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(54) **Exercising apparatus.**

(57) An exercise cycle has a frame comprising three rigid frame members (21,24,30) each connected separately with the other two members. One of the members carries a seat (11) and a crankshaft (14) carrying a pulley (17). A brake wheel (18) is mounted on a further one (24) of the members and is driven from the pulley by a belt drive. The frame can be folded to move the brake wheel towards the crank axis.

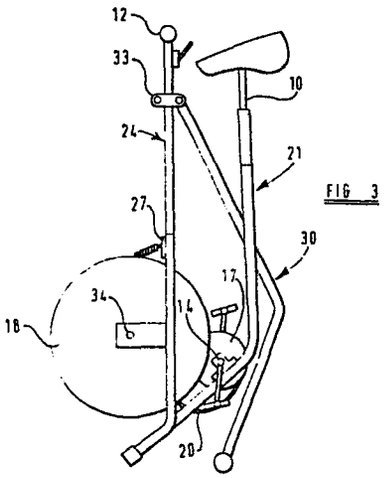

FIG 3

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Title: "Exercising Apparatus"

This invention relates to exercising apparatus.

In particular, the invention is concerned with an exercising apparatus for exercising the legs in the manner of a bicycle and of the kind, hereinafter referred to as the kind specified, comprising a frame for supporting the apparatus on the ground and carrying a seat for a user, a handlebar to be gripped by the user's hands and rotary means turnable by the user's legs.

According to the invention, there is provided an exercising apparatus of the kind specified wherein the frame comprises first, second and third rigid frame members, means providing a first connection between the first and second frame members, means providing a second connection between the first and third frame members and means providing a third connection between the second and third frame members.

Two of the connections may comprise pivotal connections, the other connection being a pivotal and sliding connection.

In the preferred apparatus according to the invention, the first frame member carries at one of its ends (its upper end when the apparatus is in use) either the handlebar or the seat and has at its opposite (lower) end a ground-engaging foot, the second frame member has at one of its ends (its upper end) the seat or the handlebar, respectively, the first connection is between an opposite (lower) end portion of the second member and an intermediate part of the first member between the ends of the first member, the third frame member has at one of its ends (its lower end) a ground-engaging foot and the second connection is between an opposite (upper) end portion of the third member and the first member at a location between the one end of the first member and the first connection.

The first or third connection may constitute the pivotal and sliding connection, but in the preferred embodiment it is the second connection which is the pivotal and sliding connection, enabling the upper end of the third member to slide along the first member and, in so doing, to pivot relative to the latter. Thus, on erection and collapsing of the frame, the second member pivots relative to the first member about the first, pivotal connection, the second and third members pivot relative to one another about the third, pivotal connection and the upper end of the third member slides along the first member between a position at a first spacing from the first

connection with the frame erected and a position at a greater spacing from the first connection with the frame collapsed.

Preferably, the first member is a generally upright member, the second member comprises a first portion extending upwardly from the first member at a relatively small angle to the horizontal and a second portion which extends upwardly from the first portion at a greater angle to the horizontal and carries the seat or the handlebar as the case may be, and the third member comprises a first portion extending downwardly from the first member at a relatively small angle to the horizontal and a second portion which extends downwardly from the first portion at a greater angle to the horizontal and carries the associated ground-engaging foot. In the preferred embodiment, the first portion of the third member intersects and is connected by the third connection to the second portion of the second member.

Preferably, the handlebar is carried by the first member and the seat is mounted on the second member.

The frame is preferably maintained in its erected position when the apparatus is in use by limiting the extent of sliding movement of that connection which is the sliding and pivotal connection. Thus, in the preferred embodiment, this is achieved by limiting the extent of sliding movement of the upper end of the third member towards the first connection. For this purpose, the first member may have an upper portion along which the sliding and pivotal connection is movable and a lower portion to which the second member is connected by the first pivotal connection, the lower portion being so formed that the sliding and pivotal connection cannot pass the junction of said two portions of the first member.

The rotary means is preferably mounted on the second member at a location intermediate the first and third connections. These means may comprise two pedals to be acted upon by the user's feet to rotate a crankshaft against resistance to such rotation provided by braking means.

Preferably the rotary means are of the form described and illustrated in our United Kingdom Patent No. 2,062,783.

There may be attached to the crankshaft a driving member which is constrained to rotate with the crankshaft about a crank axis and the apparatus may comprise a driven member mounted on the first of the frame members for rotation relative thereto about a second axis parallel to the crank axis, and an endless, flexible transmission element for transmitting

torque between the driving and driven members, the braking means being operative to brake rotation of the driven member and the frame members being movable between an extended configuration in which the apparatus is used and a compact configuration in which the driven member lies nearer to the crank axis than when the frame members are in the extended configuration.

The first frame member may include a pair of forks between which the driven member extends.

The second axis is preferably spaced from the forks by a distance approximately equal to one quarter the diameter of the driven member in a direction away from the second frame member.

When the frame members of the preferred cycle according to the invention are in the compact configuration, all parts of the cycle other than the driven member lie to one side of a chord of the driven member. The sector defined by this chord preferably includes at least one third of the circumference of the driven member. With this arrangement, the cycle can be wheeled along the ground with the driven member only engaging the ground and the frame members being in the compact configuration. The sector may include up to half of the circumference of the driven member.

An example of an exercise cycle embodying the invention will now be described, with reference to the accompanying drawings, wherein:-

FIGURE 1 shows a side view of the exercise cycle with the frame in an extended configuration;

FIGURE 2 shows a front view of the cycle;

FIGURE 3 shows a side view with the frame in a compact configuration; and

FIGURE 4 shows components of a driven member of the cycle separated from one another.

The cycle illustrated in the drawings comprises a frame which rests on the ground and supports a seat pillar 10 carrying at its upper end a seat 11. The seat is adjustable on the pillar and the pillar is adjustable in the frame, in the usual way. The frame further supports a handlebar 12 at a level somewhat above that of the seat 11 and spaced forwardly from the seat. The frame also supports a bearing 13 in which a crankshaft 14 is carried for rotation relative to the frame about a crank axis 15. Opposite end portions of the crankshaft are bent at right angles to the axis 15 to form cranks, on the free ends of which pedals 16 are mounted in the usual way.

A driving member 17 is mounted on the crankshaft 14 at one side of the frame and is constrained to rotate with the crankshaft about the axis 15. A driven member in the form of a wheel 18 is mounted on the frame for rotation relative thereto about a wheel axis 19 parallel to but spaced forwardly from the crank axis 15.

For transmitting torque between the driving member 17 and the wheel 18, there is provided a flexible transmission element which, in the particular example illustrated, is a V-belt 20. Alternatively, a toothed belt may be used. The driving member 17 is in the form of a pulley and a further pulley is provided on one side of the wheel 18.

The frame of the cycle comprises a first rigid member 24 which carries the handlebar 12, a second rigid frame member 21 and a third rigid frame member 30.

The second frame member 21 is fabricated from three tubes. An upper one, 22, of these tubes is rectilinear and receives an end portion of the seat pillar 10. The two other tubes 23 of the frame member 21 are arranged side-by-side and parallel to each other. The upper tube 22 lies between and is secured to upper end portions of the tubes 23. Rectilinear portions of the tubes 23 extend downwardly from the tube 22 to a bend in the vicinity of the pulley 17 and the tubes 23 extend forwardly from this bend to a position near to the wheel 18. The bearing 13 is fixed to the tubes 23.

The first frame member 24 includes a lower part which is formed as a pair of forks 25 and an upper part of which is formed by a single tube 26, rigidly connected with the forks by a bracket 27. The forks diverge slightly in a direction away from the bracket 27 and have at their free ends respective caps 28 which form feet of the cycle. Near to their free ends, the forks 25 are connected with the tubes 23 of the second frame member by means of a pivot pin for relative pivoting about an axis 29 parallel to the crank axis 15.

The third frame member 30 consists of two tubes. A first of these is rectilinear and constitutes a further foot 31 of the cycle, the length of the tube 31 being parallel to the axis 15. The other tube 32 extends from the foot 31 upwardly to a bend and then forwardly between the tubes 23 to a slider 33 which loosely embraces and is slidable along the tube 26. The tube 32 is pivotally connected with the slider and with the tubes 23 by respective pivot pins. The frame members can be set in the extended configuration shown in Figure 1, in which the slider 33 rests on the bracket 27, or

alternatively in the compact configuration shown in Figure 3, in which the slider is near to the handlebar 12 mounted at the upper end of the tube 26.

It will be noted that, in both the extended configuration and the compact configuration of the cycle, the cycle can rest on the ground with only the feet 28 and 31 in contact with the ground. It will be noted further that, in both configurations, all parts of the cycle, other than the wheel 18, lie at the same side of a chord of the wheel. Thus, a sector of the wheel bounded by this chord protrudes from the remainder of the cycle and can be used to support the cycle on the ground, in order that the cycle can be wheeled along the ground with all parts of the cycle other than the wheel clear of the ground. When the feet 28 and 31 are in contact with the ground, the wheel 18 is clear of the ground.

As shown in Figure 1, when the frame is in the extended configuration and the cycle is viewed in a direction along the axis 15, a gap having a width approximately equal to the diameter of the pulley 17 is seen between the pulley and the wheel 18. When the frame is in the compact configuration, the pulley 17 and wheel 18 overlap, as viewed along the axis 15, and the periphery of the wheel 18 lies close to the bearing 13.

In the particular example illustrated, the wheel 18 is carried on an axle 34 which is spaced forwardly from the forks 25 by a distance approximately equal to one quarter the diameter of the wheel, and is connected with the forks by respective arms 35 lying on opposite sides of the wheel. The wheel lies between the forks. Alternatively, the forks could be arranged to intersect the axis of rotation of the wheel and to support the axle directly.

In a case where the forks diverge somewhat more than is shown in the drawing, the arms 35 may be cranked and the tubes 23 connected with the forks via a bracket.

The wheel 18 is assembled from four components which are illustrated in Figure 4. Two of these components, 36 and 37, are identical, circular mouldings of plastics material. Each of the components 36 and 37 includes a hub portion 38 and a wall 39 extending radially outwardly from the hub portion to the periphery of the wheel. From each of the walls 39, there projects towards the wall 39 of the other component a circumferential wall 40 which is spaced slightly radially inwardly from the periphery of the wheel. The circumferential walls 40 abut each other to provide an almost continuous cylindrical surface. This surface is interrupted at one position around the axis by a slot 41.

Each of the wheel components 36 and 37 further comprises a number of partitions 42 which lie between the hub portion 38 and the circumferential wall 40. Each of these partitions projects from the wall 39 to the plane at which the components 36 and 37 meet. Thus, when these components are assembled together, a number of closed pockets 43 are defined between the components. In the assembled wheel, these pockets may be empty. Alternatively, weights may be placed in respective pockets during assembly of the wheel to increase the moment of inertia of the wheel. The number and size of the weights can be selected to achieve a required moment of inertia, which may differ from one exercise cycle to another.

The wheel 18 further comprises a band 44 which overlies the external surfaces of the circumferential walls 40. Opposite end portions of the band are bent radially inwardly to enter the slots 41 and thereby constrain the band against rotation relative to the components 36 and 37 of the wheel. The band 44 is formed of a material which has good resistance to wear and to heat, for example steel.

The hub portion of each of the wheel components 36 and 37 is shaped to provide at a position spaced along the axis of the wheel from the wall 39 a formation suitable for forming a part of a pulley. On one of the hub portions 38, there is mounted a further component 45 of the wheel, this component being shaped to complete at one side of the wheel a pulley 46 which is aligned with the pulley 17. The components 36, 37 and 45 of the wheel are rigidly secured together by fasteners, for example bolts or other releasable fasteners.

The cycle further comprises a brake for the wheel 18. This brake comprises a flexible band 47 which embraces a major part of the external surface of the band 44. At one of its ends, the band 47 is connected with the bracket 27 through the intermediary of a spring 48 (omitted from Figure 2). An extension of the brake band passes over a roller 49 mounted at the lower end of the tube 26 and extends from the roller along the interior of the tube 26 to an adjustment device 50 mounted in an aperture formed in the tube 26 just below the handlebar 12. The adjustment device may be a known device adapted to hold a free end of the extension of the brake band in any selected one of a plurality of alternative positions spaced apart along the tube 26. By moving the end portion of the extension along this tube, the tension in the brake band can be adjusted. The adjustment device may comprise a lever pivotally mounted on the tube 26, having the brake band extension attached

to one end of the lever and the opposite end of the lever constituting a handle which is accessible at the outside of the frame of the cycle. The device would further include means for releasably restraining pivoting of the lever from a position to which it has been set.

The cycle may include means (not illustrated) for responding to rotation of the wheel 18 and for responding to the pulse of a user by providing electrical signals which are fed to a processor associated with a visual display device. The processor would be adapted to cause the display device to display information concerning speed, number of revolutions of the wheel which have occurred since a datum time and heartbeat of the user.

The cycle illustrated in the accompanying drawings may be modified by substitution of the braking means described in GB 2,062,783 for the driving member 17, wheel 18, belt 20 and arms 35. The brake band 37 and associated parts also would be omitted.

In the example illustrated, the connection between the members 21 and 30 and the connection between the members 21 and 24 are both pivotal connections and the connection between the members 24 and 30 is a pivotal and sliding connection. Alternatively, the connection between the members 21 and 30 or the connection between the members 21 and 24 may be a sliding and pivotal connection and the connection between the members 24 and 30 may simply be a pivotal connection.

In the extended configuration of the frame, illustrated in Figure 1, the frame member 24 extends upwardly and forwardly from the foot 28 at a fairly small angle to the vertical. That part of the member 21 which extends from the member 24 to the crankshaft is inclined at a fairly small angle to the horizontal and the upper part of the member 21 is inclined at a similarly small angle to the vertical. The members 21 and 30 intersect, with that part of the member 30 which extends between the members 21 and 24 being inclined at a fairly small angle to the horizontal and the lower part of the member 30 being inclined at a fairly small angle to the vertical.

CLAIMS:

1. Exercising apparatus comprising a seat (11) and a handlebar (12) for a user, a frame for supporting the handlebar and the seat from the ground and rotary means (14,16) turnable by the user's legs wherein the frame comprises first (24), second (21) and third (30) rigid members, means providing a first connection between the first and second frame members, means providing a second connection between the first and third frame members and means providing a third connection between the second and third frame members.

2. Apparatus according to Claim 1 wherein said connections are such as to permit movement of the frame members relative to one another between an extended configuration and a more compact configuration.

3. Apparatus according to Claim 1 or Claim 2 wherein the rotary means includes a crankshaft (14) mounted on the second frame member for rotation relative thereto about a crank axis (15), a driving member (17) is attached to the crankshaft for rotation therewith, a driven member (18) is mounted on said first frame member for rotation relative thereto about a second axis parallel to the crank axis, an endless, flexible transmission element (20) is provided for transmitting torque between the driving and driven members and a brake (47) is provided for braking rotation of the driven member, the frame members being relatively movable between an extended configuration in which the apparatus is used and a compact configuration in which the driven member lies nearer to the crank axis than when the frame members are in the extended configuration.

4. Apparatus according to Claim 3 wherein the driving (17) and driven (18) members overlap, as viewed along the crank axis, when the frame members are in the compact configuration.

5. Apparatus according to Claim 3 or Claim 4 wherein, in the compact configuration of the frame members, all parts of the apparatus other than the driven member (18) lie to one side of a chord of the driven member.

6. Apparatus according to Claim 3 or Claim 4 wherein the second axis (19) is spaced from the forks (25) in a direction away from the second frame member (21).

7. An exercise cycle comprising a frame, a crankshaft (14) mounted on the frame for rotation relative thereto about a crank axis (15), the crankshaft having cranks fitted with pedals, a driving member (17) attached to the crankshaft for rotation therewith, a driven member (18) mounted on the frame for rotation about a second axis (19) parallel to the crank axis, a transmission element (20) for transmitting torque between the driving and driven members and a brake band (47) engaged with the driven member, wherein an extension of the brake band extends along the interior of a tubular part of the frame from a position adjacent to the driven member to an adjustment device (50) for adjusting the tension in the brake band.

8. An exercise cycle comprising a frame, a crankshaft (14) mounted on the frame for rotation relative thereto about a crank axis (15), the crankshaft having cranks fitted with pedals, a driving member (17) attached to the crankshaft for rotation therewith, a driven member (18) mounted on the frame for rotation about a second axis (19) parallel to the crank axis, a transmission element (20) for transmitting torque between the driving and driven members and a brake band (47) engaged with the driven member, wherein the driven member comprises a pair of circular components secured together.

9. A wheel comprising a pair of circular components which are secured together and which together define a plurality of pockets, the wheel further comprising a plurality of weights disposed in respective ones of the pockets.

10. Any novel feature or novel combination of features disclosed herein or in the accompanying drawings.

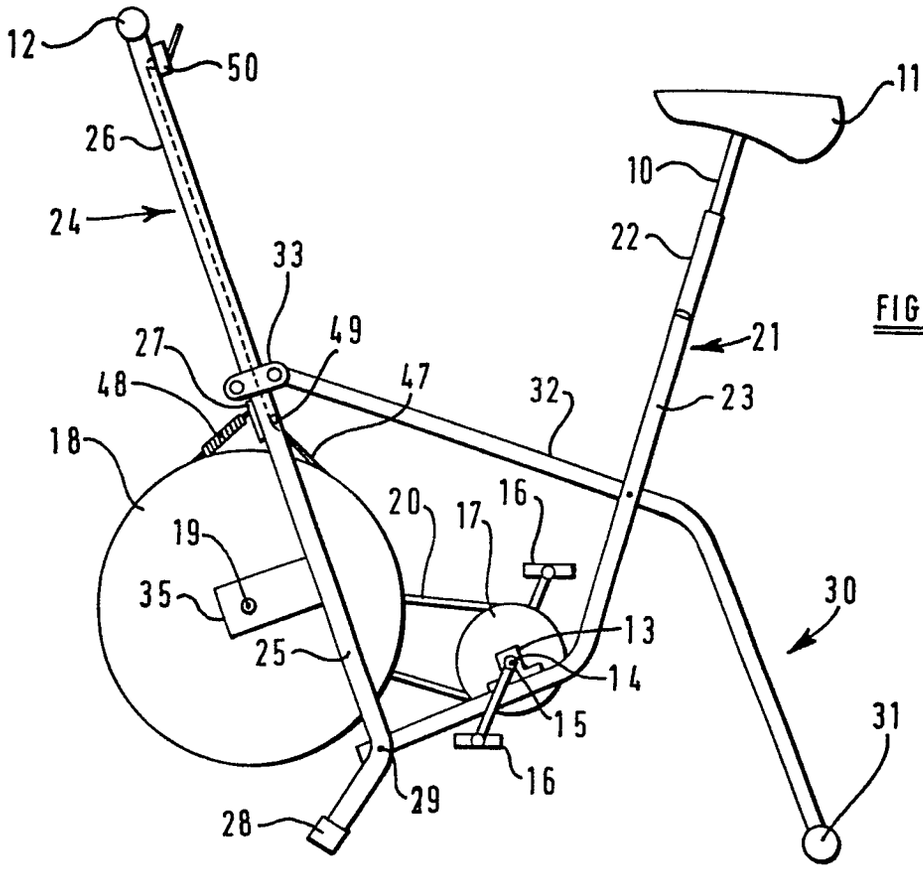
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FIG 1

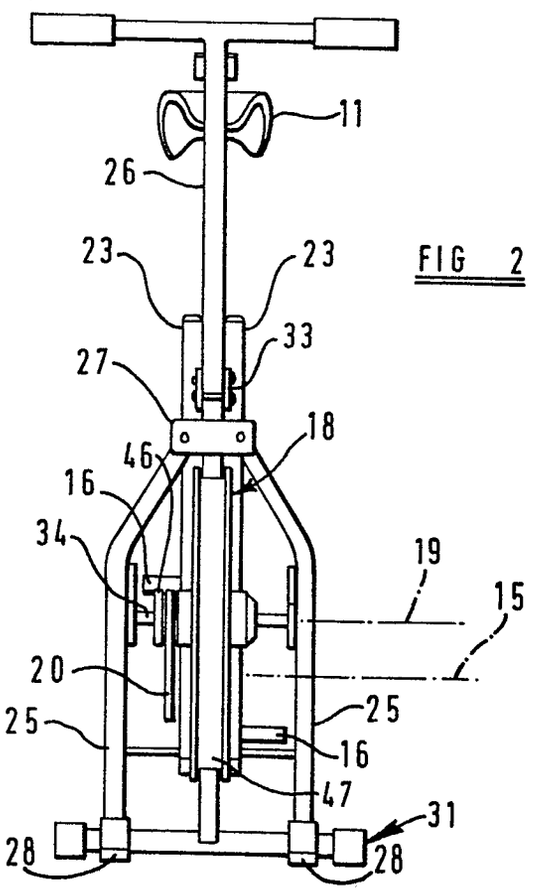
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FIG 2

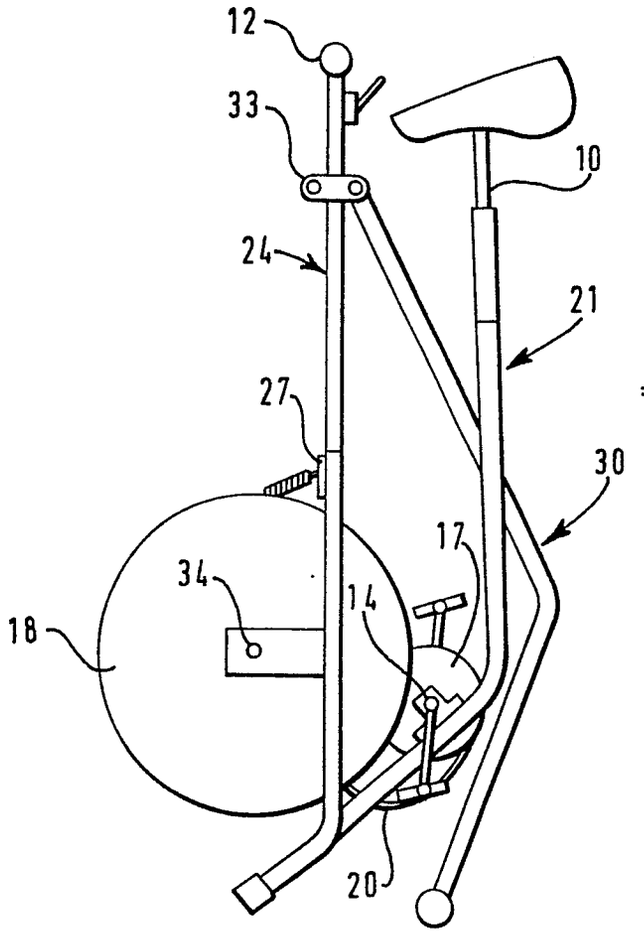

FIG 3

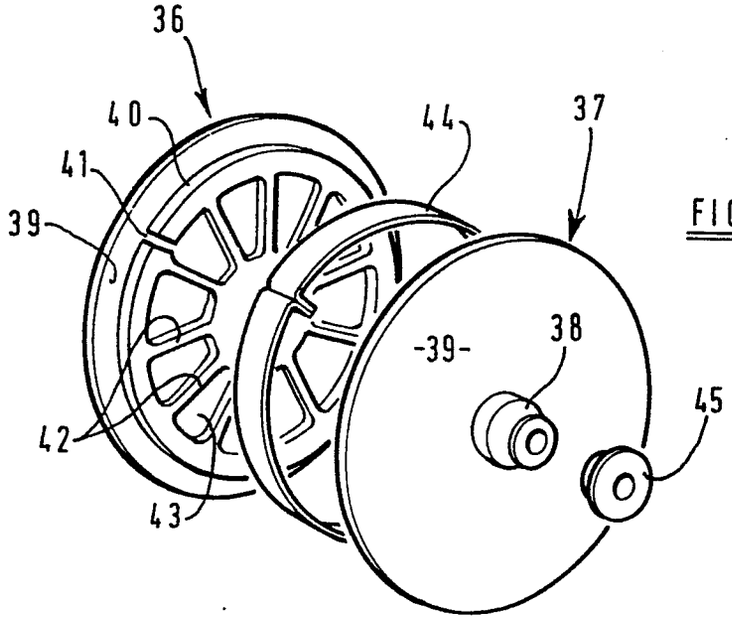

FIG 4