Aug. 27, 1946. G. BERGFORS 2,406,344

EXERCISING MACHINE

Filed April 24, 1942 3 Sheets-Sheet 1

Fig. 1.

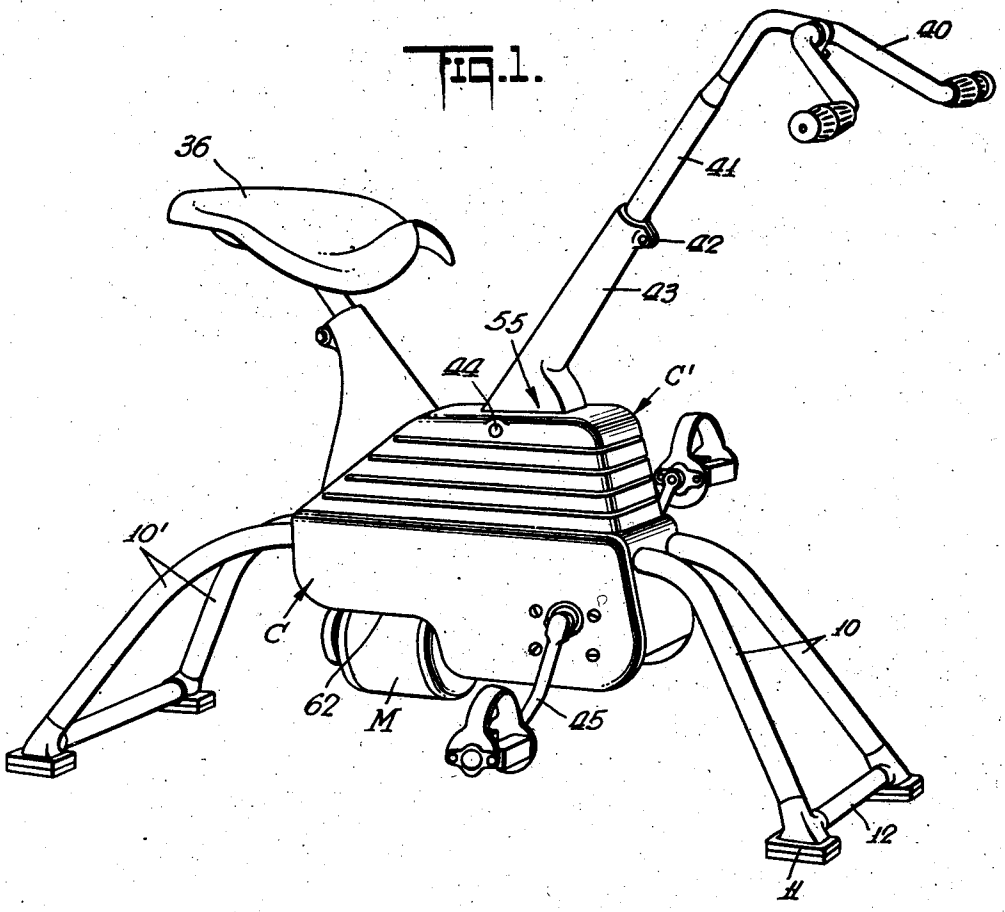
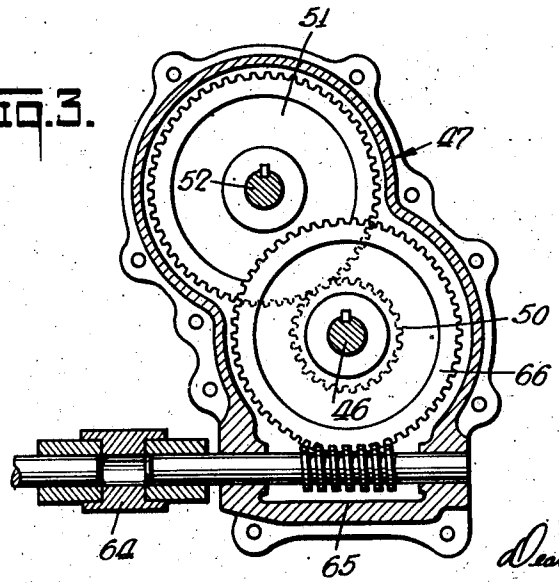


Fig. 3.



INVENTOR
Gordon Bergfors
BY
Dean Fairbank & Hirsch
ATTORNEYS

41-164

Aug. 27, 1946. G. BERGFORS 2,406,344

EXERCISING MACHINE

Filed April 24, 1942 3 Sheets-Sheet 2

Fig. 2.

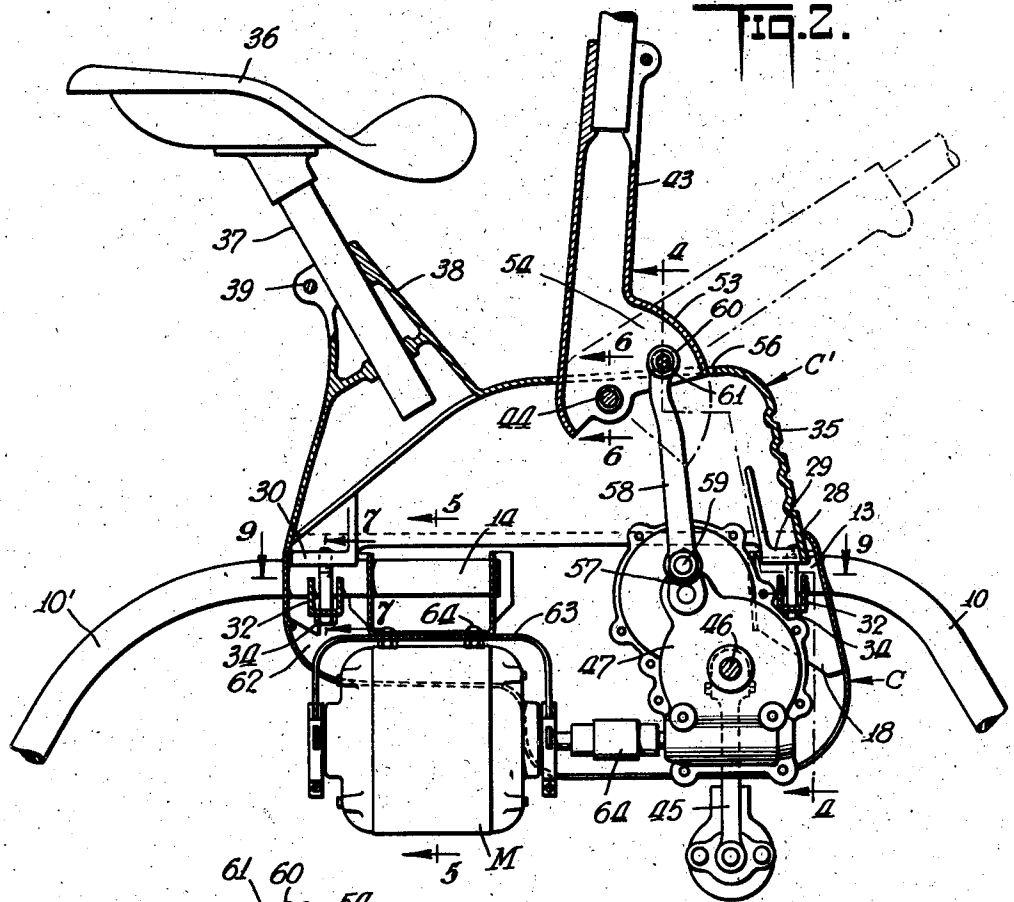


Fig. 4.

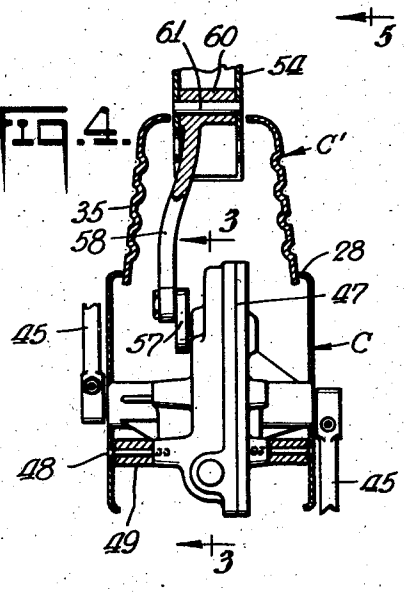
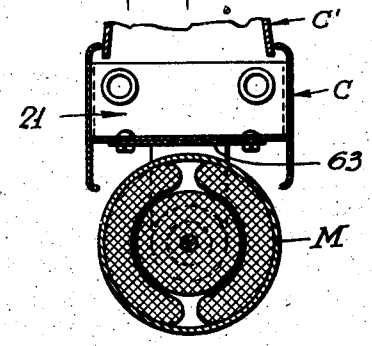


Fig. 5.



INVENTOR
Gordon Bergfors
BY
Dann Fairbank & Hirsch
ATTORNEYS

Aug. 27, 1946. G. BERGFORS 2,406,344

EXERCISING MACHINE

Filed April 24, 1942 3 Sheets-Sheet 3

Fig. 6.

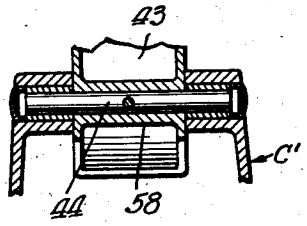


Fig. 7.

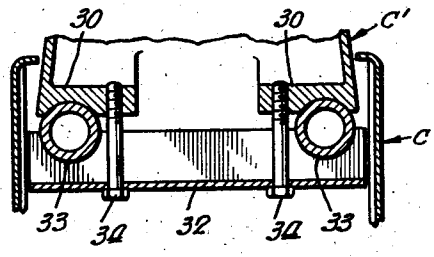


Fig. 8.

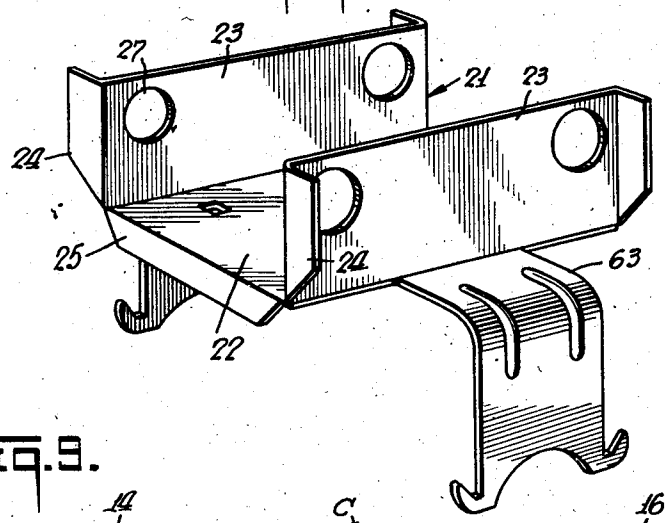
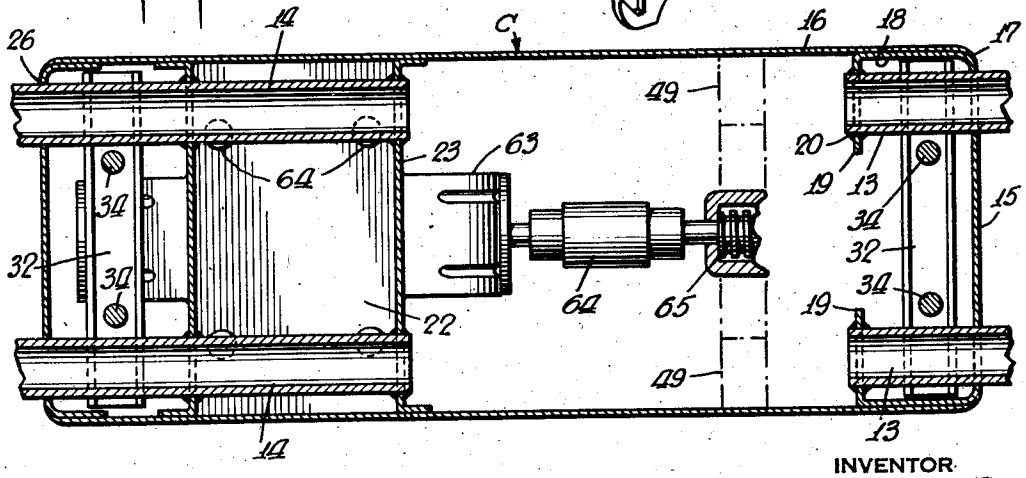


Fig. 9.



INVENTOR
Gordon Bergfors
BY
Dean Fairbank & Hinck
ATTORNEYS

41-164

Patented Aug. 27, 1946 2,406,344

UNITED STATES PATENT OFFICE

2,406,344

EXERCISING MACHINE

Gordon Bergfors, Yonkers, N. Y., assignor to Exercycle Corporation, New York, N. Y., a corporation of New York

Application April 24, 1942, Serial No. 440,294

15 Claims. (Cl. 128—33)

1

The present invention is concerned with exercising machines of the type that impart to the user the combined motion of a bicycle and a rowing machine.

It is among the objects of the invention to provide a machine of the above type in which the user is fixedly seated and the combined pedalling and arm-stretching and retracting and trunk movement of the user are effected in rhythmic manner, passively by the driving action of an electric motor incorporated in the mechanism, or if desired, actively without the resort to the motor.

Another object is to provide a mechanism of the above type involving a minimum number of rugged moving parts, and devoid of any springs, and the operative mechanism of which is enclosed and concealed and not apt to injure the user.

Another object is to provide a mechanism of the above type by which the handle movement is performed without jolts or sudden changes of direction, but is retarded near the extremity of each stroke thereof for gentle, yet effective exercise.

In the accompanying drawings in which is shown one or more of various possible embodiments of the several features of the invention,

Fig. 1 is a perspective view of the machine,

Fig. 2 is a view thereof in longitudinal cross-section and on a larger scale with parts broken away,

Fig. 3 is a view of the gear box with the cover removed and taken on line 3—3 of Fig. 4,

Fig. 4 is a view in transverse cross-section taken on line 4—4 of Fig. 2,

Fig. 5 is a view in transverse cross-section taken on line 5—5 of Fig. 2,

Fig. 6 is a sectional detatil view taken on line 6—6 of Fig. 2,

Fig. 7 is a sectional detail view taken on line 7—7 of Fig. 2,

Fig. 8 is a perspective view on a larger scale showing one of the cross-braces and motor support, and

Fig. 9 is a transverse sectional view taken on line 9—9 of Fig. 2.

Referring now to the drawings, the exercising machine comprises a pair of front legs 10 made up of hollow tubing telescoped into foot-pieces 11 connected by a cross brace bar 12 and a like pair of rear legs 10'. The legs in combination with a casing C which intervenes therebetween and is carried thereby make up a frame structure. For this purpose, the upper ends of the tube stock legs extend horizontally as at 13 and 14 respectively, in parallel aligned pairs through corresponding

2

apertures in the casing. For mounting the casing upon the legs 10, 10', sheet metal cross braces are enclosed within the casing, through which the tube stock leg ends extend and to which they are welded. The cross-brace 15 at the forward end of the casing preferably forms the front wall thereof, to which the side walls 16 of the casing are welded at 17. The brace has wings 18 extending along the side walls of the casing and inturned flanges 19, through which the extremities of the tube legs 13 extend and to which they are welded at 20.

The cross brace 21 near the rear of the case comprises a sheet metal structure having a bottom plate 22, upstanding wings 23 extending across the casing, having outturned end flanges 24 and downturned bottom flanges 25 welded or otherwise attached to the inner walls of the casing C. The horizontally extending upper ends 14 of the rear legs 10' extend through apertures 26 in the end wall of the casing and through corresponding apertures 27 in the wings 23 of the cross-brace 21 at which they are welded in place.

The casing C is made of two pieces, including the box member already described which has an inturned rim 28 somewhat above the tubular support rods 13, 14 and a cover piece C'. That cover piece is provided at its forward and rear ends respectively with unitary foot-pieces 29 and 30 adjacent the respective front and rear walls of the casing box. The foot pieces have curved bearing surfaces which rest upon the upper convexities of the horizontal support leg ends 13, 14, the forward foot pieces 29 intervening between the front of the casing and the flanges 19 of the front brace member and the rear foot pieces 30 intervening between the rear wall and the cross brace 21.

To secure the cover C' of the casing in place, corresponding cross channel bars 32 which have notches 33 for the corresponding tubular leg members are lodged thereunder, and bolts 34 through said channel bar and the respective foot pieces 29, 30 clamp the casing cover piece C' against said tubular supports. The cover is desirably reinforced by corrugations 35 and its lower rim is telescoped slightly within the rim 28 of the box portion of the casing, so that the casing appears to be completely closed.

The casing mounts a seat 36 in the character of a bicycle seat, the oblique rod support 37 of which extends into a corresponding neck 38 unitary with the cover piece C' of the casing and is adjustably and frictionally affixed therein by a cross bolt 39. The frame also carries a handle member 40 of the type used on bicycles, the

standard 41 of which is clamped by a cross bolt 42 into a sleeve carrier 43 pivoted at 44 in the upper and forward end of the cover piece C', for the back and forth movement about its pivot by action presently to be described.

For convenience of construction and neatness of appearance the handle support bar sleeve 43 has an outwardly curved front wall 53 unitary with and at the lower end of said sleeve, and connected to the sleeve by unitary wings 54 of arcuate contour. The curved enlargement 55 thus formed extends with small clearance through a corresponding slot 56 in the upper wall of the casing.

Near the front and lower part of the casing are a pair of bicycle pedals 45 extending from opposite sides of the casing and affixed to an axle 46 transversely of the casing.

The pedals 45 and the pivoted handle 41—43 are interconnected by a transmission for moving the latter back and forth in the operation of the pedals. That transmission is largely contained in a gear box 47 within the casing C. The gear box is firmly clamped in place between the side walls of casing C by means of screws 48 extending through sleeves 49 retained under compression between the respective casing and gear box side walls, and threaded into the gear box casting. The transmission includes a gear 50 keyed to the pedal axle 46 and meshing with a larger spur gear 51 keyed to countershaft 52.

Countershaft 52 in the gear box has a short crank arm 57 keyed to the outer exposed end thereof. The crank arm is connected with respect to the handle support sleeve 43 by means of a link 58, the lower end of which is pivotally clamped at 59 to the free end of the crank arm 57 and the upper end of which is pivotally connected to the handle support at sleeve 43 in the enlargement 55 thereof, but a short distance from the mounting pivot 44 thereof. For that purpose, the upper end of link 58 is provided with a unitary bearing eye 60 interposed between wings 54 and held in place by a pivot pin 61 therethrough which is affixed at its ends in wings 54.

While the device as thus far described would be suitable for a manually and pedally actuated exercising machine which comes within the scope of the invention from its broader aspect, it is preferred to provide a motor driven apparatus. To this end a fractional horse-power electric motor M of from ¼ to ⅓ H. P. is desirably mounted under the casing C in a corresponding niche 62 therein. The motor desirably, is lodged at its heads in a U-bracket 63 which is secured by carriage bolts 64 to cross-brace 21. The motor is connected by means of a coupling 64 at the forward end thereof to a worm shaft 65 bearing in the gear box 47 and meshing with worm wheel 66, keyed on the axle 46 that mounts gear 50. The electric switch (not shown) for the motor is desirably under the fixed seat and may be set after the user has mounted the machine.

The operation proceeds substantially as follows: The user, seated upon the seat 36 with his feet in the pedals 45, throws the switch and places his hands on the handle bar 40. The motor M through the worm 65 and worm wheel 66 drives the axle 46 and with it the pedals 45. Through the spur gears 50 and 51, power is transmitted from axle 46 to operate the handle member 40. This operation occurs by rotation of the crank arm 57 which by way of link 58 causes the handle bar to oscillate forward and backward by power operation. Desirably, the gear reduction of spur gears 50 and 51 is two to one, so that the handle bar will perform a complete stroke in one direction, forward or backward, for each complete turn of the pedal cranks.

It will be seen that in the rotary movement of the short crank 57, the major stroke of handle movement whether forward or backward, will occur rapidly during the substantially upward or downward movement of the crank arm. The displacement of the handle member will be relatively slow at the ends of its stroke, during the substantially horizontal movement of the outer end of the crank arm. It follows that in the continuous operation of the pedals, the oscillatory or rocking movement of the handle will occur without jolt or shock to the user. Each stroke begins and ends gently, but during the main length of the stroke the tension or compression upon the extended arms of the user is vigorous, with corresponding stress upon the muscles of the arms, back and abdomen in the enforced bending movement of the trunk, imposed by the movement of the handle bar. The handle bar performs practically a harmonic motion. This action, coupled with the continual motor operation of the bicycle pedals, imparts all of the advantages of muscular action derived both in the operations of bicycling and of rowing.

The simplicity of the device will be manifest. It will be seen that the few moving parts are all enclosed in the casing C, including every link and moving bearing, so that in operation, only the pedals and the handle support bar appear to move and the movement of said bar occurs about a bearing concealed in casing C. The construction when once lubricated, operates without noise or shock. It is rugged and has no springs or other breakable parts.

In the motor driven embodiment, action is imparted to the muscles without affirmative effort on the part of the user, so that the full measure of exercise is obtained without strain upon the heart. Moreover, the fixed seat lends stability to the construction that renders its use safe and comfortable even to elderly or timorous persons.

The machine could be used without the electric motor, or without closing the switch thereof, to compel the user to do affirmative work, and the operation of the pedals and handle bars gives effective exercise of active rather than passive type.

As many changes could be made in the above apparatus, and many apparently widely different embodiments of this invention could be made without departing from the scope of the claims, it is intended that all matter contained in the above description, or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. An exercising machine, comprising a frame having a seat mounted thereon, a handle member, a carrying bar therefor pivoted to said frame, pedals, an axle carrying the same, and a transmission between said pedal axle and said handle carrying bar, said transmission including a link pivoted to said bar near the pivot mount thereof and a short crank for the other end of said link operated from said axle and imparting substantially harmonic motion to said handle member.

2. An exercising machine, comprising a frame, including a casing, a seat affixed to said casing, a handle member and a carrying bar therefor

pivoted near the lower end thereof to said casing, a pair of pedals having an axle through said casing, a gear box from which said axle protrudes, a crank exposed on said gear box, a gear reduction in said box intervening between said axle and said crank, and a transmission link between said crank and said carrying bar and having a pivotal connection with respect to the latter near the pivot mount of the same.

3. An exercising machine, comprising a frame including a casing, a seat affixed to said casing, a handle member having a carrying bar pivoted near its lower end to said casing, pedals laterally of said casing having an axle transversely through said casing, an electric motor carried by said casing, a gear box enclosing a worm driven from said motor, a worm wheel meshing therewith, a gear reduction in said gear box, a crank arm driven from and exposed at the outside of said gear box and within said casing, and a link connecting said crank to the base end of said pivoted carrying bar.

4. An exercising machine comprising a casing having support legs protruding therefrom, an electric motor under said casing, a gear box within said casing, an axle transversely of said gear box having pedals exposed at the outer ends thereof and exposed laterally of said casing, a transmission shaft between said motor and said axle, a countershaft in said gear box, having a short crank arm exposed at one side thereof, a seat affixed to said casing, a handle member having a carrying bar pivoted to said casing and a link for imparting substantially harmonic movement to said handle member, said link connecting said crank to said support bar at a point thereof near the pivot mount thereof.

5. An exercising machine comprising a casing having front and rear legs, a motor at the lower rear part of the casing, a gear box in front of said motor, a seat rising from the rear end of the upper part of said casing, a handle member having a support bar pivoted in said casing, a pair of pedals having an axle through said gear box and said casing, a spur gear reduction within said box operated in unison with said axle, a short crank on the output end of said reduction and a link pivotally mounted upon said crank and pivoted to said support bar, near the pivot mount of the latter.

6. An exercising machine comprising a frame, including a casing having a gear box therein, enclosing speed reducing gearing, a motor upon said frame and driving said gearing, an axle through said box and said casing and driven by said motor, pedals on the ends of said axle, a counter shaft through said box and having a crank exposed on the end thereof and within said casing, a fixed seat upon said frame, a handle member having a support bar pivoted to said casing and a link connecting said crank to a portion of said support bar contiguous to the pivot support of the latter, said shafts and axle being enclosed within said casing, said support bar having a hollow enlargement at the lower end thereof accommodating the upper pivoted end of said link.

7. An exercising machine, comprising a support frame including a casing, a motor under said casing, a transmission box in said casing including reduction gearing driven by said motor and driven members actuated therefrom and engaged by parts of the body of the user, said driven members including pedals laterally of said casing and operated from said transmission box

and a handle bar pivoted to said casing and oscillated from the reduction gearing.

8. An exercising machine comprising a support frame, including a casing having a base portion and a cover piece affixed thereto, a motor under said casing, pedals extending through the base portion of said casing, a seat affixed to said cover piece, a handle bar pivoted to said cover piece, a transmission in said casing including reduction gearing driven by said motor, said reduction gearing driving said pedals and including means for causing said handle bar to oscillate about its pivot.

9. An exercising machine comprising a support frame including a leg structure of tube stock, extending horizontally at the upper part thereof, a support casing for the operative parts of the mechanism, said casing being mounted upon the horizontal portions of said legs and rigidly secured thereto, pedals extending laterally of said casing, a worm wheel moving with said pedals, a worm meshing therewith, a spur gear transmission operated from said worm wheel, a handle member having a support bar pivoted to said casing, a crank upon the output end of said spur gear transmission and a link connecting said crank to said support bar for pivotal backward and forward movement of said handle member, while the pedals are being operated.

10. An exercising machine of the type comprising support legs of tube stock, operating structure carried thereby, including a pair of pedals extending from the sides thereof, a fixed seat and a handle member having a pivoted support bar, a closed casing structure supporting said pedal members, said seat and said handle support bar, the ends of said tube stock legs extending into said casing and the latter being clamped with respect thereto, said casing having enclosed therein transmission gearing interlinking the pedal cranks with the pivoted handle support bar.

11. The combination recited in claim 10 in which an electric motor is mounted under the casing and drives the transmission to both said pedal cranks and said handle bar.

12. In an exercising machine, front legs and rear legs, a combined transmission and support casing comprising a lower box, metal cross-pieces near the ends thereof, said legs having horizontal upper portions extending across and through said metal cross-pieces and affixed thereto, said casing having a cover-piece resting upon said horizontal portions and bolted with respect to said legs, a seat mounted upon said cover piece, a handle support bar extending into and pivoted near its lower end to the upper part of said cover piece, pedal cranks extending from the sides of said box and a transmission within said box interlinking said pedals and said pivoted handle support bar.

13. In an exercising machine, front legs and rear legs, a combined transmission and support casing comprising a lower box, metal cross-pieces near the ends thereof, said legs having horizontal upper portions extending across and through said metal cross-pieces and affixed thereto, a complementary cover-piece resting upon said horizontal portions and bolted with respect thereto, a seat mounted upon said cover piece, a handle support bar extending into and pivoted near its lower end to the upper part of said cover piece, pedal cranks protruding from the sides of said box and a transmission within said box interlinking said pedals and said pivoted handle support bar, one of said cross-pieces having an

electric motor affixed thereunder and lodged in a corresponding niche in the lower part of said box and a worm drive in said box connecting said motor to the transmission.

14. In an exercising machine, a casing, legs supporting the same, a seat supported upon said casing and a handle member having a support bar pivoted near the lower end thereof to the upper part of said casing, a gear box within said casing spaced from the side walls thereof, spacer sleeves intervening between the sides of said casing and said box, screws through said spacer sleeves affixing said box in said casing, said gear box having a worm wheel therein, said worm wheel having an axle extending through the side walls of said casing, pedals upon the ends of said axle, said gear box having a worm therein meshing with said worm wheel, said gear box including a pair of spur gears driven from said worm wheel, a crank arm on the output end of said gear box, and a link connecting said crank arm to said handle bar support at a point near the pivot mount thereof.

15. An exercising machine comprising a pair of front legs and a pair of rear legs of tube stock, the upper portions of said legs extending horizontally, a transmission casing embracing the horizontal parts of said legs, said casing including a box member having transverse metal supports near the front and rear thereof through which the ends of said legs extend and with respect to which they are affixed, said box member having a cover piece, the lower rim of which has foot pieces resting upon the horizontal portions of said legs, and means clamping said cover piece in place, said means comprising channel bar cross members under the respective leg portions and screws through the foot pieces clamping the latter against the leg portions.

GORDON BERGFORS.