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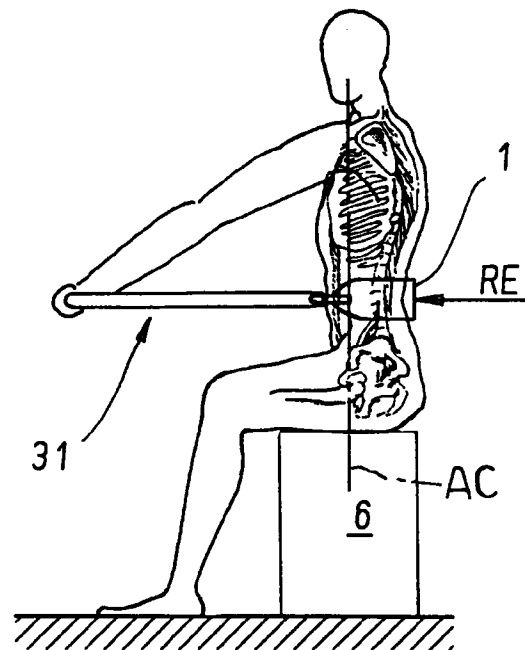
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(54) **"Implement particularly for gymnastics and use thereof"**

(57) An implement for training the recti abdominis muscles, concentrating thereon workload while preventing the workload from being distributed to the antagonists, such as the iliopsoas muscles; it is constituted, for example, by a frame (31) with three sides: a front one (33), for resting the hands, and two lateral ones, at the rear ends of which an elastic band (1) is anchored and acts as a fourth side; the elastic band is adapted to activate a contrast (RE) in the exercise that consists in flexing the trunk forwards and rotating the pelvis backwards, keeping substantially constant the position of the axis AC that joins the coxofemoral articulation to the scapulohumeral articulation; the implement is used to stimulate equilibrium between the pelvis and the spine, in gymnasiums or even at home, particularly for sports training.



*FIG. 16*

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## Description

The invention relates to an implement particularly for gymnastic training and to the use thereof, i.e., to a device which is adapted to obtain, by its use, a functionality of the body which allows most of all to achieve better sports results, particularly with regard to achieving harmony in terms of muscle tone between the recti abdominis, the iliopsoas and the erectors of the spine, particularly between the two first ones; the use of the implement is also a subject of the patent.

In this regard, it is known that the recti abdominis and the iliopsoas muscles are antagonists as regards achieving equilibrium between the pelvis and the spine.

It is also known that the recti abdominis control the posture of the pelvis by rotating it backwards and act on the costosternal, costovertebral, intervertebral, dorsolumbar and lumbosacral articulations, reducing lumbar lordosis by exercising them; however, the iliopsoas muscles, which control the posture of the pelvis, by rotating said pelvis backwards accordingly increase said lordosis.

Prior art comprises exercises which are not adapted to desirably isolate the contraction of the recti abdominis from the contraction of the iliopsoas, indeed because they act on the balance between the spine and the pelvis in partly opposite manners: depending on the currently chosen initial positions and on the current types of exercise, the latter muscles are naturally involved in the motor action, taking on a possibly very significant part of the workload, which is thus rendered unavailable to the beneficial or in any case intended training only of the former muscles, producing undesirable or unexpected effects.

This occurs both for free exercises and for those performed by means of implements or with the aid of machines, all of which are meant to overcome resistances in order to increase muscle tone and trophicity, but do so indiscriminately and therefore in a manner which is only partially productive.

The implements used so far are constituted by elements which contrast the forward flexing of the trunk, starting for example from a dorsal position with straight or bent legs, or by contrast elements which can be applied to the upper part of the trunk in exercises performed while sitting, standing or kneeling or also by using walls, floors, or mats or horizontal, inclined, fixed or adjustable benches.

Other implements have contrast elements which are applied to the pelvis or to the lower limbs; they are used exclusively to give tone and trophicity to the recti abdominis, with no selection and coordination towards other muscles.

Finally, prior art provides for the combination of implements of the two above kinds, but with similar shortcomings.

Accordingly, the embodiments and methods of application of said contrast elements and the structure

thereof do not allow to isolate the contraction of the iliopsoas muscles from the contraction of the recti abdominis, thus obtaining, for example when seeking to develop the strength of the function of the recti abdominis, the unexpected development of the iliopsoas muscles as well.

The above situation leads to the need to solve the problem of finding an implement which allows to apply the workload to the recti abdominis muscles so as to avoid distributing said workload to other muscles, particularly to the iliopsoas, precisely because they produce contrasting effects which limit the results in terms of the intended achievement of equilibrium between the pelvis and the spine.

The invention solves the above problem by adopting an implement which allows the user to perform the exercise by using an adapted structure constituted by at least one gradually yielding contrast element, such as a periodically deformable, elastic and/or movable body, which is adapted to produce full or partial contact with the dorsolumbar region of the trunk, the user applying pressure or even a thrust against said element repeatedly to flex the trunk and the spine, optionally to the point of reversing the lumbar curve; the implement requiring at least one grip point for the hands or for the retaining support of the shoulders and optionally a surface for sitting, lying in a recumbent position or resting the feet. In any case, in order to achieve the best outcome of the exercise, neither the shoulders nor the pelvis must move forwards significantly: only backward rotation is provided for the pelvis.

The main advantages obtained by the present invention are: the possibility to ensure that only the recti abdominis muscles take on the workload, excluding the iliopsoas and the other antagonists of the spine; better control of the posture of the pelvis and achievement of harmony in terms of tone between the recti abdominis and the iliopsoas in order to improve sport performance; improvement in abdominal tension and respiration, since the recti abdominis also have a respiratory function.

Some elements related to the invention are shown, merely by way of non-limitative example, in the accompanying drawings:

Figures 1 and 2 are views of the muscle insertions; Figures 3 to 22 are views of the body position during practice with the implement of the invention.

In particular:

Figure 1 is a schematic map of the recti abdominis muscles R, which are inserted in an upward region on the cartilages of the fifth, sixth and seventh ribs (C5, C6, C7) and on the xiphoid process A of the sternum and, in a downward region, on the pubic symphysis S;

Figure 2 is a map related to:

-- the iliac muscles I, which are inserted in an upward region on the iliac fossa and in a downward region on the lesser trochanter of the femur F, joined to the tendon T of the psoas magnus;

-- the psoas magni muscles G, which originate in an upward region from the lumbar vertebrae L and from the last thoracic vertebra U and are inserted in a downward region on the lesser trochanter of the femur F together with the two iliac muscles I and the psoas minor muscles P from the twelfth and first lumbar vertebrae to the iliac fascia N.

Figure 3 is a view of the initial position, with the trunk extended and with the contrast RE applied, by means of the implement according to the invention, in a dorsolumbar region of the rear wall of the trunk: the lines of action of said contrast can be normal or inclined in any way;

Figure 4 is a view of the corresponding final position with the trunk flexed.

Figures 3 and 4 show the application with the lowering of the chest, the backward rotation of the pelvis and the flexing of the dorsolumbar spine, with a consequent maximum mutual approach of the insertions of the recti abdominis R, with a contraction of said muscles which is initially isotonic and then isometric and can be separated or combined (isotonometric). At the same time, such Figures show the spacing of the insertions F, U, L of the iliopsoas I, G, P: the angle Y formed between the axis of the spine and of the pelvis with the longitudinal axis of the femur assumes a diverging orientation; the insertions of the dorsal musculus longus D, which is also an antagonist of the recti abdominis R, also move apart: accordingly, all the antagonists of said recti abdominis relax, allowing the best efficiency of the exercise, through the perfect dosage of the loads provided by using the implement as intended.

Figures 5, 6 and 7 further illustrate, respectively, the initial and final positions and the extent B of the movement range of a dorsolumbar band used when using the implement: the axis AC indicates the position, which is substantially constant around the vertical, of the line that joins the coxofemoral articulations in a downward region and the scapulo-humeral articulations in an upward region, during the exercise;

Figures 8, 9 and 10 are views showing an elastic-band implement rigidly fixed to the ground, used while sitting and resting on the ground in order to activate the contrast RE;

Figure 11 is an elevation view of a kinematic implement used for providing a contrast RE,

Figure 12 is a top view of the implement of Figure 11;

Figures 13 and 14 are elevation views of implements used as assisted by a linear actuator to provide the contrast RE;

Figures 15, 16 and 17 are views of a portable elastic-band implement usable for providing the contrast RE;

Figures 18, 19 and 20 are, respectively, views of an implement which can be worn as an outfitted belt, for use assisted by rear and front rests, not necessarily while sitting;

Figures 21 and 22 are respectively an elevation view and a top view of an alternative embodiment of a kinematic implement for providing a contrast RE.

The reference numeral 1 (Figures 8, 9 and 10) designates an elastic band or a fully or partially elastic element, the ends of which are fixed for example to a pair of posts 2 whose height is advantageously adjustable and which are provided with an upper handgrip 3 and are connected in a downward region, by means of a joint 4, to a platform 5. The reference numeral 6 designates a seat; the numeral 7 (Figure 11) designates a seating means, for example a bench provided with an oscillating backrest 8 provided, in a front region, with a padding 9 whose profile is adapted to couple to said dorsolumbar fascia, said means being pivoted to said bench. The reference numeral 10 designates a pusher which is meant to roll on the rear of the advantageously oscillating backrest 8 and is supported, for example, at the end of an angular lever 11 which is pivoted in a downward region on the pivot 12 at the lower end of the support 13, which is for example L-shaped and is supported, advantageously in a vertically adjustable manner, by the sleeve 14 which is fixed to the rear end of the bench 7 to transmit the contrast RE to said backrest 8. The reference numeral 15 designates a first preloaded elastic element inserted between the post 16 of the L-shaped support 13 and the post 17 of the right-angled bracket 11 in order to keep the backrest 8 compressed against the dorsolumbar fascia of the user's trunk. The reference numeral 18 designates an upper end fork of the post 16 for constituting a forward stroke limit; the reference numeral 19 designates a second elastic element for keeping the backrest in contact with said pusher rolling element 10 when the user is not present. The reference numeral 20 designates a pair of vertically adjustable handgrip rods which are fixed to the front part of the bench 7; the reference numeral 21 (Figure 13) designates a backrest provided with a padding 9 and pivoted on the plate 22, which is supported by a pair of rear posts 23 of the bench 7, which also supports a post 24 provided with a vertically adjustable vertical slider 25 on which the linear actuator 26 is fixed; said linear actuator is provided, at the front, with a substantially horizontal stem 27 provided with a tip rolling element 10. The reference numeral 28 (Figure 14) designates a backrest provided with a padding 9 and supported by a slider-like structure 29 which can slide

on the two horizontal guides 30 in contrast with the action of a linear actuator 26 supported by a back post 26a. The reference numeral 31 of Figures 15-17 designates a frame which has a substantially U-shaped structure and is provided, in a rear region, with an elastic band or fully or partially elastic element 1 connected in an end region of the sides of said frame. The reference numeral 32 designates an advantageous grip sleeve which covers the front side 33 of said frame; the reference numeral 34 (Figure 18) designates an elastic or non-elastic belt which is internally provided, in its rear part, with at least one flexible element 35 which advantageously has a profile which follows the curvature of the trunk in the upright position in order to mate with it, for example like a ball. The reference numeral 36 designates a wall, or any rear resting element or obstacle for said flexible element. The reference numeral 37 designates a generic element or front obstacle for resting the hands; the reference numeral 38 designates a seat. The reference numeral 39 (Figure 21) designates a grip handlebar for the hands whose position is adjustable and which is fixed to the front part of the bench 7. The reference numeral 40 designates a backrest provided, in a front region, with a padding 41 which can oscillate and slide vertically. The reference numeral 42 designates an elastic element which is preloaded to keep the backrest against the dorsolumbar fascia of the user's trunk. The reference numeral 43 designates a seat which is hinged to the bench 7 and oscillates downwards.

In the practical execution, the materials, the dimensions and the constructive details may be other than those mentioned herein but technically equivalent thereto without thereby abandoning the scope of the present invention.

Accordingly, the elements that compose the structures of the cited embodiments of the devices that constitute the implement may be replaced with others having a similar function.

The disclosures in Italian Patent Application No. MO97A000122 of July 3, 1997 from which this application claims priority are incorporated herein by reference.

Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

## Claims

1. An implement particularly for gymnastic training, characterized in that it is provided with at least one gradually yielding contrast element (1, 10, 35, 40, 42), such as a periodically deformable body, which is adapted for contact, during use, with the dorsolumbar fascia of the trunk of the user, so as to constitute a contrast (RE) which can be fully or partially

applied against said fascia.

2. An implement according to claim 1, characterized in that it is constituted by a frame (31) which advantageously has three sides: a front side (33) and two lateral sides or sidewalls; at least one fully or partially elastic contrast element (1) being connected in the end regions of said sidewalls and constituting the fourth side.
3. An implement according to claim 1, characterized in that it is constituted by two posts (2) which are fixed in a downward region and are interconnected, in a region at an intermediate elevation, by at least one fully or partially elastic contrast element (1).
4. An implement according to claim 3, characterized in that said pair of posts (2) is pivoted to a footstand (4) in a downward region.
5. An implement according to one of claims 3 and 4, characterized in that said pair of posts (2) can be elongated and is provided with a handgrip at the upper end.
6. An implement according to claim 1, characterized in that it is constituted by a belt (34) provided, in its rear part, with at least one flexible contrast element whose curved profile is convex at least in a forward direction.
7. An implement according to claim 6, characterized in that in said at least one flexible contrast element having a curved profile which is convex at least in a forward direction, said profile has a curvature substantially similar to that of the trunk in the upright position.
8. An implement according to claim 6, characterized in that said flexible contrast element having a convex curved profile is constituted by a ball (35).
9. An implement according to claim 1, characterized in that said gradually yielding contrast element is part of a mechanical device which is provided, in a front region, with a pusher to apply the contrast (RE) against the dorsolumbar fascia of the user.
10. An implement according to claim 9, characterized in that a backrest (8, 21, 28, 40) is interposed between said pusher and said dorsolumbar fascia and is provided, in a front region, with a padding (9, 41) which is adapted to couple to said dorsolumbar fascia of the user.
11. An implement according to one of claims 9 and 10, characterized in that said pusher of said mechanical device is advantageously constituted by a rolling

- element (10) which is supported by an angular lever (11) which has, in a rear region, a post which is pivoted, in a downward region, to a support (13) which is fixed in a rear region to a seating means (7).
12. An implement according to claim 11, characterized in that said support (13) of said mechanical device, which extends upwards into a post (16), has vertical positioning means (14).
13. An implement according to claim 12, characterized in that said post (16) is provided, in an upward region, with a means (18) for stopping said angular lever (11) in its forward movement.
14. An implement according to one of claims 11 to 13, characterized in that a first elastic means (15) is stretched between said posts (16, 17) of said mechanical device and is preloaded so as to push said angular lever (11) against the backrest (8).
15. An implement according to claim 14, characterized in that a second elastic means (19) is located between the backrest (8) and the supporting means (14) for the seating means (7) of said mechanical device in order to contrast the forward tipping of said backrest if the user is not present.
16. An implement according to claim 15, characterized in that said seating means (7) is provided, in a front region, with a pair of grip rods (20) for the hands, said rods being advantageously provided with means for vertical adjustment.
17. An implement according to claims 9 and 10, characterized in that said pusher is advantageously constituted by a rolling element (10) supported by the stem (27) of a linear actuator (26) which is part, of the mechanical device and is supported by the seating means (7).
18. An implement according to claim 17, characterized in that said linear actuator (26) is supported by a post (24) which is advantageously supported by the rear part of a seating means (7); said post being provided with a vertical slider (25) which has vertical adjustment means.
19. An implement according to claim 18, characterized in that for example a pair of posts (23) fixed to said seating means (7) of said mechanical device support, in an upward region, a plate (22) which is provided, in a front region, with hinge means to support, so that it can oscillate, the backrest (21) provided with padding (9).
20. An implement according to claim 19, characterized in that said plate (22) is provided, in a rear region, with means for vertically adjusting the slider (25) that supports the linear actuator (26) on a post (24) which is fixed to the seating means (7).
21. An implement according to one of claims 17 to 20, characterized in that the seating means (7) of said mechanical device is provided, in a front region, with a pair of grip rods (20) which are advantageously provided with vertical adjustment means.
22. An implement according to claim 17, characterized in that said rolling element (10) is coupled, through a linear actuator (26), to a backrest (28) which has, in a front region, a padding (9) which is part of said mechanical device; said backrest being provided, in a rear region, with a slider-like structure (29) which can slide on a pair of horizontal guides (30) supported in any manner by the seating means (7).
23. An implement according to claim 22, characterized in that said linear actuator (26) is supported by a post (26a) which is supported, in a downward region, by the seating means (7).
24. An implement according to one of claims 22 and 23, characterized in that the seating means (7) of said mechanical device is provided, in a front region, with a pair of grip rods (20) which are advantageously provided with vertical adjustment means.
25. Use of an implement according to claim 1, characterized in that the action against said contrast (RE) opposed by the periodically deformable body of the implement against the dorsolumbar fascia of the user is developed by the user himself by flexing the trunk forwards and by rotating the pelvis backwards, advantageously keeping substantially constant the substantially vertical position of the axis (AC) that joins the coxofemoral articulation to the scapulohumeral articulation.
26. Use of an implement according to claims 1 and 2, characterized in that the user, either standing, recumbent or advantageously sitting, after placing the fully or partially elastic element (1) on the dorsolumbar fascia of his trunk, gripping it in the front side (33) of the frame (31) with his arms straight, flexes his trunk forwards and produces the backward torsion of the pelvis against said contrast (RE).
27. Use of an implement according to claim 1 and one of claims 3 to 5, characterized in that the user, while standing or advantageously sitting, after placing the fully or partially elastic element (1) on the dorsolumbar fascia of his trunk and after gripping the uprights (2) with his arms straight, flexes his trunk forwards and produces the backward torsion of his

pelvis against said contrast (RE).

28. Use of an implement according to claim 1 and one of claims 6, 7 and 8, characterized in that the user, either standing, recumbent or advantageously sitting between two obstacles (36, 37), after wearing the belt (34) with the flexible element (35) advantageously at the median part of the dorsolumbar fascia of his trunk, while pushing with his arms against one of said obstacles, flexes his trunk forwards and produces the backward torsion of his pelvis, resting at the rear on the other obstacle against said contrast (RE).

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29. Use of an implement according to claim 1 and one of claims 9 to 16, characterized in that the user, advantageously sitting and with his arms pushing forwards and while keeping the dorsolumbar region of his trunk rested against an oscillating padded backrest (8, 9) which is kept vertical by the front end (10) of an angular lever (11) actuated by at least one elastic means (15) so as to press against said backrest, flexes his trunk forwards and produces the backward torsion of his pelvis.

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30. Use of an implement according to claim 1 and one of claims 17 to 21, characterized in that the user, advantageously sitting and with his arms pushing forwards and while keeping the dorsolumbar region of his trunk rested against the oscillating padded backrest (8, 9), which is kept vertical by the front end (10) of the linear actuator (26), flexes his trunk forwards and produces the backward torsion of his pelvis.

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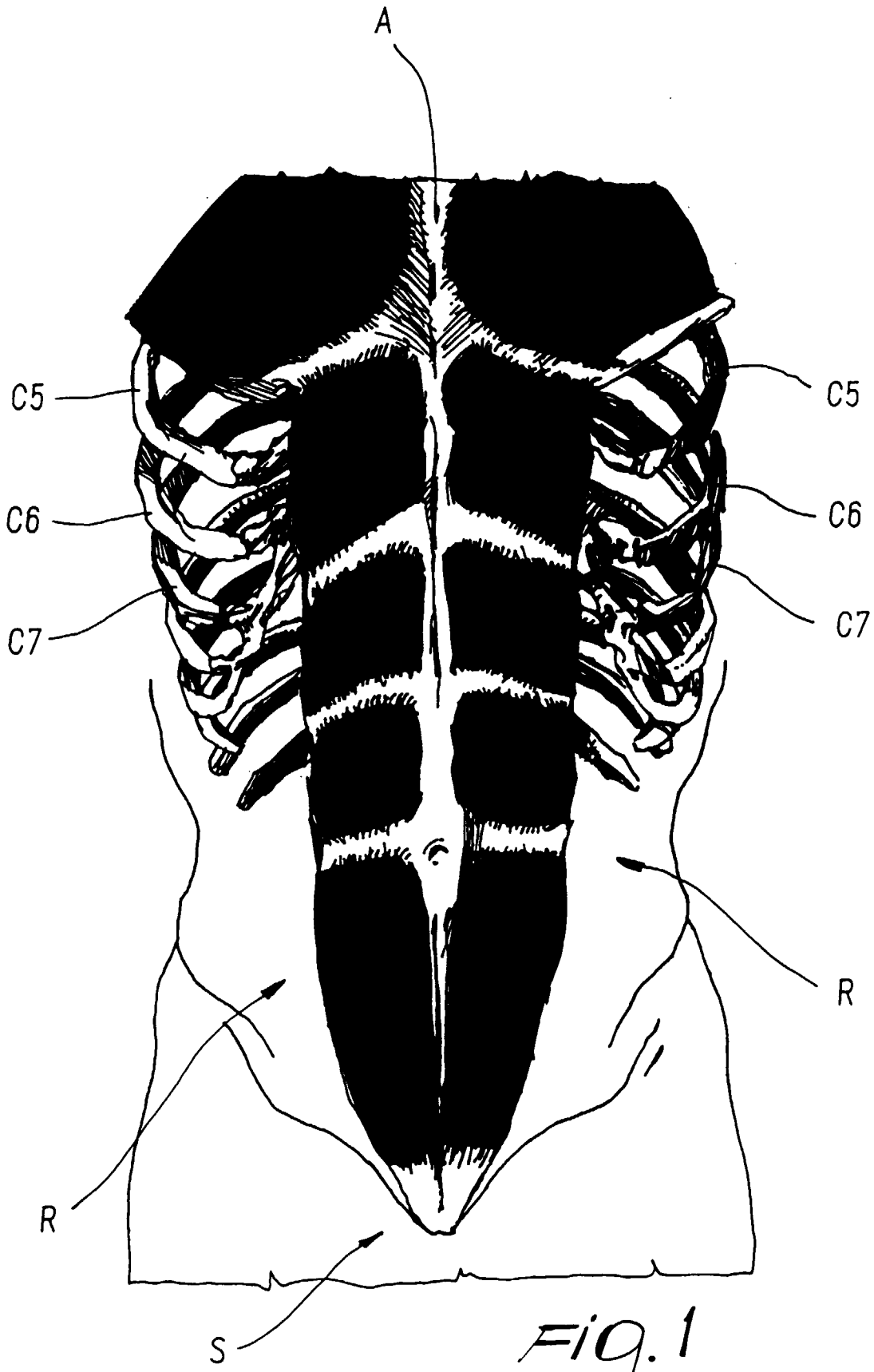
31. Use of an implement according to claim 1 and one of claims 22 to 24, characterized in that the user, advantageously sitting and with his arms pushing forwards and while keeping the dorsolumbar region of his trunk rested against an oscillating padded backrest (8, 9) which is kept vertical by a slider (29) of its own which can slide on guides (30) in contrast with the action of the linear actuator (26), produces the forward flexing of his trunk and the backward torsion of his pelvis.

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*FIG. 1*

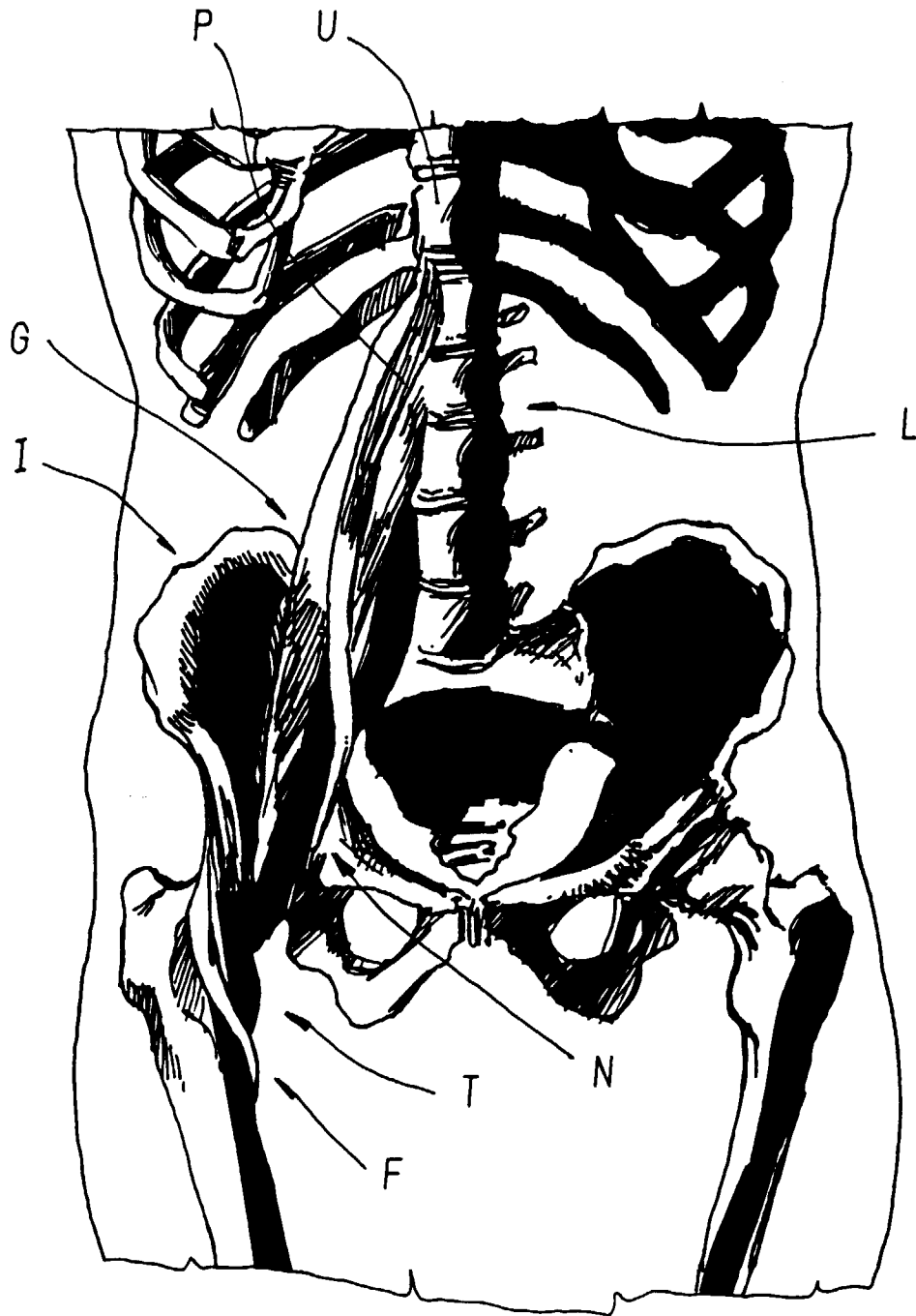


FIG. 2

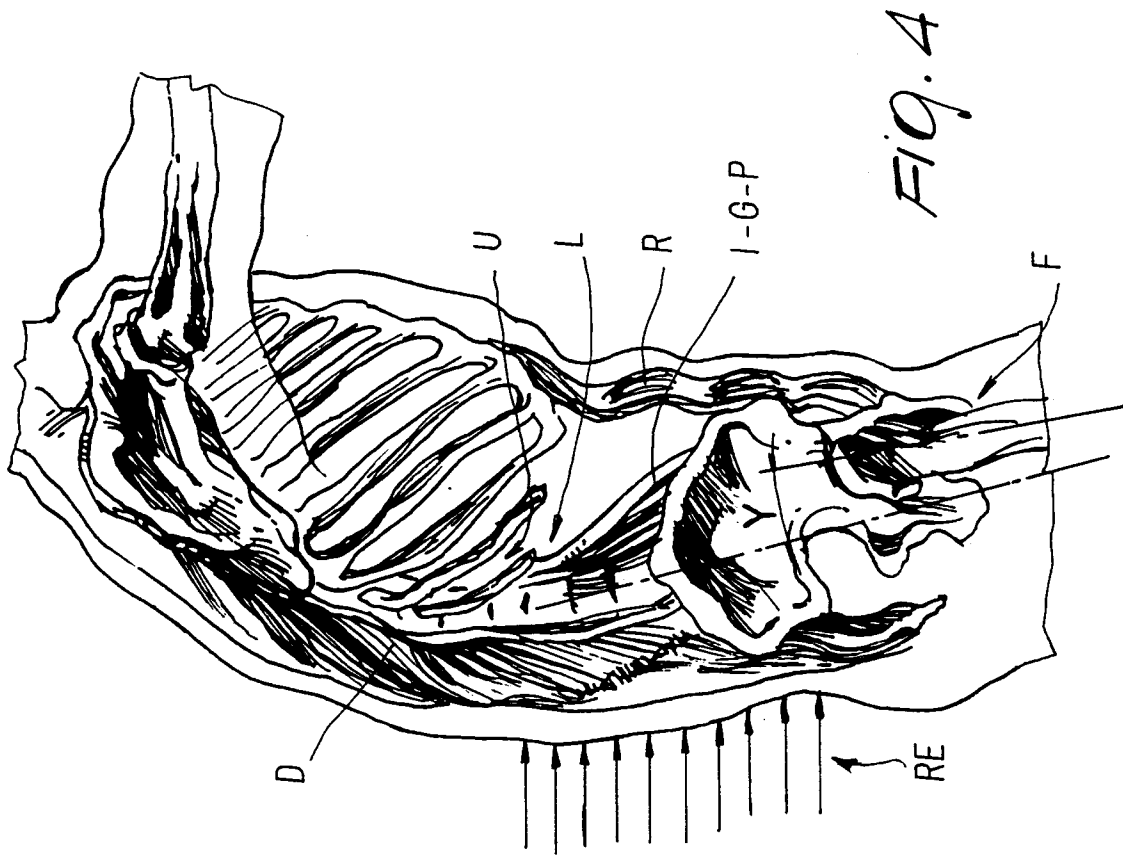


FIG. 4

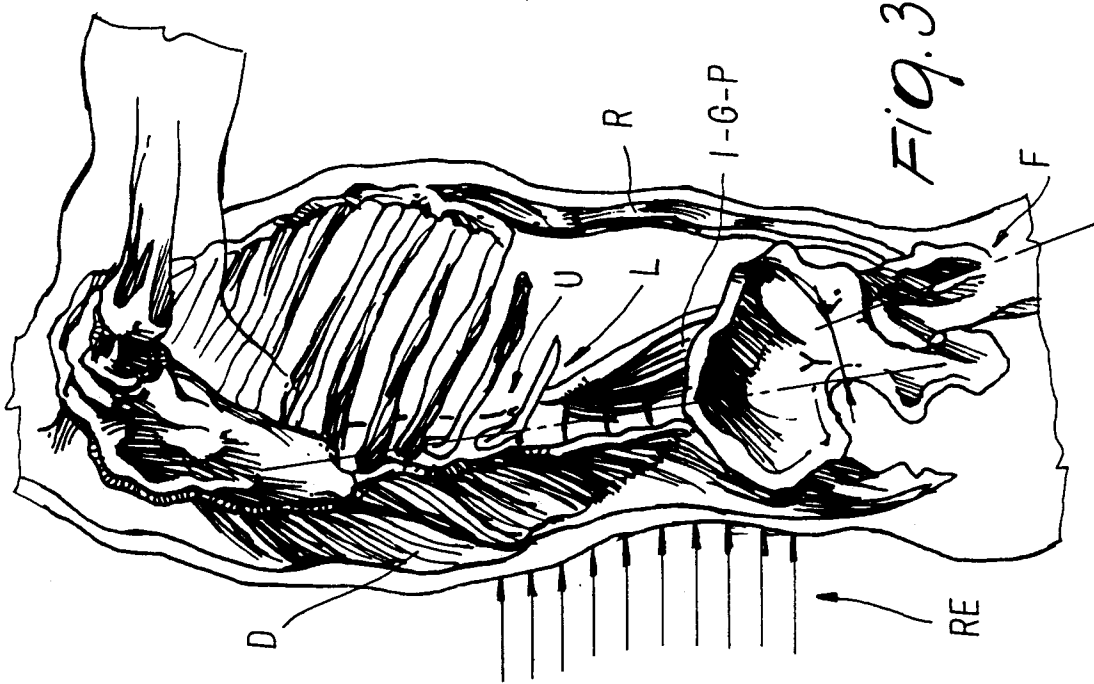


FIG. 3

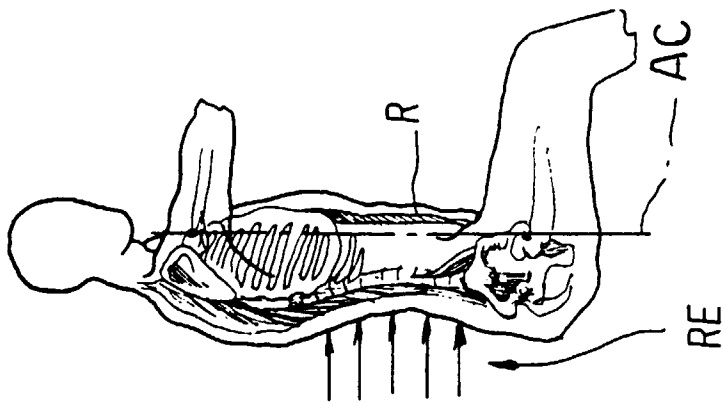


FIG. 5

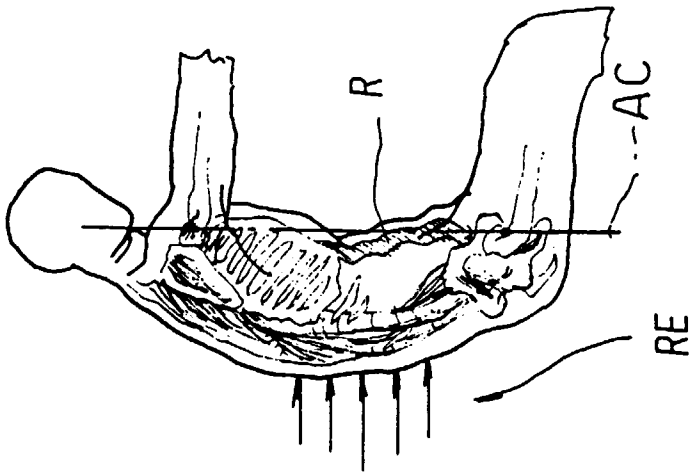


FIG. 6

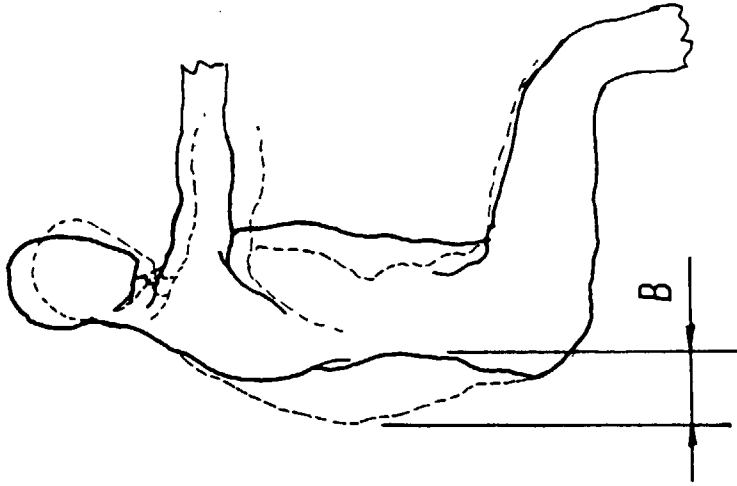
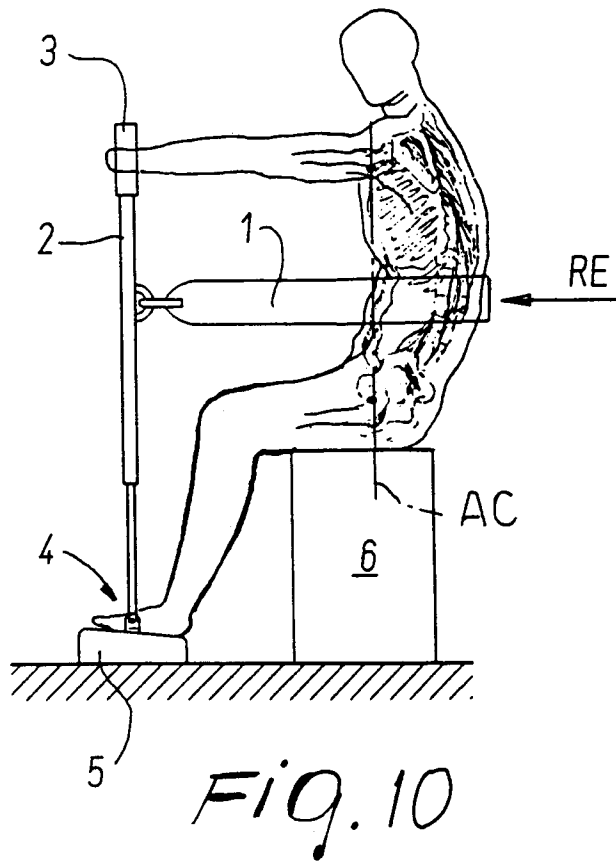
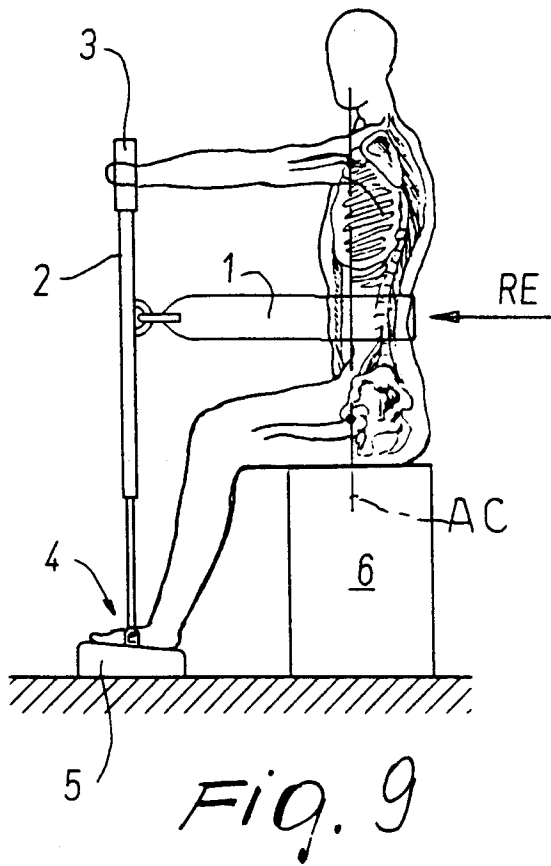
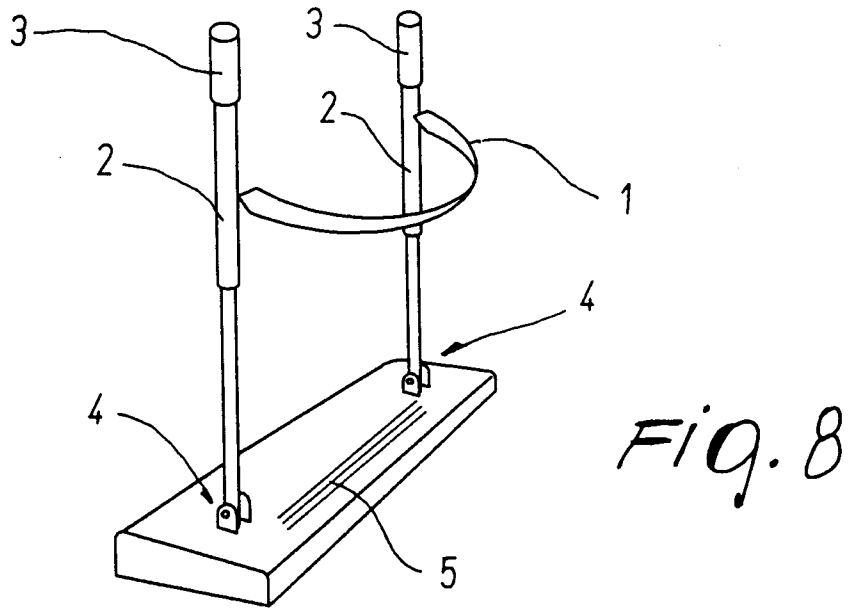
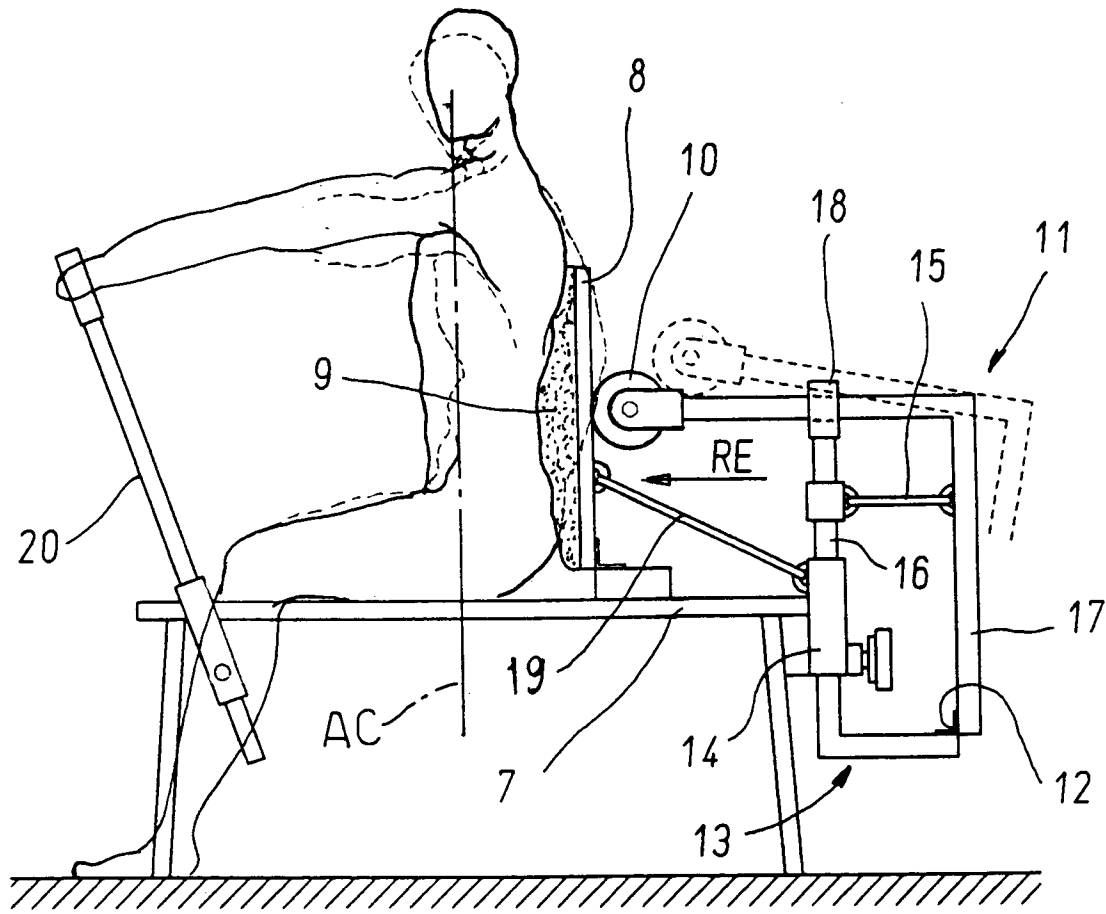
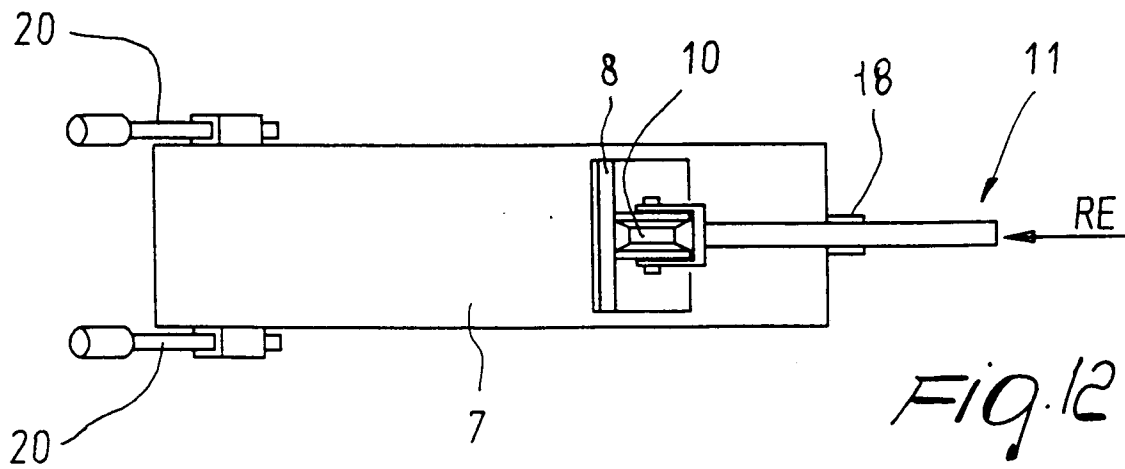


FIG. 7





*Fig. 11*



*Fig. 12*

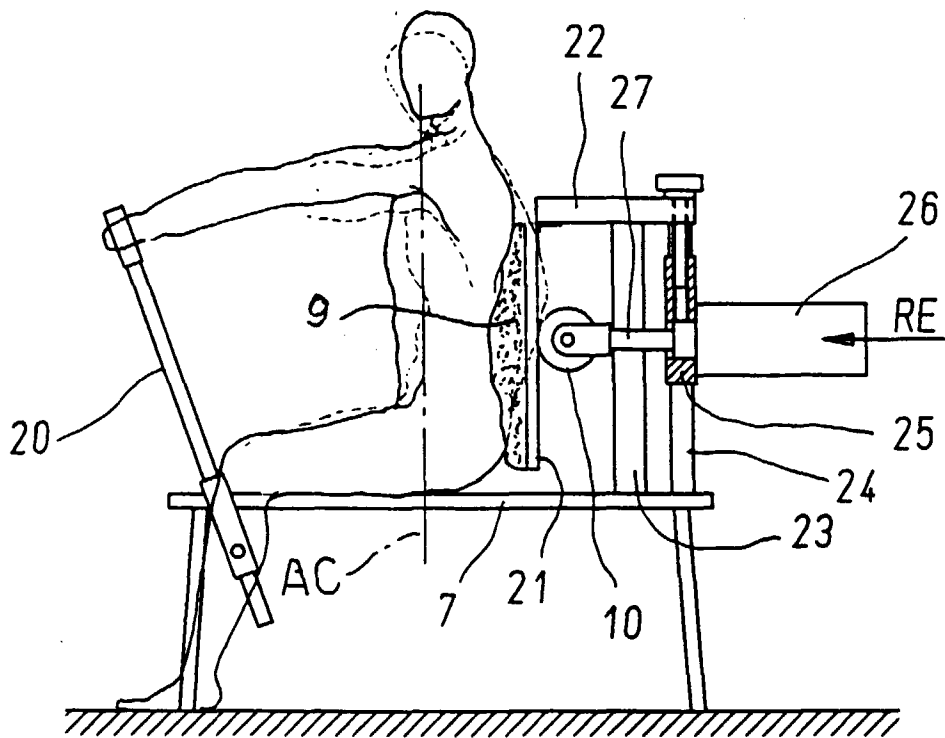


Fig. 13

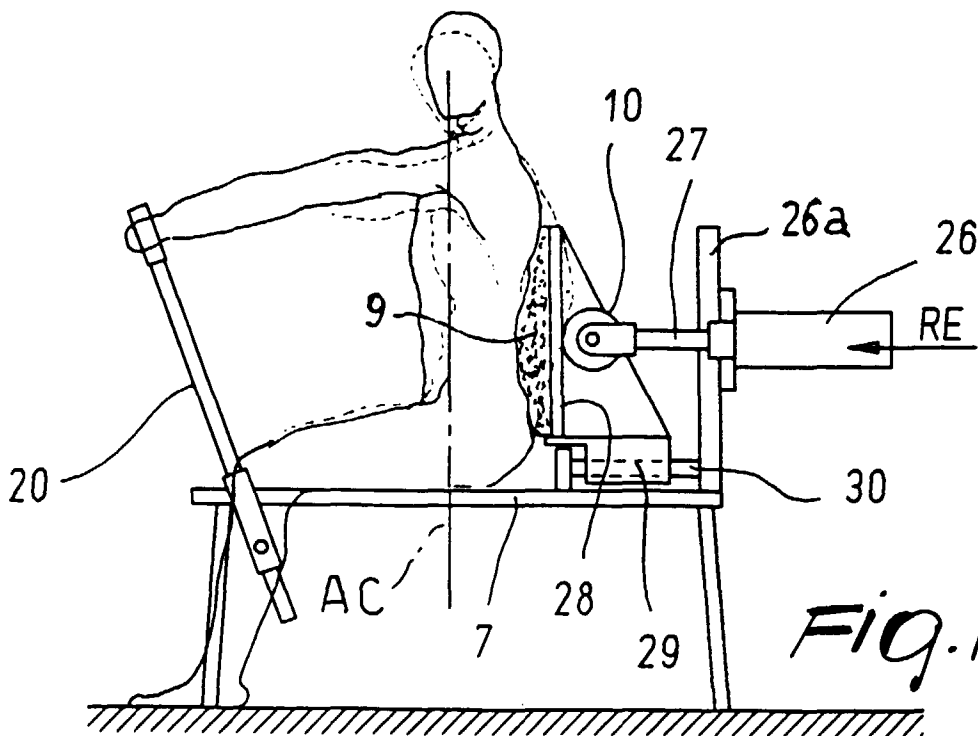
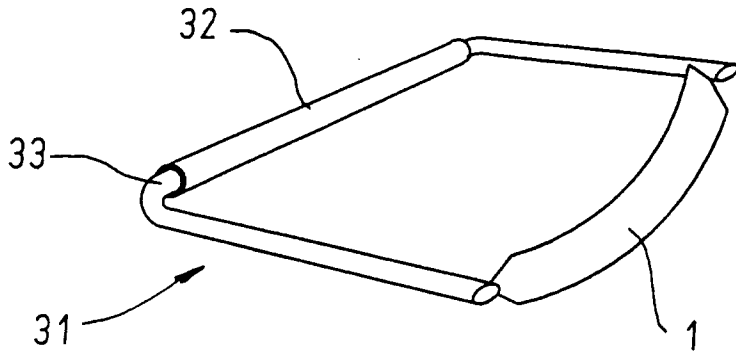
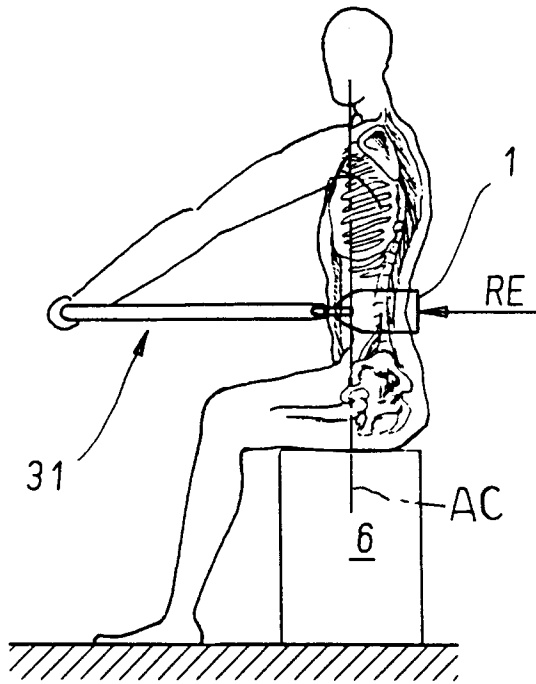


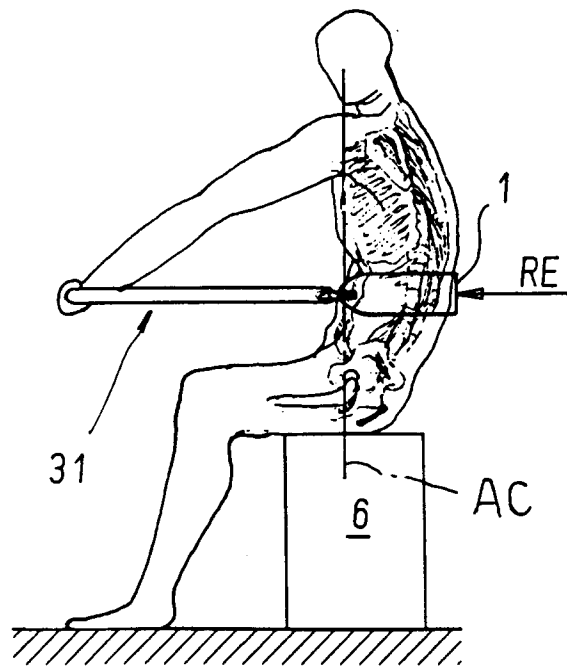
Fig. 14



*Fig. 15*



*Fig. 16*



*Fig. 17*

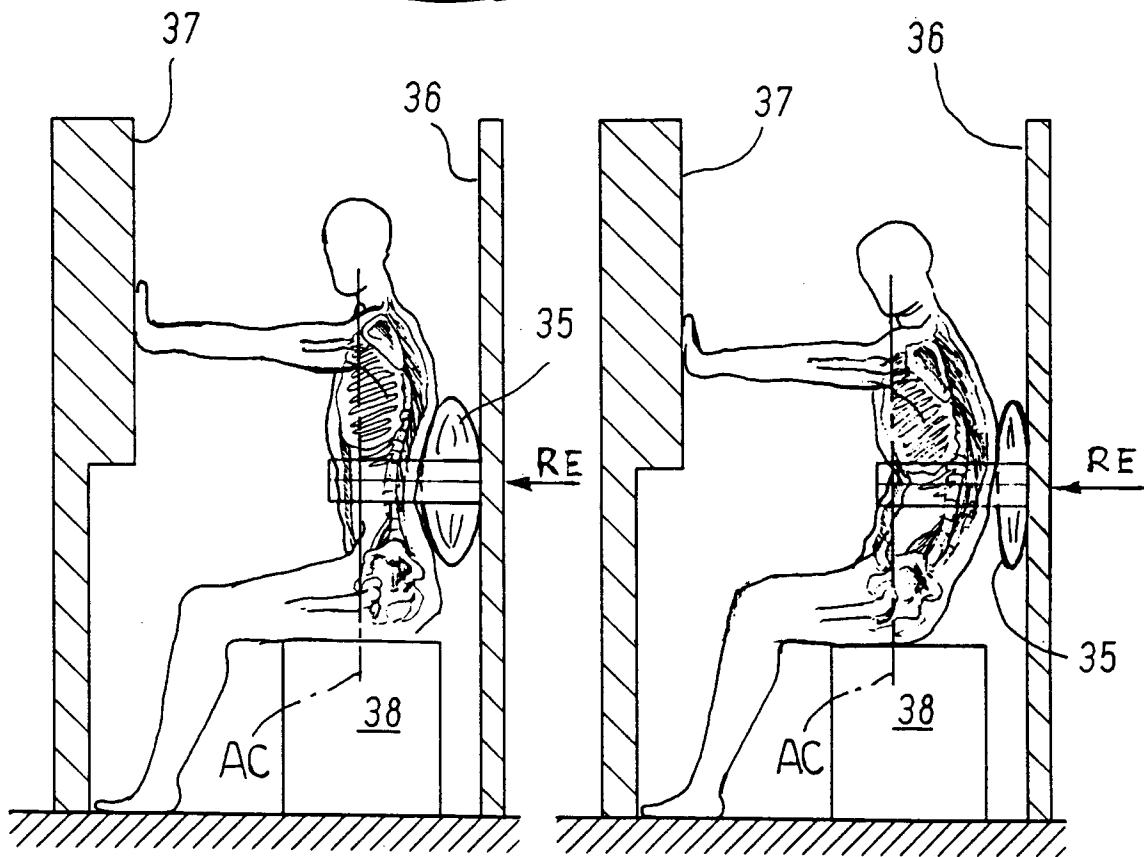
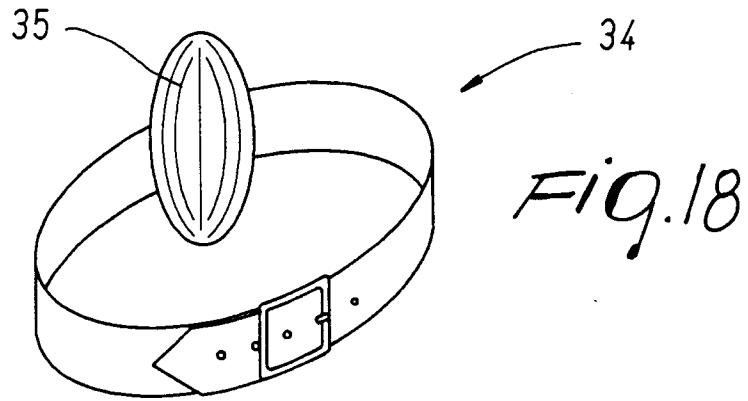


Fig. 19

Fig. 20

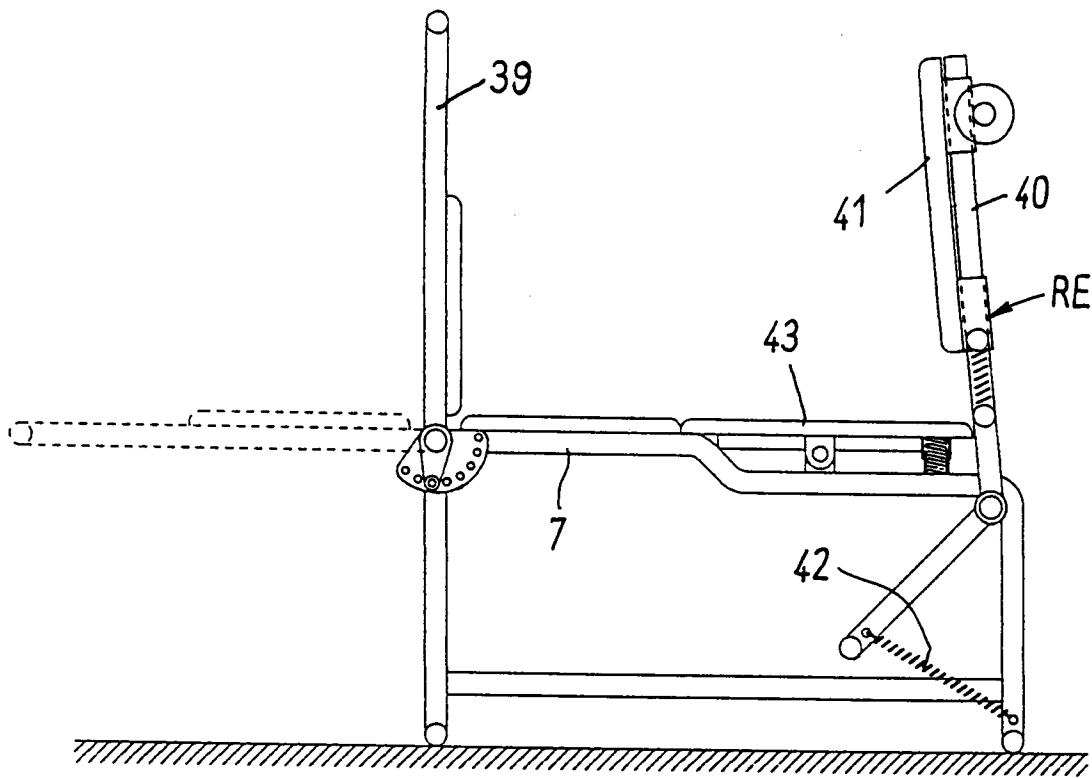


FIG. 21

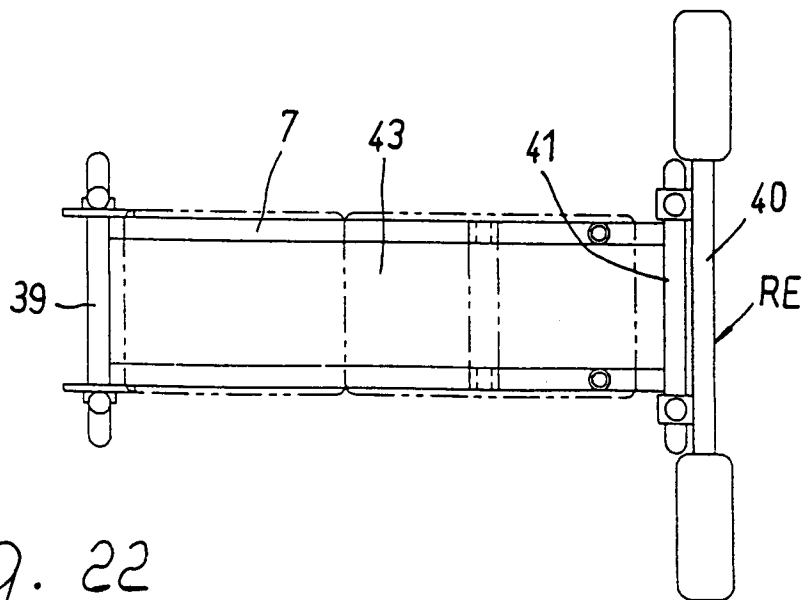


FIG. 22