PATENT SPECIFICATION (11) 1 587 845

1 587 845

(21) Application No. 38748/77 (22) Filed 16 Sep. 1977 (19)

(31) Convention Application No. 7758/76 (32) Filed 18 Oct. 1976 in

(33) Australia (AU)

(44) Complete Specification Published 8 Apr. 1981

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A6M 8EY 8F

(54) CYCLE EXERCISER

(71) We, REPCO LIMITED, a company incorporated under the laws of the State of Victoria, of 630 St. Kilda Road, Melbourne, Victoria 3004, Australia, do hereby declare the invention, for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to cycle exerci[illegible] connected to a respective end portion of the drive shaft through respective connecting means including a foot pedal crank arm, each said foot pedal and associated crank arm being located outwardly of the adjacent said second drive means in the axial direction of said drive shaft, and said food pedal crank arms extending in opposite directions.

The essential features of the invention

ERRATUM

SPECIFICATION NO.1587845

Page No.1 Line No.42 delete whole line
Page No.1 Line No.43 delete drive shaft to (first occurrence)
Page No.1 Line No.52 for food read foot
Page No.2 Line No.23 for dried read drive
Page No.3 Line No.119 after said insert drive shaft to cause the drive shaft to rotate in response to oscillation of said

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[illegible]ory movement, second drive means for each said handlebar lever and connecting the respective handlebar lever to a respective end portion of said drive shaft to cause the respective end portion of said drive shaft to cause the drive shaft to rotate in response to oscillation of said handlebar levers, two foot pedals each of which is

[illegible] of the exerciser according to an alternaive embodiment.

Figure 8 is a part sectional view, on an enlarged scale, taken along line VIII-VIII of Figure 7.

As a matter of convenience, the invention will be hereinafter described as applied to a cycle exerciser of the kind disclosed in Australian Patent 462,920. That exerciser

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This invention relates to cycle exercisers, and is particularly although not exclusively applicable to a ergometer-exerciser of the kind disclosed in Australian Patent 462,920.

Cycle exercisers suffer a disadvantage in that they only make use of the muscles of the legs and lower torso of the user. Exercises such as jogging and running are usually considered to be of more benefit because more muscles groups are brought into play, thereby placing a greater cummulative demand on the oxygen transport system of the body.

It is a particular object of the present invention to provide a cycle-type exerciser which is adapted to permit muscle groups in the upper part of the body to be used in the course of operation of the exerciser.

According to the invention there is provided a cycle exerciser including, a frame, a seat mounted on said frame, energy absorbing means rotatably mounted on said frame, a substantially horizontal drive shaft rotatably carried by said frame, first drive means connecting said drive shaft to said energy absorbing means to cause rotation thereof in response to rotation of said drive shaft, two handlebar levers mounted on said frame for oscillatory movement, second drive means for each said handlebar lever and connecting the respective handlebar lever to a respective end portion of said drive shaft to cause the respective end portion of said drive shaft to cause the drive shaft to rotate in response to oscillation of said handlebar levers, two foot pedals each of which is connected to a respective end portion of the drive shaft through respective connecting means including a foot pedal crank arm, each said foot pedal and associated crank arm being located outwardly of the adjacent said second drive means in the axial direction of said drive shaft, and said food pedal crank arms extending in opposite directions.

The essential features of the invention, and further optional features, are described in detail in the following passages of the specification which refer to the accompanying drawings. The drawings however, are merely illustrative of how the invention might be put into effect, so that the specific form and arrangement of the features (whether they be essential or optional features) shown is not to be understood as limiting on the invention.

In the drawings:

Figure 1 is a side elevational view of an example cycle exerciser incorporating the present invention.

Figure 2 is an enlarged cross-sectional view taken along line II-II of Figure 1.

Figure 3 is a view similar to Figure 1 but showing the cycle exerciser in operation.

Figure 4 is a diagrammatic view showing the relative disposition of principal components in the situation depicted in Figure 3.

Figure 5 is a view similar to Figure 3 but showing the exerciser at a different stage of operation.

Figure 6 is a view similar to Figure 4 but relative to the Figure 5 situation.

Figure 7 is a side elevational view of part only of the exerciser according to an alternaive embodiment.

Figure 8 is a part sectional view, on an enlarged scale, taken along line VIII-VIII of Figure 7.

As a matter of convenience, the invention will be hereinafter described as applied to a cycle exerciser of the kind disclosed in Australian Patent 462,920. That exerciser

includes a frame 2 having a base section 3 for supporting the exerciser on a floor or other surface, and which frame 2 carries a seat 4 at a rear end and a rotatable energy absorbing wheel 5 at the front end. The wheel 5 is driven by a pedal actuated chain and sprocket drive assembly 6, and resistance to wheel movement is achieved through blades or vanes 7 secured around the periphery of the wheel 5. A direct reading work output meter 8 commonly associated with such exerciser. The ergometric effect of that form of exerciser and its manner of calibration for accurate measurement of work output, is fully described in the aforementioned Australian Patent 462,920.

In the above example exerciser, and other conventional cycle exercisers, rigidly mounted handle bars are provided for the user to grip and react his body against in driving the wheel 5 through the foot pedal dried assembly. It is a feature of the present invention that the handle bars are movably mounted on the frame and are drivably connected to the wheel so that rotation of the wheel can be achieved either through leg movement or arm movement, or both.

A typical frame 2 of a cycle exerciser is shown in Figure 1, and includes a seat supporting column 9 extending upwardly from the rear end portion of the base 3, and a pair of laterally spaced members 11 (one only is visible in Figure 1) extending upwardly from a front end portion of the base 3. In a conventional construction, the front upright members 11 support the rigid handle bars at their upper ends, or are extended at their upper ends to form those bars. In the present case however, the handle bars are connected in a different manner as hereinafter described. At least one bracing member 12 connects the upper section of the front members 11 to the seat supporting column 9. A wheel mounting is provided by two longitudinally extending frame members 13 (only one is visible in Figure 1) which are each connected to a respective one of the front upright members 11 and projects forwardly beyond that member. The two forward projections 14 define laterally spaced forks adapted to receive the wheel axle 15 in a conventional manner, and the rearward end of each longitudinal member 13 is connected to the seat supporting column 9.

The invention will be hereinafter described in relation to the particular frame described above, but it is not limited to that frame. Similar comments apply to the drive mechanism described in the following passages of this specification.

Drive mechanism 6 for the wheel 5 normally comprises a chain and sprocket assembly actuated by a conventional foot pedal crank arrangement. A typical mechanism of that kind used in cycle exercisers is shown in Figure 1, and includes a primary sprocket 16 connected to the main drive shaft 17 which is rotatably mounted on the frame 2, preferably on the seat supporting column 9 near the junction of the longitudinal frame members 13, and has a respective pedal crank arm 18 and 20 secured to each of its ends. A secondary sprocket assembly is rotatably mounted on the frame 2 between the seat supporting column 9 and the front upright members 11, and includes two sprockets 19 and 21 of different diameter interconnected through a secondary shaft 22. The primary sprocket 16 is connected to the smaller secondary sprocket 19 through one chain 23, and another chain 24 connects the larger secondary sprocket 21 to a sprocket 25 secured to the wheel axle 15.

In the particular construction shown in the drawings, the handle bar assembly comprises two separate handle bars, 26 and 27. Each handle bar 26 and 27 includes an elongate lever 28 which is pivotally connected to the frame 2 and arranged so as to extend generally upright. The pivot connection may be formed by extensions of the wheel axle 15 so that each lever 28 is connected to a respective opposite end of that axle as shown in Figure 1. It will be appreciated however, that other forms of pivotal mounting may be employed, such as a pivotal connection direct to the front upright members 11 of the frame 2 as shown in Figure 7. A relatively short section 29 of each lever 28 projects below the pivotal mounting whereas a relatively long section projects above, so as to provide a suitable mechanical advantage for the user in operating the exerciser as hereinafter described. The short section 29 is not essential and may be omitted if desired so that the drive connection hereinafter described will then be connected to the lever 28 above the pivot 15 rather than below it as shown in the drawings. The upper end portion 31 of each lever 28 is bent to extend rearwardly for convenient engagement by the user, and a laterally projecting hand grip 32 may be provided at the terminal end of each rearwardly extending portion 31. Quite clearly, the actual form and arrangement of each handle bar can vary considerably, according to requirements.

A drive connection is provided between the two handle bars 26 and 27, and the wheel 5, and in the preferred form shown that connection includes the drive mechanism 6. In that form, each handle bar 26 and 27 is operatively connected to the drive mechanism 6 through a respective transmission system. Preferably, as shown, each such system includes an eccentric 33 which

rotates with the main drive shaft 17 and is connected to a drive bar 34. The connection 30 between the lever 28 and drive bar 34 is a pivotable one, and may be adjustable to permit variation of its position relative to the pivotal axis of the lever 28 and/or to permit variation of the effective length of the drive bar 34.

In the example arrangement best shown in Figure 2, each eccentric 33 comprises a disc secured to the main drive shaft 17 in non-concentric relationship, so as to rotate therewith. Connection between the eccentric disc 33 and the associated drive bar 34 is achieved by way of a crank ring 35 rotatably mounted on the disc 33 and secured to the drive bar 34. The crank ring 35 is preferably formed by two laterally spaced annular plates 36 having a plurality of rollers 37 mounted between them and arranged for rolling engagement about the outer periphery of the eccentric disc 33. Each plate 36 is secured to the associated drive bar 34 in any appropriate fashion. It will be appreciated that numerous other constructions are available for achieving the necessary rotational relationship between the eccentric 33 and the adjacent end of the drive bar 34. Furthermore, the eccentric 33 need not comprise a disc as described, but could be of any other form such as an eccentrically located pin.

The arrangement described above is such that movement of either handle bar 26 or 27 about is pivotal mounting 15, tends to pull the associated drive bar 34 away from the main drive shaft 17, or to push it towards that shaft, depending on the direction of handle bar movement. Assuming that the drive bar 34 is disposed so that its line of action is to one side of the main drive shaft axis, a turning moment will be applied to the eccentric disc 33 and the main drive shaft 17 is thereby rotated. The aforementioned line of action is an imaginary straight line joining the rotational axis of the crank ring 35 and the axis of the pivotal connection 30 between the drive bar 34 and handle bar lever 28.

Preferably, as shown in the drawings, the two eccentrics 33 are arranged 180° out of phase - i.e., in a manner similar to the foot pedal cranks 18 and 20. It is also preferred that the eccentrics 33 are positioned relative to the pedal crank 18 and 20 so as to achieve a natural balance between upper and lower body movements in a manner similar to walking and running. That is, when the right leg 38 of the user is pushing downwards, as shown in Figure 3 the left arm 39 and shoulder are moving backwards. As seen in Figure 5 however, when the left leg 41 is pushing downwards, the right arm 42 and shoulder are moving backwards. Figures 4 and 6 show, in diagrammatic form, the relative positions of the major components in the Figure 3 and 5 situations respectively.

In the alternative construction shown in Figures 7 and 8, the levers 28 are pivotally connected direct to the frame upright members 11 as at 43, rather than through the wheel axle 15, and the eccentric of the drive connection is different to that shown in Figure 2. The alternative eccentric, for each drive bar 34, includes a crank arm 44 which is connected to the respective end of the drive shaft 17 so as to rotate with that shaft, and the two arms 44 extend laterally from the shaft 17 in opposite directions. A crank pin 45 having its axis substantially parallel to that of the shaft 17, extends from the outer end of each arm 44 and provides a connection for the drive bar 34 and pedal crank arm 18 and 20. Each drive bar 34 is rotatably mounted on its respective crank pin 45, but the pedal crank arms 18 and 20 are secured to their pins 45 against relative rotation. It will be appreciated that such a construction permits rotation of the shaft 17 by foot and/or hand actuation as in the construction previously described.

The user of an exerciser as described can proportion the ratio of effort contributed by the arms and legs dependant on the degree of fatigue found in either, but the total result of using the exerciser is that a greater number of muscle groups can be exercised than is possible by use of conventional cycle exercisers.

It will be understood that various alterations, modifications, and/or additions may be incorporated into the foregoing without departing from the scope of the invention as defined by the appended claims.

WHAT WE CLAIM IS:-

1. A cycle exerciser including, a frame, a seat mounted on said frame, energy absorbing means rotatably mounted on said frame, a substantially horizontal drive shaft rotatably carried by said frame, first drive means connecting said drive shaft to said energy absorbing means to cause rotation thereof in response to rotation of said drive shaft, two handle bar levers mounted on said frame for oscillatory movement, second drive means for each said handlebar lever and connecting the respective handlebar lever to a respective end portion of said handlebar levers, two foot pedals each of which is connected to a respective end portion of the drive shaft through respective connecting means including a foot pedal crank arm, each said foot pedal and associated crank arm being located outwardly of the adjacent said second drive means in the axial direction of said drive shaft, and said foot pedal crank arms extending in opposite directions.

2. A cycle exerciser according to claim 1, wherein each said second drive means

includes a rigid drive bar.

3. A cycle exerciser according to claim 1 or 2, wherein each said foot pedal crank arm is secured direct to the adjacent end portion of said drive shaft.

4. A cycle exerciser according to claims 2 and 3, wherein each said second drive means includes an eccentric secured to the respective said drive shaft end portion for rotation therewith and an end of the respective said drive bar is rotatably mounted on said eccentric.

5. A cycle exerciser according to claim 1 or 2, wherein each said second connecting means includes a drive crank arm secured at one end ot the adjacent drive shaft end portion and extending radially therefrom, a pin secured to the opposite end of the drive crank arm and extending substantially parallel to said drive shaft, and said foot pedal crank arm is fixedly secured to said pin, said drive crank arms extending in opposite directions and each said second drive means is connected to the respective said drive shaft end portion through a respective one of said pins and the associated drive crank arm.

6. A cycle exerciser according to claims 5 and 2, wherein each said drive bar has an end portion rotatably mounted on a respective one of said pins.

7. A cycle exerciser according to claim 4, wherein each said handlebar lever is pivotally connected to said frame, a crank ring is rotatably mounted on each said eccentric, and the respective said drive bar is connected at one end to said crank ring and at its opposite end to the respective said handlebar lever at a location spaced from the axis of said pivotal connection between said handlebar lever and said frame.

8. A cycle exerciser according to claim 4 or 7, wherein said two eccentrics are arranged substantially 180° out of phase.

9. A cycle exerciser according to claim 7 or 8, wherein the pivotal connections of said levers are coaxial with the axis of rotation of said energy absorbing means.

10. A cycle exerciser according to any one of claims 7-9, wherein each eccentric is in the form of a disc and said crank ring includes a pair of annular plates, each of which is located on a respective opposite side of said eccentric disc, and a plurality of rollers are secured between said plates and are arranged in a circle about said eccentric disc so as to engage with the outer periphery of said eccentric disc.

11. A cycle exerciser according to any preceding claim, wherein said energy absorbing means is a wheel having a plurality of blades secured thereto and being arranged to resist rotation of said wheel by movement of their broad surfaces against the surrounding body of air.

12. A cycle exerciser constructed and adapted to function substantially as herein particularly described with reference to either embodiment as shown in the accompanying drawings.

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1587845 COMPLETE SPECIFICATION
4 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheet 1

FIG. 1.

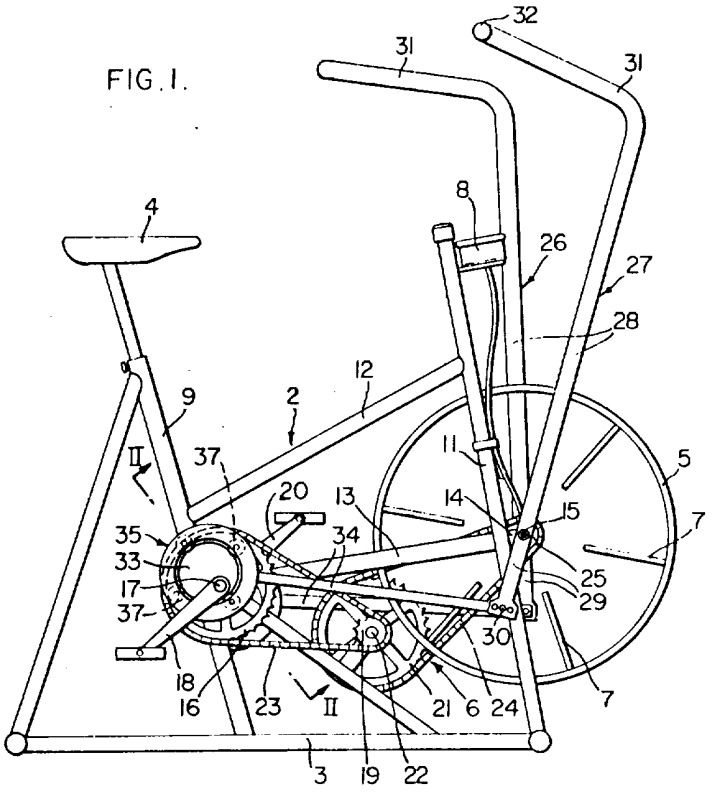

FIG. 2.

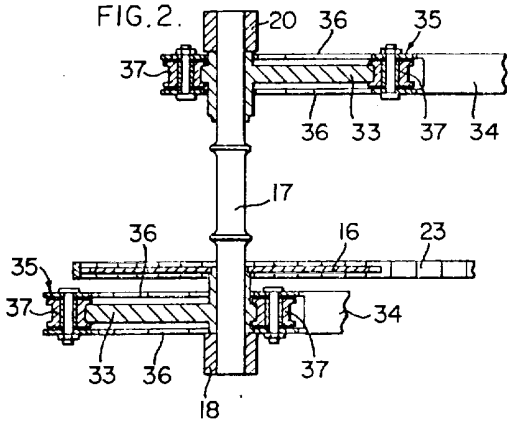

FIG. 3.

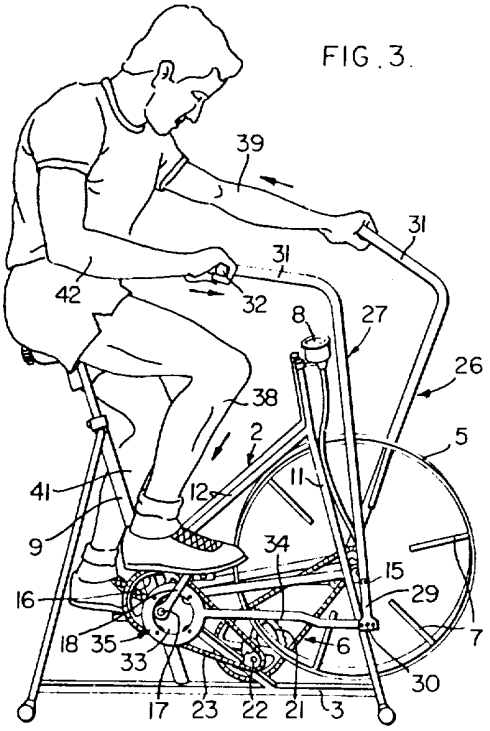
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FIG. 4.

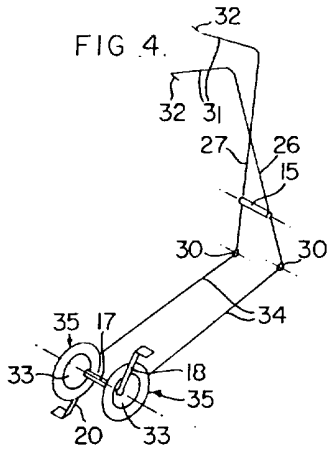
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FIG. 5.

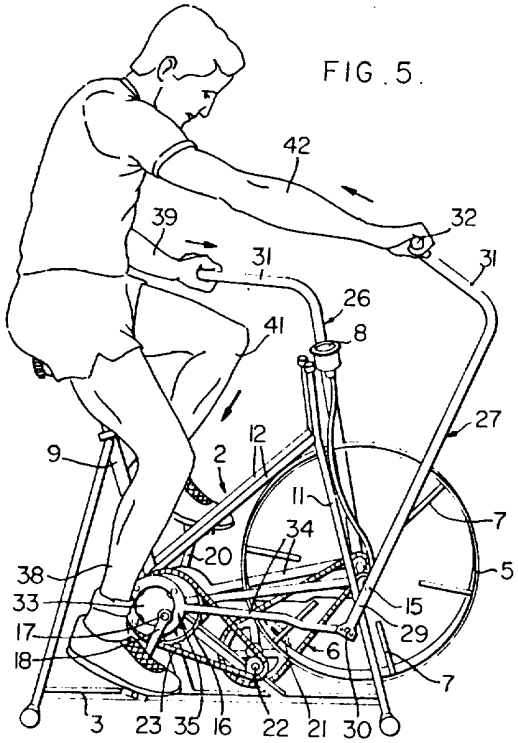
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FIG. 6.

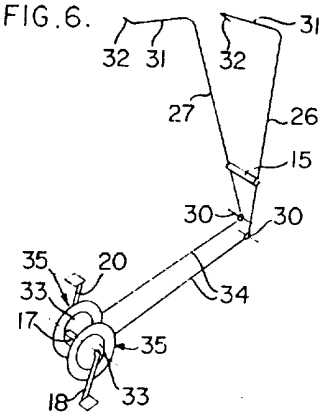
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Fig. 7.

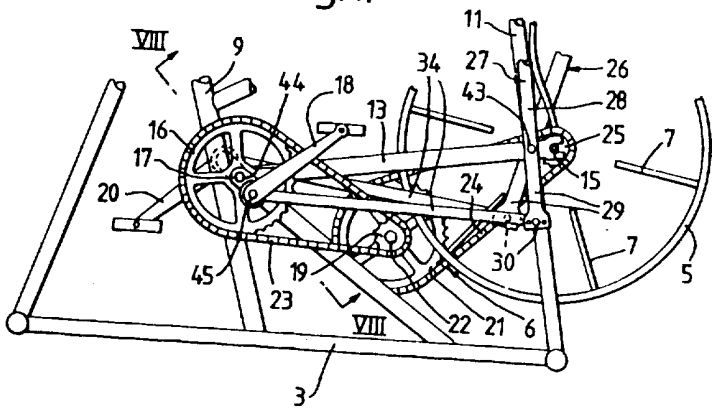
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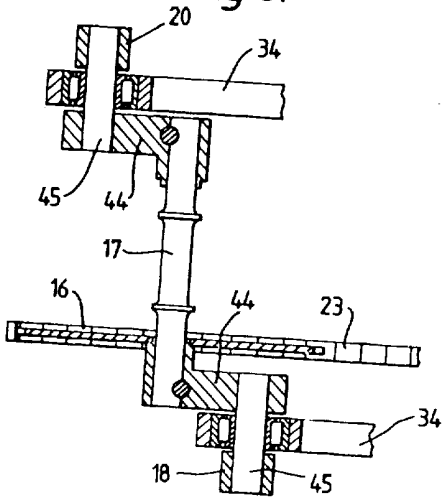
Fig. 8.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