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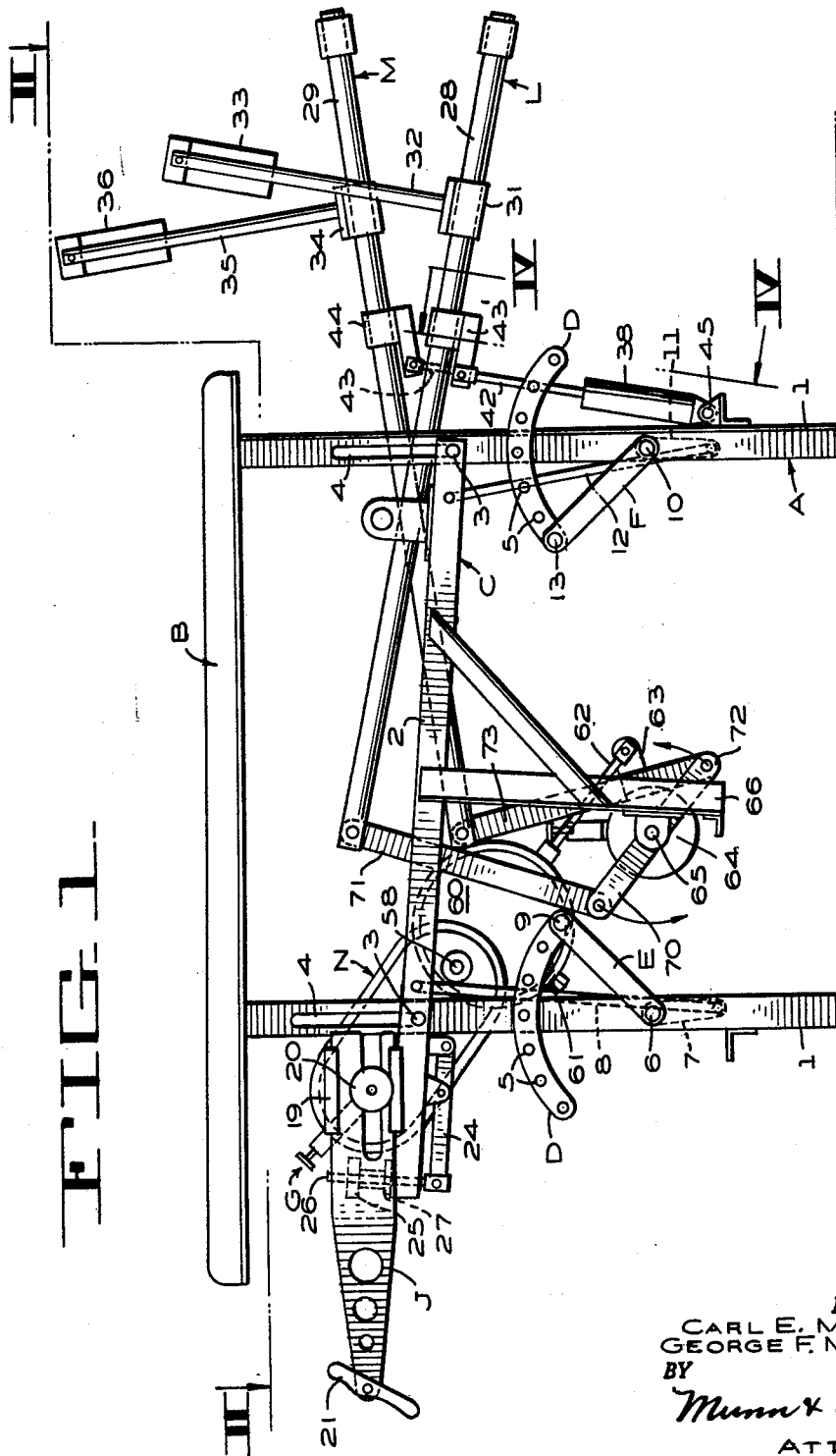
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3,074,716

SWIMMING INSTRUCTING MACHINE AND EXERCISER

Filed July 26, 1960

3 Sheets-Sheet 1



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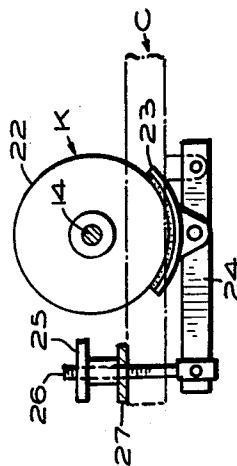
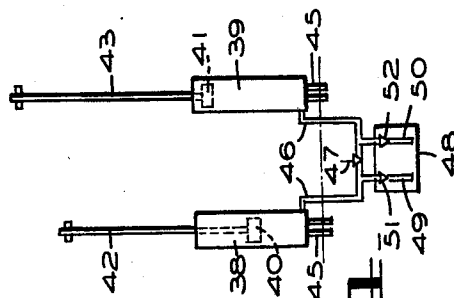
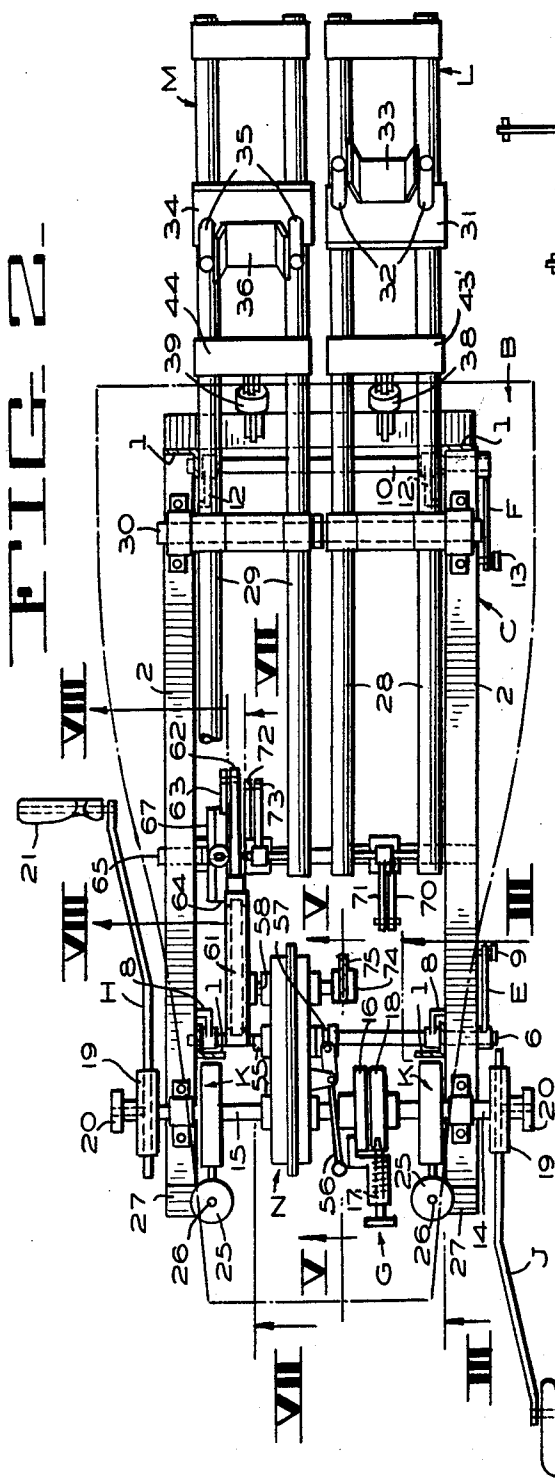
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FIG. 5

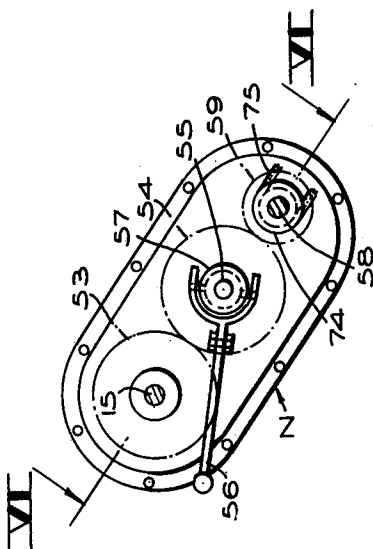


FIG. 6

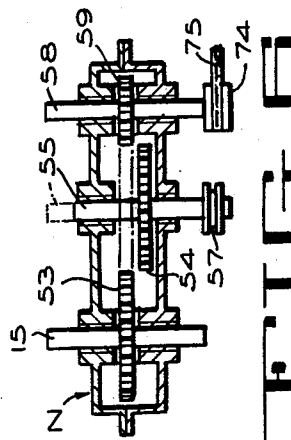
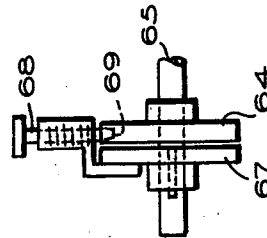


FIG. 7

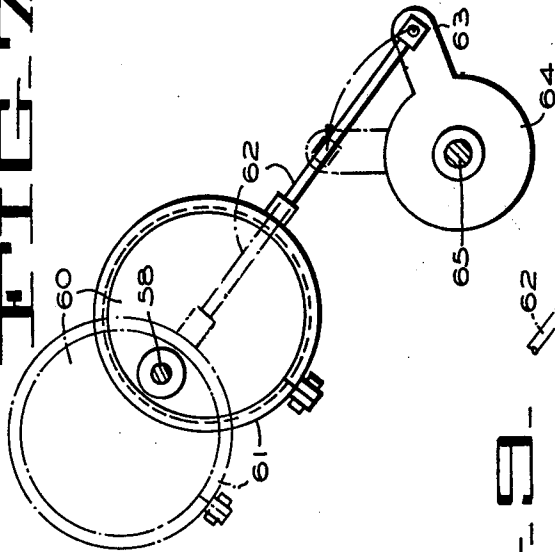


FIG. 8

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SWIMMING INSTRUCTING MACHINE AND EXERCISER

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The present invention relates to improvements in a swimming instructing machine and exerciser, and it consists in the combinations, constructions, and arrangement of parts as hereinafter described and claimed.

An object of our invention is to provide a swimming instructing machine and exerciser that is used as an aid in the teaching of swimming, conditioning of the body or for therapeutic use. When the machine is used as an aid in teaching swimming, the main purpose is to develop the coordination of the arm movements with the leg movements. The mechanism for moving the legs will lift them in a perpendicular motion when the operator is lying in a prone position on a body-supporting bed with his head facing downwardly. The movement of the leg lifting mechanism is such as to cause the operator's legs to "flutter kick," in a manner similar to that of an experienced swimmer. The arm moving mechanism will cause the operator's arms to move through circular paths which resemble actual movements of the swimmer's arms while swimming. The circular movement of one arm is 180° apart from the circular movement of the other arm which means when the right hand of the swimmer is at the top of the circle in its movement, the left hand is at the bottom of the circle.

A further object of our invention is to provide a device of the type described in which the arm and leg moving mechanisms can be adjusted vertically with respect to the body-supporting bed so that they will accommodate swimmers having arms and legs of different lengths.

Still a further object of our invention is to provide a device of the type described in which the leg operating mechanism can be disconnected from the arm operating mechanism so that the swimmer can practice arm and leg stroke coordination which the machine taught him when the arm and leg operating mechanisms were operatively connected together and compelled him to coordinate his arm and leg strokes in a particular manner. It is also possible to disconnect the hand-operated crank arm for the left hand from the hand-operated crank arm for the right hand so that the swimmer can practice various types of arm strokes. When the two crank arms are disconnected from each other, they can be rotated clockwise or counterclockwise together or alternately.

A further object of our invention is to provide a device of the type described in which adjustable braking means can be applied to the hand operated crank arms to apply a desired resistance thereto. We also provide hydraulic means for the leg-operating mechanism so that it is possible to throttle the flow of fluid in the hydraulic means so as to apply a desired resistance to the movement of the leg-supporting levers. This can be done when the leg operating mechanism is disconnected from the arm operating mechanism.

Other objects and advantages will appear as the specification continues and the novel features will be set forth in the appended claims.

DRAWINGS

For a better understanding of our invention, reference should be had to the accompanying drawings, forming a part of this specification, in which:

FIGURE 1 is a front elevation of the machine;

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FIGURE 2 is a horizontal section taken along the plane II—II of FIGURE 1;

FIGURE 3 is an elevational sectional view of the brake and is taken along the line III—III of FIGURE 2;

FIGURE 4 is a rear elevation of the hydraulic means when looking in the direction of the arrows IV—IV of FIGURE 1;

FIGURE 5 is an elevational view of the transmission as seen from the plane V—V of FIGURE 2;

FIGURE 6 is a horizontal sectional view taken through the transmission, as indicated by the plane VI—VI of FIGURE 5;

FIGURE 7 is an elevational view of the eccentric drive as seen from the plane VII—VII of FIGURE 2;

FIGURE 8 is an elevational view of a clutch as seen from the plane VIII—VIII of FIGURE 2; and

FIGURE 9 is an elevational view of the same clutch when looking from the left hand side of FIGURE 8.

While we have shown only the preferred form of our invention, it should be understood that various changes or modifications may be made within the scope of the annexed claims without departing from the spirit thereof.

Detailed Description

In carrying our invention into practice we provide a main frame indicated generally at A in FIGURES 1 and 2. The frame is composed of four vertically extending legs 1 which are angle irons. A bed B is supported by the tops of the legs 1 and it is preferably made of canvas webbing or other suitable material. A plan view of the bed B is shown by the dot-dash line in FIGURE 2, and it will be noted that the front (left) end of the bed is of less width than the rear (right) end. This is for the purpose of permitting the operator to lie face down on the bed with his head projecting beyond the narrow end and his arms extending downwardly past the two sides of the narrow end.

A subframe C is positioned below the bed B, and is adjustably supported by the main frame A. The subframe C carries an arm exercising and guiding mechanism as well as a leg exercising and guiding mechanism, both of which will be described in detail hereinafter. The subframe C has side members 2—2, that parallel each other and carry bolts 3 that are slidably received in vertical slots 4, provided in the legs, see FIGURE 1. Arcuate-shaped members D are secured to two of the legs 1 that are disposed on the same side of the machine, and these members have openings 5 therein that are spaced equal distances from each other. A shaft 6 is rotatably carried by the front (left) legs 1 of the main frame and a pair of arms 7 are rigidly secured to the shaft. Links 8 are pivotally connected to the free ends of the arms 7, and have their other ends pivotally connected to the side members 2 of the subframe C at points adjacent to the front legs 1. A handle E is rigidly connected to the shaft 6, and the outer end of the handle carries a spring-loaded pin 9 that can be manually retracted from the right hand opening 5, and then the handle swung in a counterclockwise direction for swinging the two arms 7, and raising the two links 8 for lifting the forward end of the subframe C to the desired extent. The pin 9 may now be released and will enter one of the openings 5 with which it is aligned. The bolts 3 at the forward end of the subframe C will ride upwardly in the slots 4 as the handle E is swung counterclockwise.

In like manner, the rear end of the subframe C can be raised to the desired extent by swinging a handle F clockwise to rotate a shaft 10, and swing arms 11 for lifting links 12, and moving the rear end of the subframe upwardly. When the desired upward position is reached for the subframe the spring-loaded pin 13 is released and will enter the opening 5 in the arcuate-shaped member D.

It is possible for the subframe to be supported in a horizontal position or in an inclined position as shown in FIGURE 1. The subframe can be positioned the desired distance below the bed B so that the arm exercising and guiding means and the leg exercising and guiding means will be disposed the desired distance below the bed.

Arm Exercising and Guiding Means

The arm exercising and guiding means is illustrated in FIGURES 1 and 2, and is supported at the forward end of the subframe C. A pair of axially aligned shafts 14 and 15 are supported in bearings which in turn are mounted adjacent to the front ends of the side members 2—2 of the subframe. The adjacent ends of the shafts 14 and 15 may be rigidly connected together by a clutch indicated generally at G in FIGURE 2. One clutch member 16 is keyed to the inner end of the shaft 15, and carries a spring loaded pin 17 that is designed to enter a notch in a second clutch member 18 that is keyed to the inner end of the shaft 14. The pin 17 can be manually retracted and held in retracted position to disconnect the two axially aligned shafts 14 and 15. When it is desired to connect the two shafts, the pin 17 is rotated on its axis 90° to free it and permit its spring to move the pin into the recess in the rim of the clutch member 18 when the recess aligns with the pin.

Both shafts 14 and 15 carry hand-operated crank arms J and H, and since both are identical, the arm J will be described and corresponding parts in both arms will be given similar reference numerals. FIGURE 1 shows the arm J provided with a fork-shaped end that slides in a bracket 19 that is carried by the shaft 14. The arms J and H may be moved out or in and then the jamb nuts 20 may be tightened for clamping the arms against radial movement. Hand-gripping members 21 are pivotally secured to the outer ends of the arms J and H. When the clutch G connects the two shafts 14 and 15 together, the arms J and H will be 180° apart.

It is possible to apply a braking force to either of the shafts 14 or 15. A brake K is mounted on the shaft 14 and is shown in detail in FIGURE 3. A similar brake is mounted on the shaft 15, see FIGURE 2. It will be seen from FIGURE 3 that the brake K comprises a brake drum 22, keyed to the shaft 14. A brake shoe 23 is pivotally mounted on a lever 24, and the lever is pivotally carried by the side member 2 of the subframe C and is swung by rotating a nut 25 on a bolt 26, the latter being pivotally connected to the free end of the lever. The nut 25 bears on a strap 27 carried by the side member 2. A tightening of the nut 25 will apply the brake shoe 23 against the brake drum. Both brakes K can be individually applied to create the desired braking force on the shafts 14 and 15.

Leg Exercising and Guiding Means

The leg exercising and guiding means is illustrated in FIGURES 1 and 2. It will be seen from FIGURE 2 that we provide two pairs of tubular members 28—28 and 29—29, and these pairs act as levers L and M. The pair of tubular members 28—28 is pivotally mounted on a shaft 30 that in turn is supported near the rear end of the subframe C. The pair of tubular members 29—29 is pivotally mounted on the same shaft 30. At the right hand ends of the tubular members 28—28, we slidably mount a bracket 31 and this bracket can be moved along the tubular members comprising lever L into a desired position. The bracket carries uprights 32 and FIGURE 2 shows the upper ends of the uprights as pivotally supporting a leg-receiving saddle 33. In like manner the tubular members 29—29 slidably carry a bracket 34 and the upright members 35 of this bracket pivotally support a leg-receiving saddle 36. The two pairs of tubular members 28—28 and 29—29 function as levers L and M and they are designed to swing in opposite directions to one another. For example, when the operator's leg in the

saddle 36 is moved downwardly, the lever M will move downwardly and cause the lever L to move upwardly so that the saddle 33 will raise the other leg of the operator.

In FIGURES 1 and 4 we show a pair of cylinders 38 and 39 in which pistons 40 and 41 are slidably mounted. A piston rod 42 extends upwardly from the piston 40 and is pivotally connected to the leg-supporting lever L by a bracket 43, see FIGURE 1. In like manner the piston 41 has a piston rod 43 extending upwardly therefrom which is connected to the leg-supporting lever M by means of a bracket 44. The lower ends of the cylinders 38 and 39 are pivotally secured to the main frame A at 45. The two hydraulic cylinders 38 and 39 are interconnected at their lower ends by a pipe 46 and a valve 47 is placed in the pipe and can be adjusted for controlling the flow of fluid therethrough. If the valve 47 is fully open, there will be no appreciable resistance to the flow of fluid from one cylinder to the other. However, the valve 47 can be partially closed, and in this way the fluid will be restricted as it flows from the cylinder 39 into the cylinder 38, and the restricted fluid will offer a resistance to the movement of the operator's leg.

We provide a reservoir 48 for additional fluid and two pipes, 49 and 50, see FIGURE 4, lead from the reservoir 48 and communicate with the pipe 46 on opposite sides of the control valve 47. If for any reasons either cylinder demands more fluid, reservoir 48 takes care of that demand. This could happen on a fast upward movement of one of the pistons in which the fluid was unable to pass thru the control valve 47 fast enough. A slight vacuum could be created that would hold the piston back. In a situation such as this the necessary amount of fluid would be drawn thru check valve 51 or 52 into the needed cylinder and the result would be a smooth piston action.

Interconnecting Means for the Arm- and Leg-Operating Mechanisms

We will now described how the arm exercising and guiding means can be connected to the leg exercising and guiding means so that an operation of the arm mechanism will actuate the leg mechanism. Referring to FIGURES 5 and 6, it will be seen that a gear 53 is keyed to the shaft 15 and forms a part of a transmission or chain of gears N. An idler gear 54 of the same size as the gear 53, is keyed to a stub shaft 55 and FIGURE 6 shows it disengaged from the gear 53. A forked lever 56, see FIGURES 2 and 5, engages with a collar 57, mounted on the shaft 55, so that a swinging of the lever 56 will move the shaft 55 for shifting the gear 54 into mesh with the gear 53 as indicated by the dot-dash line position in FIGURE 6. A driven shaft 58 has a gear 59 mounted thereon and the idler gear 54, when meshing with the gear 53, will mesh with the gear 59 and will connect the driven shaft 58 to the drive shaft 15. The gear 59 is about one half the diameter of the idler gear 54 so that the gear 59 will be rotated about twice as fast as the gears 53 and 54.

Again referring to FIGURE 2, the driven shaft 58 is connected to an eccentric 60, see also FIGURE 7. The eccentric has a channel-shaped collar 61 contacting its rim and a pitman 62 extends from the collar and is connected to an arm 63 of a clutch member 64. The clutch member is free to rock on a shaft 65 that is carried by a depending frame member 66, see FIGURE 1 of the subframe C. A second clutch member 67 is keyed to the shaft 65, see FIGURE 9, and the member carries a spring-loaded pin 68 that enters a recess 69 provided in the rim of the clutch member 64, for securing the two clutch members together. The clutch shown in FIGURE 9 works in the same manner as the clutch G, shown in FIGURE 2. It will be seen that a rotation of the shaft 15 will rock the shaft 65 when the clutch members 64 and 67 are interconnected, and gear 54 is in its engaged position.

The shaft 65 has an arm 70 projecting therefrom and a

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link 71 connects the arm to the forward end of the lever L, see FIGURE 1. In like manner the shaft 65 has another arm 72 that extends 180° away from the arm 70. A link 73 connects the free end of the arm 72 to the front end of the lever M. As the shaft 65 is rocked by the reciprocating pitman 62, the arms 70 and 72 will be rocked back and forth and will raise and lower the links 71 and 73 to raise and lower the front ends of the levers L and M. The levers will rock on the shaft 30 and will raise and lower the leg-supporting saddles 33 and 36. The legs of the operator will be moved about twice as fast as his arms. An important feature is that the clutch members 64 and 67 can be disconnected to free the leg exercising and guiding mechanism from the eccentric 60 and thus permit the operator to use the leg exercising mechanism independently of the arm exercising mechanism.

OPERATION

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. In teaching a novice the correct hand and leg strokes for swimming, the novice first lies face down on the body-supporting bed B. The arms J and H are then adjusted and the leg-supporting saddles 33 and 36 are also adjusted to accommodate the arms and legs of the novice. The clutch G interconnects the aligned shafts 14 and 15, and the brakes K are adjusted to apply the desired braking force on the shafts. The subframe C is adjusted to the desired position by the handles E and F.

The leg-operating levers L and M are connected to the arms J and H by the clutch members 64 and 67 being interconnected, and the forked lever 56 being thrown for causing the idler gear 54 to mesh with the gears 53 and 59 in the manner already described. The machine will now teach the novice the correct number of leg movements to a certain number of arm movements. The arms J and H will be held 180° apart and the levers L and M will swing in opposite directions.

After the novice has been taught the proper strokes and the timing of the arm and leg strokes, the hand operated crank arms J and H may be disconnected from the leg operating mechanism in the manner previously described. The swimmer may now exercise his arms independently from his legs. The brakes K can be adjusted to vary the braking force and the clutch G may be disengaged to permit the arms J and H to be operated independently of each other.

The leg-operated mechanism can also be actuated by the swimmer independently of the arm actuated mechanism. The valve 47 in FIGURE 4 is adjusted to apply the desired resistance to the legs of the swimmer.

It is possible to use the machine as a therapeutic device. The driven shaft 58 can have a sprocket 74 keyed thereto. A sprocket chain 75 may be applied to the sprocket 74 and connected to a source of power when it is desired to rotate the shaft 58, rather than have it driven by rotating the arms J and H. The shaft 58 now becomes a drive shaft and will actuate the levers L and M to impart movement to the legs of the person lying on the body-supporting bed B when the person only wants leg motion and not arm motion. The forked lever 56 can be moved to cause the idler gear 54 to mesh with the gears 53 and 59 when the person wants legs and arms exercised. The arms J and H will now be actuated by the shaft 58 and will exercise the arms of the person when his hands grip the hand-grip members 21. If the person only wants his arms exercised and not his legs, the clutch members 64 and 67 are disengaged from each other.

All of the mechanism is mounted on a single subframe C that can be raised or lowered in front or in back by a system of arms E and F. The machine teaches swimming strokes to a person who does not have to enter the water. The leg-moving mechanism can be disengaged from the arm actuated mechanism. There are three places for disconnecting parts. One is the clutch G for disconnecting

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the shaft 14 from its aligned shaft 15. The second is the idler gear 54 and the third is the clutch shown in FIGURES 8 and 9 for disconnecting the pitman 62 from the shaft 65.

We claim:

1. In a device of the type described: two axially aligned shafts; a hand-operated crank arm secured to each shaft and extending radially therefrom for rotating the shafts; a manually-controlled clutch for interconnecting the two shafts; a pair of leg-supporting levers rockable about a horizontal axis; and means for connecting the axially aligned shafts with said leg-supporting levers; said means comprising a first gear keyed to one of the aligned shafts; an idler gear meshing with said gear; a second gear meshing with the idler gear and keyed to a stub shaft; manually controlled means for disconnecting the idler gear from the other two gears; an eccentric mounted on said stub shaft; a pitman reciprocated by said eccentric; a transverse shaft; an arm connected to an element of a second clutch, the element being free to rock on the transverse shaft and being swung by the reciprocation of the pitman; said second clutch having a second element keyed to the transverse shaft; the two elements of the second clutch when interconnected causing the second clutch element to rock when the first element is rocked so as to rock the transverse shaft; and arm and link connections between the transverse shaft and the leg-supporting levers for swinging the levers when the axially aligned shafts are rotated.

2. In a device of the type described: two axially aligned shafts; a hand-operated crank arm secured to each shaft and extending radially therefrom for rotating the shafts; a manually-controlled clutch for interconnecting the two shafts; a pair of leg-supporting levers rockable about a horizontal axis; and means for connecting the axially aligned shafts with said leg-supporting levers; said means comprising a first gear keyed to one of the aligned shafts; an idler gear meshing with said gear; a second gear meshing with the idler gear and keyed to a stub shaft; an eccentric mounted on said stub shaft; a pitman reciprocated by said eccentric; a transverse shaft; an arm connected to an element of a second clutch, the element being free to rock on the transverse shaft and being swung by the reciprocation of the pitman; said second clutch having a second element keyed to the transverse shaft; the two elements of the second clutch when interconnected causing the second clutch element to rock when the first element is rocked so as to rock the transverse shaft; and arm and link connections between the transverse shaft and the leg-supporting levers for swinging the levers when the axially aligned shafts are rotated.

3. In a device of the type described: two axially aligned shafts connected together; a hand-operated crank arm secured to each shaft and extending radially therefrom for rotating the shafts as a unit; a pair of leg-supporting levers rockable about a horizontal axis; and means for connecting the axially aligned shafts with said leg-supporting levers; said means comprising a first gear keyed to one of the aligned shafts; an idler gear meshing with said gear; a second gear meshing with the idler gear and keyed to a stub shaft; manually controlled means for disconnecting the idler gear from the other two gears; an eccentric mounted on said stub shaft; a pitman reciprocated by said eccentric; a transverse shaft; an arm connected to an element of a second clutch, the element being free to rock on the transverse shaft and being swung by the reciprocation of the pitman; said second clutch having a second element keyed to the transverse shaft; the two elements of the second clutch when interconnected causing the second clutch element to rock when the first element is rocked so as to rock the transverse shaft; and arm and link connections between the transverse shaft and the leg-supporting levers for swinging the levers when the axially aligned shafts are rotated.

4. In a device of the type described: two axially aligned shafts; a hand-operated crank arm secured to each shaft

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and extending radially therefrom for rotating the shafts; a manually-controlled clutch for interconnecting the two shafts; a pair of leg-supporting levers rockable about a horizontal axis; and means for connecting the axially aligned shafts with said leg-supporting levers; said means comprising a first gear keyed to one of the aligned shafts; an idler gear meshing with said gear; a second gear meshing with the idler gear and keyed to a stub shaft; manually controlled means for disconnecting the idler gear from the other two gears; an eccentric mounted on said stub shaft; a pitman reciprocated by said eccentric; a transverse shaft; an arm connected to an element of a second clutch, the element being free to rock on the transverse shaft and being swung by the reciprocation of the pitman; said second clutch having a second element keyed to the transverse shaft; the two elements of the second clutch when interconnected causing the second clutch element to rock when the first element is rocked so as to rock the transverse shaft; arm and link connections between the transverse shaft and the leg-supporting levers for swinging the levers when the axially aligned shafts are rotated; and adjustable braking means for the leg-supporting levers for applying the desired braking force on these levers.

5. A device of the type described: a main frame, a bed carried by the frame for supporting an operator in a prone position, a subframe positioned below the bed, adjustable means for connecting the subframe to the main frame and for securing the subframe at the desired angular or horizontal position with respect to the bed and at the desired distance below the bed, arm exercising and guiding means arranged at one end of and supported by the subframe, and leg exercising and guiding means extending beyond the opposite end and supported

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by the subframe, said adjustable means securing the subframe to the main frame for simultaneously disposing the arm exercising and leg exercising means in proper relation with respect to the bed where they can be engaged by the arms and legs of the operator lying on said bed, and clutch means carried by said subframe for connecting and disconnecting the arm exercising means to and from the leg exercising means, whereby an operation of the arm exercising means will operate the leg exercising means when the clutch means is engaged.

6. In a device of the type described, a frame, a bed adjustably carried by the frame for supporting an operator in a prone position, a pair of axially aligned shafts carried by said frame, a hand operated crank arm secured to each shaft and extending radially therefrom for rotating said shafts, said shafts adapted to be interconnected to act in unison, a pair of leg supporting levers carried by said frame for pivotal movement about a horizontal axis, and clutch means interposed between said shafts and said levers for connecting and disconnecting said levers to said shafts, said clutch means when engaged causing said levers to swing about their axis upon the rotation of said shafts and upon disengagement allowing said levers to be moved independently of said shafts.

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