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(54) **APPARATUS FOR ABDOMINAL EXERCISE**

(57) Apparatus for gymnastic abdominal exercise comprising a base (1) and supporting means (2) for the user's legs. Base (1) comprises at least one suction cup

(3) for attaching said apparatus to a smooth surface and supporting means (2) comprise holding elements (4) for firmly holding the user's legs.

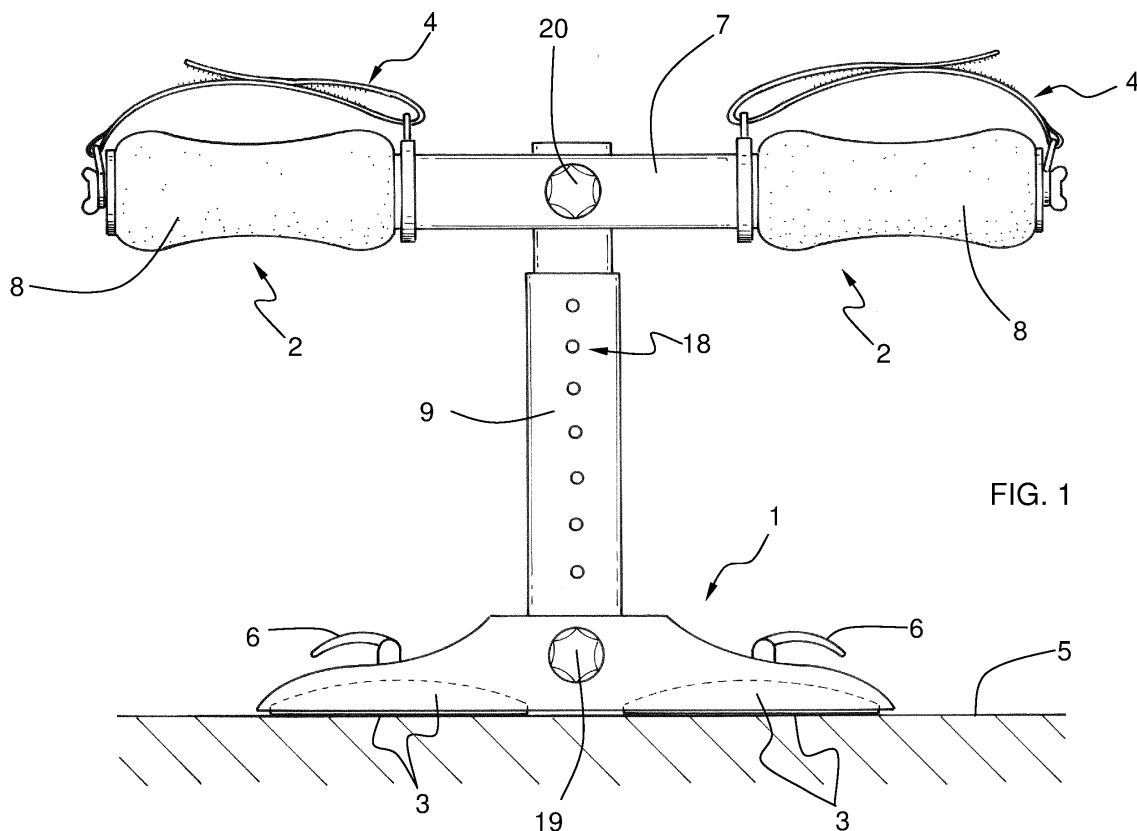


FIG. 1

Description

Field of the invention

[0001] The invention relates to the sector of apparatuses intended for exercising abdominal muscles in a correct way.

[0002] In particular, the invention relates to an apparatus for gymnastic abdominal exercises comprising a base and supporting means for the user's legs.

State of the art

[0003] Abdominal muscles stretch out from the bottom part of the ribs to the top of the pelvis, protecting the internal organs. However their functions go further, as in coordination with the paravertebral muscles of the back and the psoas muscle of the hip, they help to keep the spine straight.

[0004] The abdominal muscles together with these hip and back muscles form a nucleus where the body's centre of gravity lies. Most of the routine movements we make repetitively every day stem from this nucleus. A strong nucleus leads to greater strength, stability and balance and also prevents injuries, particularly due to muscles overloading.

[0005] Generally, the abdominal muscles are usually weak in comparison with the lumbar muscles. This is because the lumbar muscles are exercised involuntarily just by standing up. However the abdominal muscles need to be exercised voluntarily with specific exercises. This maladjustment causes decompensation in the pelvic area which often ends up in hyperlordosis, an abnormal curving of the back, and its dangerous resulting consequences (painful sciatic nerve, spondylolysis, etc.).

[0006] Going beyond aesthetical criteria, abdominal muscles must be exercised regularly in order to maintain correct body alignment and to compensate natural spine imbalance as the years go by.

[0007] There is plenty of literature on the most recommended exercises for strengthening abdominal muscles. However, many of the most used exercises, in addition to not achieving the desired effect, also cause injuries, particularly in the back.

[0008] It is important to remember that healthy muscles, in physiological terms, balance the abdominal muscles with the back and hip muscles. The more intensely somebody practices sport, the more necessary it will be to exercise the abdominal muscles in order to compensate maladjustments.

[0009] Generally, and unless there are specific medical counter indications for certain individuals with specific ailments, it is important to highlight the following aspects which should be taken into account to increase performance and reduce the risk of injury when doing abdominal exercises: start from the ideal or neutral position, which is lying on the back. Head relaxed so as not to force the neck muscles, the chin separated from the body and

hands at the height of the back of the neck. This is called the supine position. The back rests in a relaxed state on the mat. The knees are bent to prevent the lumbar region from arching. Then, with the knees bent, the top part of the torso is lifted to a maximum of 30°. From this inclined position, the spine does not bend any further and the hip (iliopsoas) and pelvis flexing muscles are required for the lift. Exceeding the limit of 30° implies considerably increasing the risk of injury and not obtaining the intended aim. Finally, the torso is kept in a raised position and is let down slowly.

[0010] It is advisable to carry out no more than three or four series, with a maximum of twenty to thirty repetitions in each series. It is worth highlighting that in order to exercise the abdominal muscles in a physiologically healthy way, it is not advisable to strain the psoas muscles (hip) as the drawbacks outweigh the benefits. Therefore, it is not advisable to carry out series with too many repetitions as this introduces rebounds and impulses that reduce effectiveness.

[0011] In the state of the art, there are three usual ways of doing abdominal exercises.

[0012] Exercising in pairs. Where one holds and the other does the exercise and vice versa. However, a partner is not always available, particularly at home. Also, it is difficult for the partner to counteract the body mass of the person doing the exercise and so their legs can easily move. This task becomes more complicated when the exercise has to be done with the legs in the air.

[0013] Stall bar. Very few people can have this apparatus at home. But in the event it is possible, or for example, for those who use a gym, the stall bar is more of a difficulty than an advantage. This is because the leg muscles, starting with the muscles in the feet, tibialis, peroneus, triceps surae and quadriceps, and ending with the actual psoas muscles, are under great tension because they must keep the feet fitted between the wooden bars. The effort is such after the second series, that the tension is concentrated more in that area than in the area of the actual abdominal muscles.

[0014] Abdominal benches. These have been used for a long time, and will continue to be used, but they have two problems, particularly for those people with back problems. First of all, the legs are held such that they are under the pelvis. Secondly, they are intended more for sit up exercises than for crunch exercises. It is worth remembering that for healthy, effective exercise the spine only has to curve up to 30°.

[0015] Moreover, it is worth highlighting that doing exercises to strengthen the abdominal muscles, with the aim of maintaining a balanced muscular structure and particularly for therapeutic purposes, requires regularity rather than intensity. In other words, it is more effective and beneficial to do a few abdominal exercise series regularly than to do a large number of series on a non-regular basis. Some people do hundreds of repetitions and introduce rebounds that involve other non-desired muscle groups, and reduce the effectiveness. This leads to the

need for an apparatus that as well as allowing the user to do exercises in a physiologically correct manner, can be transported simply, and used anywhere.

Disclosure of the invention

[0016] The aim of the invention is to provide an apparatus for gymnastic abdominal exercises that facilitates doing abdominal exercises in a physiologically optimum way, reducing as much as possible any effort that is not aimed at directly strengthening the abdominal muscles and which at the same time is compact, lightweight, transportable and allows the user to do the exercises anywhere. This purpose is achieved by means of an apparatus for gymnastic abdominal exercise of the type indicated at the beginning, **characterized in that** the base comprises at least one suction cup for attaching said apparatus to a smooth surface and in that said supporting means comprises holding elements for firmly holding the user's legs.

[0017] The suction cup ensures that the apparatus according to the invention can be attached to any smooth surface. This is important because, as already mentioned, strengthening the abdominal muscles in a physiologically healthy way, requires doing the exercises regularly. In other words, the suction cup allows the user to attach the apparatus to any smooth surface, so that said user can install it anywhere he needs to. Therefore, the user does not have to have various apparatuses installed on a fixed basis in the different areas where he wants to do the exercises.

[0018] Furthermore, the suction cup or cups have the additional advantage whereby by allowing the apparatus to be transportable, they reduce the weight of the apparatus as much as possible, without thereby losing versatility with respect to its attachment. Any alternative lightweight attachment system would always require some kind of previous installation. Alternatively, the base could be heavy enough to counteract the upward force produced by the user as he comes down when exercising. However, this would automatically increase the weight of the apparatus and would compromise its transportability.

[0019] Moreover, the leg holding elements facilitate doing the exercises in a particularly effective and physiologically optimum way. The known apparatuses of the state of the art that do not guarantee holding the legs firmly, reduce the effectiveness of the exercises. This is due to the fact that the user must compensate the movement of the centre of the body mass when lifting and lowering with corrective movements using the legs, that reduce the real effort made directly on the abdominal area and therefore, prevent taking advantage of the exercise in an optimal manner.

[0020] Preferably said suction cup comprises vacuum production means for removing the air contained between said suction cup and said smooth surface. This facilitates assembling and particularly dismantling the

apparatus. In the invention, the active vacuum production means refer to any way of producing the vacuum in the suction cup, that does not consist in compressing it manually against a surface. In the case of suction cups that work simply via compression against the floor, it may be difficult to dismantle the apparatus from the surface on which it is assembled and a strength may be necessary that certain users may not be able to exercise.

[0021] Preferably each of said holding elements comprise bands of adjustable length for accommodating and holding the user's legs in the ankle area and particularly preferably, said bands hold the user's ankles above the user's ankle joint. The bands have the advantage of being comfortable for the user, but it is particularly advantageous that the user's legs are held by the ankle area, so that when doing the exercise, the user does not have to use strength to compensate any possible relative movement between the foot and leg. This makes it possible to concentrate the effort in an even more optimal manner on the abdominal area.

[0022] Preferably said bands are rotatably mounted around the longitudinal direction of said supporting means, so as to increase the comfort of the apparatus when holding the ankle area.

[0023] Preferably the apparatus comprises means for adjusting the height of said supporting means with respect to the floor, in order to give the apparatus versatility and make it possible to do exercises with the legs in different positions.

[0024] In a particularly preferable manner, the height between the floor and the supporting point of the user's legs on said holding elements is adjustable by means of said adjustment means in a range of 10 to 65 cm. This guarantees that the legs remain held at a height above the pelvis, and improves the quality of the exercises performed.

[0025] Preferably said supporting means and said base can be disassembled from each other.

[0026] Also, the invention covers other advantageous characteristics illustrated in the detailed description of an embodiment of the invention and in the accompanying figures.

Brief description of the drawings

[0027] Other advantages and characteristics of the invention will be appreciated from the following description, in which, as a non-limiting example, a preferable embodiment of the invention is described, with reference to the accompanying drawings, in which:

Fig. 1, a front view of the apparatus for gymnastic abdominal exercise according to the invention.

Fig. 2, a longitudinal section along one of the apparatus supporting means.

Figs. 3A and 3B, side views of a first way of using the apparatus according to the invention.

Figs. 4A and 4B, side views of a second way of using

the apparatus according to the invention.

Detailed description of an embodiment of the invention

[0028] As can be seen in Figure 1, the apparatus for gymnastic abdominal exercise according to the invention mainly comprises a base 1 for supporting the apparatus on the floor 5 and supporting means 2 for the user's legs. When the apparatus for doing the exercises is assembled, said supporting means are firmly joined to said base to prevent significant relative movements of the legs with respect to the floor. The apparatus can be attached to a smooth surface by means of two suction cups 3 or vacuum cups. Preferably, suction cups 3 comprise reversible vacuum production means 6 in the form of an action lever that acts on the respective suction cup. These levers make it possible to remove the air under corresponding suction cup 3 by tilting the lever or letting the air enter so that the apparatus can be dismantled in a simple way for the user. In a more basic embodiment, suction cups 3, can be simple suction cups that adhere when the apparatus is compressed against the floor and that do not have specific means for removing the vacuum created. In an alternative, more sophisticated embodiment, the apparatus could also include, for example, a mechanically driven suction pump. It is also important to highlight that the number of suction cups 3 can vary according to the configuration. So, optionally, an apparatus with one single suction cup or with more than two is conceivable.

[0029] Furthermore, in this embodiment, supporting means 2 for the legs comprise a horizontal support 7 like a cylindrical cross section bar. Figure 2 shows in greater detail the configuration of supporting means 2 also comprising holding elements 4 for firmly holding the user's legs. At each of its ends horizontal support 7 has a cushion 8 on which the user can comfortably rest his legs, and in particular the ankle area. At its external end, horizontal support 7 has a bushing 10 joined to horizontal support 7, for example, by means of a thread screwed onto its inner diameter. Bushing 10 also has a retention disk 11 that prevents cushions 8 from coming out of support 7. Moreover, thanks to bushing 10 cushions 8 can be disassembled to be changed in the event of excessive wear through use.

[0030] Holding elements 4, are, in this case, bands 14 of adjustable length for accommodating and holding the user's legs by the ankle area. As can be seen in Figure 2 the first end 12 of band 14 is joined via a clamp 16 to a shaft 11 that is threaded as one piece with bushing 10. So, band 14 can rotate freely with respect to horizontal support 7. Second end 13 is joined to horizontal support 7 by ring 15, and freely rotatable with respect to horizontal support 7. This way each band 14 can rotate freely by its ends 12, 13 around the longitudinal direction defined by horizontal support 7 of supporting means 2.

[0031] Moreover, bands 14 have corresponding strips 21 of Velcro® that allow their length to be adjusted when attaching the user's ankles to supporting means 2.

[0032] Figure 1 also shows that supporting means 2 are joined to base 1 by a vertical telescopic support 9. The height of vertical support 9 with respect to the floor can be regulated by adjustment means 18. Preferably the height between floor 5 and supporting point 17 can be adjusted in a range of 10 to 65 cm. This way, any user can do exercises with the tibia-fibula group arranged in a horizontal position, according to Figures 3A and 3B, or in an acute angle position according to Figures 4A and 4B. As can be seen in the Figures, supporting point 17, moves around the perimeter of cushions 8 as the acute angle between the tibia and floor 5 increases.

[0033] Figure 1 also shows that the apparatus according to the invention can be disassembled in parts so that it can be transported more comfortably. In particular, between base 1 and vertical support 9 a first dismountable joint 19 is provided, while between vertical support 9 and horizontal support 7 a second dismountable joint 20 is provided. This first and second dismountable joints 19, 20 can be, for example, a pin with a spring or a screwed articulation.

[0034] Below, on the basis of Figures 3A to 4B the operation and advantages of the invention are explained in more detail.

[0035] Figures 3A and 3B show how in order to do the exercises in a physiologically optimum way, the user starts in the supine position shown in Figure 3A, in other words, lying face upwards, while the back and head rest fully supported on floor 5. The hands must be at the height of the neck but without holding it. The user bends his knees at an angle α of preferably approximately 45° and the legs rest on cushions 8 of supporting means 2 in the ankle area, with the tibia and fibula in a horizontal position. In turn, band 14 holds each ankle to prevent it from moving either vertically or sideways during the exercise. This is a notable advantage in the invention because it ensures that no useless effort is made to compensate the imbalance in the centre of gravity when lifting or any relative movement between the ankle and leg.

[0036] From this resting position the contraction known as "crunch" begins, which consists in lifting the top part of the torso to an angle β of approximately 30° , directing the head towards the knees, but not up to the knees. In this position, the user must maintain the contraction for a few moments and then come down slowly. So, a repetition consists of 3 differentiated stages : lifting stage, contraction stage and finally the lowering stage.

[0037] During the first lifting stage, the torso is bent towards the knees and so the legs push against the floor. At this point, the user's legs find a stable support on supporting means 2 and particularly on cushions 8 which facilitate the movement.

[0038] Once in the position of maximum contraction is reached, the user must hold the position for a few moments, as shown in Figure 3B. Without the inertia of the lift and with the centre of gravity altered, in this second stage the whole body tends to fall down. This must be compensated by forcing a new distribution of weight to-

wards the legs, using the hip muscles. Thanks to bands 14, the legs have no vertical movement. The torso does not fall down and the user can hold the contraction at 30°, concentrating the force totally in the abdominal muscles. This makes the exercise much more intense and effective with the same number of repetitions. At this point it is worth highlighting that thanks to the fact that bands 14 hold the legs in the ankle area, instead of on the feet, the user does not have to make any effort to compensate the ankle articulation, which would jeopardise the effectiveness of the exercise, and which is particularly advantageous with respect to other apparatuses known in the state of the art, where at the most, it is the feet that are held.

[0039] Finally, the user lowers, which is just as important as the lift or contraction. This third stage tends to be omitted because of the difficulty implied in keeping the tension in the abdominal area while the whole body balances towards the torso. The imbalance causes a sudden, and therefore sterile lowering. It is important to lower slowly, also concentrating the force on the abdominal muscles until the shoulder blades are again resting on the floor. Again bands 14 firmly hold the user's legs so that the user can perform the exercise in a physiologically optimum way, in other words, lowering slowly and making the most of the exercise.

[0040] Therefore, thanks to the apparatus according to the invention it is also possible to intensify resistance during the lowering, making the most of each repetition.

[0041] Figures 4A and 4B show an alternative way of doing the abdominal exercise, where the difference with the previous example consists in the position of the tibia and fibula with respect to the floor 5. In this case, supporting means 2 are in a lower position, so that the tibia-fibula set forms an acute angle with respect to the floor. Thanks to the fact that bands 14 are rotatably mounted around the longitudinal direction of supporting means 2, the user can do the exercise without causing harmful tension on the ankles. Figures 4A, 4B show how bands 14 form approximately a right angle with the longitudinal direction of the tibia and fibula.

[0042] The reasoning set out above is reinforced further when it is desired to increase the intensity of the exercise, for example, with weights. If a certain weight is held in the hands to intensify the execution of the crunch, the centre of gravity moves towards the area of the neck, and without the legs being held, this movement must be corrected in some way, for example, by stretching the legs or looking for a compromised point of balance with the back, which is very uncomfortable and can be harmful to lumbar health. By contrast in the invention, firmly holding the user's ankle area guarantees being able to do the exercise in a physiologically optimum, effective way.

prising a base (1) and supporting means (2) for the user's legs, **characterized in that** said base (1) comprises at least one suction cup (3) for attaching said apparatus to a smooth surface and **in that** said supporting means (2) comprises holding elements (4) for firmly holding the user's legs.

2. Apparatus according to claim 1, **characterized in that** said suction cup (3) comprises vacuum production means (6) for removing the air contained between said suction cup (3) and said smooth surface.
3. Apparatus according to claim 1 or 2, **characterized in that** each of said holding elements (4) comprise bands (14) of adjustable length for accommodating and holding the user's legs in the ankle area.
4. Apparatus according to claim 3, **characterized in that** said bands (14) are rotatably mounted around the longitudinal direction of said supporting means (2).
5. Apparatus according to claim 3 or 4, **characterized in that** said bands (14) hold the user's ankle area above the user's ankle joint.
6. Apparatus according to any of the claims 1 to 5, **characterized in that** it comprises adjustment means (18) for the height of said supporting means (2) with respect to the floor.
7. Apparatus according to claim 6, **characterized in that** the height between the floor and the supporting point (17) of the user's legs on said holding elements is adjustable by means of said adjustment means (18) in a range of 10 to 65 cm.
8. Apparatus according to any of the claims 1 to 7, **characterized in that** said supporting means (2) and said base (1) can be disassembled from each other.

Claims

1. Apparatus for gymnastic abdominal exercise com-

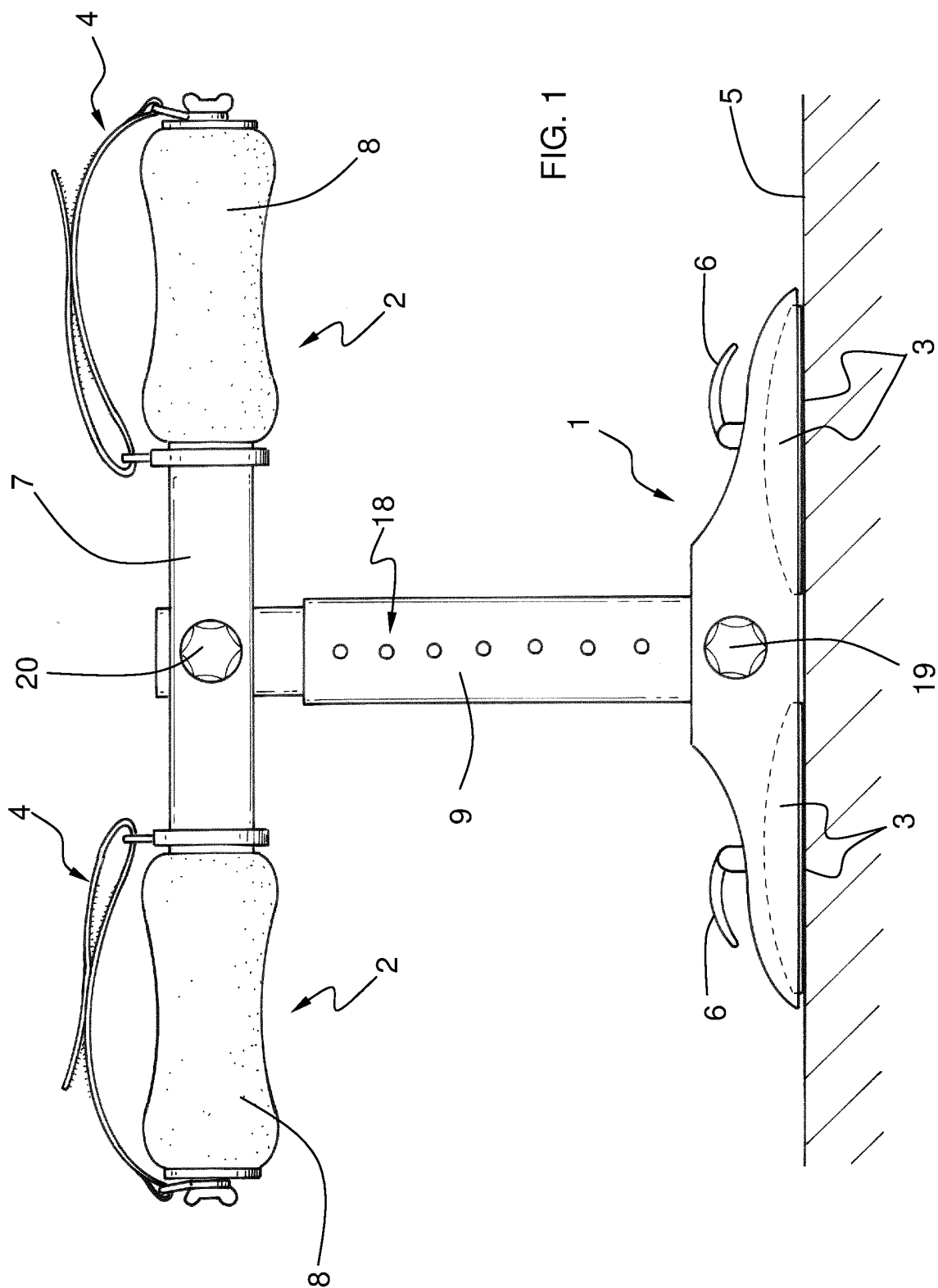


FIG. 1

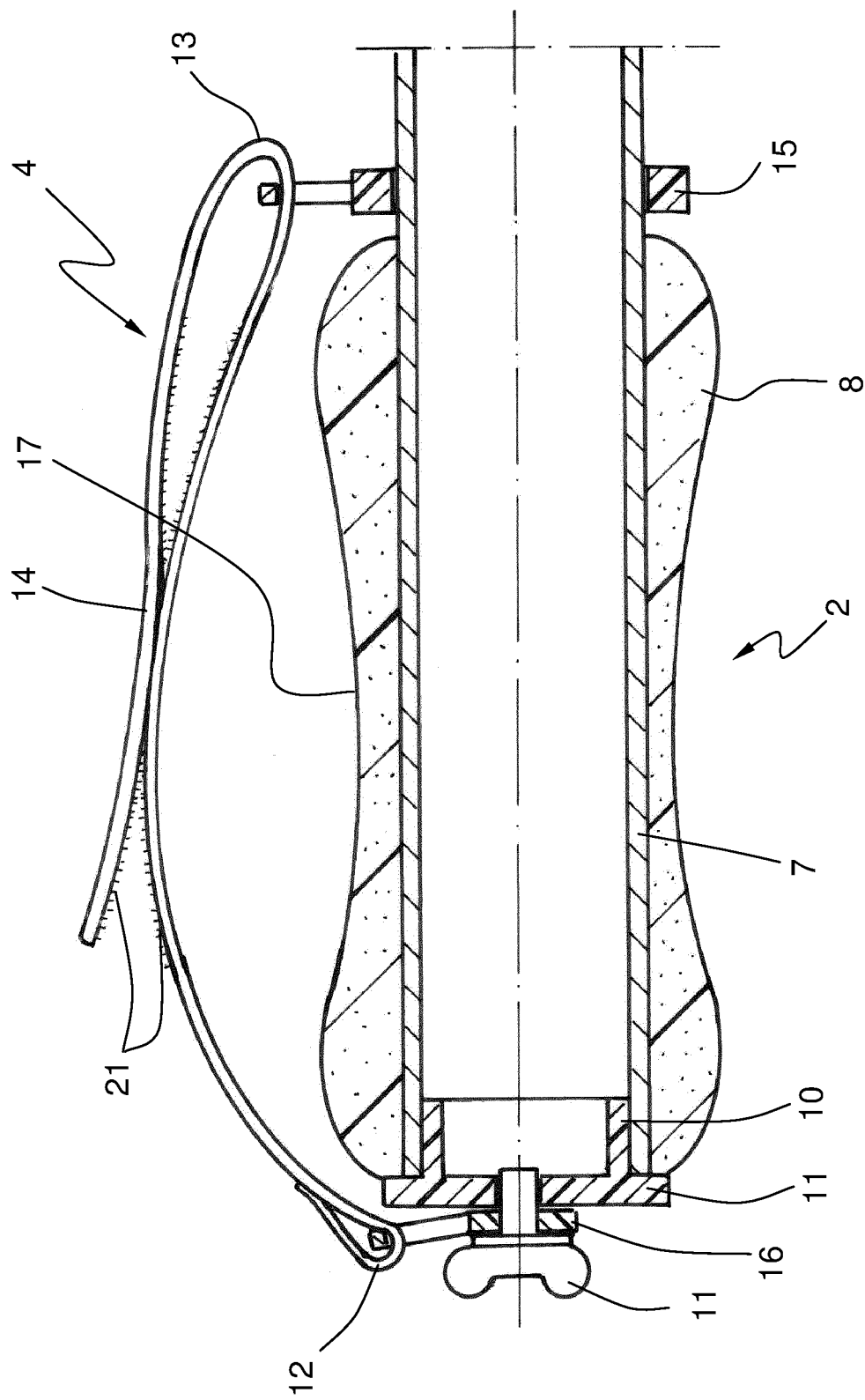


FIG. 2

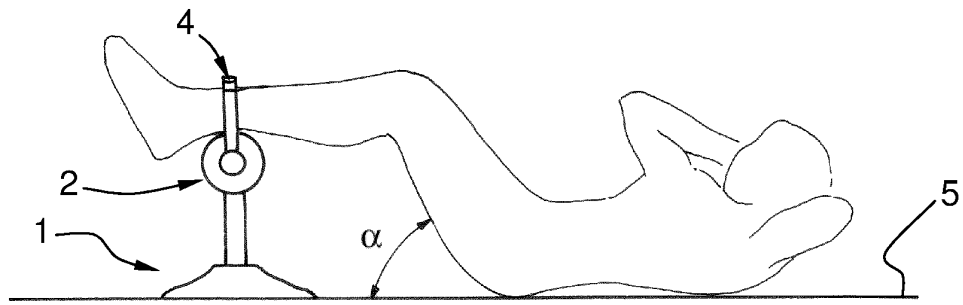


FIG. 3A

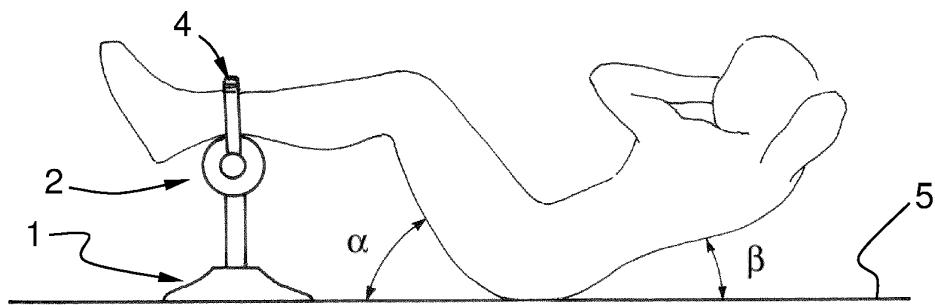


FIG. 3B

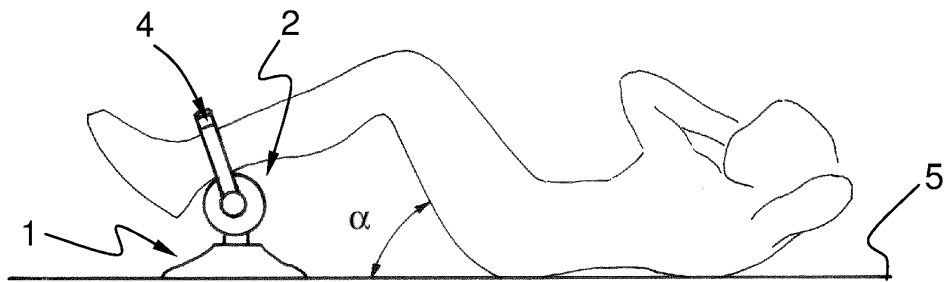


FIG. 4A

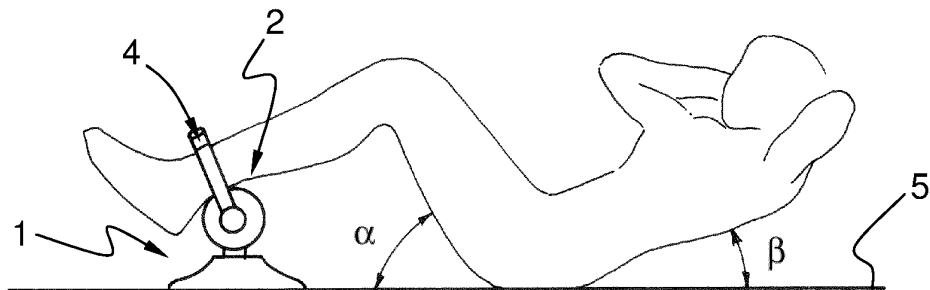


FIG. 4B

INTERNATIONAL SEARCH REPORT

International application No

PCT/ES2010/070485

A. CLASSIFICATION OF SUBJECT MATTER

INV. A63B21/16 A63B23/02

ADD.

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

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 practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 186 702 A (AMANZE CHARLES U) 16 February 1993 (1993-02-16) column 2, lines 38-68 - column 3, lines 1-42; figures	1,2,6-8
X	US 5 328 434 A (CARROLL KEVIN [US]) 12 July 1994 (1994-07-12) column 4, lines 16-68 - column 5, lines 1-68; figures 1-3	1,3-5,8
A	WO 02/074393 A2 (BALBO ALBERTO [IT]) 26 September 2002 (2002-09-26) page 10, lines 19-31 - pages 11-15; figures 28-47	1-8

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

* Special categories of cited documents :

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Date of the actual completion of the international search

15 December 2010

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27/12/2010

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/ES2010/070485

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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