

(21) Application No: 0519239.8
(22) Date of Filing: 21.09.2005

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(51) INT CL:
A63B 26/00 (2006.01) **A63B 21/008** (2006.01)

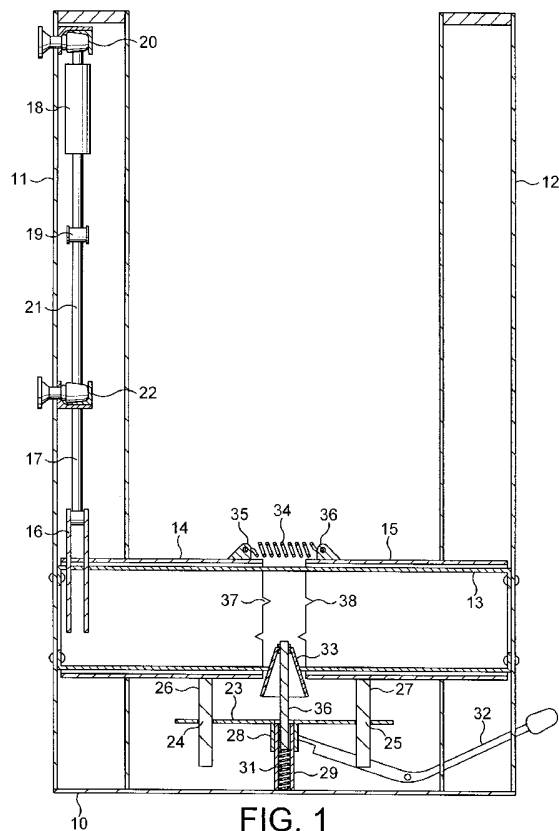
(52) UK CL (Edition X):
A6M MAQ

(56) Documents Cited:
US 4391441 A **US 4254950 A**
US 4082267 A **US 3792860 A**

(58) Field of Search:
INT CL **A63B**
Other: **WPI, EPODOC, TXTE**

(54) Abstract Title: **Exercising machine**

(57) A mechanism for synchronizing exercise movements of physical exercising equipment, comprises two members 14,15 rotatable about a common axis, a pivoted beam 23 for coupling the rotatable members for rotation in anti-phase and means for releasing the coupling means from the rotatable members and allowing the rotatable members to move in unison. The pivoted beam 23 may include slots for the reception of lugs 26,27 extending from the rotatable members 14,15. After the pivoted beam 23 has been released from the lugs 26,27 the rotatable members 14,15 are urged together by spring 34 and linked together by pins 37 and sockets 38, such that the members 14,15 are connected to rotate in unison. The rotatable members 14,15 may be linked to a damper 18 so as to provide a resistance to exercise movement. The arrangement of the damping mechanism is also disclosed.



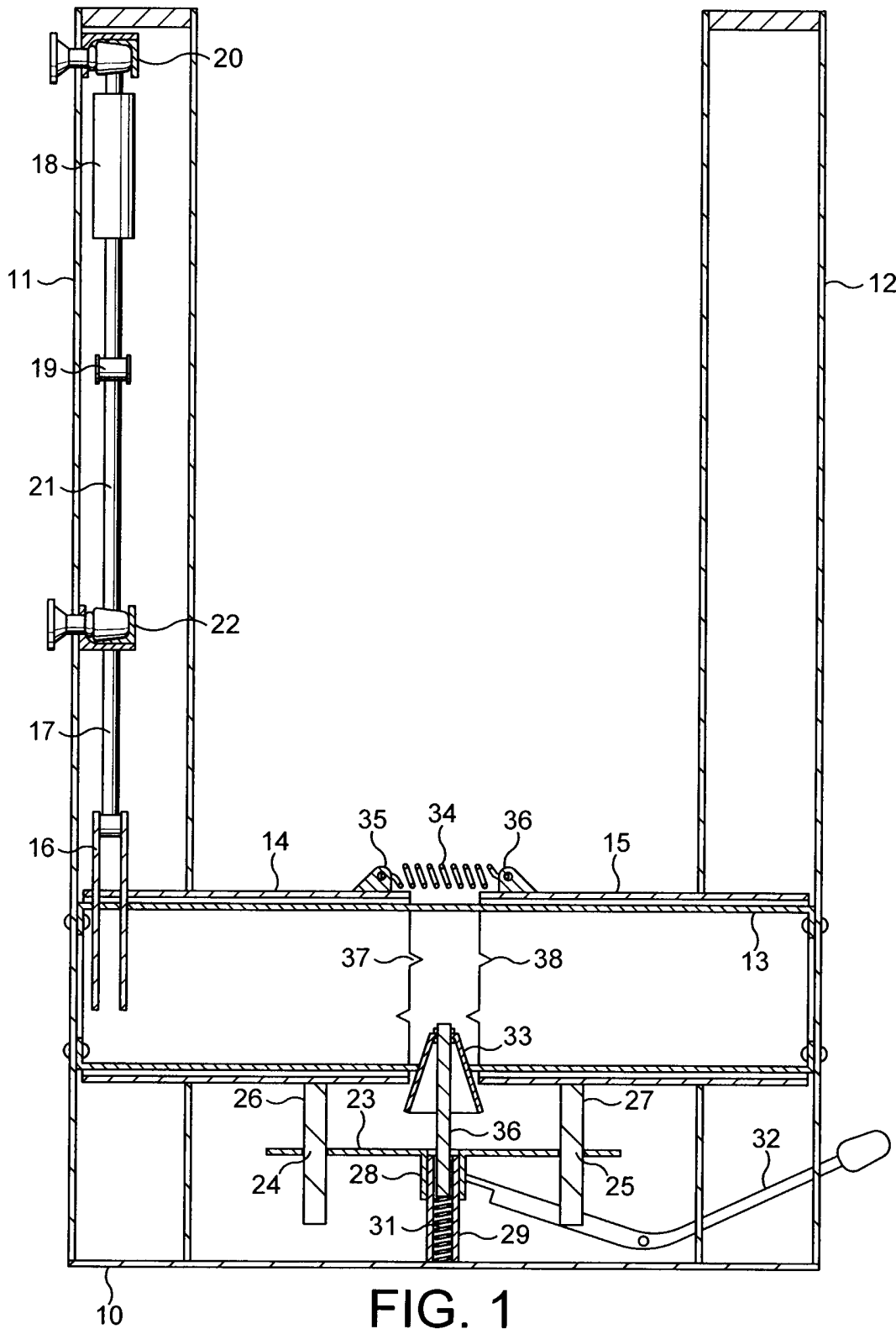


FIG. 1

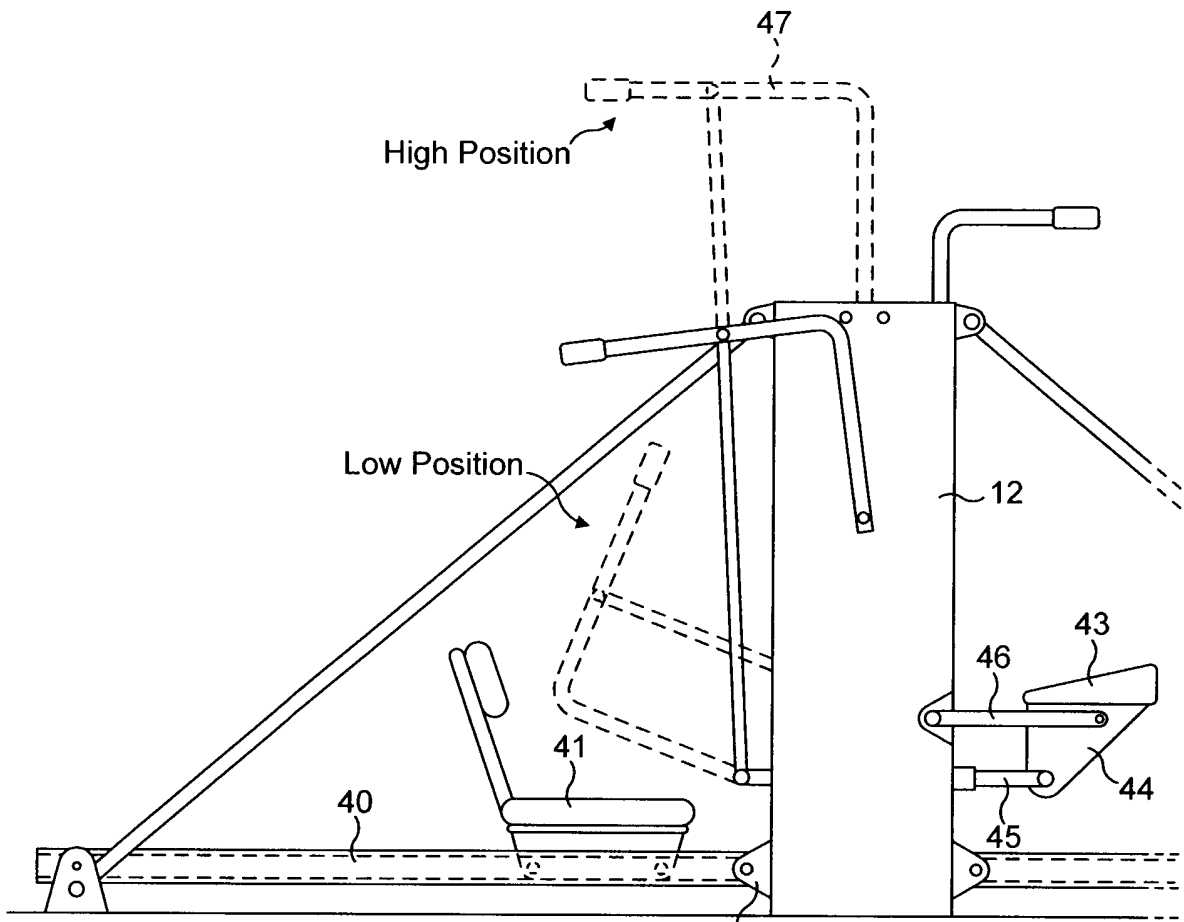


FIG. 2

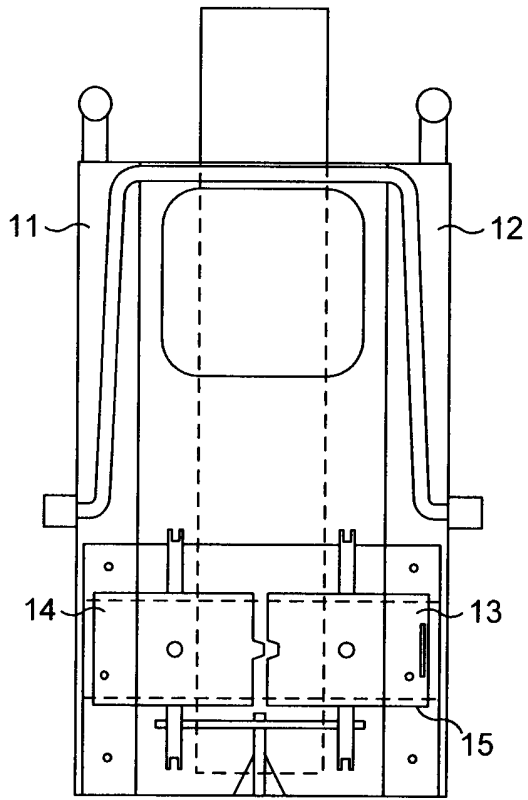


FIG. 3

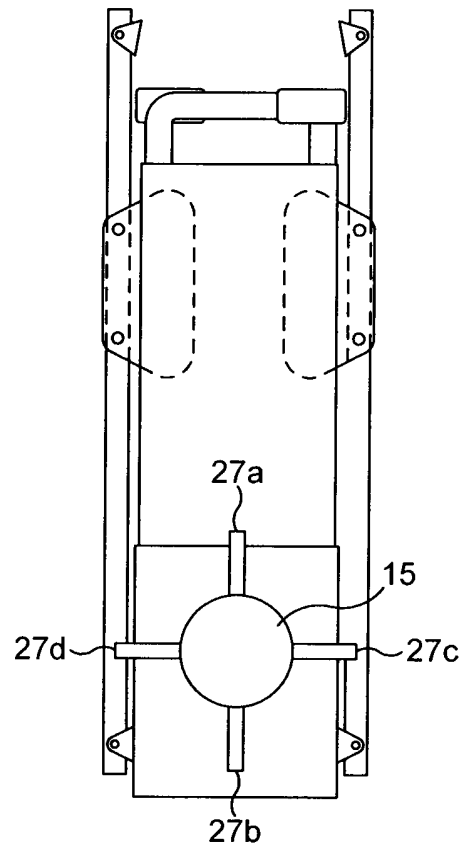


FIG. 4

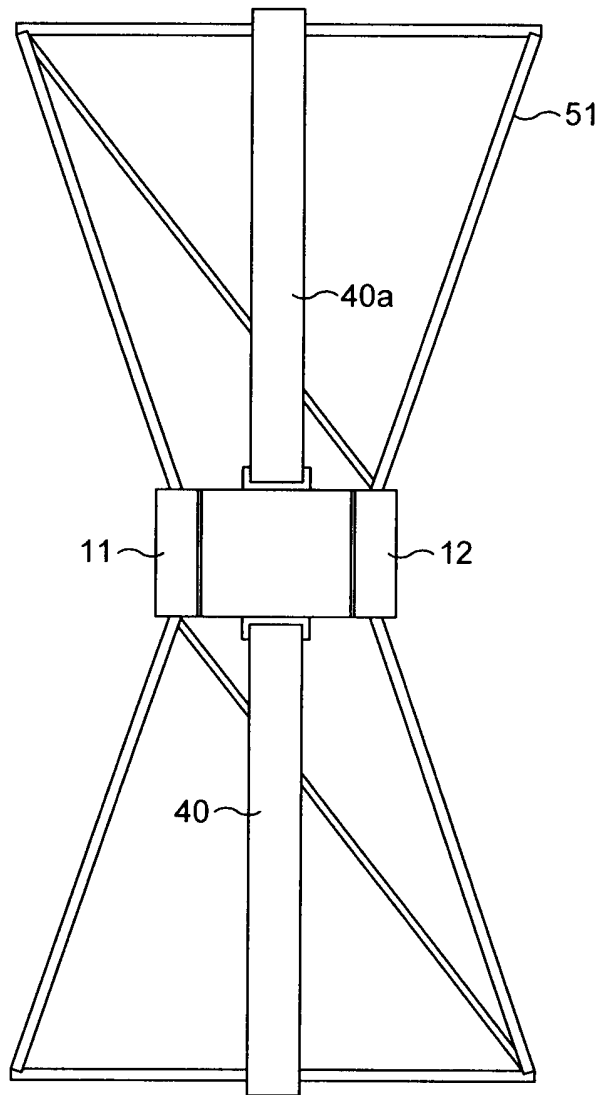


FIG. 5

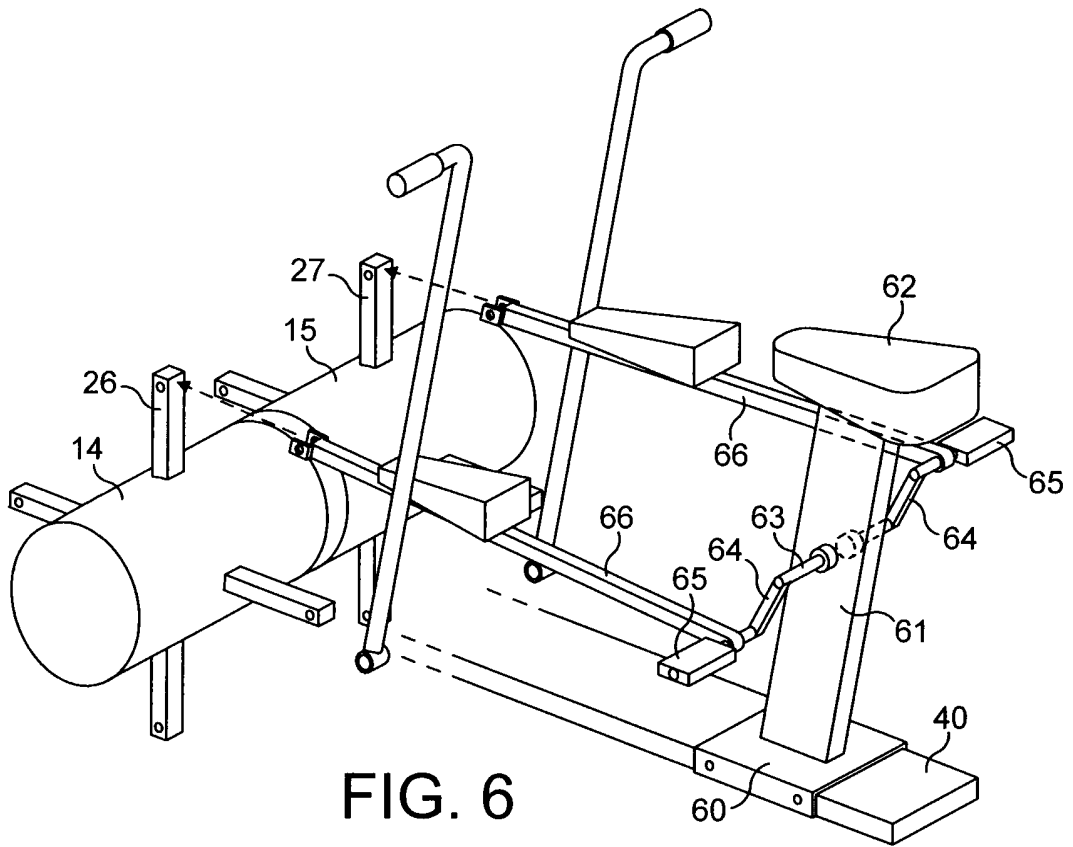


FIG. 6

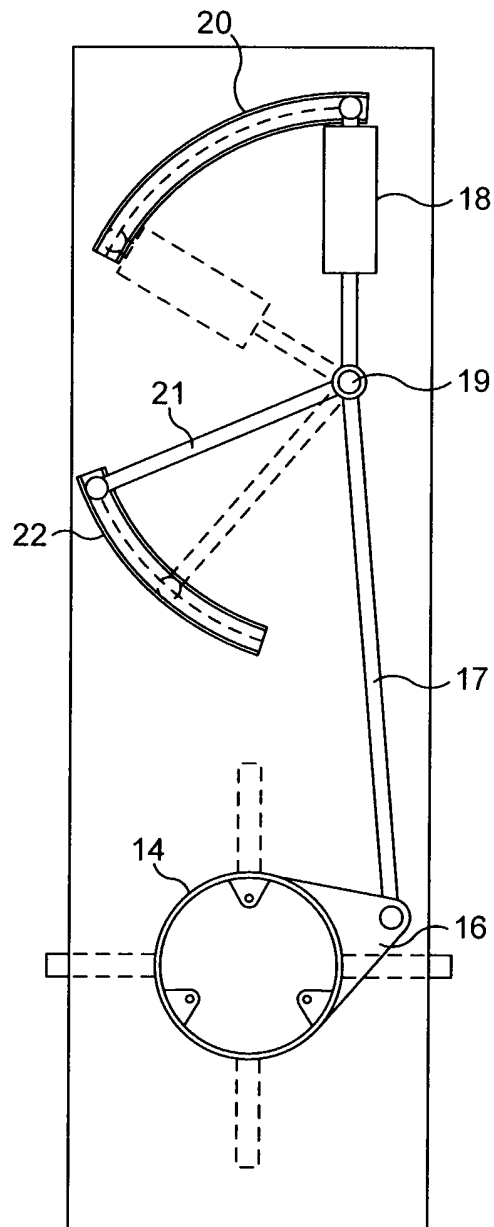


FIG. 7

EXERCISING MACHINE

This invention relates to exercising machines and particularly to a basic mechanism which can be adapted for a variety of different exercises either by alteration of the set-up
5 of the machine in which it is incorporated or by combination with different auxiliary mechanisms or both and which allows two people who may be of different sizes or strengths to perform the same exercise together. For preference the machine is adaptable so that each person can experience a respective different resistance to the exercise.

10 In one aspect the invention provides a mechanism for synchronizing exercise movements of physical exercising equipment, comprising two members rotatable about a common axis, means for coupling the rotatable members for rotation in anti-phase and means for releasing the coupling means from the rotatable members and allowing the rotatable members to move in unison.

15 In another aspect the invention provides a mechanism for synchronizing exercise movements of physical exercising equipment, comprising two members rotatable about a common axis, a pivoted beam adapted for coupling the rotatable members for rotation and means for releasing the beam from the rotatable members

20 Each rotatable member may include an attachment means for the application of an exercising effort to the respective rotatable member.

25 Each rotatable member may be connected to a damper which is adapted to provide an adjustable or variable resistance. The damper, which may have independent utility, may comprise a damping strut connected at one end to a connecting shaft which forms a crank with a respective one of the rotatable members, a mounting means which allows the adjustment of the location of the other end of the damper strut, and a compensating link which is connected between the said one end and a positionally adjustable anchorage.

Brief description of the drawings

Figure 1 is a front view of a basic operating mechanism according to the invention;

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Figure 2 is a general view of an exerciser including the basic mechanism;

Figure 3 and Figure 4 are views of the exerciser in a folded or stored configuration;

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Figure 5 is a plan view of an exerciser.

Figure 6 is a perspective view showing an accessory connected to the basic mechanism

Figure 7 is a side view of a damping mechanism.

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Detailed description of exemplary embodiments

5 Figure 1 of the drawings illustrates an exerciser comprising a basic mechanism which allows dual working and a damper mechanism which will be described later.

10 The machine includes a base 10 and two upright pillars 11 and 12. Mounted between the pillars is a horizontal support constituted by a stationary cross tube 13. The support mounts for rotation two linkable rotatable members 14 and 15 constituted in this embodiment by two linked cylinders. Each of these rotatable cylinders is intended for limited back and forth rotation about its axis in response to movement of a user transmitted through a link or motion linkage to the respective cylinder. As will be later described in detail, each cylinder has attachment means for coupling to the

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In this embodiment (and as also shown in Figure 7) each cylinder 14 and 15 is connected to a damper by way of a connecting linkage. Only that for the left-hand cylinder is shown. In particular, the damper linkage comprises a double lug 16 which is fixed to the cylinder 14, a connecting shaft 17 which is pivotally connected to the lug and thereby to the cylinder 14, so that the cylinder and the connecting shaft form a crank, and a damper strut 18 connected by a pivot 19 at one end, here its lower end, to the connecting shaft 17 and secured at its other end to an anchorage. In this embodiment the anchorage for the upper end of the damper is a curved track 20 and the upper end of the damper can be secured by any convenient means at different locations along the track 20. Connected between the pivot 19 and another curved track 22 is a compensating arm 21. Other forms of damper assembly may, as will be explained, be used with the basic mechanism.

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30 The basic mechanism includes a coupling for enabling the two rotatable members 14 and 15 to rotate either in anti-phase or in unison. This coupling principally comprises a beam, hereinafter called 'synchroniser beam' 23, which is pivotally connected to each of the cylinders 14 and 15. For this purpose the synchronizer beam has slots 24 and 25 into

which extend lugs 26 and 27 from a respective cylinder 14 and 15. The beam 23 has a central hub 28 which fits for rotation on an upright axle 29 secured to the base 10. For the configuration shown in the Figure, the beam 23 ensures that the cylinders 14 and 15 move in anti-phase in response to the efforts of the respective users.

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For some exercises, for example assisted push-ups, it is desirable for the movements of the cylinders to be in unison. To permit this mode of operation, the beam 23 can be decoupled from the cylinders 14 and 15, and the cylinders can be directly coupled together. In this embodiment of the invention, the beam includes a central post 30 which is urged upwards by a resilient bias constituted by a spring 31 within the axle 29. The hub 28 is connected to one end of a lever 32 which can lower the hub and thereby the post 30 and beam 23 against the bias of the spring 31. At the top of the post is an upwardly directed wedge 33 of which the inclined sides engage the inner confronting ends of the cylinders 14 and 15. Lowering of the beam disengages the beam from the lugs 26 and 27 and allows by the withdrawal of the wedge the cylinder 14 and 15 to move towards each other, the cylinders having means for urging them together. This means comprises a tension spring 34 which extends between anchoring lugs 35 and 36 on the cylinder 14 and 15 respectively. On their confronting ends the cylinders have mutually engageable connectors, for example pins 37 and sockets 38.

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One exercise accessory is shown in Figure 2. It comprises an ordinary slide track 40 on which a seat is mounted for sliding movement. An inner end of the track is connected to the base structure of the machine by pivots 42 so that the slide track can be swung to a vertical state for storage. A hand bar (not shown) is connected by wire to a multiple sheave pulley mechanism, to reduce the full movement to a small movement of an output wire, which in turn is connected to a lug on each side of the one of the cylinders 14 and 15. In this way the full back and forth movement of the user is reduced to a distance compatible with the limited rotary movement permitted for the cylinder; this movement would usually be somewhat less than 90 degrees. The seat 41 can be locked in a position near the pillar 12 so as to allow the user to rest on it when performing 'arm-pulls'.

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Another accessory is a fitting which allows for stepping or assisted push-ups. This fitting comprises a pair of platforms of which one is shown at 43. This platform has a lower plate 44 which has two linking bars 45 and 46 to the base unit. The lower is attached to a horizontal lug on a cylinder 14 or 15 and another linking bar is attached to the base structure to provide a parallelogram linkage. As a user steps up and down the cylinder 14 or 15 is rotated back and forth. The use of the parallel links ensures a comfortable stepping motion.

The rowing seat 41 may be placed on the platform 43. If the synchroniser beam is now locked down the alternate stepping motion is converted to a direct up and down motion for assisted push-ups. Arm bars are fitted into the uprights 11 and 12 and can swivel outwardly to provide hand-holds for this exercise. Most exercises require only resistance during the exercise, so no springs are required to store energy during the movement, other than light springs as necessary to return the apparatus to its start position. However, for certain exercises, for example assisted push-ups, a means to store enough energy to return the user to the start position is required. Accordingly the apparatus may provide a means to select or deselect a set of supplementary springs which are capable of providing enough energy storage to return the appropriate weight of user to the user's start position on the apparatus.

To allow for push-up and pull-up exercises a bar assembled into a U-shape is clipped onto the base structure for storage and has two down links which can be attached to the horizontal lugs on a cylinder 14 or 15. The bar fits into hooks on the top of the pillars 11 and 12. The user may fit it in a lower position and perform sitting push-ups or fit it onto upper hooks and perform standing push-ups. By fitting it onto the lower hooks the user can perform pull-ups.

In a modification the synchroniser beam may be adjustable to allow the rotatable members to move, for respective positions of the beam, in anti-phase, independently and in phase.

Figures 3 and 4 show the machine in a stowed position. Figure 4 particularly shows the cylinder 15 with an upper lug 27a, a lower lug 27b and horizontal lugs 27c and 27d.

5 Figure 5 illustrates the machine in plan and particularly shows two slide tracks 40 and 40a each extending away from the basic mechanism located between the pillars 11 and 12

Figure 5 also illustrates a bracing structure which can be stored in the pillars 11 and 12. When the rowing slides 40 and 40a are folded down bracing tubes are inserted at each end, parallel to the axis of the cylinders 14 and 15. From each end of these tubes extend
10 bracing struts to the top and bottom of the base structure. This bracing structure provides strength and stability more efficiently than large welded frames, and allows the dual exerciser to be stored in a small space.

Figure 6 illustrates a 'cross-trainer/cycling' attachment. This includes a base platform 60
15 which can be secured to the slide track 40 and an upright post 61 supporting a seat 62. A cross-shaft 63 in the post has end cranks 64 to which pedals 65 can be attached. In addition a respective one of two long links 66, each supporting a footpad, is connected to form a crank to an upper lug of the respective cylinder 14 or 15. Using the pedals or the
20 footpads the user may perform either a cycling or a cross-trainer exercise. As will be apparent, since the damper mechanism is driven by the cylinder 14 or 15, the resistance to movement will be provided at the reciprocating ends of the footpad links and not at the rotating ends. The aforementioned U-bar can be clipped to hooks on the base structure to provide a handlebar.

25 Other attachments include a U-shaped bar to be used for shoulder lifts and a tubular pad with a pivot, fitted on the rowing slide. This may via a linkage pull on a cylinder 14 or 15 while the user lies on a padded platform fixed to the outer part of the rowing slide., to allow the performance of 'leg-curls'.

30 Another aspect of the invention concerns damping in order to provide an adjustable resistance to the user's efforts. One form of damper mechanism is shown in Figure 7 and

comprises the elements 17 – 22 already mentioned in relation to Figure 1. The damper strut 18 may be an ordinary automotive-type damper of which the springs are connected to the cylinder 14 or 15 as previously described. The angle of the damper to the vertical can be varied by moving the point of anchorage of the upper end of the damper along the track 20. Because the effective rate of the damper as sensed by the cylinder 14 or 15 varies according to the inclination of the damper to the vertical, the effective resistance can be altered independently for the two sides of the machine. The angle of inclination of the damper varies during its stroke when it moves away from the vertical and accordingly the mechanism includes a compensator to render the resistance more linear. The dynamic compensating arm 21 is attached to the lower end of the damper and to the upper end of the shaft 17 which is connected to the cylinder 14 or 15. The static end of arm 21 can be positioned at a selectable location on the curved track 22. For some exercises a varying resistance across the range of exercise is beneficial and can be provided by appropriate selection of the anchorage point for the arm 21. The damper strut 18 and the arm 21 are releaseably securable to a respective track by means of a suitable fastener such as a clamp wheel.

The damper mechanism just described provides different degrees of resistance from an ordinary constant resistance damper. Other forms of damping may be employed to provide a resistance which can be altered during the stroke. For example, the damper mechanism linked to the respective cylinder 14 or 15 may be a damper in which a valve orifice is controlled via an electronic control and a motor. Another form of damper has a fixed orifice and a fluid that is a rheological fluid of which the viscosity can be electrically or magnetically controlled.

If such alternative dampers are employed they may be disposed in fixed positions. The machine would include a control panel by means of which a user can select a desired resistance or resistance profile.

It is beneficial for a user to observe the level of exercise. For electronically controlled damping an appropriate readout may be obtained from the control algorithms for the

damper For the mechanical version described the work-out effort may be calculated from the outputs of temperature sensors of which one may measure ambient temperature; there may be another which measures the surface temperature of a respective damper. The values of temperature rise compared with the ambient temperature and the time elapsed may be inserted in an appropriate computation to provide an indication of the intensity of the exercise.

CLAIMS

1. A mechanism for synchronizing exercise movements of physical exercising equipment, comprising two members rotatable about a common axis, means for coupling the rotatable members for rotation in anti-phase and means for releasing the coupling means from the rotatable members and allowing the rotatable members to move in unison.
5
2. A mechanism according to claim 1, in which the coupling means comprises a pivoted beam.
10
3. A mechanism according to claim 2, in which the beam includes slots for the reception of engagement members extending from the rotatable members
4. A mechanism according to claim 2 or 3, in which the means for releasing comprises a wedge positioned to separate the rotatable members and withdrawable to allow the rotatable members to move towards each other.
15
5. A mechanism according to claim 4 in which the wedge and the beam are connected together.
20
6. A mechanism according to any of claims 2 to 5 in which the beam is axially movable and is axially urged for coupling the rotatable members.
7. A mechanism according to any foregoing claim in which the rotatable members include mutually engageable connectors which on engagement couple the rotatable members for rotation in unison.
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8. A mechanism according to claim 7 and including a bias for urging the rotatable members towards each other.
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9. A mechanism according to any foregoing claim in which the rotatable members comprise two cylinders mounted for rotation on a common fixed cylinder

5 10. A mechanism according to any foregoing claim in which each rotatable member includes an attachment means for the application of an exercising effort to the respective rotatable member.

11. A mechanism according to claim 10 in which the attachment means comprise lugs

10 12. A mechanism according to any foregoing claim in which the means for coupling allows or ensures that the rotatable members move either in anti-phase, or in unison or independently

15 13. A mechanism for synchronizing exercise movements of physical exercising equipment, comprising two members rotatable about a common axis, a pivoted beam adapted for coupling the rotatable members for rotation and means for releasing the beam from the rotatable members

20 14. A mechanism according to claim 13, in which the beam includes slots for the reception of engagements members extending from the rotatable members.

15 15. A mechanism according to claim 14, in which the beam is axially movable and is axially urged for coupling the rotatable members.

25 16. A mechanism according to claim 15 in which each rotatable member includes an attachment means for the application of an exercising effort to the respective rotatable member.

30 17. A mechanism according to any foregoing claim wherein each rotatable member is connected to a damper which is adapted to provide an adjustable or variable resistance to movement of the respective rotatable member.

18 A mechanism according to claim 17 wherein the damper comprises a damping
strut connected at one end to a connecting shaft which forms a crank with a respective one
of the rotatable members, a mounting means which allows the adjustment of the location
5 of the other end of the damper strut, and a compensating link which is connected between
the said one end and a positionally adjustable anchorage

19. A mechanism according to claim 18 in which the mounting means and the
positionally adjustable anchorage each comprise a respective curved track.

10

20. A mechanism according to claim 17 in which the damper comprises an electrically-
controlled damper which provides said variable resistance

21. A mechanism according to claim 17 wherein the damper includes rheological fluid to
15 provide said variable resistance.

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22 A damping mechanism which comprises a damping strut connected at one end to
a connecting shaft which forms a crank with a rotatable member, a mounting means which
allows the adjustment of the location of the other end of the damper strut, and a
20 compensating link which is connected between the said one end and a positionally
adjustable anchorage.

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23 A damping mechanism according to claim 22 in which the mounting means and
the positionally adjustable anchorage each comprise a respective curved track.

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For Innovation

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Application No: GB0519239.8

Examiner: Paul Makin

Claims searched: 1-12

Date of search: 7 April 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	US 4082267 A (FLAVELL)
A	-	US 4391441 A (SIMJIAN)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^X :

Worldwide search of patent documents classified in the following areas of the IPC

The following online and other databases have been used in the preparation of this search report



For Innovation

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Application No: GB0519239.8

Examiner: Paul Makin

Claims searched: 13-21

Date of search: 16 August 2006

**Patents Act 1977
Further Search Report under Section 17**

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	13,17	US 3792860 A (SELNES) see figure 1

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

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Worldwide search of patent documents classified in the following areas of the IPC

A63B

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC



For Innovation

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Application No: GB0519239.8

Examiner: Paul Makin

Claims searched: 22-23

Date of search: 16 August 2006

**Patents Act 1977
Further Search Report under Section 17**

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	US 4254950 A (BAUMANN)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application

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Worldwide search of patent documents classified in the following areas of the IPC

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WPI, EODOC, TXTE