(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 643 983 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **94830438.1**

(51) Int. Cl.[6] : **A63B 21/06**

(22) Date of filing : **19.09.94**

(30) Priority : **22.09.93 IT AN930052**

(43) Date of publication of application :
22.03.95 Bulletin 95/12

(84) Designated Contracting States :
AT BE CH DE DK ES FR GB GR IE IT LI LU MC NL PT SE

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(54) Automatic weight adjusting system for exercising apparatus.

(57) This invention concerns a device for generating an adjustable an resisting force for body building machines, characterised by a lever pivoted by means of horizontal pins to the supporting structure of the machine, the same being fitted with a sliding and arrestable mass along the lever, one of whose ends is fitted with attachments for the mechanical devices used to transmit the muscular force that the athlete transmits on the handles or the foot board of the machine, to the lever.

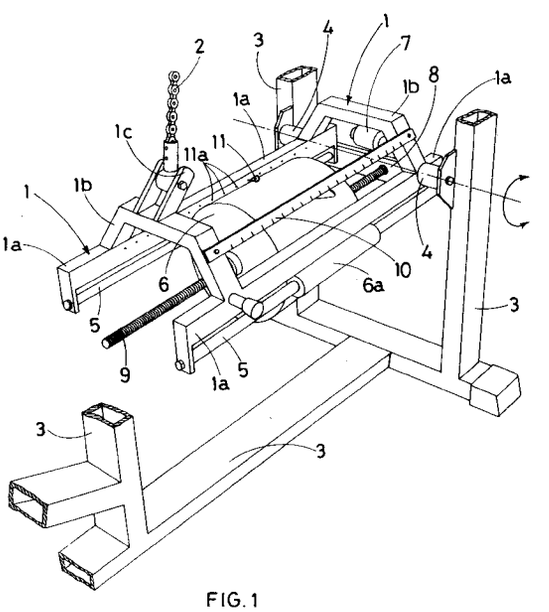

FIG. 1

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This patent application concerns a device for body building machines that generates an adjustable resisting force on the same.

It has today become very common to use body building machines for physical fitness training. Although the structure and operation of these machines may be different, they are all characterised by a power unit that generates an adjustable resisting load that the athlete must balance with the power of his own muscles.

In the great majority of cases, this power unit consists of a series of metal prismatic blocks, generally called "weights", housed and sliding along two upright bars having a circular cross-section, that traverse the entire pile of weights at two symmetrically opposite points with respect to the barycentre of each weight.

The weight selecting device generally consists of a vertical bar subject to the direct or indirect lifting force applied by the athlete, which is fitted into the hole at the centre of each weight; said bar being characterised by a series of transverse through holes having equidistant horizontal axes in which the plug for selecting the weight is fitted.

In other words, the body builder may select the number of weights to lift, according to physical effort he wants to exert, simply by sliding the plug into one of the holes of the above vertical bars; naturally the lower the hole selected, the greater will be the number of weights to be lifted.

In the more modern machines, the power unit consists of one or more pneumatic jacks on whose piston the muscular force of the athlete is unloaded, generally by means of lever mechanisms; in this type of machine the resistance created by the piston may be adjusted by varying the air pressure in the jack.

The purpose of this invention is to design a new device for generating an adjustable resisting force for body building machines.

The device according to the invention consists of a lever on which a sliding mass is fitted, whose weight generates, with respect to the pivoting point of the lever, a moment of resistance whose force is directly proportional to the distance between the pivot and the barycentre of the mass.

One of the two ends of said lever being fitted with attachments for the mechanical devices (such as cables, chains or levers) generally used to transmit the muscular force that the athlete exerts on the handles or foot board of the machine, to the power unit.

The device according to the invention is fundamentally characterised by a lever, having a fixed driving force arm (namely the force exerted by the athlete) while the resisting force arm (namely that corresponding to the weight of the sliding mass) varies so that the athlete is required to exert an effort proportional to the arm of the resisting force.

For major clarity the description of the invention continues with reference to the enclosed drawings which are intended for purposes of illustration and not in a limiting sense, whereby:

- fig. 1 is an axonometric view of the device according to the invention in its preferred embodiment, characterised by the use of an actuator to activate the sliding action of the above mass.

With reference to figure 1, the device according to the invention is characterised by a lever (1) consisting of a parallel pair of longitudinal bars (1a) joined together by means of two transverse bridges (1b) positioned at the ends of the bars (1a); a fork (1c) being provided above and at the centre of one of the bridges (1b) in order to hook the mechanical means, which in this case, is a chain (2), used to transmit the muscular force that the athlete exerts on the handles or foot board of the machine, to the power unit.

Said lever (1) is pivoted to the supporting frame (3) of the machine by means of two horizontal coaxial pins (4), projecting externally from the longitudinal bars (1a), at the bottom whereof two circular supporting and guiding bars (5) are fitted for a cylindrical drum (6) having two opposing supporting couplings (6a) fitted and sliding on the above bars (5).

In the preferred embodiment of the invention, shown in figure 2, the drum (6) slides automatically by means of an actuator fixed externally to a fixing plate (8) over the back of the pair of bars (1a).

In the case in question, the actuator consists of an electric motor (7) having a reduction gear that rotates a threaded shaft (9) fitted in the drum (6) with the same being coupled helicoidally so that the rotation of the shaft (9) translates the drum (6) along the respective support and guide bars (5).

The drum (6) can quite obviously be motorised with any other suitable means, without absconding from the inventive concept; the drum (6) could, for example, be joined to the piston of a pneumatic jack, flanged externally to the plate (8) or the drum (6), could be joined to a geared rack having a pinion rotated by an electrical motor.

Without absconding from the inventive idea, the drum (6) may also be made to slide manually; in this case, means for stopping the drum (6) along the bars (5), should be provided.

These means may be of any kind: the simplest and most commonly used in gym machines, consists of a plug that fits both into a transverse hole on the coupling (6a) and into a closely packed series of transverse holes on the bars (5a).

A calibrated line marked with the number (10) is shown in fig. 1, having a scale that shows the power that the athlete must exert to move lever (1) according to the position of the sliding drum (6) along the bars (5).

The value of this power may be visualised on a monitor by means of a conventional electronic device involving the use of an optical detector (11) mounted on the drum (6) that reads fixed reference marks

(11a) along the bars (1a) of the lever (1).

Claims

1) A device for generating an adjustable resisting force for body building machines characterised by a lever pivoted by means of horizontal pins to the supporting frame of the machine, the same being fitted with a sliding and arrestable mass along the lever, one of whose ends is fitted with attachments for the mechanical devices used to transmit the muscular force that the athlete transmits on the handles or the foot board of the machine, to the lever.

2) A device for generating an adjustable resisting force for body building machines, according to the previous claim, characterised in its preferred embodiment, by a lever (1) consisting of a parallel pair of longitudinal bars (1a) joined by means of transverse bridges (1b) and supporting at the bottom two circular supporting and guide bars (5) for a cylindrical drum (6) fitted with two opposing support couplings (6a) fitted and sliding on the above bars (5); the drum (6) being made to slide by means of an actuator fixed externally to an anchoring plate (8) fixed over the back of the pair of bars (1a).

3) A device for generating an adjustable resisting force for body building machines, according to the previous claims, characterised in that the drum (6) actuator consists of an electrical motor (7) having relevant reduction gear that rotates a threaded shaft (9) fitted into the drum (6) with which this shaft is coupled helicoidally.

4) A device for generating an adjustable resisting force for body building machines, according to claims 1 and 2, characterised in that the drum (6) actuator consists of a pneumatic jack.

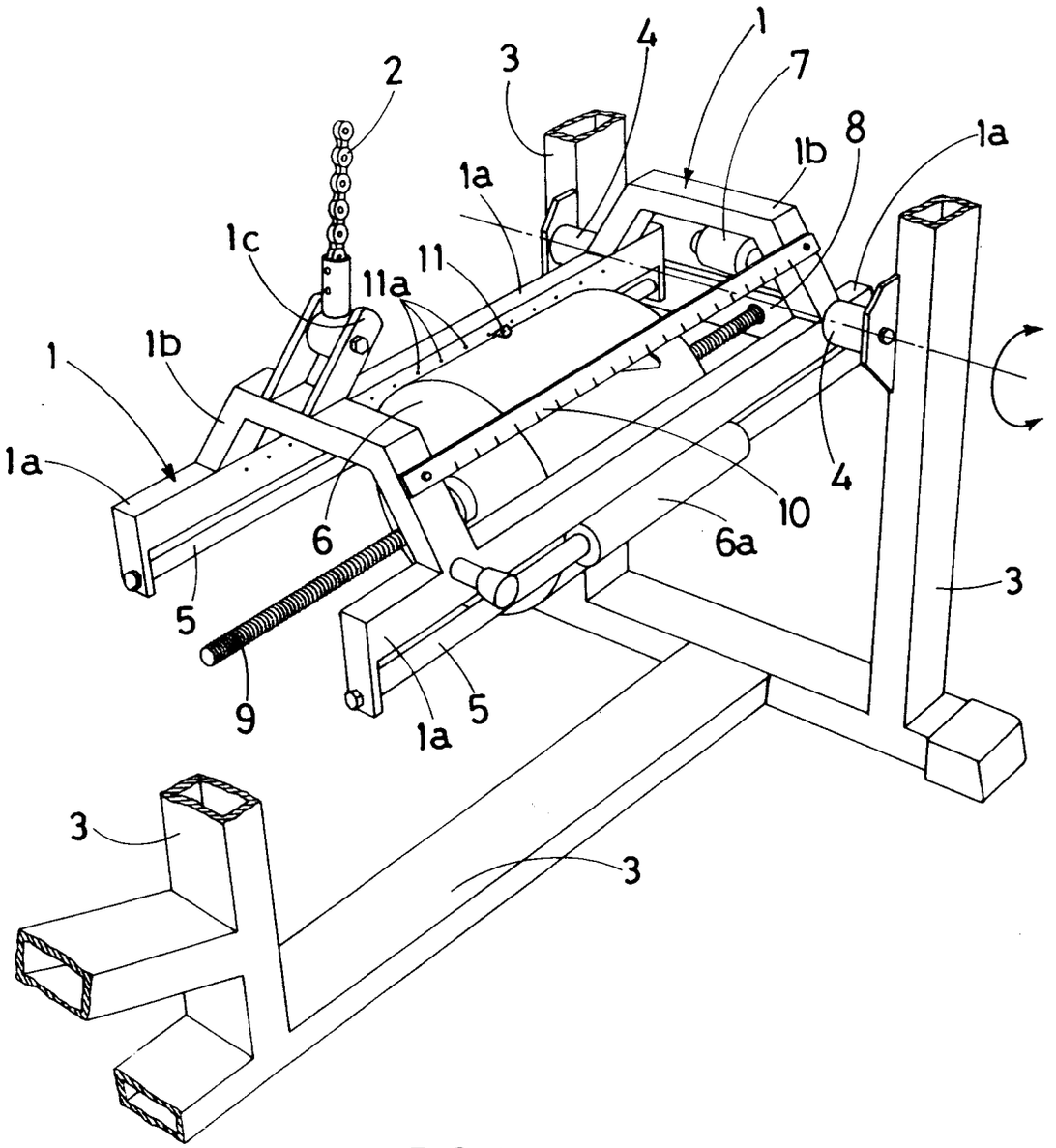

FIG. 1

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EUROPEAN SEARCH REPORT

Application Number
EP 94 83 0438

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-3 588 101 (JUNGREIS) * the whole document *	1-4	A63B21/06
X	US-A-4 650 185 (CARTWRIGHT) * column 1, line 50 - column 2, line 44 * * claim 1; figures 1-3 *	1	
A		2,3	
X	US-A-4 863 161 (TELLE) * abstract; figures *	1	
A		2,3	
X	US-A-3 573 865 (ANNAS ET AL.) * abstract; claims; figures *	1	
A		2,3	
A	GB-A-J23278 (CARO) &GB-A-23278 A.D. 1909 * figure 1 *		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A63B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	8 December 1994	GIMENEZ BURGOS, R

CATEGORY OF CITED DOCUMENTS

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EPO FORM 1503 03.82 (P04C01)