May 6, 1947 W. J. S. JOHNSON 2,419,998

EXERCISING MACHINE

Filed March 1, 1946 3 Sheets-Sheet 1

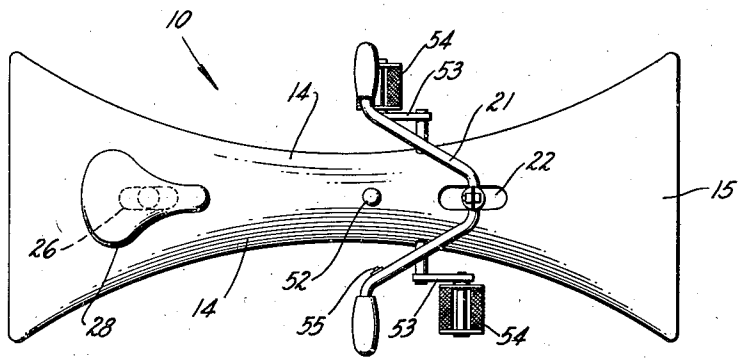


FIG. 1

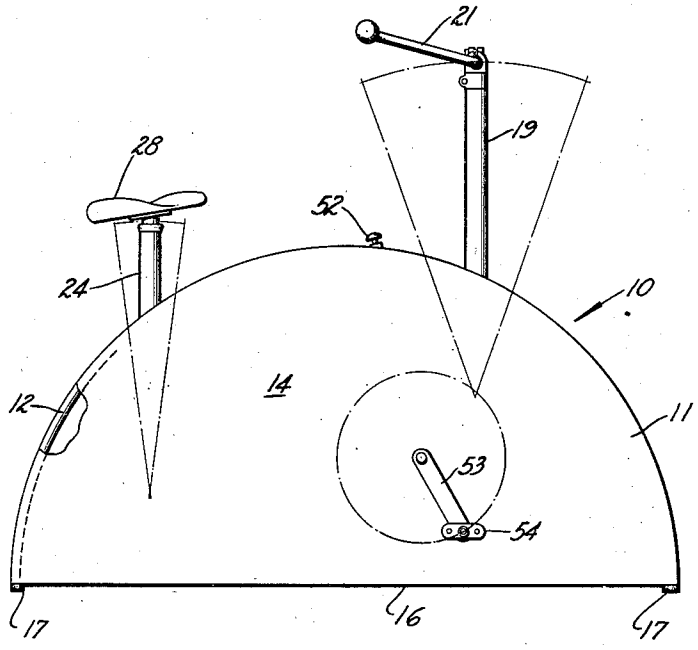


FIG. 2

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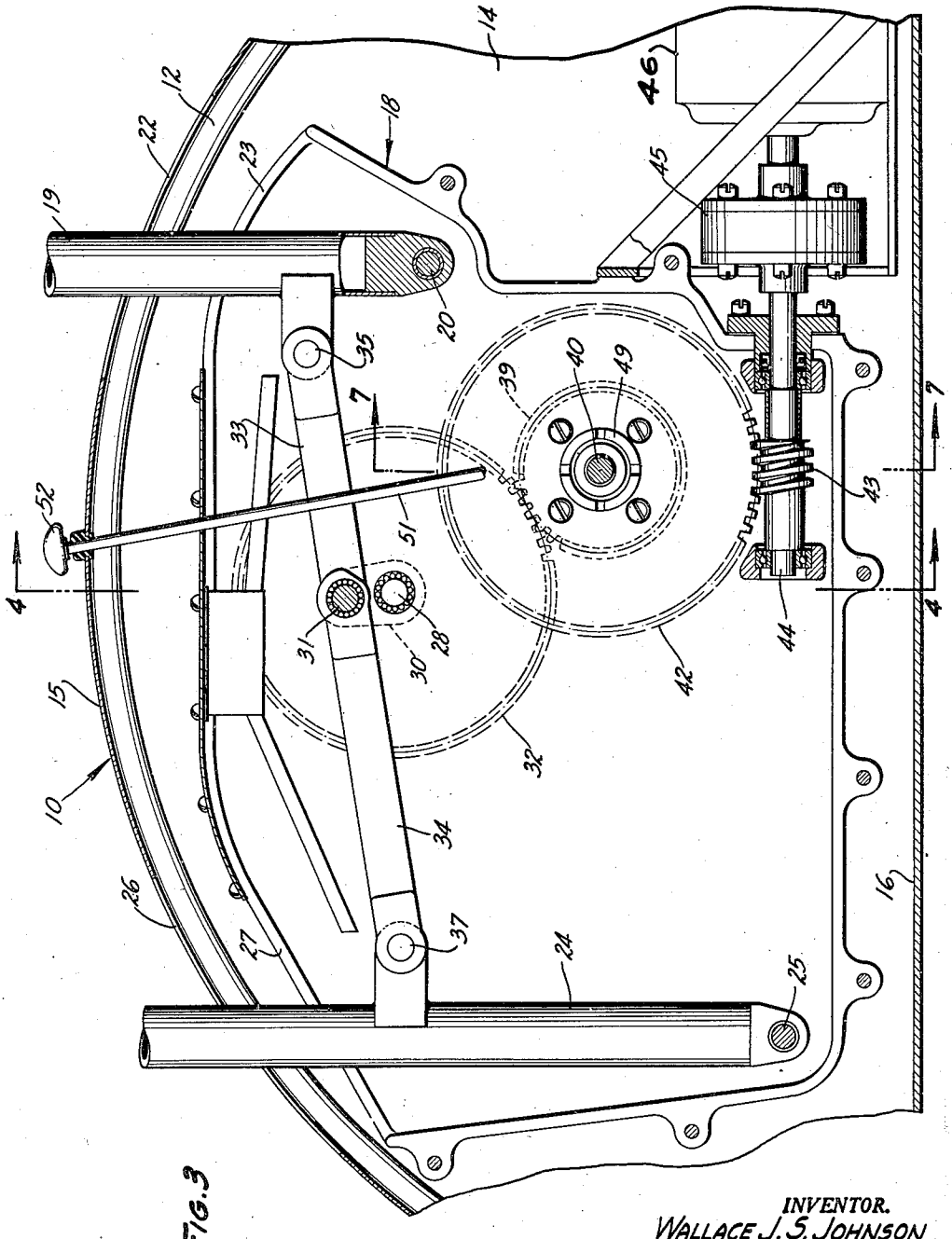


FIG. 3

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Filed March 1, 1946 3 Sheets-Sheet 3

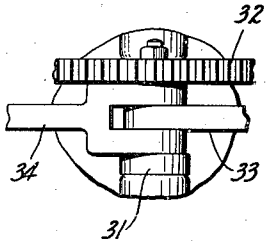


FIG. 5

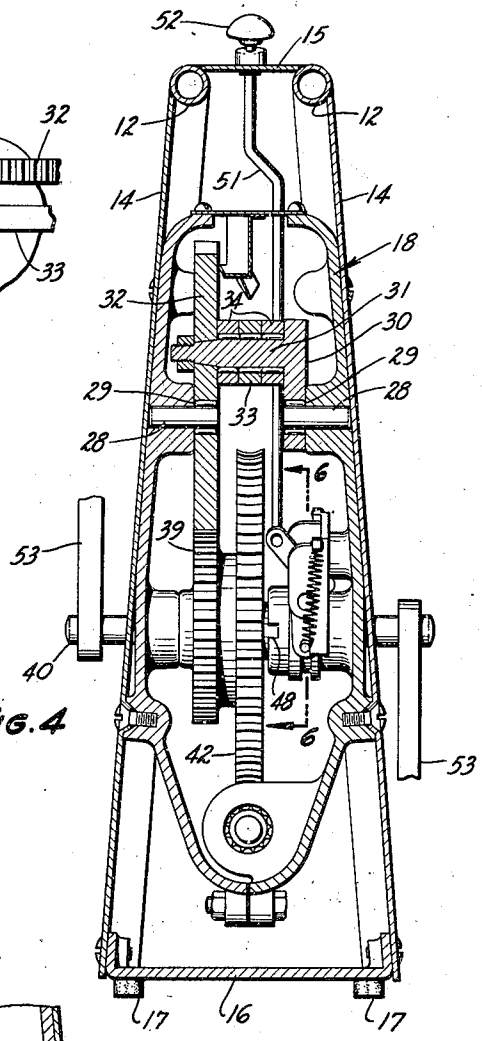


FIG. 4

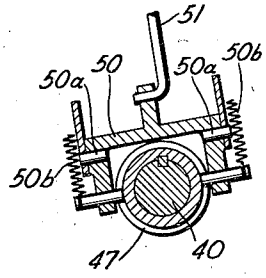


FIG. 6

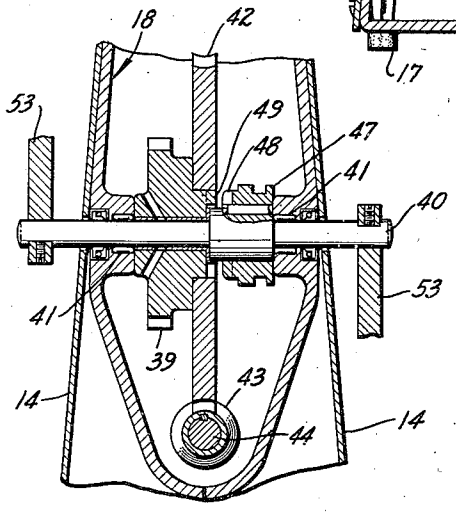


FIG. 7

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UNITED STATES PATENT OFFICE

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EXERCISING MACHINE

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Application March 1, 1946, Serial No. 651,356

6 Claims. (Cl. 128—25)

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This invention relates to exercising machines for exercising the muscles of the body normally utilized in rowing and bicycling.

It is the principal object of my invention to provide an improved exercising machine of the character referred to by means of which passive or active exercising may be obtained by a true rowing motion combined with bicycling leg motion.

It is a further object of my invention to provide a machine of the character described having no unbalanced positions in its operating cycle, and the operating power requirement of which is minimum and uniform.

It is a further object of my invention to provide a machine of the character described in which the operating mechanism is completely enclosed for maximum safety of the user.

One form which the invention may assume is exemplified in the following description and illustrated by way of example, in which:

Fig. 1 is a view in plan of an exercising machine embodying the preferred form of my invention.

Fig. 2 is a side elevation of said machine.

Fig. 3 is an enlarged fragmentary view taken centrally and longitudinally through the frame and the transmission case, showing in detail the operating elements of the machine.

Fig. 4 is a transverse sectional view through the operating mechanism of the machine taken on line 4—4 of Fig. 3.

Fig. 5 is a fragmentary view in plan of the connection between the connecting rods and the crank pin of the machine.

Fig. 6 is a fragmentary view in section through the clutch mechanism taken on line 6—6 of Fig. 4.

Fig. 7 is a fragmentary view in transverse section taken on the line 7—7 of Fig. 3.

Referring more particularly to the accompanying drawings, 10 indicates an exercising machine embodying the preferred form of my invention, which machine enables a user to obtain either passive or active exercise of the muscles ordinarily used in rowing and bicycling.

The machine is of a portable nature and comprises a closed rigid frame 11 of simple construction which completely houses the operating mechanism of the machine. This frame is formed of two tubular side frame members 12 arched in substantial semi-circular form. These frame members 12 are arranged upright with their terminals lowermost and are disposed at opposite inclinations to the vertical so that they are spaced more closely together at the longitudinal center and top of the frame than at the base and ends of the frame.

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A side plate 14 is arranged exteriorly of each side frame 12, which side plate has a bottom marginal edge lying in a plane extending between the terminals of the side frame. Each side plate 14 has an arcuate edge conforming to the contour of the frame member 11 and is secured thereto by welding, as illustrated most clearly in Fig. 4. The side plates are laterally arched, as illustrated most clearly in Fig. 1, to give a pleasing appearance to the frame 11.

A top plate 15 is provided which is bent in semi-circular form to conform to the arcuate contour of the side frames 12, and the side edges of this top plate 15 are molded so as to conform to the top edge contour of the frame, as illustrated. The side edges of the top plate 15 are also welded to the side frame members 12, as illustrated. The ends of the top plate extend to the bottom edges of the side plates 14 and register therewith and lie in the same plane so that the bottom of the frame is defined by the edges of the three plates, all lying in the same plane.

Transverse frame members 16 extend between and are secured to the side plates 14 adjacent the lower edges thereof and adjacent the opposite ends of the frame 11 to aid in forming the rigid closed frame structure 11. Suitable floor engaging pads 17 of rubber or like material are provided at the underside of the frame 11, preferably on the transverse frame members 16 to bear on the floor for vibration absorbing and for floor protective purposes.

Arranged within the frame 11 and securely fixed to the side plates 14 is a rigid transmission case 18. This transmission case 18 is preferably formed in two complementary halves having meeting surfaces or faces at the longitudinal center of the case 18. This transmission case 18 houses the operating mechanism of the machine, as will be described.

Arranged on the longitudinal center of the frame and extending forwardly of its geometrical center is a vertically projecting handle-bar or first lever 19 which is pivoted at its lowermost end within the transmission case 18 on a transverse pintle 20 journalled at its ends in suitable bearings in the transmission case 18. The upper end of this handle-bar or first lever 19 projects vertically through the transmission case 18 and the top plate 15 of the housing. At its upper end the lever 19 is fitted with handle-bars 21 somewhat like those ordinarily fitted to bicycles of conventional type. The handle-bar or first lever

19 is intended to oscillate longitudinally of the frame on the longitudinal center of the latter and for this purpose the upper plate 15 of the frame 11 and the upper wall of the transmission case 18 are slotted as at 22 and 23.

A seat supporting or second lever 24 is provided which is also vertically disposed and which is in longitudinal alignment with the handle-bar or first lever 19. This seat lever is arranged at a spaced distance rearwardly of the geometrical center of the frame and is pivoted for longitudinal oscillation on the frame 11 in the same longitudinal plane as is the handle-bar or first lever 19. The lower end of the seat or second lever 24 extends within the transmission case and is pivoted thereto by means of a pintle 25 suitably journalled at its ends in the sides of the transmission case 18.

The axes of the pintles 20 and 25 are, of course, parallel but the pintle 25 is positioned at a spaced distance below the pintle 20 for a purpose which will be hereinafter described.

To accommodate the oscillating movement of the seat or second lever 24 the upper wall 15 of the frame 11 is slotted as at 26, and the upper end of the transmission case is slotted as at 27.

The upper end of the seat supporting or second lever 24 is fitted with a seat or saddle 28 similar to those with which conventional bicycles are equipped. I intend that the handle-bars 21 be adjustable on the handle-bar lever 19 and the seat 28 be adjustable on the seat lever 24, but in that such adjustability forms no part of the present invention, it will not be described in detail.

I intend that the handle-bar lever 19 and the seat supporting lever 24 oscillate in unison and move at all times in the same direction but at relatively different speeds. That is to say, I intend the handle-bar lever 19 oscillate through an arc which is greater than the arc through which the seat supporting lever 24 oscillates. Although the oscillations are synchronous, the rate of travel of the seat supporting lever 24 will be less than the rate of travel of the handle-bar lever 19. This gives a true rowing motion and exercises those muscles of the arms and torso ordinarily used in rowing.

To accomplish this operation of the handle-bar lever 19 and seat supporting lever 24, I provide a crank-shaft 28 formed in two parts and mounted at its ends in bearings 29 formed in opposite sides of the transmission case 18. The crank-shaft 28 extends, of course, transversely of the transmission case and the frame of the machine. Fixed on the crank-shaft at one side of the longitudinal center of the machine is a radial crank web 30 having a crank pin 31 which is also secured in a spur gear 32 fixed on the crank-shaft, as illustrated. The crank pin 31 is, of course, eccentric with respect to the crank-shaft 28 so that it will revolve about the axis thereof.

Journalled on the crank pin 31 are two connecting rods 33 and 34. The connecting rod 33 extends generally forwardly of the machine and is pivotally connected by a wrist pin 35 to the handle-bar lever 19 at a point longitudinally spaced along the latter from the pintle 20. The second connecting rod 34 is connected by a wrist pin 37 to the seat supporting lever 24 at a point longitudinally spaced from the pintle 25. The longitudinal spacing along the lever 24 between the pin 37 and the pintle 25 is considerably greater than the spacing between the pintle 20 and the pin 35 of the handle-bar lever 19 so that the latter will oscillate through an arc of greater angularity than will the seat supporting lever 24.

To rotate the crank-shaft 28 and thereby revolve the crank pin 31, the spur gear 32 is in mesh with a spur gear 39 rotatably mounted on a transverse pedal shaft 40. This pedal shaft 40 is journalled in bearings 41 at opposite sides of the transmission case 18. Relatively fixed to the spur gear 39 is a worm wheel 42 which is in mesh with a worm 43. The pitch angle of the worm 43 and, of course, of the teeth of the worm wheel 42 is in excess of 17° so that the worm wheel 42, when rotated, will cause rotation of the worm 43 and vice versa.

The worm 43 is secured on a worm shaft 44 connected by a coupling 45 to an electric motor 46. Obviously when this motor is in operation, a drive will be transmitted through the worm shaft 44 to the worm 43 and thence to the worm wheel 42. Inasmuch as this worm wheel 42 is relatively fixed to the spur gear 39, a drive will be transmitted to the latter and thence to the spur gear 32 and thence to the crank pin 31 to revolve the same about the axis of the crank-shaft 28, operating the handle-bar and seat supporting levers 19 and 24, as previously described.

A clutch member 47 is feathered on the pedal shaft 40 having a clutch face 48 to mesh with a clutch face 49 on the hub of the spur gear 39, so that this latter may, if desired, be clutched to the pedal shaft 40 or disengaged therefrom. The clutch member 47 is engaged by a clutch shifting fork 50 in turn connected with a clutch shift lever 51. This lever extends upwardly through the case 18 to a point closely adjacent to the geometrical center of the case between the handle-bar and seat supporting levers 19 and 24, at which point it is fitted with a clutch shifting knob 52.

The arrangement of these parts is such that shifting of the clutch member 47 may be effected by longitudinal movement of the shift lever 51 imparted through the medium of the knob 52. By exerting an upward pull on the knob 52, as will be clearly seen from Figs. 4 and 6, engagement of the clutch is effected, while a depression of the knob 52 and longitudinal movement of the shift lever 51 will be translated into disengagement of the clutch.

The ends of the pedal shaft 40 project laterally from the sides of the frame and at each end it is fitted with a pedal lever 53, which levers are fixed to the pedal shaft 40 and arranged at 180° apart. Laterally and outwardly extending rotatable pedals 54 are fitted to the ends of the pedal levers 53.

The relative positioning of the pedal shaft 40, the seat 28 and the handle-bars 21 is such that when one is seated on the seat 28, the handle-bars 21 may be grasped in the hands with the feet disposed on the pedals 54, much in the manner of a bicycle.

Assuming that the clutch 47 is in engagement, clutching the spur gear 39 to the pedal shaft 40, and the motor 46 is in operation, the pedal shaft 40 will be driven and the handle-bar and seat supporting levers 19 and 24 will be placed in operation, so that the user will be exercised. That is to say, those muscles of the user ordinarily used in rowing and in bicycling will be exercised by the combined operations of the machine. Such exercise, however, I prefer to term "passive exercise."

However, if the user desires active exercise, the clutch 47 may be moved to disengaging position and the user may cause operation of the various parts of the mechanism by manual effort. It

is seen that the friction set up in the various parts will provide sufficient resistance to operation to properly exercise the user. If desired, the user may only actively exercise his legs by manual operation of the pedals 54, or he may only actively exercise his arm and torso muscles by a rowing action effected by manual effort exerted on the handle-bar lever 19 and the seat supporting lever 24.

I wish to point out that the operation of the machine requires a minimum of power and the power requirement is uniform in that there is no unbalanced position in the cycle of operation of the levers 19 and 24. The rowing motion which is created by operation of the motor 46 is aided by any manual effort exerted by the user in producing a rowing action and is no time hindered by such manual effort of the user. Also, the weight of the user of the machine may be distributed by him as he desires between the seat and the foot pedals.

The reason that the minimum of power effort is required is that the weight of the user imposed on the lever 24 is taken up directly by the pintle 25. This is likewise true when the weight of the user is imposed on the pedals 53.

In operation of the device, it is constructed substantially as illustrated and described, and I prefer that the circuit of the motor 46 be equipped with a switch 55 adjacent one of the grips of the handle-bars 21 so that the user of the machine can at any time quickly and easily open or close the circuit of the motor 46. Obviously, the operating knob 52 of the shift lever 51 is also conveniently located so that the user may at any time throw in or throw out the clutch, as desired.

The user sits upon the seat 28 and places the feet on the pedals 54 and grasps the grips of the handle-bars 21. If he desires passive exercise, he closes the switch 55 to close the circuit of the motor 46. Operation of the motor will be transmitted through the worm shaft 44 to the worm 43 and thence to the worm wheel 42. This worm wheel, as previously described, is relatively fixed to the spur gear 39.

Assuming that the clutch face 48 of the clutch member 47 is in mesh with the clutch face 49 of the spur gear 39, the latter will be clutched to the pedal shaft 40 and the latter will be power driven, causing revolving of the pedals 54, imparting exercise to the legs of the user. At the same time a drive will be transmitted from the spur gear 39 to the spur gear 32 to revolve the crank pin 31 about the axis of the crank-shaft 28. This revolving of the crank pin 31 will, through the connecting rods 33 and 34, simultaneously oscillate the handle-bar lever 19 and the seat supporting lever 24 in the same direction at relatively different speeds.

In that the point of connection between the connecting rod 34 and the seat supporting lever 24 relative to the pivotal point 25 of the lever 24 is greater than the distance between the point of connection of the connecting rod 33 with the handle-bar lever 19 and its pivotal connection 20, the latter will be moved through a greater arc of oscillation during the same time that the seat lever 24 is moved through a lesser arc of oscillation.

This movement of the levers 19 and 20 simultaneously in the same direction but at relatively different speeds creates a true rowing action to properly exercise the arm and torso muscles ordinarily used in rowing.

If it is desired to actively exercise, the circuit of the motor is opened and the clutch face 48 of the clutch member 47 may, if it is not desired to exercise the legs, be disengaged from the clutch face 49 of the spur gear 39 by depression of the knob 52 of the shift lever 51. As previously stated, such movement of the shift lever 51 pivots the shift fork 50 about its pivotal pins 50a and moves the clutch member 47 endwise along the pedal shaft 40 to a disengaging position. Springs 50b are provided and associated with the shifting fork 50 and normally tend to maintain the shifting fork in a disengaged position.

The user may then exert manual effort to create the rowing motion through the medium of the levers 19 and 20, and may or may not operate the pedal shaft 40 through the medium of the pedals 54. The user, if desired, may operate the entire machine through the medium of the pedals 54, creating the rowing motion generated by the levers 19 and 24.

From the foregoing it is obvious that I have provided a very compact simple machine, the operating parts of which are wholly and entirely enclosed and which may be utilized to either passively or actively exercise the muscles of the arms, legs and torso in a simulated rowing motion or bicycle pedaling action, or the two actions combined, and while I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. An exercising machine of the bicycle type comprising a frame, an oscillatory handle-bar lever pivoted to the frame for oscillation longitudinally thereof, a seat constituting a body support, an oscillatory supporting lever for said seat pivoted to the frame for oscillation and longitudinally spaced from the handle-bar lever in the direction of oscillation, reciprocating means connected to said levers for simultaneously oscillating said levers in unison and in the same angular direction but moving the seat supporting lever at a relatively slower rate of speed than the handle-bar lever, and pedals mounted on said frame adapted to receive the feet of a user.

2. An exercising machine of the bicycle type comprising a frame, an upright handle-bar lever pivoted at its lower end to the frame, a pair of handles fixed to said lever, a seat constituting a body support, an upright supporting lever for said seat pivoted at its lower end to the frame, the said levers being capable of oscillation longitudinally of said frame and being longitudinally spaced in the direction of oscillation, a rotatable crank, connecting rods connecting said crank to said levers whereby the same will oscillate in unison in the same angular direction with the seat supporting lever moving at a relatively slower rate of speed than the handle-bar lever, and pedals mounted on said frame adapted to receive the feet of a user.

3. An exercising machine of the bicycle type comprising a frame, a handle-bar lever pivoted at one end to the frame, a seat constituting a body support, a supporting lever for said seat pivoted at one end to the frame, the pivotal connections between said levers and the frame enabling the same to oscillate in the same plane, said levers being spaced apart longitudinally in said plane, a rotatable crank carried by the frame intermediate said levers, connecting rods connecting said

crank to said levers, the points of connection between said connecting rods and said levers being such relative to their pivotal points that operation of the crank will be accompanied by oscillation of said levers in unison and in the same angular direction but moving the seat supporting lever at a relatively slower rate of speed than the handle-bar lever, and pedals mounted on said frame adapted to receive the feet of a user.

4. An exercising machine of the bicycle type comprising a frame, an upright handle-bar lever pivoted at its lower end to the frame, a seat constituting a body support, an upright supporting lever for said seat pivoted at its lower end to the frame, the said levers being capable of oscillation longitudinally of said frame and being longitudinally spaced in the direction of oscillation, a rotatable crank, connecting rods connecting said crank to said levers whereby the same will oscillate in unison and move in the same angular direction with the seat supporting lever moving at a relatively slower rate of speed than the handle-bar lever, and driving means for oscillating said levers in synchronism.

5. An exercising machine of the bicycle type comprising a frame, an upright handle-bar lever pivoted at its lower end to the frame, a seat constituting a body support, a lever for said seat pivoted at its lower end to the frame, said levers being arranged to oscillate in the same plane and being longitudinally spaced apart in said plane, a revoluble crank carried by the frame intermediate said levers, a connecting rod connecting said crank to the handle-bar lever, a connecting rod connecting said crank to the seat supporting lever whereby revolution of said crank will be accompanied by oscillation of said levers in unison and in the same angular directions, the point of connection of the connecting rod and the seat lever with respect to the pivotal point of the latter and the point of connection between the connecting rod and the handle-bar lever relative to the

pivotal point of the latter being such that the seat lever will move at a relatively slow rate of speed and through an arc of less angularity than the handle-bar lever, a rotatable gear to which said crank is connected at an eccentric point thereon, a second gear in mesh with the first gear, a transverse pedal shaft rotatably mounted in the frame and upon which said second gear is rotatably mounted, operative clutch means for clutching said second gear to said pedal shaft, and pedal levers carried by said pedal shaft.

6. An exercising machine of the bicycle type comprising a frame, an upright handle-bar lever pivoted at its lower end to the frame, a seat constituting a body support, an upright seat supporting lever pivoted at its lower end to the frame, said levers being pivoted to the frame to oscillate in the same plane, said levers being spaced apart in said plane of oscillation, a revoluble crank member carried by the frame and disposed intermediate the levers, connecting rods connecting said crank member to said levers at points thereon relative to their pivotal points whereby revolution of the crank member will be accompanied by oscillation of said levers in unison and movement thereof in the same angular direction but moving the seat supporting lever at a relatively slower rate of speed than the handle-bar lever, pedals mounted on said frame adapted to receive the feet of a user, and means for driving said pedals.

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