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(54) **Exercise apparatus**

(57) An exercise apparatus (10) is composed of a counterweight device (20), a pulley assembly (30), a pulley sensor (40), an operating device (50), and a control device (60). The counterweight device (20) includes a frame (22), a plurality of weight pieces (24) mounted to the frame (22), and a plurality of electronic switches (26) mounted to the frame (22) for detecting the number of the weight pieces (24) that are moved. The pulley assembly (30) includes at least one pulley (32) mounted to the frame (22); and a transmission member (34) mounted to the pulley (32) and connected with the weight pieces (24). The pulley sensor (40) is mounted to the frame (22) for sensing the status of the pulley (32). The operating device (50) is connected with the transmission member (34) for driving the pulley assembly (30) to move the weight pieces (24). The control device (60) is electrically connected with the electronic switches (26) and the pulley sensor (40) for calculating, displaying, and recording data of the user's exercise performance.

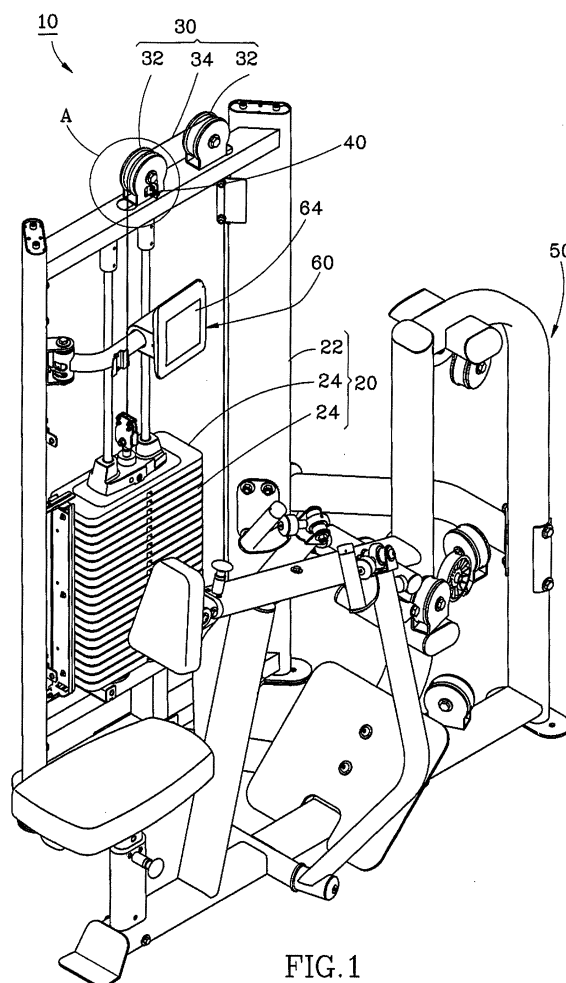


FIG. 1

Description**1. Field of the Invention**

[0001] The present invention relates generally to exercise and fitness, and more particularly, to an exercise apparatus.

2. Description of the Related Art

[0002] A conventional exercise apparatus is composed of a counterweight device and an operating device connected with the counterweight device. The counterweight device includes a plurality of weight pieces whose number is adjustable subject to the requirement while a user strengthens his/her muscles in such a way that a proper load of weight can be provided. In other words, the exercise apparatus can help the user strengthen the muscles for different degrees by means of different number of the counterweight blocks.

[0003] However, people have different physical stamina and require different degrees of muscular strengthening, such that it is not easy to infer the outcome of the user's muscle strengthening. Generally speaking, the muscle strengthening needs more accurate data for procurement of exercise amount and calorie expenditure. For the prior art, the user may though feel that much exercise is taken but fails to know the exact data of performance of the muscular strengthening, such that it is deficient for inconvenient operation to need improvement.

SUMMARY OF THE INVENTION

[0004] The primary objective of the present invention is to provide an exercise apparatus, which can come up with the exact data of performance of the user's muscular strengthening to be convenient for the user.

[0005] The foregoing objective of the present invention is attained by the exercise apparatus composed of a counterweight device, a pulley assembly, a pulley sensor, an operating device, and a control device. The counterweight device includes a frame, a plurality of weight pieces mounted to the frame, and a plurality of electronic switches mounted to the frame for detecting the number of the weight pieces that are moved. The pulley assembly includes at least one pulley mounted to the frame; and a transmission member mounted to the pulley and connected with the weight pieces. The pulley sensor is mounted to the frame for sensing the status of the pulley. The operating device is connected with the transmission member for driving the pulley assembly to move the weight pieces. The control device is electrically connected with the electronic switches and the pulley sensor for calculating, displaying, and recording data of the user's exercise performance.

BRIEF DESCRIPTION OF THE DRAWINGS**[0006]**

FIG. 1 is a perspective view of a preferred embodiment of the present invention.

FIG. 2 is a circuit block diagram of the preferred embodiment of the present invention.

FIG. 3 is an enlarged view of a part A indicated in FIG. 1.

FIG. 4 is an enlarged view of a part of the preferred embodiment of the present invention, illustrating the counterweight device.

FIG. 5 is a block diagram of the preferred embodiment of the present invention.

FIG. 6 is another perspective view of the preferred embodiment of the present invention, illustrating that the weight pieces are moved.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0007] Referring to FIGS. 1-4, an exercise apparatus 10 constructed according to a preferred embodiment of the present invention is composed of a counterweight device 20, a pulley assembly 30, a pulley sensor 40, an operating device 50, and a control device 60.

[0008] The counterweight device 20 includes a frame 22, a plurality of weight pieces 24 mounted to the frame 22, and a plurality of electronic switches 26 mounted to the frame 22. Each of the weight pieces 24 has a magnetic portion 241. Each of the electronic switches 26 is a photoelectric switch or a reed switch, which is taken in this embodiment as an example only rather than a limitation. The magnetic portions 241 can magnetically activate the electronic switches 26 for detecting the number of the weight pieces 24 that are moved. When the electronic switches 26 detect one of the magnetic portions 241, the electronic switch 26 is triggered.

[0009] The pulley assembly 30 includes a plurality of pulleys 32 and a transmission member 34. The pulleys 32 are mounted to the frame 22. The transmission member 34 is mounted to the pulleys 32 and connected with the weight pieces 24. The transmission member 34 is a belt or a cable wire, which is taken in this embodiment as an example only rather than a limitation.

[0010] The pulley sensor 40 is mounted to the frame 22 and located at one of the pulleys 32 for sensing the status of the pulleys 32. The pulley sensor 40 is a pressure sensor, a photoelectric sensor, or a Hall sensor, which is taken in this embodiment as an example only rather than a limitation.

[0011] The operating device 50 is connected with the transmission member 34 for the user to operate for strengthening the user's muscles. While the operating device 50 is operated, the transmission member 34 is drawn to enable the pulley assembly 30 to drive the movement of the weight pieces 24.

[0012] The control device 60 is electrically connected with the electronic switches 26 and the pulley sensor 40. The control device 60 includes a processor 62, a display panel 64, and a memory module 66. The processor 62 is electrically connected with the electronic switches 26 and the pulley sensor 40, for identifying the number of the moved weight pieces 24 according to the number of the triggered electronic switches and then identifying the status of the pulleys 32 according to output signals of the pulley sensor 40 for inferring data of performance of the user's muscle strengthening. The data include at least one of the information, like load of weight, exercise frequency, exercise time, and calorie expenditure. The display panel 64 is electrically connected with the processor 62 for displaying the data. The memory module 66 is electrically connected with the processor 62 for recording the data.

[0013] Referring to FIGS. 5-6, a method based on the exercise apparatus 10 for inferring the data of performance of the user's muscle strengthening includes the following steps.

a) Sense the movement of the pulleys 32 by the pulley sensor 40. If the pulleys 32 remain still, repeat this step to identify whether the user has operated the exercise apparatus 10. If the pulleys 32 are moved, indicating that the user begins to pull the transmission member 34 for operating the exercise apparatus, proceed to the next step.

b) Detect the magnetic portions 241 by the electronic switches 26. The processor 62 acquires the number of the moved weight pieces 24 according to the number of the triggered electronic switches.

c) The processor 62 acquires the load of weight according to the number of the moved weight pieces 24 to calculate the exercise time and the calorie expenditure.

d) Detect by means of the pulley sensor 40 as to whether the pulleys 32 are rotated counterclockwise. If the pulleys 32 have not been rotated counterclockwise, indicating that the user has not finished pulling the weight pieces 24, repeat this step. If the pulleys 32 are rotated counterclockwise, indicating that the user has finished pulling the weight pieces 24 to re-instate the weight pieces 24, proceed to the next step.

e) Accumulate the exercise frequency.

f) Sense by the pulley sensor 40 as to whether the pulleys are rotated clockwise. If the pulleys 32 are rotated clockwise, indicating that the weight pieces 24 are pulled again, proceed back to the step b). If the pulleys 32 have not been rotated clockwise, indicating that the weight pieces 24 have not been re-instated, proceed back to the next step.

g) Sense by the pulley sensor 40 as to whether the pulleys 32 stop rotation. If the pulleys 32 do not stop rotation, proceed back to the step f). If the pulleys 32 stop rotation, indicating that the user stops oper-

ating the exercise apparatus 10, the processor 62 stops counting the time.

[0014] In conclusion, the exercise apparatus 10 of the present invention can come up with more accurate data, like the load of weight, the exercise frequency, the exercise time, and the calorie expenditure, to further enable the user to know the performance of the muscle strengthening.

[0015] Although the present invention has been described with respect to a specific preferred embodiment thereof, it is no way limited to the details of the illustrated structures but changes and modifications may be made within the scope of the appended claims.

Claims

1. An exercise apparatus (10) being **characterized in that** the exercise apparatus (10) comprises:

a counterweight device (20) having a frame (22), a plurality of weight pieces (24) mounted to the frame (22), and a plurality of electronic switches (26) mounted to the frame (22) for detecting the number of the weight pieces (24) that are moved;

a pulley assembly (30) having at least one pulley (32) and a transmission member (34), the at least one pulley (32) being mounted to the frame (22), the transmission member (34) being mounted to the at least one pulley (32) and connected with the weight pieces (24);

a pulley sensor (40) mounted to the frame (22) for sensing the status of the at least one pulley (32);

an operating device (50) connected with the transmission member (34) for driving the pulley assembly (30) to move the weight pieces (24); and

a control device (60) electrically connected with the electronic switches (26) and the pulley sensor (40).

2. The exercise apparatus (10) as defined in claim 1, being **characterized in that** the electronic switch (26) is a reed switch or a photoelectric switch.

3. The exercise apparatus (10) as defined in claim 1, being **characterized in that** the electronic switch (26) is the reed switch, and each of the weight pieces (24) comprises a magnetic portion (241), the electronic switches (26) corresponding to the magnetic portions (241) respectively, the magnetic portions (241) magnetically

4. The exercise apparatus (10) as defined in claim 1, being **characterized in that** the control device (60)

comprises a processor (62) electrically connected with the electronic switches (26) and the pulley sensor (40), the processor (62) referring to the number of the moved weight pieces (24) and the status of the at least one pulley (32) for inferring data of performance of a user's muscle strengthening. 5

5. The exercise apparatus (10) as defined in claim 4, being **characterized in that** the data comprises at least one of load of weight, exercise frequency, exercise time, and calorie expenditure. 10
6. The exercise apparatus (10) as defined in claim 4, being **characterized in that** the control device (60) further comprises a display panel (64) electrically connected with the processor (62) for displaying the data. 15
7. The exercise apparatus (10) as defined in claim 4, being **characterized in that** the control device (60) further comprises a memory module (66) electrically connected with the processor (62) for recording the data. 20
8. The exercise apparatus (10) as defined in claim 1, being **characterized in that** the transmission member (34) is a cable wire or a belt. 25
9. The exercise apparatus (10) as defined in claim 1, being **characterized in that** the pulley sensor (40) is a Hall sensor, a pressure sensor, or a photoelectric sensor. 30
10. A method based on the exercise apparatus (10) defined in claim 1 for inferring the data of performance of the user's muscle strengthening being **characterized in that** the method comprises steps of: 35
 - a) sensing by the pulley sensor (40) as to whether the at least one pulley (32) is moved or not; if the at least one pulley (32) remains still, repeat this step; if the at least one pulley (32) is moved, proceed to the next step; 40
 - b) detecting the weight pieces (24) by the electronic switches (26) to identify the number of the moved weight pieces (24); 45
 - c) calculating the exercise time and the calorie expenditure;
 - d) detecting by means of the pulley sensor (40) as to whether the at least one pulley (32) is rotated counterclockwise; if the at least one pulley (32) is not rotated counterclockwise, repeat this step; if the at least one pulley (32) is rotated counterclockwise, proceed to the next step; 50
 - e) accumulate the exercise frequency; 55
 - f) sensing by the pulley sensor (40) as to whether the at least one pulley (32) is rotated clockwise; if the at least one pulley (32) is rotated clockwise,

proceed back to the step b); if the at least one pulley (32) is not rotated clockwise, proceed to the next step; and
g) sensing by the pulley sensor (40) as to whether the at least one pulley (32) stops rotation; if the at least one pulley (32) does not stop rotation, proceed back to the step f); if the at least one pulley (32) stops rotation, the processor (62) stops counting the time.

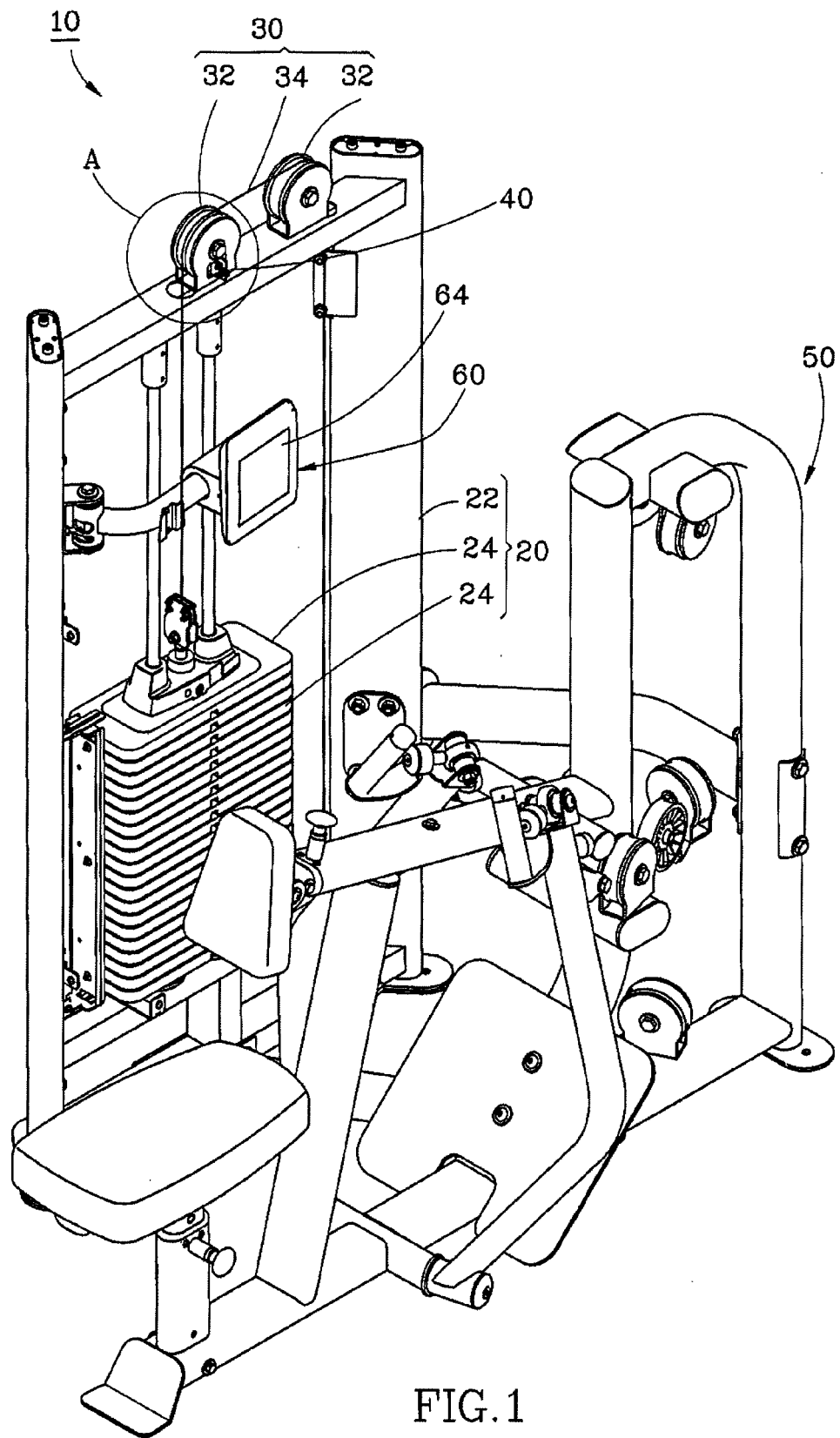


FIG. 1

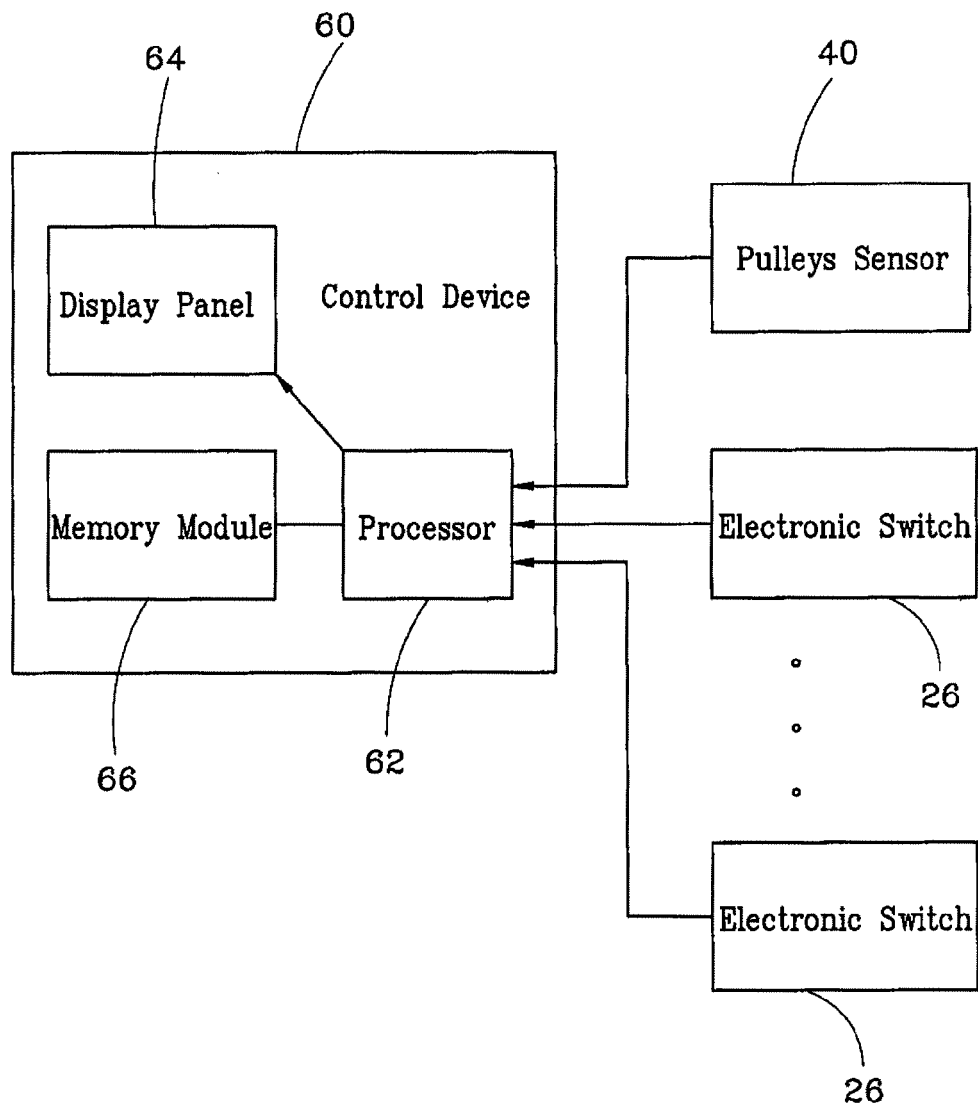


FIG. 2

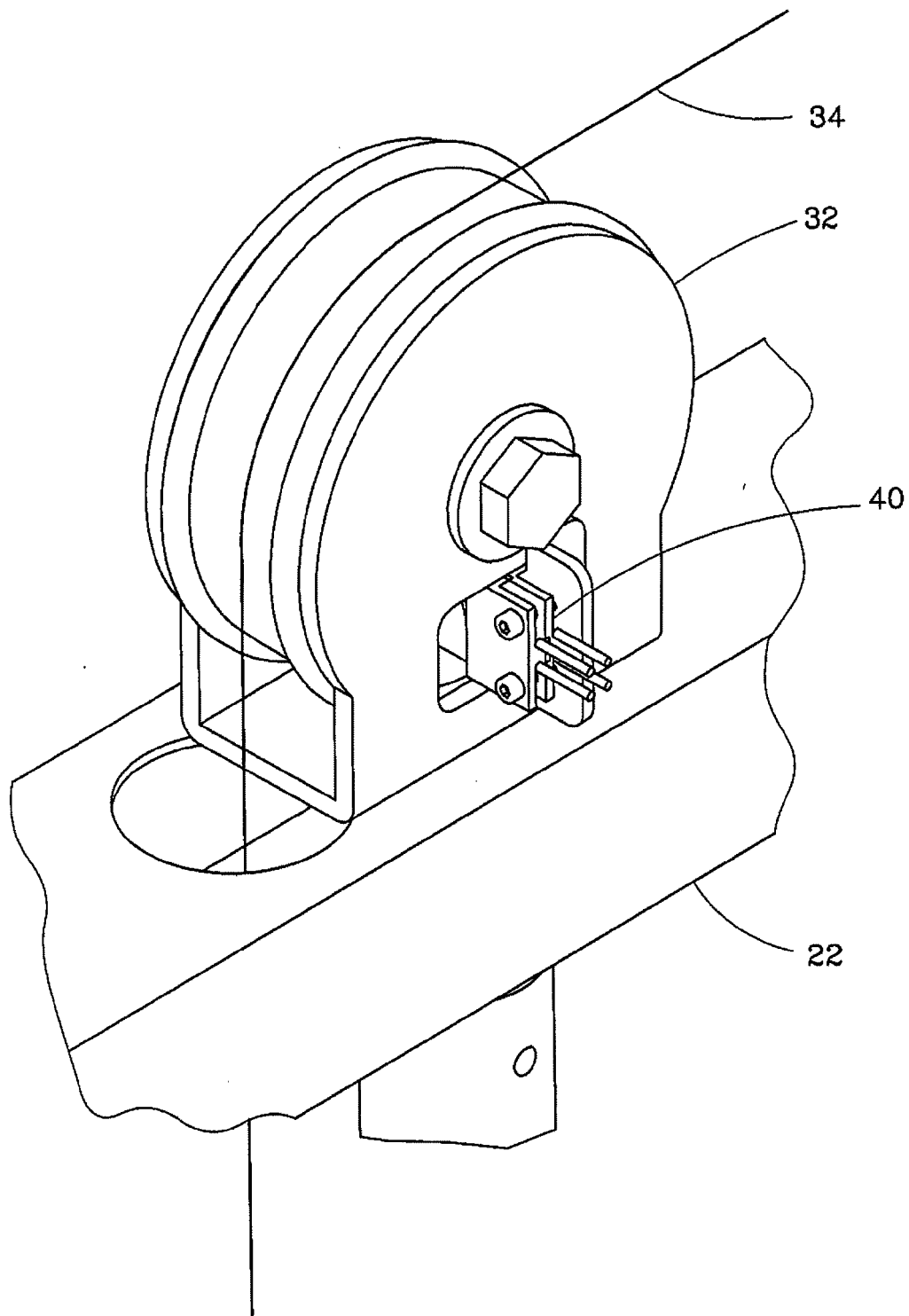


FIG. 3

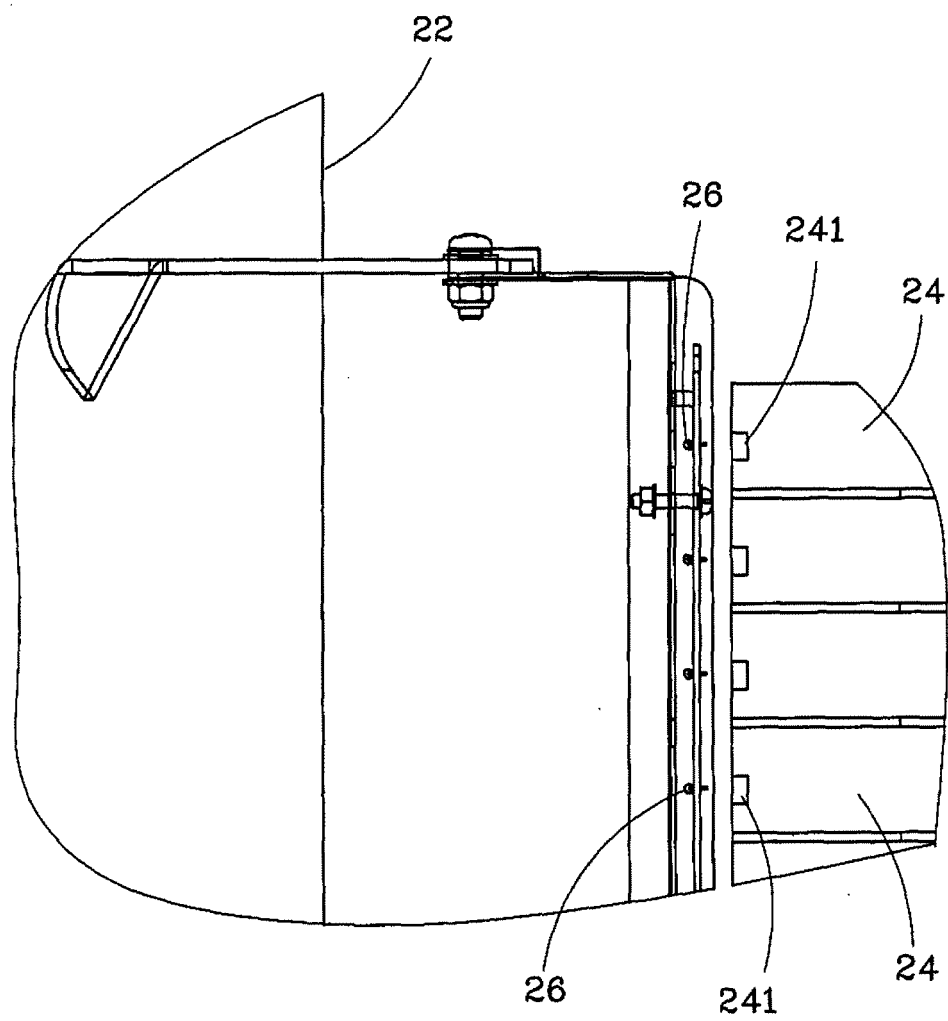


FIG. 4

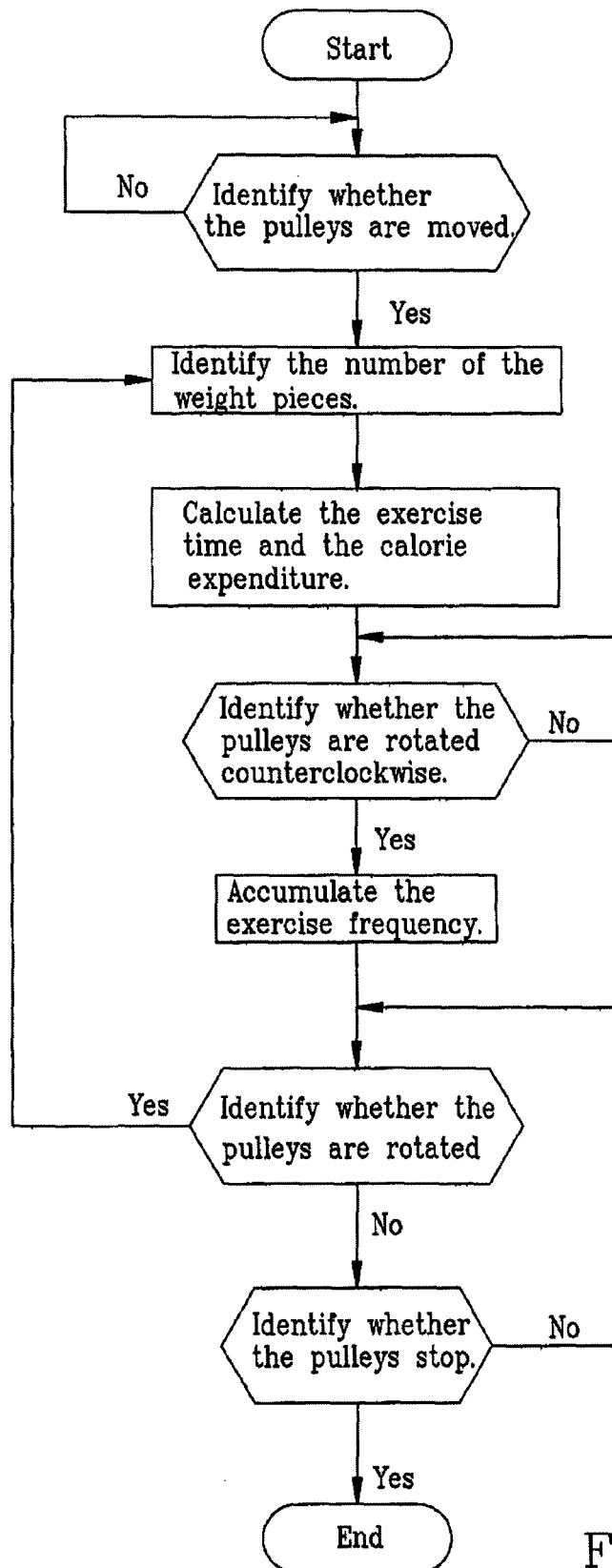


FIG. 5

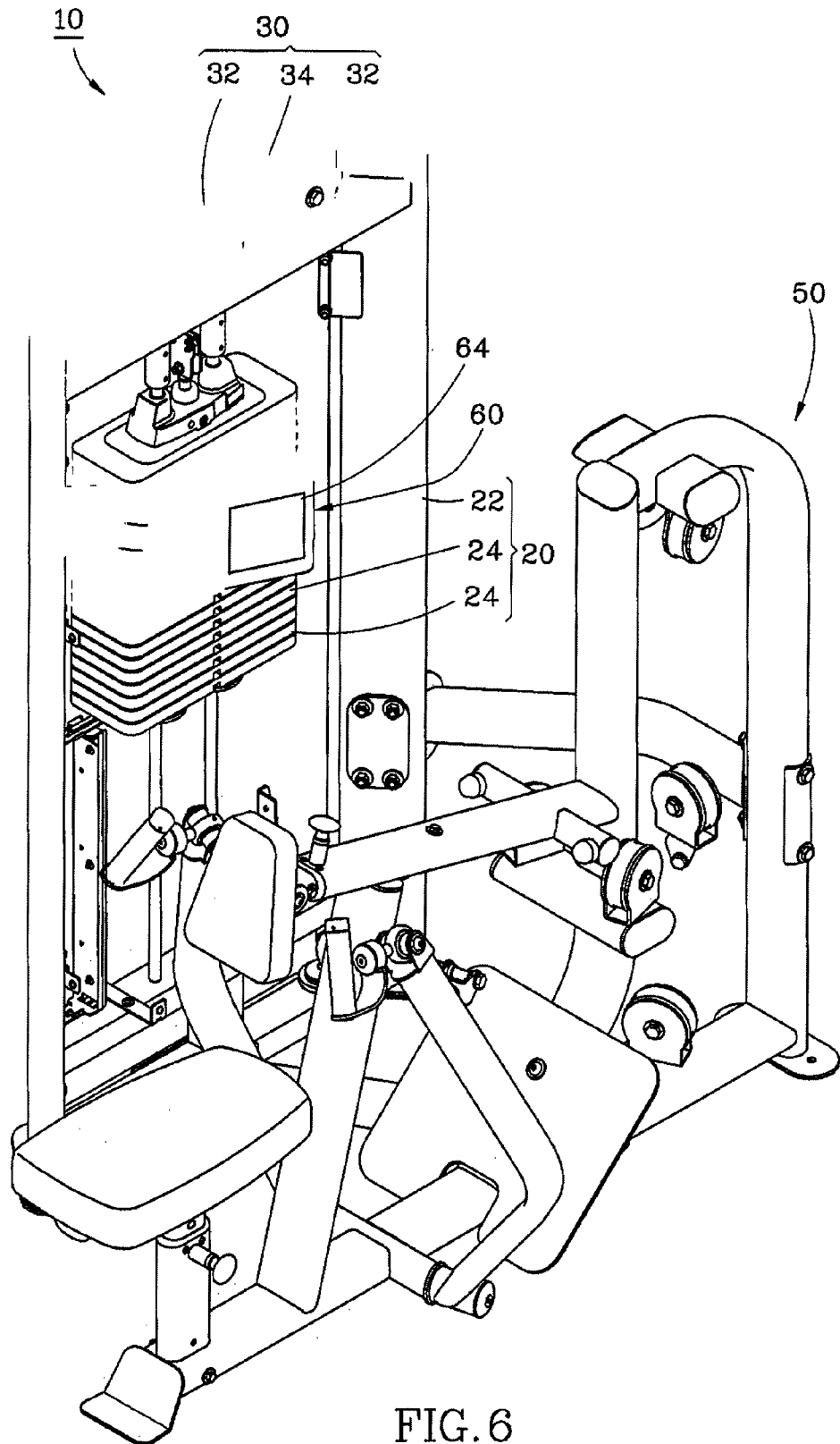


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 5278

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2007/054786 A1 (PIANE ROBERT A JR [US] PIANE JR ROBERT A [US]) 8 March 2007 (2007-03-08) * paragraph [0013] - paragraph [0062]; figures 1-8 *	1-10	INV. A63B21/062
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 18 June 2010	Examiner Oelschläger, Holger
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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