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(54) WORK-OUT STATION FOR FITNESS ACADEMY WITH AN ELECTROMECHANICAL CONTROL OF THE END OF STROKE POSITION

(57) Fitness center work-out station with electromechanical control of the end of stroke position, wherein the work-out station is basically comprised of a base (1), from which there arises a structure (2) where there is fastened a seat (3), a back rest (4), arms (5) for action by the user, pulley (6) for connecting the arms (5), and a steel cable (7) which descends to the level of the base (1) passing through a compensating pulley (8) and following on horizontally to the opposite end of the base (1) where there is a vertical tower (18) where there are stacked the weights (17), where the end of the steel cable (7) is connected. The base (1) is provided with a contour structure (9), with two centrally supporting frame rails (10) of the upper structure (2) and a compensating pulley (8) pivoted between the pair of frame rails (10) and at the base of the structure (2); having pulleys (11 and 12), with vertical shafts and with a space between them where there is inserted a pulley (13) mounted on the rod (14) of a linear actuator (15) fixed to the structure (9) and its frame rails, the steel cable (7) passing between the compensating pulley (8) and the exit of the cable, by the pulleys (11, 12 and 13), being fastened to the rod (14) of the linear actuator (15) a linear sensor (16) to inform relative positions of the rod (14) and memorize them.

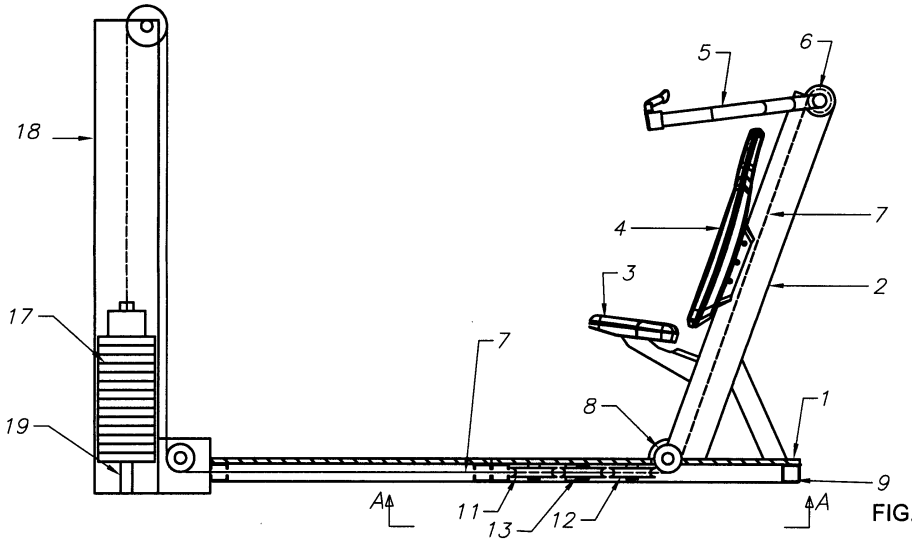

FIG.1

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Description

[0001] The present specification refers to a fitness center work-out station with electromechanical control of the end of stroke position and, more specifically, to an electromechanical control of the end of stroke position which coupled to a weights tower of the work-out station acts in conjunction with a combination of fractional weights so as to permit the relief of the steel cable transmitting the strength/weight, without the need for displacing the weights in relation to the work-out station tower.

[0002] As many persons skilled in the art are aware, weights towers of work-out stations have various stacked unit weights, which may, in whole or in part, be lifted inside the towers by centrally vertical steel cables, tractioned by active members of the work-out station driven by the user. Selecting the weights to be lifted can be obtained by inserting a horizontal pin, which traverses a hole existing in each weight in correspondence with a sequence of holes of a tenon which extends below the lower weight and fastens superiorly to the steel cable. A weight selected by the pin carries with it all the weights above it.

[0003] Generally, the exercises recommended by the gym trainer require that a movement of the arms or legs begin just beyond the point in which user access is comfortable.

[0004] Therefore, there have been idealized systems which, regardless of the links of the steel cables from the work-out station to the stack of weights of the tower, use parallel cables to lift the weights that are partially moved by pedals, whereby slacking the main cable and allowing the work-out levers to assume position outside the critical limit. Thus, by releasing the pedal the tension of the main steel cable is restored, but the user has already taken position at his post, and can accept an initial strain. The use of a pedal to relieve the tension on the steel cable is recommendable because the strength exerted by the leg of the user is much greater than that of the muscles that are being targeted by the station.

[0005] It is an objective of the present invention to provide a fitness center work-out station with electromechanical control of the end of stroke position which permits the provision of a relief to the steel cable which is kept tightened between the weights and the traction component accessible to the user, without having to lift the weight of the work-out station, by strain of the user.

[0006] Another objective of the present invention is to provide a fitness center work-out station with electromechanical control of the end of stroke position which besides permitting a relief on the tension of the steel cable for the start and finish of the exercise stroke, eliminates the mechanical shocks of the weights due to potential inadvertent displacements of the path and to the stack of weights.

[0007] The present invention will now be described with reference to the accompanying drawings, wherein:

Figure 1 represents a side view of the combination of the tower and work-out station, and

Figure 2 represents a bottom plan of a work-out station.

[0008] According to these drawings, a fitness center work-out station with electromechanical control of the end of stroke position, the subject matter of the present invention, is brought into effect in a work-out station basically comprised of a base 1, from which there arises a structure 2 to which there are fastened seat 3, back rest 4, arms 5 for action by the user, pulley 6 for connecting the arms 5, and a steel cable 7 which descends to the level of the base 1 passing through a compensating pulley 8 and following on horizontally to the opposite end of the base 1 where there is a vertical tower 18 where there are stacked the weights 17, where the end of the steel cable 7 is connected.

[0009] As can be noted in figure 2, the base 1 presents a contour structure 9, with two centrally supporting frame rails 10 of the upper structure 2 and a compensating pulley 8 pivoted between the pair of frame rails 10 and at the base of the structure 2. In the horizontal section of the steel cable 7, intermediarily the pulley 8 and the exit of this steel cable 7 towards the tower 18, the base 1 has two pulleys 11 and 12, coplanar in relation to each other with their respective vertical shafts distanced apart that allows the provision of a pulley 13 fitted therebetween. The shaft of this pulley 13 is mounted on a rod 14 of a linear actuator 15, which is mounted on the structure 9 of the base 1.

[0010] The steel cable 7, between the compensating pulley 8 and the exit towards the tower 18, passes through two pulleys 11 and 12 and forms a U-section with the pulley 13 of the linear actuator 15, see figure 2. This electromechanical actuator 15 can be driven by switch buttons situated at a place on the station that is accessible by the user. Preferably the linear actuator is driven by thread, such that it is not driven by external forces.

[0011] With this constructive conception provided to the traction system of the work-out station, when it is desirable to slacken the steel cable 7 to facilitate the user's initial movement positions, the linear actuator 15 is driven such that it displaces its arm 14 to a retracted condition, bringing its pulley 13 to a position substantially aligned with the pulleys 11 and 12, releasing an amount of steel cable 7. Afterwards, the linear actuator 15 is driven in the opposite direction, and the movement of the arm 14 displaces the pulley 13 between the pulleys 11 I and 12 to a condition of misalignment, stretching the cable again to the original position.

[0012] It is possible to use a sensor linear 16 connected to the pulley 13 and aligned with the actuator 15, to transmit to the control panel of the work-out station the data on initial and end positions of the linear actuator 15 to determine automatic stops.

[0013] The linear actuator 15 also promotes the adjustment of the initial tension of the steel cable 7, when

the weights 17 of the tower 18 are lifted by this cable 7, starting from its rest position, when they are supported on the base of the tower and the arms 5 or levers of the work-out station are in the initial position. If slack appears in this situation, a slack sensor warns the command panel which drives the linear actuator 15 which displaces its arm 14 until the slack is eliminated.

[0014] In the hypothesis that there is no space available at the base 1 of the station to mount the pulleys 11 and 12 and the linear actuator 15 with its pulley 13, this combination can be mounted on a module similar to the base 1 but mounted between it and the tower 18, through where the cable 7 passes.

[0015] The linear actuator 15 is not encumbered to stretch the steel cable 7 to the point of lifting the weights 17 of the tower 18, but only alters the free length of this cable when it is not tightened by the work-out station. To eliminate slack in the steel cable 7, a sensor 19 of the tower should indicate to the command panel that the weights are all on the rest at the base of the tower 18, that is, at its lowest point, when it does not exert traction on the steel cable 7, so that the linear actuator 15 is authorized to operate. At the same time, if the sensor 19 of the tower, with the weights not reaching support position on the base, indicates that the lowest level has not been reached, the command panel perceives this anomaly and makes linear actuator 15 slightly slacken the steel cable 7 until the sensor 19 indicates the state corresponding to the minimum height.

[0016] The electromechanical control of the present invention, besides allowing comfort for the user when assuming position at the work-out station, thereafter also controls any slacks appearing in the steel cable 7 by snaring or assembly flaw, performing these tasks automatically.

Claims

1. Fitness center work-out station with electromechanical control of the end of stroke position, wherein the work-out station is basically comprised of a base (1), from which there arises a structure (2) to which there are fastened seat (3), back rest (4), arms (5) for action by the user, pulley (6) for connecting the arms (5), and a steel cable (7) which descends to the level of the base (1) passing through a compensating pulley (8) and following on horizontally to the opposite end of the base (1) where there is a vertical tower (18) where there are stacked the weights (17), where the end of the steel cable (7) is connected, **characterized** wherein the base (1) is provided with a contour structure (9), with two centrally supporting frame rails (10) of the upper structure (2) and a compensating pulley (8) pivoted between the pair of frame rails (10) and at the base of the structure (2); with pulleys (11 and 12), with vertical shafts and with a space between them where there is inserted a pulley (13) mounted on the rod (14) of a linear actuator (15) fixed to the structure (9) and its frame rails, the steel cable (7) passing between a compensating pulley (8) and the exit of the cable, by the pulleys (11, 12 and 13), being fastened to the rod (14) of the linear actuator (15) a linear sensor (16) to inform relative positions of the rod (14) and memorize them.

2. Fitness center work-out station with electromechanical control of the end of stroke position, according to claim 1, **characterized** wherein the base (1) presents the horizontal section of the steel cable (7), intermediarily the pulley (8) and the exit of this steel cable (7) towards the tower (18), at least, two pulleys (11 and 12), coplanar in relation to each other with their respective vertical shafts distanced apart which allows the provision of a pulley (13) fitted therebetween; and the shaft of this pulley (13) is mounted on a rod (14) of a linear actuator (15), which is mounted on the structure (9) of the base (1).

3. Fitness center work-out station with electromechanical control of the end of stroke position, according to claim 1 or 2, **characterized** wherein the pulleys (11 and 12), of the pulley (13), of the rod (14) which make up the linear actuator (15) and also the sensor (16) are part of a combination mounted on a base attached to the base (1) and interplaced between weights tower (18) and station, forming an extension of this base (1).

4. Fitness center work-out station with electromechanical control of the end of stroke position, according to claim 1 or 2 or 3, **characterized** wherein the linear actuator (15), which is driven by the station command panel is authorized to operate when a sensor (19) of the tower (18) informs that the stack of weights (17) is on the base of the tower, without tightening the steel cable (7).

5. Fitness center work-out station with electromechanical control of the end of stroke position, according to claim 4, **characterized** wherein there is provided a tension sensor of the steel cable (7), with the weights (17) of the tower (18) on the rest on its base, to recognize slack in this steel cable (7), and warn the station command panel to drive the linear actuator (15) until the slack disappears.

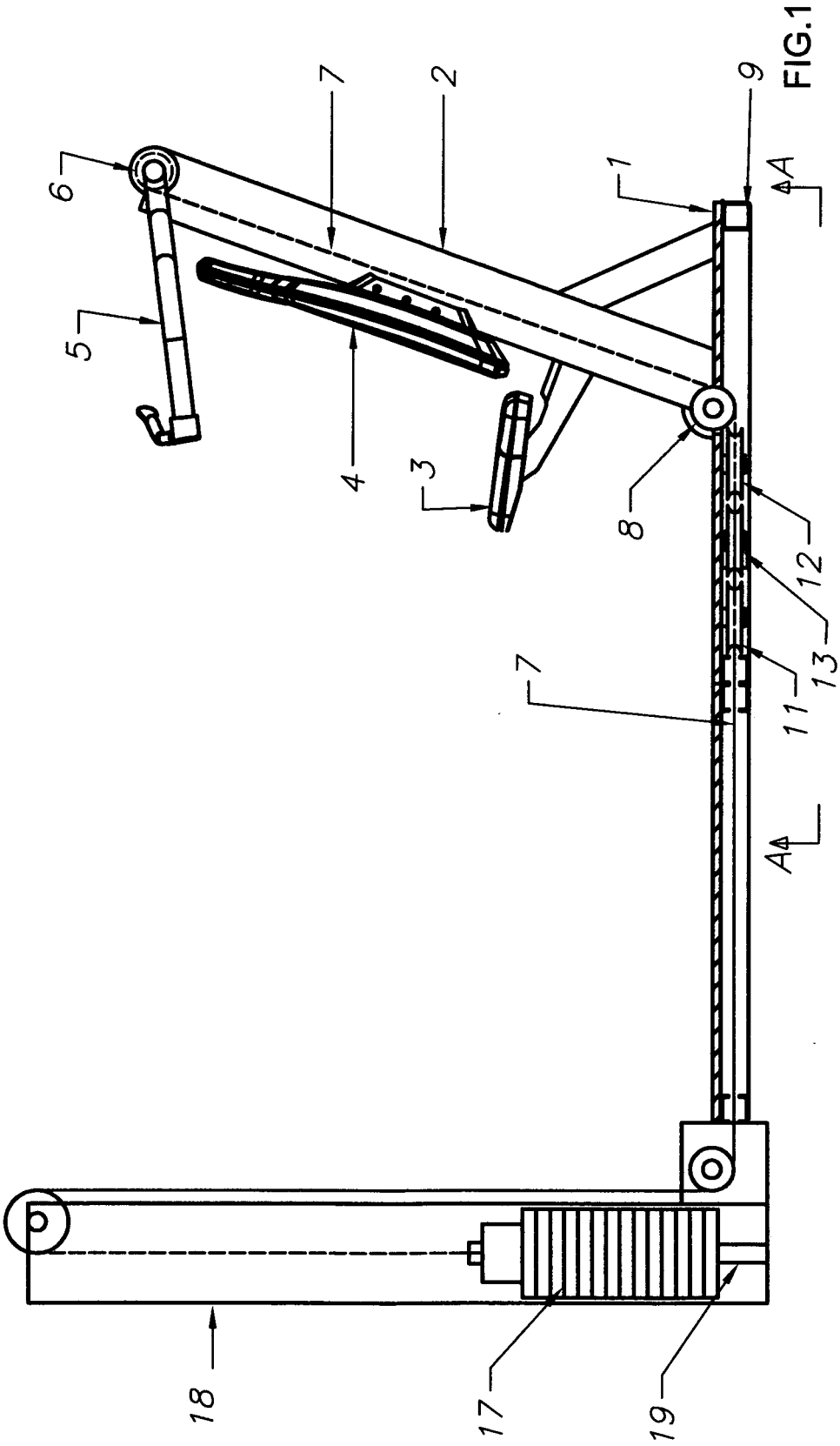
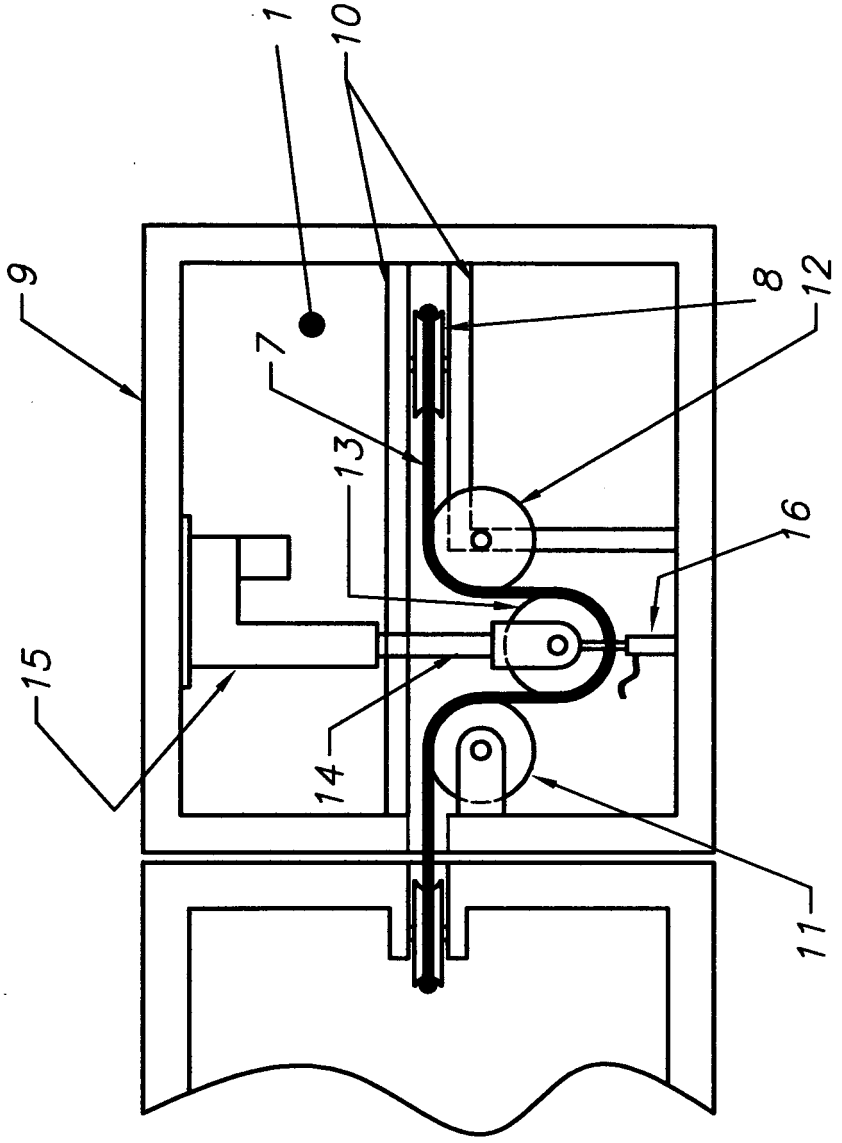


FIG.1

FIG.2



INTERNATIONAL SEARCH REPORT

International application No.
PCT/BR2010/000213

A. CLASSIFICATION OF SUBJECT MATTER

A63B 21/062 IPC (2009.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A63B 21/062, 21/06, /21/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, ESPACENET, GOOGLE PATENTS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5263915 A (PACIFIC FITNESS CORP [US]) **23 November 1993 (23.11.1993)**	
A	EP 1832317 A1 (BRUNSWICK CORP [US]) **12 September 2007 (12.09.2007)**	
A	US 5328429 A (COMPUTER SPORTS MEDICINE INC [US]) **12 July 1994 (12.07.1994)**	

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

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Date of the actual completion of the international search	Date of mailing of the international search report
15 July 2010 (15.07.10)	**05 August 2010 (05.08.10)**

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/BR2010/000213

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