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**(54) AUTOMATIC WEIGHT ADJUSTING SYSTEM FOR EXERCISING APPARATUS**

**AUTOMATISCHES SYSTEM FUR DIE REGELUNG VON GEWICHTE IN UBUNGSGERATEN**

**SYSTEME DE REGULATION AUTOMATIQUE DE POIDS POUR APPAREIL D'ENTRAINEMENT PHYSIQUE**

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(56) References cited:  
**US-A- 3 573 865**                      **US-A- 3 731 922**  
**US-A- 4 322 071**                      **US-A- 4 650 185**  
**US-A- 4 863 161**

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## Description

This invention refers to an automatic weight adjustment system for gymnasium exercise apparatus.

At present, for body-building, gymnasium, etc, machines, the market offers electronic machines which work using compressed air via cylinders and iron plates which make up a block comprised of plates of 5 or 10 kg. and with a weight per block which varies between 25 and 200 kg., depending on the machine and the exercise being performed.

Both the electronic and compressed-air machines have the drawback of exercising an uneven force, thus presenting difficulties when exercising, especially for professionals and physical instructors. At present, in gymnasia and professional centres, machines with iron plates making a block are used mainly, this system being the most commonly used due to the fact that the force exercised is the most true and balanced, although it poses a major problem when weight needs to be increased or decreased, as the exercises have to be interrupted at this point to place the weight selector on the spot on the block required and the exercises resumed with more or less weight, which interferes with the exercises enormously, both because of the stoppage and because of the abrupt weight change.

Amongst the exercise apparatus using iron plates making a block, we can cite the Lambert Jr. et al US-A-4 322 071 patent, which is of the classic type.

There are other patents which use a weight which can be displaced along a tilting guide which is tipped by the user, amongst which we can cite the W.G. Annas US-A- 3 573 865 patent, in which the tilting guide with the weight tips freely on the axis on one side, and is tilted by a framework connected firmly to the transmission system. Telle's US-A- 4 863 161 patent, in which the motor does not engage the spindle directly and lengthways. Moreover, it works in combination with a hydraulic cylinder. Cartwright's US-AS- 4 650 185 patent in which the motor does not engage the spindle directly and lengthways, and Jungreis' US-A-3 731 922 patent.

In all the above patents, the arrangement and displacement of the weight on the tilting guide is different, and transmission of the user's action is completely different from this invention. Likewise, the aforesaid Annas, Telle, Cartwright and Jungreis patents do not make use of the two power and resistance wheels of this invention, neither is the power wheel (or its equivalents) connected to the means activated by the user, nor is the resistance wheel connected to the swivel axis of the tilting guide.

The system of this invention eliminates the problems mentioned, and enables the weight to come in progressively and automatically, without the need to stop exercising. With the invention's system, the instructor or the person in charge of the physical instruction can program in advance the weight and the repetitions he feels are the most appropriate for the person who will be per-

forming the exercises, achieving a perfect training session.

Amongst the advantages offered by this system, we can highlight:

- a) Automatic entry and exit of weight, without the need to stop exercising;
- b) The weight can be programmed, as can the number of repetitions;
- c) Balanced effort from start to finish of the exercises;
- d) Entry and exit of the machine with reset to 0 kg., greatly assisting the position and start-up of the person exercising;
- e) The machine has standard or standardized programs, which can be selected according to professional criteria or medical recommendations;
- f) Control of the training system of improvements achieved physically, from a workcard recorded beforehand via a data-processing system; and
- g) Weight adjustment in fractions of grams.

The invention is set out in claim 1.

To assist a more detailed explanation, two sheets with sketches are included, showing a practical case of application which shows, for illustration purposes only and not limitatively, the scope of the invention.

In the sketches:

Figure 1 is a side elevational view which shows, in diagram form, this invention's system.

Figure 2 is a perspective view which shows, in diagram form, an example of application of the invention's system to each of the body-building appliances.

In accordance with the sketches, the automatic weight adjustment system in exercise machines, with which this invention is concerned, consists of a weight 1 in the form of a block, which comprises several weights 1a back-to back, weight 1 of which can be displaced gradually, as per the arrow F1 along a tilting guide 2 on an axis 3-6, guide 2 of which is tipped by the user's action whilst he is performing the exercise with the corresponding apparatus, tilting guide 2 of which consists of two parallel bars, upper 2a and lower 2b. This exercise consists of making the tilting guide 2 tip with weight 1 situated in a determined position along the tilting guide - as per arrow F2 - (see Figure 1), the user pulling the same weight during the exercise - for each weight position on the tilting guide -.

In the said displacement F1, towards one end or the other of the tilting guide 2 of the weight 1 along the said tilting guide, the weight for the user to perform the exercise increases or decreases gradually, which is effected by way of a combination of a resistance arm BR, comprising weight 1 which can be displaced along the tilting guide 2, and a power wheel 4, connected to the means

activated by the user, and a resistance wheel 5, arranged in the axis 3,6 of the tilting guide 2, the power wheel 4 and resistance wheel 5 of which are interconnected to each other by a transmission system consisting of a chain 7.

We should highlight that the power wheel 4 is excentric to its swivel axis and, if applicable, depending on the path - longer or shorter - along which the weight has to travel, the profile (excentric, oval or mixed profile) of this power wheel over which the transmission is taken up (chain 7) between the power wheel 4 and the resistance wheel 5 during the tipping movement of the tilting guide 2, can be excentric to this power wheel's swivel axis, in such a way that when the user performs the corresponding exercise, for each position of the weight 1 on the tilting guide 2, he has the same weight pull.

As per this invention's system, the user can effect this gradual displacement of the weight 1 along the tilting guide 2, increasing or decreasing this weight, whilst he is exercising, without the need to stop the exercise. As per the invention, this gradual weight displacement can be programmed, if applicable, repetitively, according to the user's physical characteristics.

As per the invention, the weight 1 moves along the guide 2 by way of a motor 8 activated by the user by pressing a button - not illustrated - or by programming, as indicated in the above paragraph. As is illustrated in the figures, this weight is displaced by the motor 8 by way of a spindle 9.

The unit of the tilting guide 2, comprising the bars 2a, 2b, with the weight 1 which can be displaced along them by way of a spindle 9 driven by the motor 8, is mounted on a framework 10 which, with the power wheel 4 and the resistance wheel 5, is mounted on a bedplate 11, which rests on the floor.

As per this invention's system, the displacement of the weight 1 and the increase or decrease of the weight for the user's exercises are infinitely adjustable, although in practice the increase or decrease will be in grams or kilograms.

In the example used, as illustrated in Figure 2, the invention's automatic weight adjustment system is shown applied to a specific exercise machine, although it can be applied to any kind of gymnasium exercise apparatus. In this example, the user sits on a chair 12 (illustrated in dotted lines in Figure 2) and places his feet underneath a push-up support 13 (illustrated in dotted lines), in combination with a counterweight 14, so that the push-up support 13 can go back to its initial position, all as per the conventional arrangement of these machines.

To operate the user sets the weight 1 in a specific position along the tilting guide 2 with a button - not illustrated - and, seated on the chair 12 with both his feet under the push-up support 13, he raises up the tilting guide 2 with the weight 1, turning the power wheel 4 in the direction of the arrow F3 which, by way of the chain 7 makes the resistance wheel 5 turn in the direction of the arrow F4 and, by way of the axis 3,6, the framework

10 is raised up (with the weight 1 and the tilting guide 2), in the direction of the arrow F2 (see Figure 1). When the framework reaches the top point - the ascent of which is shown in dotted lines - (Figure 1), corresponding to the top point of the push-up support 13, it goes through the return path and it is ready to start again.

The make-up of the framework 10 and the bedplate 11 can be as illustrated or any other to suit.

## 10 Claims

1. Automatic weight adjustment system for gymnasium exercise apparatus comprising a tilting guide (10) along which a weight (1) is displaced and positioned, by way of a spindle (9) driven by motorized means (8), the tilting guide (10) of which is tipped by the user's action, the tipping movement being effected by way of a power wheel (4) driven by the user (13,14) and a resistance wheel (5), characterized by the fact that the axis of the resistance wheel (5) is provided in the rotating axis (3,6) of the tilting guide (10), said power wheel (4) and resistance wheel (5) being connected by a chain transmission (7) rolled up, in an eccentric way, on the power wheel (4), such that at each position of the weight (1) in the tilting guide (10), the user performs the same weight pulling during the exercise.

## Patentansprüche

1. Automatisches System zur Gewichtsregulierung in Gymnastikgeräten, bestehend aus einer Kippführung (10), über die ein Gewicht (1) mit einer Spindel (9) mit Motorantrieb (8) verschoben und positioniert wird, wobei die Kippführung (10) durch den Benutzer geschwenkt werden kann und das Schwenken durch ein durch den Benutzer (13, 14) betätigtes Leistungsrad (4) und ein Widerstandsrads (5) durchgeführt wird, dadurch gekennzeichnet, daß die Achse des Widerstandsrades (5) in der Drehachse (3, 6) der Kippführung (10) liegt, wobei das erwähnte Leistungs- (4) und das Widerstandsrads (5) über eine Übertragungskette (7) verbunden sind, welche exzentrisch auf dem Leistungsrad (4) aufgerollt wird, so daß der Benutzer während der Übung in jeder Position des Gewichtes (1) auf der Kippführung (10) dasselbe Gewicht zieht.

## Revendications

1. Système automatique de réglage du poids dans des appareils de gymnastique, qui comprend une glissière basculante (10) sur laquelle un poids (1) se déplace et se positionne à l'aide d'une vis (9) actionnée par des moyens moteurs (8), cette glissière basculante (10) oscille sous l'action de l'utilisateur, l'oscillation s'effectue à l'aide d'une roue de puissance (4) actionnée par l'utilisateur (13, 14) et d'une roue de résistance (5), ce système se carac-

térise par le fait que l'axe de la roue de résistance (5) se trouve sur l'axe de rotation (3, 6) de la glissière basculante (10), ces roues de puissance (4) et de résistance (5) étant reliées par une transmission à chaîne (7) qui s'enroule de forme excentrique, sur la roue de puissance (4) de manière à ce que sur chaque position du poids (1) sur la glissière basculante (10) l'utilisateur entraîne le même poids pendant tout l'exercice.

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