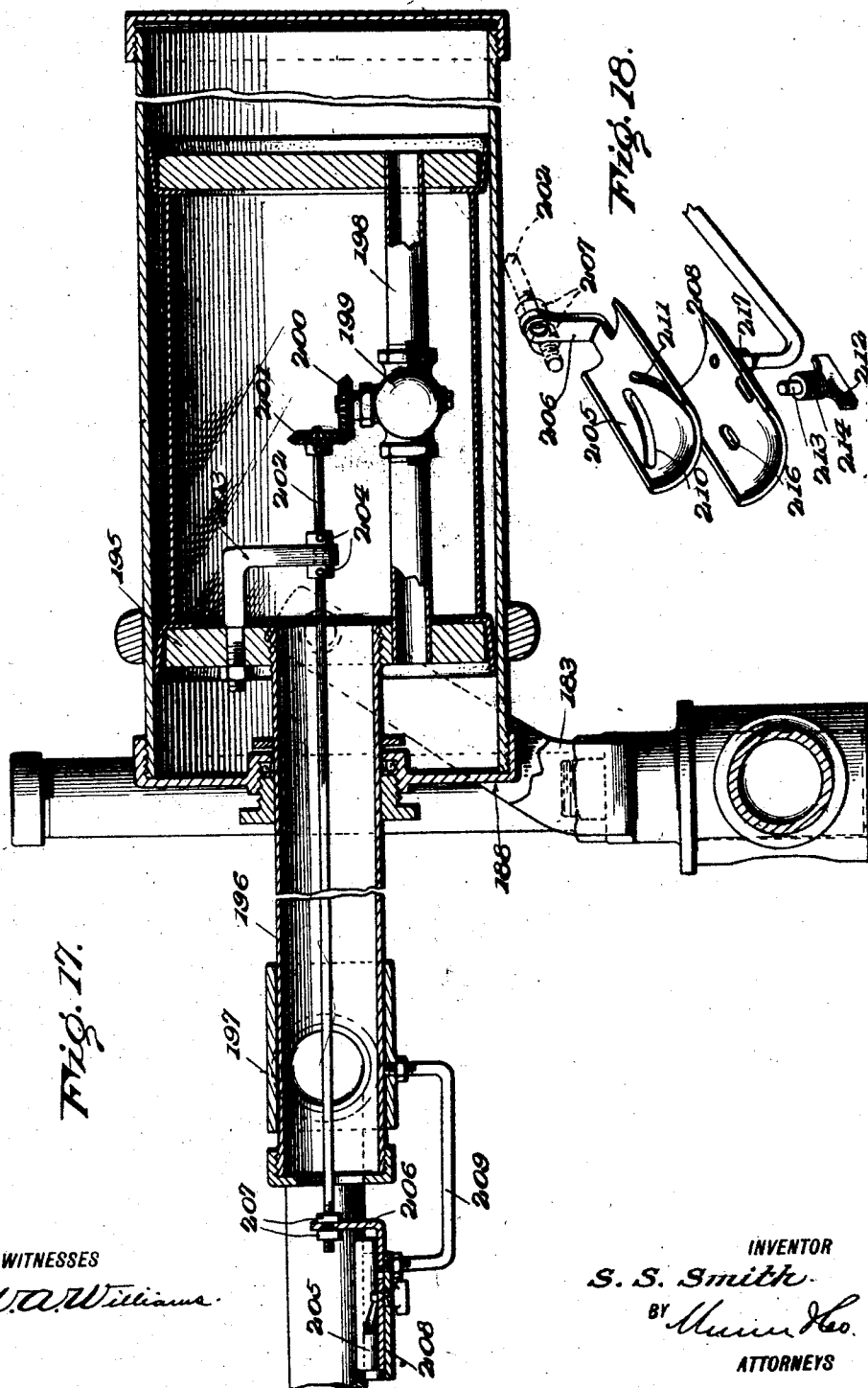


Fig. 17.

Fig. 18.

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UNITED STATES PATENT OFFICE.

SAMUEL STEPHEN SMITH, OF TILDEN, ILLINOIS.

HUMAN EXERCISER AND STRENGTH TESTER.

Application filed December 1, 1922. Serial No. 604,454.

This invention relates to human exercisers and strength testers and is a continuation, in part, of my prior application filed Sept. 4, 1919, Serial No. 321,699.

5 The object of the invention is to provide an apparatus of this character which brings about not only individual development of the various muscles and organs but also co-ordination between them; which permits of
10 periodical relaxation of the muscles during exercising movements so as to insure proper and healthy development and which in general may be utilized to exercise and develop the human body uniformly and to a high degree thereby upbuilding the general strength
15 and health.

Another important object of the invention is to provide an apparatus of this character which presents variable resistance and ample
20 capacity for adjustment so as to adapt itself to persons of different strength and physique.

Another object is to provide an apparatus of this character which is of strong and
25 durable construction, reliable in operation, readily controlled, universal in its action, easy to pack and assemble and easy and inexpensive to manufacture.

30 Other objects and advantages of the invention reside in certain novel features of the construction, combination and arrangement of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had
35 to the accompanying drawings forming part of this specification, and in which:—

Figure 1 is a side elevational view of an embodiment of the invention;

Figure 2 is a plan view thereof;

40 Figure 3 is a fragmentary view in end elevation;

Figure 4 is a fragmentary view in section of the piston, piston rod and valve control mechanism;

45 Figure 5 is a detail view, partly in section and partly in elevation of the valve controlled mechanism;

Figure 6 is a detail view in section of a form of throttle valve;

50 Figure 7 is a detail view of the three-way valve for the register and indicator;

Figure 8 is a detail view in elevation of the seat;

65 Figure 9 is a view in transverse section thereof;

Figure 10 is a detail view in section of the foot rest;

Figure 11 is a fragmentary view in section of a modified form of fluid control;

Figure 12 is a fragmentary perspective
60 view of the piston rod adjacent the handle bar and illustrating the valve regulating mechanism designed for use with the form of the invention illustrated in Figure 11;

Figure 13 is a view, partly in section and
65 partly in elevation of another modified form of fluid control;

Figure 14 is an end elevational view of the piston rod thereof;

Figure 15 is a similar view of still an-
70 other modified form of fluid control;

Figure 16 is a view, partly in end elevation and partly in transverse section, showing a modified form of cylinder mounting in
75 conjunction with a modified form of valve control;

Figure 17 is a similar view, partly in longitudinal vertical section and partly in side elevation; and

Figure 18 is a group view in perspective,
80 showing the shifting mechanism for the valve or throttle.

Referring to the drawings wherein for the sake of illustration is shown the preferred embodiment of the invention, and
85 more particularly to Figures 1 to 6, inclusive, the numeral 10 designates generally the main frame which is preferably constructed of tubing and which has at one end a cylinder frame 11 braced by brace rods 12 and including adjustable standards 13 controlled by
90 clamps 13^a. The standards 13 telescope into the vertical members of the cylinder frame 11 and by fastening the clips 13^a at various points on the stand the extent to which the
95 standards telescope into the members 11 and consequently the vertical adjustments of the standards may be varied. Of course it is to be understood that the clips 13^a being fixed to the standards 13 and being engageable
100 with the upper ends of the members 11 limit the downward movement of the standards into the members. A cross bar 14 extends between the adjustable standards 13 and has a bearing 15 intermediate its ends in which
105 a rotatable support 16 is mounted, the support 16 being rotatable on a vertical axis and having a clamp member 17 threaded on its lower end by which it may be held
110 against rotation if this is desired.

A cylinder designated at 20, is provided and has a strap 21 rigidly secured to the periphery thereof, the strap 21 having downwardly extending parallel arms 22 constituting a yoke which embraces and is pivotally secured to the upper end of the rotatable support 16 by means of a horizontal pivot 23 controlled by a clamp 23^a. When the clamp members 17 and 23^a are adjusted to permit free rotation of the support 16 the cylinder is universally mounted on the cylinder frame and is free to partake of universal motion thereon. A second strap 24 is secured to the cylinder 20 and in spaced relation to the strap 21 and is connected with the strap 21 above the horizontal pivot 23 by means of a link 25 and exerts a bracing action.

A piston 28 is operatively mounted in the cylinder and includes a drum 29, heads 30 and packing elements 31 adjacent each head. The packing elements preferably comprise leather washers and portions thereof are inserted between the drum 29 and the heads 30 to be thereby associated with the piston. Short pipes, designated at 32 and 33 and each including sections 32^a and 32^b and 33^a and 33^b, respectively, extend through the piston at diametrically opposite points and the ends of the pipes project beyond the heads of the pistons, these projecting ends being threaded and having mounted thereon nuts 34 and 35, respectively, which not only serve to secure the pipes in position but also serve to maintain the elements of the piston in assembly.

A hollow piston rod 36 is threaded into an opening provided therefor in one of the piston heads 30 as indicated at 37. The piston rod 36 operates in a stuffing box 38 provided in one of the cylinder heads and carries at its outer end a handle bar 39 slidably mounted on the piston rod by means of a sleeve connection 40. The sleeve 40 is slidable on the piston rod and is provided with a slot 41. At the ends of the slot 41 brackets 42 are provided and carry adjustable abutments 43 which are adapted to successively engage or abut a post 44 rigidly secured to the piston rod and projecting through the slot 41 of the sleeve 40. A second post 45 is also carried by the piston rod and is connected with the post 44 by the rod 46 to thereby brace the post 44. The handle bars 39 carry loose hand grips 39^a and when these hand grips are grasped and the handle bar is moved in one or the other direction it first partakes of motion relative to the piston rod, the motion being in the one or the other direction accordingly as the handle bar is moved in one or the other direction and this relative motion of the handle bar with respect to the piston rod continues until one of the adjustable abutments 43 carried by the sleeve connec-

tion 40 of the handle bar engages the post 44 of the piston rod. This relative motion between the sleeve and the piston rod is utilized to actuate the valve control as will presently appear.

The short pipe 32 has incorporated therein a throttle valve 50 including a casing 51 having screw threaded connection with the sections 32^a and 32^b of the pipe 32 and a turning plug 52 having a port 53 therein which may be brought into full registry with the sections of the pipe 32, entirely out of registry therewith, or into any partial degree of registry therewith. In this way the throttle valve controls the resistance offered to movement of the piston in either direction. It is obvious that when the throttle valve is fully opened the air may flow freely through the pipe 32 from one side of the piston to the other and no resistance is presented to the travel of the piston and that when the throttle valve is entirely closed the fluid is locked in the cylinder on the opposite side of the piston and presents the maximum degree of resistance to piston travel. Between these two extremes the resistance opposed to the piston may be greatly varied by regulating the adjustment of the throttle valve.

For the purpose of varying the resistance, the throttle valve carries an operating arm 54 connected with the turning plug and having a stop pin 54^a for limiting its movement. The free end of the operating arm 54 is pivotally secured to one end of a connecting rod 55 which slidably extends through a guide 56 carried on a bracket 57 secured to the outer end of the piston rod. A swinging cross head 58 is pivotally mounted on the bracket and is connected by a link 59 with the sleeve 40 of the handle bars. An adjustable pitman 60 is pivotally connected at one end to the rod 55 of the valve mechanism and is adapted to be connected at its other end to any one of the pins 61, 62 or 63 on the swinging cross head. The pins 61 and 63 are equidistant from the center or axis of swing of the swinging cross head and the pin 62 is aligned with this axis. It is obvious that when the handle bar is grasped and actuated so as to move its sleeve 40 relative to the piston rod as previously described, the motion of the sleeve is transmitted to the connecting rod 55 and to the throttle valve 50 by means of the link 59, the swinging cross head 58 and the adjustable pitman 60 provided the adjustable pitman is connected with either the pin 61 or the pin 63. If the adjustable pitman 60 is connected with the pin 61 as shown in full lines in Figure 4, the motion of the sleeve of the handle bar is transmitted reversed to the connecting rod 55 and on the other hand if the adjustable pitman 60 is connected with the pin 63, the

motion of the handle bar and its sleeve is transmitted unchanged in direction to the connecting rod 55. When the adjustable pitman 60 is connected to the pin 62 the motion of the handle bar and its sleeve is not transmitted to the connecting rod 55 since the point of connection of the adjustable pitman 60 then lies in the axis of swing of the cross head 58. It is apparent that the movement of the connecting rod 55 is transmitted to the plug of the throttle valve by means of the operating arm 54 and thus serves to control this valve.

A three-way valve 65 is incorporated in the pipe 33 having screw threaded connection with the sections 33^a and 33^b thereof and includes a valve casing 66 having an outlet port 67 which communicates with the connection 68 to a register or indicator pipe 69. The register or indicator pipe 69 extends through the hollow piston rod and through the outer end thereof and carries a pressure gage or register 70 at its outer end. In the valve casing 66 of the three-way valve, a turning plug 71 is rotatably arranged and is provided with an angular port 72 extending therethrough. An operating arm 73 is connected with the plug 71 and by manipulating this arm the plug may be turned to bring its port 72 into register with either of the sections of the pipe 33 and with the outlet port 67 of the valve casing. In this manner the register or gage pipe may be connected with one side or the other of the cylinder. A stop pin 73^a is carried by the operating arm 73 and limits the movement of the arm. An operating rod 76 is pivotally connected at one end to the operating lever 73 and extends through the hollow piston rod and exteriorly thereof terminating in a handle 77. The rod 76 slidably extends through the guide 78 in which is incorporated a clamp screw 79 for securing the rod in adjusted position.

A sliding seat, designated generally at 80, is arranged on the frame 10 and includes a seat frame 81 having rollers 82 and a seat proper 83 having an arm 84 adjustably mounted in a bearing 85 carried by the seat frame. The rollers 82 of the seat frame operate on tracks 82^a carried on the floor of the main frame and in this manner the seat 80 serves as a sliding seat.

A foot rest, designated generally at 86, is provided and includes a base 87 having studs 88 at its end adapted to be received in sockets 89 provided therefor on the main frame. The frame of the foot rest is mounted on the base 87 nearer to one end than to the other so that by reversing the base 87 the distance of the foot rest from its seat may be varied. The frame of the foot rest includes a post 89 upon which a sleeve 90 is rotatably mounted. A clamp 91 is associated with the sleeve 90 and has a

bifurcated arm 92 adapted to be engaged over the base 87 to prevent rotation of the sleeve 90 on the post 89 when the clamp is set to grip the sleeve. At its upper end the sleeve 90 carries a cross bar 93 which carries a foot plate 95 by means of a bracket 96, the bracket having hooks 97 engageable with the cross bar and having turn buckles 98 for varying the inclination of the foot plate. The foot plate includes heel plates 100 and toe straps 101.

Means is provided for securing the seat 80 stationary when desired and includes a flexible element such as a chain 105 and a hook 106 carried by the chain and engageable with the foot rest.

In operation, the person using the machine may either stand or sit, the machine being adapted for either by adjusting the standards 13. When sitting, use is made of the sliding seat 80 and the foot rest 86. In using the foot rest, the feet may be placed upon the foot plate 95 or the calves of the legs may be engaged with the cross bar 93, the latter being preferable when the valve control is set so as to present resistance to inward travel of the piston. In any event the person using the machine grasps the grips 39^a of the handle bar and reciprocates the piston against the resistance presented by the fluid in the cylinder. If the sliding seat and the foot rest are made use of and the valve control is set to present resistance to the outward movement of the piston, a body swing, leg drive and arm movement may be availed of in moving the piston. The valve control may be set so as to cause the piston to encounter any desired degree of resistance in travelling inwardly or outwardly or in travelling in both directions by an adjustment of the abutments 43 and adjustable pitman 60. As may be seen in Figures 3, 4 and 5, these adjustable abutments may be set to engage the stationary abutment or post 44 at all times, and thus entirely prevent actuation of the throttle valve, thus maintaining the throttle valve entirely opened or entirely closed accordingly as it is desired to have maximum or minimum resistance. On the other hand, one of the adjustable abutments may be set so as to maintain the throttle valve opened or closed when the piston is moved in one direction, while the other adjustable abutment is set to permit the throttle valve to be partly closed and vice versa.

In Figure 11 there is shown a modified form of fluid control. This fluid control is preferably embodied in the piston head as in the foregoing embodiment of the invention, the piston head and all of the other instrumentalities of the machine being precisely the same as in the embodiment above described. As shown in Figure 11 a single short pipe or intake tube 110 extends

through the piston head. The intake tube 110 is made up of a number of sections 110^a, 110^b, 110^c and 110^d. Centrally of the pipe 110 and connected with the sections 110^b and 110^c is a three-way distributing valve 111. A check pipe 112 having incorporated therein check valves 113 and 114 is connected with the intake pipe by means of short pipe connections 115 and 116 and is also connected with the distributing valve 111 by means of a pipe connection 117. A throttle pipe 118 is connected at one end with one end of the check pipe 112, and with the pipe 116 by means of a T 119 and at its other end the throttle pipe is connected with the opposite end of the check pipe and with the pipe 115 by means of a T 120. A throttle valve or resistance regulating valve 121 is incorporated in the throttle pipe 118. The distributing valve 111 is provided with an operating arm 122 and an operating rod 123 which slidably extends through a bearing 124 provided therefor in the piston rod, a clamp screw 125 being threaded through the piston rod and engageable with the operating rod 123 for securing the discharge valve in adjusted position. The throttle valve or resistance regulating valve 121 is provided with an operating arm 126 connected with an operating rod 127 journaled in the bearing 128 of the piston rod and having a clamp screw 129 cooperable therewith for maintaining the throttle valve in adjusted position. An indicator pipe 130 is connected with the intake pipe 110 and is provided with a three-way valve 131 whereby the indicator may be connected with one side or the other of the piston. The three-way valve 131 is provided with an operating arm 132 connected with an operating rod 133 slidably journaled in a bearing 134 provided therefor in the piston and having a clamp screw 135 cooperable therewith and retaining this valve in adjusted position.

In operation with this embodiment of the invention, when the distributing valve 111 and the throttle valve 121 are closed, the piston encounters a maximum resistance since the fluid is locked in the cylinder and cannot pass through the piston. On the other hand, when two valves are open, the fluid freely passes through the cylinder and the minimum resistance is encountered. When the distributing valve 111 is set to establish communication between the section 110^c of the intake pipe and the pipe 117 and the throttle valve is set to present the required resistance to the passage of the fluid, the piston on the inward stroke does not encounter resistance as the fluid coming in through the pipe 110 passes through the distributing valve 111 and the pipe 117 into the check pipe 112 and through the check valve 113 and pipe 115, out through the section 110^a of the intake pipe. On the outward

stroke of the piston, the fluid enters the section 110^a of the intake pipe and passes up through the pipe 115 into the throttle pipe, since the distributing valve 111 and check valve 113 are closed to the fluid when coming in this direction. The fluid is thus constrained to pass through the throttle valve where in its flow is retarded to the desired degree thus presenting the desired resistance to the outward travel of the piston. When the distributing valve 111 is set to establish communication between the section 110^b of the intake pipe and the pipe 117, and the throttle valve 121 is set to present the desired degree of resistance the piston encounter resistance on the inward stroke since the fluid is then constrained to pass through the throttle valve but does not encounter any resistance on the outer stroke since the fluid then passes from one side of the piston through the distributing valve and check valve 114 to the other side of the piston. In this form of the invention it is not necessary to provide any automatic valve operating mechanism since after the throttle valve and the fluid distributing valve are set the control of the fluid is therefore effected automatically. The other features of the machines are identical with those of the embodiment above described except that the connection between the handle bars and the piston rod may be rigid and that the automatically operating valve is dispensed with.

In Figure 13 there is shown a slight modified means for controlling the fluid to vary the resistance presented to the movement of the piston. In this form the cylinder is designated at 138 and includes cylinder heads 139 and 140. The piston which is identical in construction with the form of the invention shown in Figures 1 to 6, is designated at 140 and is reciprocable in the cylinder 138. A piston rod 141 is operatively connected with the piston. An intake tube 142 extends through the piston 140 and has incorporated therein a shut-off valve 143 having a valve control rod 143^a. An indicator pipe 144 is also extended through the piston head and is provided with a three-way valve 145 having a valve control rod 145^a whereby the indicator may be connected with every working chamber of the cylinder. Pipes, designated at 146 and 147 are threaded into the cylinder heads 139 and 140, respectively. The pipe 146 has a throttle valve or resistance regulating valve 148 and a check valve 149 associated therewith and similarly the pipe 147 has a second throttle valve or resistance regulating valve 150 and a second check valve 151 associated therewith.

In operation with this embodiment of the invention when the shut off valve 143 is closed and both throttle valves 148 and 150 are closed the air is locked in the cylinder

and the piston encounters maximum resistance. When this shut off valve is open with the throttle valves closed or when the shut off valve is closed and both throttle valves are open, the piston encounters minimum or practically no resistance. If it is desired to present resistance to the inward travel of the piston the shut off valve 142 is closed and the throttle valve 150 is closed to the desired degree. Then when the piston is pushed inwardly, the air or other fluid being retarded in its escape through the throttle valve 150 opposes the inward motion of the piston, the air being permitted to flow into the other side of the piston through the check valve 149. When the piston is moved outwardly the air escapes freely through the throttle valve 148 since this is fully opened. To have the piston moved outwardly against resistance and fully inwardly, the throttle valve 150 is open and the throttle valve 148 is closed to the desired degree. The partially closed throttle valve 148 retards the discharge of the air when the piston is moved outwardly and causes a pressure to be built up against the piston to produce the desired resistance.

In Figure 15 is shown another modified form of means for controlling the flow of the fluid to vary the resistance. In this embodiment the piston is designated at 155 and through the piston a pipe 156 extends and constitutes a combined throttle pipe and indicator pipe, a throttle valve 157 being incorporated in the pipe and a three-way valve 158 being incorporated in the bypass 159 provided in the pipe 156 and extending around the throttle pipe 157. A check valve 160 also extends through the piston and the ends thereof are formed to constitute valve seats with which the check valves 162 and 163 coact. The check valves 162 and 163 are provided with stems 164 and 165, respectively, which are slidably mounted in bearings 166 and 167 provided therefor in the sliding cross head 169, the cross head being controlled by a rod 170 extending outwardly through the piston rod to the exterior. Nuts 168 and 168^a are threaded on the ends of the stems 164 and 165, respectively, and limit the relative movement between the bearings 166 and 167 and the stems 164 and 165, respectively. Springs 171 and 172 are arranged on the stems 164 and 165, respectively the springs engaging the check valves at one end and the bearings at the other end. By sliding the cross head 169 in one direction, that is to the right in Figure 15, the check valve 162 is seated against its seat under the light spring tension of the spring 171 and by the same movement the check valve 163 is unseated. Then when the piston moves inwardly of the cylinder it encounters no resistance since the fluid flows from one side

of the piston through the tube 160 and check valve 162 to the other side thereof. Similarly when the cross head is moved to the left of Figure 15, the check valve 163 is seated and the check valve 164 is unseated so that the piston encounters resistance when moved inwardly and encounters no resistance when moved outwardly. It is to be understood that when the check valve is closed to prevent flow of the fluid through the tube 160 that the fluid must flow through the throttle valve 156 and thus be retarded by the valve 157 to build up the pressure to produce the desired resistance.

Referring now to Figures 16 to 18, inclusive, it will be seen that there is shown in these figures a modified form of cylinder mounting in conjunction with a modified form of valve control. In this connection it is to be understood however that the form of cylinder mounting shown in these figures may be utilized with either forms of valve control and also that the valve control may be utilized with either forms of cylinder mounting.

The cylinder mounting shown in Figures 16 and 17 comprises a bearing 175 incorporated in the cross bar 14 in the same manner in which the bearing 15 is incorporated in this cross bar, as previously described. This bearing 175 has a vertical socket 176 and a horizontal socket 177. A rotatable supporting rod 178 is adapted to be selectively mounted in either the sockets 176 or 177, and in the arrangement shown the rod is mounted in the socket 176. This rotatable supporting rod is provided adjacent its upper end with an annular flange or collar 179 which engages the upper end of the socket 176 and the lower end of the rod is externally threaded, as at 180 and is adapted to be engaged with a clamping nut 181 having a handle 182. When the clamping nut 180 is tightened up the supporting rod 178 is held against movement. A substantially U-shaped frame 183 is provided and is supported upon the upper end of the rod 178, this rod 178 having a reduced extension 184 which extends through an opening 185 provided in the frame 183, the reduced extension defining on the rod 178 a shoulder 186 upon which the frame 183 is supported. A nut 187 is engaged with the reduced extension 184 and clamps the frame 183 in position on the rod 178. The frame 183 includes a pair of spaced and parallel arms 188 which although extending upwardly from the base of the frame are not vertical but are inclined as shown in Figure 17. Adjacent the upper end of the arms 188 bearings 189 are formed and rotatably receive trunnions 190 formed on the outer ends of the cylinder clamp members 191, said clamp members being bolted to each other and being clamped to the cylinder, as at 192. The trunnions

190 project beyond the arms 188 and the projecting portions of these trunnions are threaded and have mounted thereon nuts 193 having handles whereby they may be rotated into engagement with the arms 188 when it is desired to lock the trunnions against movement.

With this form of cylinder mounting the cylinder may be constrained to partake of the desired character of motion. When the nuts 181 and 193 are loosened the cylinder is mounted for universal movement and accordingly as one or the other of the nuts is loosened it is mounted upon a horizontal or vertical axis. Also the nuts 183 and 193 may be tightened to hold the cylinder stationary. The inclination of the arms 188 enables the operator to use the device with the cylinder arranged horizontally or vertically as he may desire. Moreover if it is not convenient to take advantage of the inclination of the arms 188 to use the device with the cylinder vertical, then the supporting rod 178 may be engaged with a socket 177 instead of with the socket 176 so that the cylinder will be supported in substantially a vertical position.

In the form of the invention shown in Figures 16 to 18, the piston is designated at 195 and has connected thereto the tubular piston rod 196, to the outer end of which the handle bars are connected through the sleeve connection 197, this sleeve connection having limited movement on the piston rods, as in the other embodiments of the invention, and this movement being utilized to actuate the valve shifting or controlling mechanism as before. A pipe 198 extends through the heads of the piston and has incorporated therein a throttle or resistance regulating valve 199, the stem of which valve has rigidly connected thereto a gear 200. A second valve gear 201 meshes with the gear 200 and is fixed to one end of the rotatable valve controlled rod 202 supported for rotary movement in a bracket 203 carried by one of the piston heads. The collars 204 are fixed to the rod 202 and engage the opposite sides of the bracket 203 to prevent longitudinal displacement of the rod 202. This rod 202 extends out through the piston rod 196, and to the outer end of this rod a curved plate 205 is adjustably connected by means of an angular arm 206 and a pair of nuts 207 having threaded connection with the rod and engaging the opposite sides of the arm 206. This curved plate 205 nests in or is snugly fitted against a second curved plate 208 rigidly supported upon one arm of the U-shaped bracket 209, the other arm of which bracket is rigidly connected to the sleeve 197 of the handle bars. The plate 205 is provided with cam slots 210 and 211. The cam slots being of opposite throw and being adapted to selectively cooperate with

a pin 212, the pin having a smooth shank 213 adapted to operatively engage either one of the slots 210 and 211 and the pin also having a threaded portion 214 adapted to be engaged with threaded sockets 216 and 217 provided in the plate 208 and underlying the slots 210 and 211, respectively.

It is obvious that when the handle bars are grasped and moved in either direction, the sleeve connection 197 will first move relative to the tubular piston rod 196. This relative movement is limited in any convenient manner and may be limited after the manner shown in conjunction with either types of valve control but in any event this relative movement is utilized to actuate the valve shifting or control mechanism since as the sleeve connection 197 moves it carries with it the bracket 209 which being connected to the plate 208 will cause the plate 208 to move and carry with it the pin 212. This movement of the pin 212 of the plate 208 is relative to the plate 205 and its cam slots since the plate 205 is carried on the rod 202 which is held against longitudinal movement with respect to the piston and piston rod. The movement of the pin 212 relative to the slot 210 or 211 as the case may be imparts to the plate 205 a rotary movement so that the valve operating rod 202 is rotated when the valve 199 is moved through the instrumentality of the gears 201 and 200. It is obvious that when the pin 212 is engaged with the slot 210 the valve will be moved in one direction whereas when it is moved in engagement with the slot 211 the valve will be moved in the opposite direction. Any desired ratio may be had between the gears 201 and 200 to provide for the proper degree of movement being imparted to the valve 199.

It is obvious that with the exercising apparatus hereinabove described the operator or person indulging in the exercise can put on the various forms of floor calisthenics by removing the seat, the foot rest and its base, thus clearing the platform from all obstructions to lie down. As shown in the drawing and description of the automatic valve control by means of the cross head, pitman and sliding connecting rod the pitman may be placed on the pin in alinement with the axis of the cross head and clamped there after the valve has been set as desired. This makes possible the development of the same resistance by piston travel in either direction. This principle is cared for in the rotary connecting rod and valve gear arrangement by placing the pin 212 in a socket in the cap on the outer end of the piston rod. Here it acts as a set screw to prevent any rotation of the connecting rod after the valve has been set to produce the desired resistance to piston travel in either direction.

It is to be understood that with the spring

valve arrangement the throttle can be dispensed with by setting the valve in action so as to allow the fluid to pass under it when resistance is desired, this arrangement being maintained by having a set screw act as a clamp on the rod controlling the head. In this manner the valve acts as an intake valve as the piston travels in the direction in which no resistance is desired and the same valve serves as a resistance regulating valve as the piston travels in the direction in which resistance is desired.

It is also to be understood that an air cock attached to the outer end of the indicating tube will provide for changing the air in the cylinder.

I claim:—

1. In an apparatus of the character described, a frame, a cylinder mounted on the frame and having a fluid therein, a piston operable in said cylinder against the resistance of said fluid and comprising a drum, heads, packing washers confined between the heads and the drum, pipes extending through the heads and nuts threaded on the ends of the pipes and bearing against said heads, a three-way valve incorporated in one of said pipes, an indicator pipe leading from said three-way valve, an indicator connected with said pipe, a throttle valve arranged in the other of said pipes and regulating the resistance presented to the movement of said piston, and operating mechanism for said throttle valve.

2. In an apparatus of the character described, a frame, a cylinder mounted on the frame and having a fluid confined therein, a piston operable in said cylinder against the action of said fluid, a piston rod, a handle bar having a connection with said piston rod permitting of limited relative movement between the handle bar and the piston rod in the initial phase of the actuation of the handle bar, valve means for controlling the flow of fluid in said cylinder to vary the resistance presented thereby to the movement of the piston, and operating mechanism for said valve means actuated by the movement of said handle bar relative to said piston rod.

3. In an exercising machine, a frame, a cylinder mounted thereon and having a fluid therein, a piston operable in said cylinder against the resistance of said fluid, actuating means for said piston, a throttle valve for controlling the fluid to vary the resistance presented thereby to the motion of said piston, and automatic operating mechanism for said throttle valve driven by the actuating means for said piston.

4. In an apparatus of the character described, a main frame, a cylinder frame upstanding from said main frame, and including adjustable standards and a cross bar extending between said standards, a rotat-

able support on said cross bar, a cylinder having a strap provided with radially extending spaced arms constituting a yoke and pivotally secured to said support on an axis at right angles to the axis of rotation of said support, a piston in said cylinder and a handle bar connected with said piston.

5. In an exercising machine, a frame having sockets, a foot rest including a base provided with studs receivable in said sockets, a frame mounted on said base and including a post, a sleeve rotatable on said post, a cross bar at the upper end of said sleeve, a bracket having hooks embracing said cross bar, a foot plate carried by said bracket, means for varying the inclination of said foot plate, and a heel plate and toe strap on said foot plate.

6. In an exercising machine, a frame having sockets, a foot rest including a base provided with studs receivable in said sockets, a frame mounted on said base and including a post, a sleeve rotatable on said post, a cross bar at the upper end of said sleeve, a bracket having hooks embracing said cross bar, a foot plate carried by said bracket, means for varying the inclination of said foot plate, a heel plate and toe strap on said foot plate, and means for preventing rotation of said sleeve on said post when desired including a clamp engageable with said sleeve and a bifurcated arm engageable with the base.

7. In an apparatus of the character described, a frame having a bearing provided therein, said bearing having a vertical socket and a horizontal socket, a rotatable supporting bar selectively engageable with said sockets, a frame fixed to the supporting bar and having arms provided with bearings and a cylinder clamp having trunnions rotatably mounted in said bearings.

8. In an apparatus of the character described, a frame having a bearing provided therein, said bearing having a vertical socket and a horizontal socket, a rotatable supporting bar selectively engageable with said sockets, a frame fixed to the supporting bar and having arms provided with bearings and a cylinder clamp having trunnions rotatably mounted in said bearings, a nut for holding the rotatable support against rotary movement and nuts for holding said trunnions against rotatable movement.

9. In an apparatus of the character described, a frame having a bearing mounted thereon, a rotatable support operatively mounted in said bearing, a frame carried by said rotatable support and having upwardly inclined arms, said inclined arms having bearings provided adjacent their outer ends, and a cylinder clamp having trunnions rotatably mounted in the bearings of said arms.

10. In an exercising machine, a cylinder

having a fluid therein, a piston operable therein against the resistance of said fluid, actuating means for said piston, a throttle valve for controlling the flow of the fluid 5 to vary the resistance presented by the motion of the piston, and automatic operating means for said throttle valve driven by the actuating means of said piston and including a rotatable valve rod, means for rotating 10 the valve rod from the actuating means, and motion transmission means between the valve rod and the throttle valve.

11. In an apparatus of the character described, a cylinder having a fluid therein, a 15 piston operable in said cylinder against the resistance of said fluid, a piston rod, actuating means for said piston including a handle bar having a sleeve connection with said piston rod, the sleeve connection being 20 adapted to partake of a limited degree of relative movement with respect to the piston rod, a throttle valve for controlling the fluid to vary the resistance presented thereby to the motion of said piston, and automatic 25 operating means for said valve including a rotatable valve rod, gearing between the valve rod and the throttle valve, a bracket rigidly supported upon the sleeve connection, a plate fixed to said bracket and having a 30 pin, and a plate fixed to the valve rod and having a cam slot cooperable with the pin of said first mentioned plate.

12. In an exercising machine, a cylinder 35 having a fluid therein, a piston operable in said cylinder against the resistance of said

fluid, a pipe extending through the piston and open on the opposite sides thereof, a throttle valve incorporated in said pipe, an actuator for said piston, and means driven 40 by the actuating means of the piston for automatically operating the throttle valve.

13. In an exercising machine, a cylinder having a fluid therein, a piston operable in said cylinder against the resistance of said 45 fluid, a pipe extending through the piston and opening on the opposite sides thereof within the cylinder, a throttle valve incorporated in the pipe intermediate its ends, and operating means for the throttle valve 50 extending to the exterior of the cylinder and controllable to positively operate the throttle valve.

14. In an exercising machine, a cylinder having a fluid therein, a piston operable in said cylinder against the resistance of said 55 fluid, a pipe extending through said piston and opening on the opposite sides thereof within the cylinder, a throttle valve incorporated in the pipe intermediate its ends, a hollow piston rod connected to the piston 60 and extending through one end of the cylinder, packing means between the cylinder and said rod, and operating means for the throttle valve including a rod extending 65 through the hollow piston rod, motion transmission means between the inner end of the rod and the throttle valve, and means co-operable with the outer end of the rod to aid in positive adjustment of said throttle valve.

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