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(54) **TRAINING MODULE**

(57) The invention relates to a training module for exercising a body, specifically suited for exercising the central core stability in combination with increasing the strength of shoulder, elbow and hand joints as part of a personal training routine or as an exercise to prevent or recover from joint or movement problems. The training module thereto comprises: at least one elongated guide; a coupling, at one end thereof connected to the guide, which coupling is configured for rotatably connecting the guide to a support surface; at least one handle, moveably connected to the guide, wherein the at least one handle is moveable in at least a lengthwise direction of the guide.

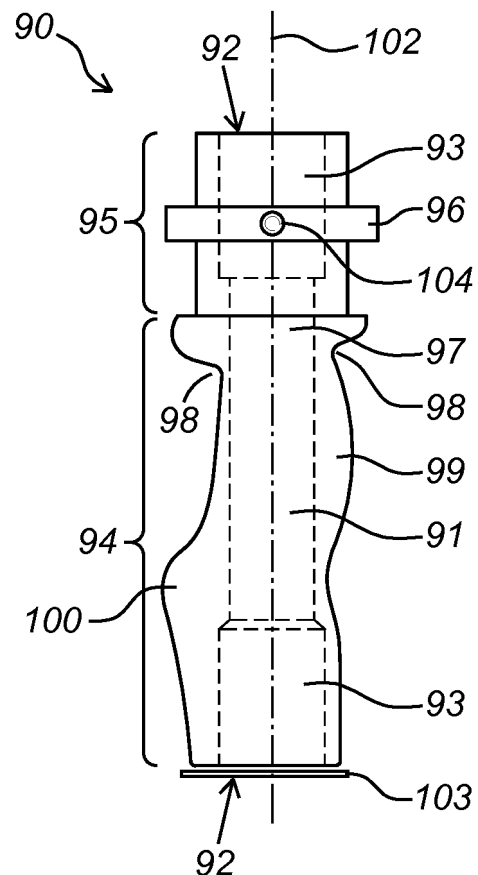


Fig. 10

Description

[0001] The invention relates to a training module for exercising a body, specifically suited for exercising the central core stability in combination with increasing the strength of the upper limbs as part of a personal training routine or as an exercise to prevent or recover from joint or movement problems.

[0002] All kinds of fitness equipment for exercising core stability and shoulder muscles and joints are known in the art. Common equipment is aimed to ensure safety in training and prevent injury by restricting range of motion as much as possible by keeping body parts or joints in proper alignment. Because of this, the user's movement is guided almost entirely by the machine, allowing the user to only move within a predetermined range of motion that lies well within the body's capabilities. However, such fitness equipment has multiple drawbacks. One drawback is that common fitness machines, due to their restrictive and predicted movement, do not train complete human movement patterns in full extension, letting the user experience a limited carryover to daily activities as well as athletics. For example, such training does not lead to an increase in full range and chained proprioception abilities as the stabilizing muscles and proprioceptors in the body's movement apparatus are not stimulated by the isolated movement allowed by the machine. There is also an increased risk of overuse injury because joints and muscles (or parts thereof) are overloaded repeatedly in a similar, restricted and isolated manner. Moreover, the effect of isolated training is limited to a limited number of target muscle groups that are isolated, thereby neglecting other important stabilising muscles, which could lead to chronic injury and poorness in functional posture and movements.

[0003] A barbell connected to a universal joint, thereby creating an inverted pendulum, serves as a frequently seen alternative to the above-mentioned training apparatus for training of the core and shoulder muscles. Because movement of the body is only partly restricted by the pendulum, multiple muscle groups are addressed instead of isolating only a few muscles of a muscle target group. However, as the shown pendulum provides a considerable freedom of movement and does not provide any measures for the purpose of increasing safety in training, the risk of injury due to improper use or due to use by people having a physical limitation is therefore large. Moreover, the training possibilities that the pendulum provides are still limited due to limited adjustment possibilities of the apparatus and the unilateral movement patterns through which the pendulum is effective in use.

[0004] It is an object of the present invention to provide a training module that takes away at least one of the above-mentioned disadvantages and/or at least provides a useful alternative to the state of the art.

[0005] The invention hereto proposes a training module comprising: at least one elongated guide; a coupling,

at one end thereof connected to the guide, which coupling is configured for rotatably connecting the guide to a support surface; at least one handle, moveably connected to the guide, wherein the at least one handle is moveable in at least a lengthwise direction of the guide. The advantage of the aforementioned training module lies in the fact that the at least one handle, which can move along the guide, together with the rotatable coupling provide the user of the module a large freedom of movement while at the same time the module ensures safety in training due to it being mounted to a fixed support surface. The large freedom of movement of the training module allows the user to perform full range, functional movements, thereby exercising and improving coordination, (core) stability, elasticity, power and speed with a single device. Hereby, the at least one moveable handle specifically enables rotation of the body that causes the shoulder joint to perfectly align for a combination of antelexion, abduction and outside rotation.

[0006] In another embodiment, the training module comprises at least two elongated guides, each connected to the coupling and each provided with at least one handle, wherein the handles are moveably connected to the respective guides and wherein the handles are moveable in at least a lengthwise direction of the guides. By placing his hands on different handles, the user can easily steer and control the module's movement, allowing use of the training module in a more safe and secure manner. Namely, while one of the arms generates most of the strength the other - contralateral - arm can keep control over the course of motion.

[0007] In yet another embodiment, the handles are independently moveable with respect to each other in at least a lengthwise direction of the guides. The independent movement of the handles provides the user with additional freedom of movement, which allows the user to tap into his technique and coordination skills for a highly functional training. Moreover, due to the additional freedom of movement, more exercise varieties can be performed on the same training module.

[0008] In a further embodiment, the coupling of the training module comprises a hinge, wherein the hinge is configured to allow the at least one guide to rotate with respect to the support surface around three rotational axes. The three-dimensional joint, for example formed by a homokinetic or a universal joint, allows for a maximum freedom of movement of the training module. The training module is therefore able to follow all possible movement patterns and exercise variations necessary to improve core stability in combination with strength of the shoulder, elbow and hand joints while functionally loading the torso, pelvis and both legs in a closed kinetic chain, as the feet remain in constant contact with the floor.

[0009] It is possible that the at least one handle is provided with bearings configured for movement relative to the at least one guide in an axial and radial direction of the guide. Preferably the bearings comprise a linear bearing provided on an inside of the handle and more pref-

erably integrated into the handle. The bearings allow for a rotational and a linear movement of the handle relative to the guide and thereby reduce the friction during this movement of the handle. This freedom of movement of the handle enables the user to follow a movement path that corresponds with the body's natural movement, which increases the effectivity of training and at the same time reduces risk of overstraining muscles and tendons.

[0010] In a further embodiment, the training module comprises at least one weight receiving part for receiving weights, thereby changing the mass moment of inertia of the training module. This provides the user with the option to vary with the weight, the necessary amount of torque the user must apply to change the angular momentum of the module. A change in weight thus changes the "resistance" of the module that is felt by the user, thereby determining the training intensity. Weights may be specifically tailored to the module and could for instance be 50 g and/or 100 g weights that allow for a gradual increase in training resistance.

[0011] In addition, it is possible that the training module comprises at least two weight receiving parts, wherein the distance from a first weight receiving part to the coupling is smaller than the distance from a second weight receiving part to the coupling. This allows the user to change the mass moment of inertia of the training module not only by varying the amount of weight, but also by varying the weight's position along the module in terms of distance from the module's centre of rotation (which is located at the coupling). Namely, the further the mass is placed from the centre of rotation of the module, the greater the mass moment of inertia of the module. Placing weights at different positions along the module in terms of distance to the coupling thus uniquely effects the dynamic characteristics of the module, giving the user options with regard to training resistance and feel of the module.

[0012] At least one weight receiving part may be provided at the coupling. By placement of the weight receiving part at the coupling, the weights can be positioned relatively close to the centre of rotation, which weights therefore have a limited effect on the module's mass moment of inertia. Hence, placement of weights on this weight receiving part allows for a gradual increase in training intensity.

[0013] At least one weight receiving part may be provided at an end of at least one of the at least one guide, which end is facing away from the coupling. This allows for the placement of weights at a position along the module that is distant from the coupling, and therefore distant from the centre of rotation. Placing weights at this weight receiving part will thus have a large effect on the experienced resistance of the module. Placement of relatively small weights thus lead to a large increase in training intensity.

[0014] At least one weight receiving part may be provided on at least one of the at least one handle. This allows for additional possibilities to change the weight

and weight distribution of the training module, thereby providing the user with options to change the effect and/or intensity of the training. Moreover, by placing weights on the moveable handle, the weight distribution of the training module changes during use of the module as the handle is moved to and away from the module's centre of rotation.

[0015] The at least one handle may comprise an anatomically shaped outer surface to closely fit the cylindrical grasp of a human hand. The anatomically shaped outer surface of the handle improves, amongst others by an increased contact surface between the hand and the handle, the handle's ergonomics and considerably increases comfort for the user compared to for example a cylindrical handle. Also, user performance and safety are increased due to the user being able to better retain a firm grip on the handle. This firm grip has been found necessary for a proper load transfer from the hand onto the training module, especially in the case that training resistance or intensity is increased by adding weights to or increasing movement speed of the module. In case that the handle is provided with a weight receiving part such that weights are directly placed onto the handle, the user must, during exercise, counteract the downward force of the weights exerted on the handle. Also in this case of increased forces acting on the handle, it is especially important that the handle provides the user the best possible grip and comfort through the use of said anatomically shaped outer surface.

[0016] In a preferred embodiment, the anatomically shaped outer surface of the at least one handle comprises a protruding circumferential edge, configured to interface at one side thereof a hand's thumb and index finger and on another, opposing side thereof the weights placed on the weight receiving part. Preferably, the protruding circumferential edge is at one side thereof anatomically shaped to follow the shape of the hand's thumb and index finger and at the other, opposing side thereof substantially flat to form an even surface for the weights to be placed on. The protruding circumferential edge serves as a spacer between a user's hand and the weights and prevents excessive pressures exerted by the weights on the hand. The latter effect is effectuated by the enlarged surface area of the circumferential edge interfacing with the hand and further strengthened in case the circumferential edge is anatomically shaped.

[0017] In another preferred embodiment, the anatomically shaped outer surface of the at least one handle comprises a circumferential indentation configured for receiving a hand's thumb and index finger, a rounded protrusion adjacent to the circumferential indentation configured for being enclosed by the hand's middle and ring finger and a tapered protrusion opposing the rounded protrusion configured for supporting the hand's ball of the little finger. The circumferential indentation allows the user to apply, with his/her thumb and index finger, a powerful grip on the handle to decrease the chance of slipping of the hand and/or fingers from the handle. The rounded

protrusion increase the amount of grip that can be obtained by the use of the user's middle finger and ring finger as the rounded protrusion effectively fills the space underneath said fingers, thereby increasing the area where the fingers may contact the handle. The tapered protrusion supports the hand's ball of the little finger to prevent unwanted ulnar deviation during movement of the handle. All aspects of the anatomically shaped outer surface together provide a user's hand with the maximum amount of support and load transfer capabilities during exercise.

[0018] It may be possible that the at least one handle is symmetrically shaped with respect to a plane of symmetry containing the longitudinal centre line of the guide. The symmetrical design of the handle allows the handle to be gripped and used by a right hand as well as a left hand. Moreover, with the use of an ambidextrous handle, only one type of handle needs to be applied in the training module.

[0019] In a further embodiment, the training module comprises first adjusting means for adjusting the distance of the at least one guide with respect to the coupling. This allows the user to adjust the module in its longitudinal direction, thereby determining the range of motion of the guide and the thereto attached handle. This adjustment option is especially useful for accommodating users of different lengths such that, independent on the body length of the user, a full range of motion of the module can be ensured that allows for maximum extension of the of the arms and vertebrae. Moreover, the total length (full height) of the module can be reduced such that it meets specific shipping requirements set by a shipping agent, which enables shipment or decreases cost of shipment.

[0020] It is possible that the first adjusting means are incorporated into the coupling and comprise a receiving space for fittingly receiving a part of the training module containing the at least one guide, thereby securing said part of the training module in a radial direction. The receiving space allows simple attachment of the part of the training module containing the at least one guide, while enabling the distance of the part of the training module containing the at least one guide to still be adjusted with respect to the coupling.

[0021] It is also possible that the receiving space and the part of the training module containing the at least one guide are both provided with at least one recess configured for receiving a corresponding retention element for securing said part of the training module in an axial direction. The recesses in combination with the retention element are able to secure the training module in different positions in axial direction, making the training module adjustable in height. By placing the retention element into a corresponding recess, a simple and secure fix of the coupling is obtained to the part of the training module containing the at least one guide. The first adjustment means may also comprise a (electric motor) spindle drive to automatically adjust the distance of the at least one

guide with respect to the coupling, and more specifically adjust the position of a part of the training module containing the at least one guide with respect to the receiving space.

[0022] In case that the training module comprises at least two guides, the training module may comprise second adjusting means for adjusting the distance between the guides. The distance between the guides will at least in part determine the grip position of the hands, thereby altering the training effect. Placing the guides close together results in a close-grip position of the hands, which allows training of regular, functional joint stability. Placing the guides further apart results in a wide-grip position of the hands, which places an emphasis on the compression within the shoulder joint and, to a greater extent, the acromioclavicular joint. Furthermore, as the second adjusting means enable the user to pre-set the distance between the guides (for example dependent on the user's shoulder width) unwanted horizontal adduction in the acromioclavicular joint and the corresponding intra-articular disk during training can be prevented.

[0023] It is also possible that the second adjusting means are configured to adjust an angle enclosed by the guides. By adjusting the angle enclosed by the guides, the user is provided with a whole new range of possible movements, which further expands the training possibilities of the training module. Specifically, adjustment of the angle enclosed by the guides enables the shoulder stabilizers to be exercised in a different, full range of motion, thereby addressing shoulder stability in a comprehensive manner. This is especially beneficial in preventing or recovering from common rotator cuff injuries.

[0024] In order to allow the training module to be fixed to essentially vertical support surfaces, the training module may comprise a wall mount configured for connecting the coupling to a wall and thereby attaching the training module to said wall. By suspending the training module to the wall, the training module can remain clear of the floor, saving floor space and decreasing the module's footprint. In the absence of wall space, it is also possible to connect the training module to a freestanding vertical support instead of a wall. The training module may in this case comprise a mount configured for connecting the coupling to such a freestanding vertical support. The freestanding support may hereby be configured to connect multiple training modules on different sides of the freestanding support for an efficient use of the available space.

[0025] Moreover, the wall mount may comprise a connection element for connecting the coupling thereto, wherein the connection element, by means of third adjustment means, is adjustable in its position with respect to the wall and in particular is adjustable in height. These third adjustment means therewith allow for the adjustment of the position of the at least one guide and at least one handle of the module with regard to the floor without changing the total length of the module measured from the coupling to the upper end of the guide, thus keeping

constant the range of motion of the guide and the thereto attached handle. When combined with the first adjusting means for adjusting the distance of the guide with respect to the coupling, the third adjustment means enable the user to independently set the height of the guide and handle, based on the user's length, and the range of motion of training module, based on the desired training effect.

[0026] In addition, the wall mount may comprise a safety mechanism for limiting the maximum deflection of the at least one guide. The allowed maximum deflection thereby preferably lies within normal the range of motion of the user. This makes the training module inherently safe to use, even for users having physical disabilities such as reduced eyesight or scoliosis who therefore cannot keep full control of the module's movement. The safety mechanism moreover ensures physically fit users to safely push their boundaries while relying on the safety mechanism in case something goes wrong.

[0027] Additionally, the safety mechanism could comprise fourth adjusting means for adjusting the maximum deflection of the at least one guide to which the training module is limited by the safety mechanism. By providing the user the ability to adjust the maximum deflection of the guide, the user can set the module to a desired range of motion. This can be advantageous when the user, for example due to injury or disabilities, is restricted in his movement range and therefore needs to safely restrict the module's range of motion accordingly.

[0028] In an embodiment, the wall mount comprises a support for letting the training module abut upon the wall mount in a stable equilibrium position. This allows for a safe storage of the training module while the module is not in use. Besides, in supported position parallel to the wall, the module occupies a minimum amount of space. In addition, the wall mount may be adjustable in height to match the length of the at least one guide.

[0029] In order to further increase the training capabilities of the training module, at least one of the at least one guide may be provided with a spring for generating a resistance force upon movement of one of the at least one handle connected to said guide, which force acts on said handle in a direction opposite to the direction of said movement. The spring will influence the forces necessary to move the at least one handle along the respective guide and thereby influences the amount of force the user has to exert on the handle. This force is thus dependent on the position of the handle, and, other than the force required to counteract the gravitational force pulling on the module or the force required to change the angular momentum of the module, independent from the position or momentum of the module. The spring can thus be used to counteract and/or amplify the force the user has to exert necessary to accelerate the module in a certain range of motion of the module. In a preferred embodiment, the spring is directly connected with the handle, wherein at the point where the spring engages on the handle, the handle may be provided with a cover

plate or flange to ensure a proper load transfer from the spring onto the handle and vice versa.

[0030] The training module may additionally comprise at least one sensor for observing the movement conducted by the training module. One of this at least one sensor is preferably provided on one of the at least one handle of the training module, such that not only the movement of for example the at least one guide may be tracked, but that the position of the at least one handle and thereby the user's hand(s) is also tracked concurrently. The sensor data may be received by a receiver and presented on a screen, placed nearby the training module to provide the user immediate feedback on the position of the module. By combining the sensor with data storage and processing means, the movement of the training module can also be registered for later analysis. It is also imaginable that the user, based on the sensor data, receives real-time feedback on his movement that can correct for improper form or improper usage of the module. For example, the user can be given a warning signal when a certain predetermined range of motion is exceeded and the user is at risk of injuring himself.

[0031] The invention will now be elucidated into more detail with reference to non-limitative exemplary embodiments shown in the following figures. Herein:

- figure 1 shows a front view of a training module according to the invention;
- figure 2 shows a front view of another embodiment of the training module according to the invention;
- figure 3 shows a front view of yet another embodiment of the training module according to the invention;
- figure 4 shows a front view of still another embodiment of the training module according to the invention;
- figure 5 shows a side view of the training module shown in figure 4;
- figure 6 shows a schematic representation of a motion sequence performed on a training module according to the invention;
- figure 7 shows schematic representation of another motion sequence performed on a training module according to the invention;
- figure 8 shows schematic representation of yet another motion sequence performed on a training module according to the invention;
- figure 9 shows a front view of a handle for use in a training module according to the invention;
- figure 10 shows a side view of the handle shown in figure 9; and
- figure 11 shows a perspective view of the handle shown in figure 9 and 10.

[0032] Figure 1 shows a front view of a training module 1 according to the invention. The training module 1 comprises a guide 2, which guide 2 is coupled rotatably to a support surface 3, such as a floor, by means of a coupling

4. The coupling 4 thereto comprises a joint 5 that allows the training module 1 to rotate with respect to the support surface 3 around three rotational axes. Joints suitable for this may for example be universal, homokinetic or ball joints. The coupling 4 moreover comprises a receiving space 6 for fittingly receiving the guide 2, such that the guide 2 is secured in radial direction with respect to the coupling 4. By means of multiple recesses 7 provided in the coupling and a corresponding recess in the guide, the guide 2 can be locked in place. For this, a retention element 8 such as a magnetic pin is inserted through one of the recesses 7 in the coupling and the corresponding recess in the guide 2. The total length of the training module 1 can be adjusted by inserting the retention element 8 in different recesses 7 of the coupling. The total length of the training module 1 can for example be varied from 195 cm until at least 245 cm, which allows users with a body height from 140 cm until at least 210 cm to use the training module 1 under ideal conditions. The length of the receiving space 6 of the coupling 4 may hereto be dimensioned accordingly to accommodate the module's adjustment in length. For example, the length of the receiving space 6 may be chosen to be 70 cm. The guide 2, which can for instance be manufactured from a stainless steel such as a X46Cr13 alloy, is provided with a handle 9, which dimensions are chosen such that the handle 9 may accommodate either one or both hands. The handle 9 may comprise bearings that allow the handle 9 to smoothly slide along the guide 2 in a lengthwise direction of the guide 2 as well as allow the handle 9 to rotate around the guide 2. In an alternative embodiment, the coefficient of friction could be kept low without the use of bearings, for example by choosing a (synthetic) material for the handle 9 and a material for the guide 2 that together allow for a smooth, low friction sliding motion of the handle 9 relative to the guide 2. It is furthermore possible to provide the guide 2 with one or more buffer stops 13 that limit the maximum deflection of the handle 9. These buffer stops 13 may be adjustable in their position along the guide 2 and may be manufactured from an elastic material such as rubber to absorb shocks induced by the handle 9 upon hitting the buffer stop 13. Both the handle 9 and the guide 2 can be fitted with weight receiving parts 10 that may comprise protrusions 11 onto which training weights can be placed. The dimensions, and specifically the diameter, of the weight receiving parts 10 could hereby determine the kind of weights that the can be received onto the weight receiving parts 10. It is for example possible to allow the handle 9 to receive weights with a 50 mm diameter hole and to allow the guide 2 to receive weights with a 30 mm diameter hole. Once weights are positioned onto the weight receiving parts 10, clamps 12 or other fixing means can be used to securely lock the weights in place.

[0033] Figure 2 shows a front view of another embodiment of the training module 20 according to the invention. In this embodiment, the training module 20 comprises two guides 21, both coupled to the coupling 22. The cou-

pling 22 connects the guides 21 to a support surface 23 and comprises a joint 24 that allows the training module 20 to rotate with respect to the support surface 23 around three rotational axes. A first part 25 of the coupling 22 is provided with a receiving space 26 for fittingly receiving a second part 27 of the coupling 22 that is connect to the guides 21. By means of multiple recesses 28 provided in the first part 25 of the coupling 22 and a corresponding recess in the second part 27 of the coupling 22, the guides 21, connected to the second part 27 of the coupling 22 can be locked in place. A retention element 29 such as a pin is therefore inserted through one of the recesses 28 in the first part 25 of the coupling 22 and the corresponding recess in the second part 27 of the coupling 22. Again, the total length of the training module 20 can be adjusted by inserting the retention element 29 in different recesses 28 of the coupling 22. The second part 27 of the coupling 22 is provided with second adjustment means 30 for adjusting the distance A between the guides 21. In addition, the second adjustment means 30 could be configured to adjust an angle α enclosed by the guides 21. The guides 21 are each provided with a handle 30. The handles 30 comprise linear rotary bearings that allow for rotational and linear movement of the handles 31 relative to the guides 21. The handles 31 may be provided with weight receiving parts 32 that each comprise a protrusion 33 onto which training weights can be placed. The dimensions of the weight receiving parts 32 may be chosen such that standard training weights or weights specifically tailored to the training module can be fitted onto the training module 20. Other weight receiving parts 32 can be found on the second part 27 of the coupling 22 and on the ends of the guides 21 facing away from the coupling 22. Clamps 34 can be placed over the weight receiving parts 32 to securely lock in place the weights placed thereon.

[0034] Figure 3 shows a front view of yet another embodiment of the training module 40 according to the invention, wherein the training module 40 comprises two guides 41 that are, at a first end, connected to a coupling 42. The coupling 42 connects the guides 41 to a support surface 43 by means of a receiving space 44 that can hold part of coupling 42 connected to the guides 41 in a fitting manner. A retention element 45 can be inserted through a recess 46 in the first part 47 of the coupling 42 and a corresponding recess in the second part 48 of the coupling 42 to secure the position of the second part 48 of the coupling and the thereto attached guides 41 with regard to the first part 47 of the coupling 42. A joint 49, provided in the coupling 42, allows the training module 40 to rotate with respect to the support surface 43 around three rotational axes. The guides 41 are provided with handles 50, which handles 50 are configured for rotational and linear movement relative to the guides 41. Additionally, the guides 41 are provided with a spring 51 for generating a resistance force upon movement of the handles 50. At a second end opposite to the first end of the guides 41, the guides 41 are connected to each other by

means of a connecting piece 52. The connecting piece 52 and the coupling 42 are provided with a weight receiving part 53 that comprises a protrusion 54 onto which training weights can be placed. Each of the handles 50 could thereby also be provided with a weight receiving part 53. Again, clamps 55 can be placed over the weight receiving parts 53 to securely lock in place the weights placed on these weight receiving parts 53.

[0035] Figure 4 shows a front view of still another embodiment of the training module 60 according to the invention, which comprises a guide 61 provided with a handle 62, which guide 61 connected to a coupling 63, which coupling 63 comprises a joint 64 having three degrees of freedom. The guide 61 and the handle 62 are provided with a weight receiving part 65 that can also receive a clamp 66 for securing the weights. This particular embodiment of the training module 60 comprises a wall mount 67 configured for connecting to the coupling 63 by means of connection element 68, enabling the training module 60 to be attached to a wall 69. The connection element 68 is, by means of third adjustment means 70, adjustable in its position with respect to the wall 69. In particular, the third adjustment means 70 allow the user to set the height of the guide with respect to the floor 71, without thereby changing the total length of the training module 60. The wall mount 67 also comprises a safety mechanism 72, comprising a ring 73 and fourth adjusting means 74, for adjusting the position of the ring 73 and thereby adjusting the maximum deflection of the guide 61. The wall mount 67 furthermore comprises a height adjustable support 75 for letting the training module abut upon the wall mount. A (magnetic) safety pin 76 can be applied to prevent the training module from falling out of the support 75.

[0036] Figure 5 shows a side view of the training module 60 shown in figure 4, wherein similar numbers correspond to similar features of the training module 60.

[0037] Figure 6 shows a schematic representation of a motion sequence performed on a training module 80 according to the invention. A user 81 hereby performs a motion by moving the training module 80 around a joint 82 that allows the training module 80 to be rotated around three rotational axes. Independently sliding and rotating handles 83 enable the user 81 to perform a natural motion by letting the user vary the position of his hands. In this instance, the user 81 moves his hands alternately up and down guides 84, thereby sliding the handles 83 along the guides 84 of the training module 80, while performing a sideward rotation. Although the depicted motion sequence concerns a movement to one lateral side of the body, it is very well possible to extent the movement to both lateral sides of the body (see also figure 8). In order for the user 81 to take a correct standing position in front of the training module 80, it is conceivable that markings (not shown) are applied on the floor that indicate suitable foot positions.

[0038] Figure 7 shows schematic representation of another motion sequence performed on a training module

80 according to the invention. In this instance, a user 81 moves his hands simultaneously up and down, thereby sliding the handles 83 along the guides 84 of the training module 80, while performing a sideward rotation, thereby rotating the training module 80 around a joint 82. Again, note that even though the depicted motion sequence concerns a movement to one lateral side of the body, it is possible to perform a bilateral motion sequence with similar movement of the hands.

[0039] Figure 8 shows schematic representation of yet another motion sequence performed on a training module 80 according to the invention, wherein a user 81 performs an exercise within a range of motion that extends to both lateral sides of the body. To execute this bilateral movement, the user 81 may start in a middle/neutral position 85 and from there move with a rotational movement to a first lateral position 86 while increasing the sideward deflection of the training module 80. Once the user 81 reaches the first lateral position 86, the user 81 may move in opposite lateral direction through the middle/neutral position 85 to a second lateral position 87. This movement may be repeated several times, after which the user 81 can move back to the middle/neutral position 85 to end the exercise. During the exercise, the training module 80 rotates around joint 82, thereby carefully following the movement of the user 81.

[0040] Figures 9 and 10 respectively show a front view and a side view of a handle 90 for use in a training module according to the invention. The handle 90 is configured to fit over one of the at least one elongated guide 91 of the training module and thereto comprises a receiving space 92 for said elongated guide 91 to pass through. Linear bearings or sliding bearings 93 are incorporated into the handle 90 on both ends of the receiving space 92 to allow low friction rotational and a linear movement of the handle 90 relative to the guide 91. The outer surface of the handle 90 comprises a first, anatomically shaped part 94 for receiving a hand and a second, cylindrical part 95 for receiving weights. The cylindrical part 95 hereby preferably has an outer diameter suitable for receiving weights having a hole diameter of 50 mm. Fixing means such as a clamping ring 96 may be used to securely lock the weights in place. The second part of the handle 90 outer surface is anatomically shaped and comprises a protruding circumferential edge 97 which interfaces at one side thereof a hand's thumb and index finger and on another, opposing side thereof the weights placed on the cylindrical weight receiving part 95. The protruding circumferential edge 97 is anatomically shaped at the side interfacing the hand to follow the shape of the hand's thumb and index finger. At the opposite side the protruding circumferential edge 97 is substantially flat to from an even surface for the weights to be placed on. The second, anatomically shaped part of the handle 90 outer surface further comprises a circumferential indentation 98 for receiving a hand's thumb and index finger, a rounded protrusion 99 adjacent to the circumferential indentation 98 for being enclosed by a hand's middle and ring

finger and a tapered protrusion 100 opposing the rounded protrusion 99 for supporting a hand's ball of the little finger. The handle is further shaped to be symmetrically with respect to a plane of symmetry 101 containing the longitudinal centre line 102 of the guide. In addition, the handle 90 may be provided with a cover plate or flange 103 to act as a contact or connection surface for a resistive spring. The handle 90 may also be provided with an integrated sensor 104 for tracking the movement of the handle.

[0041] Figure 11 shows a perspective view of the handle shown in figure 9 and 10, wherein similar numbers again correspond to similar features.

[0042] It should be clear that features included in one of the above embodiments could as well be included in the other shown embodiments. Moreover, it will be apparent that the invention is not limited to the exemplary embodiments shown and described here, but that within the scope of the appended claims numerous variants are possible which will be self-evident to the skilled person in this field.

Claims

1. Training module comprising:

- at least one elongated guide;
- a coupling, at one end thereof connected to the guide, which coupling is configured for rotatably connecting the guide to a support surface;
- at least one handle, moveably connected to the guide;

wherein the at least one handle is moveable in at least a lengthwise direction of the guide and wherein the at least one handle comprises an anatomically shaped outer surface to closely fit the cylindrical grasp of a human hand.

2. Training module according to claim 1, wherein the at least one handle is provided with bearings configured for movement relative to the at least one guide in an axial and radial direction of the guide.
3. Training module according to claim 1 or 2, wherein the at least one handle is provided with at least one weight receiving part for receiving weights and thereby changing the mass moment of inertia of the training module.
4. Training module according to claim 3, wherein the anatomically shaped outer surface of the at least one handle comprises a protruding circumferential edge, configured to interface at one side thereof a hand's thumb and index finger and on another, opposing side thereof the weights placed on the weight receiving part.

ing part.

5. Training module according to any of the preceding claims, the anatomically shaped outer surface of the at least one handle comprises a circumferential indentation configured for receiving a hand's thumb and index finger, a rounded protrusion adjacent to the circumferential indentation configured for being enclosed by the hand's middle and ring finger and a tapered protrusion opposing the rounded protrusion configured for supporting the hand's ball of the little finger.
6. Training module according to any of the preceding claims, wherein the at least one handle is symmetrically shaped with respect to a plane of symmetry containing the longitudinal centre line of the guide.
7. Training module according to any of the preceding claims, wherein the training module comprises at least one sensor for observing the movement conducted by the training module, wherein at least one of the at least one sensor is provided on one of the at least one handle.
8. Training module according to any of the preceding claims, wherein the training module comprises at least two elongated guides, each connected to the coupling and each provided with at least one handle, wherein the handles are moveably connected to the respective guides and wherein the handles are moveable in at least a lengthwise direction of the guides.
9. Training module according to claim 8, wherein the handles are independently moveable with respect to each other in at least a lengthwise direction of the guides.
10. Training module according to any of the preceding claims, wherein the coupling comprises a hinge, wherein the hinge is configured to allow the at least one guide to rotate with respect to the support surface around three rotational axes.
11. Training module according to any of the preceding claims, wherein the training module comprises first adjusting means for adjusting the distance of the at least one guide with respect to the coupling.
12. Training module according to any of the preceding claims, wherein the training module comprises a wall mount configured for connecting the coupling to a wall and thereby attaching the training module to said wall, wherein the wall mount comprises a connection element for connecting the coupling thereto, wherein the connection element, by means of third adjustment means, is adjustable in its position with respect

to the wall and in particular is adjustable in height.

13. Training module according to claim 12, wherein the wall mount comprises a safety mechanism for limiting the maximum deflection of the at least one guide, wherein the safety mechanism comprises fourth adjusting means for adjusting the maximum deflection of the at least one guide to which the training module is limited by the safety mechanism.
14. Training module according to claims 11 or 12, wherein the wall mount comprises a support for letting the training module abut upon the wall mount in a stable equilibrium position.
15. Training module according to any of the preceding claims, wherein at least one of the at least one guide is provided with a spring for generating a resistance force upon movement of one of the at least one handle connected to said guide, which force acts on said handle in a direction opposite to the direction of said movement.

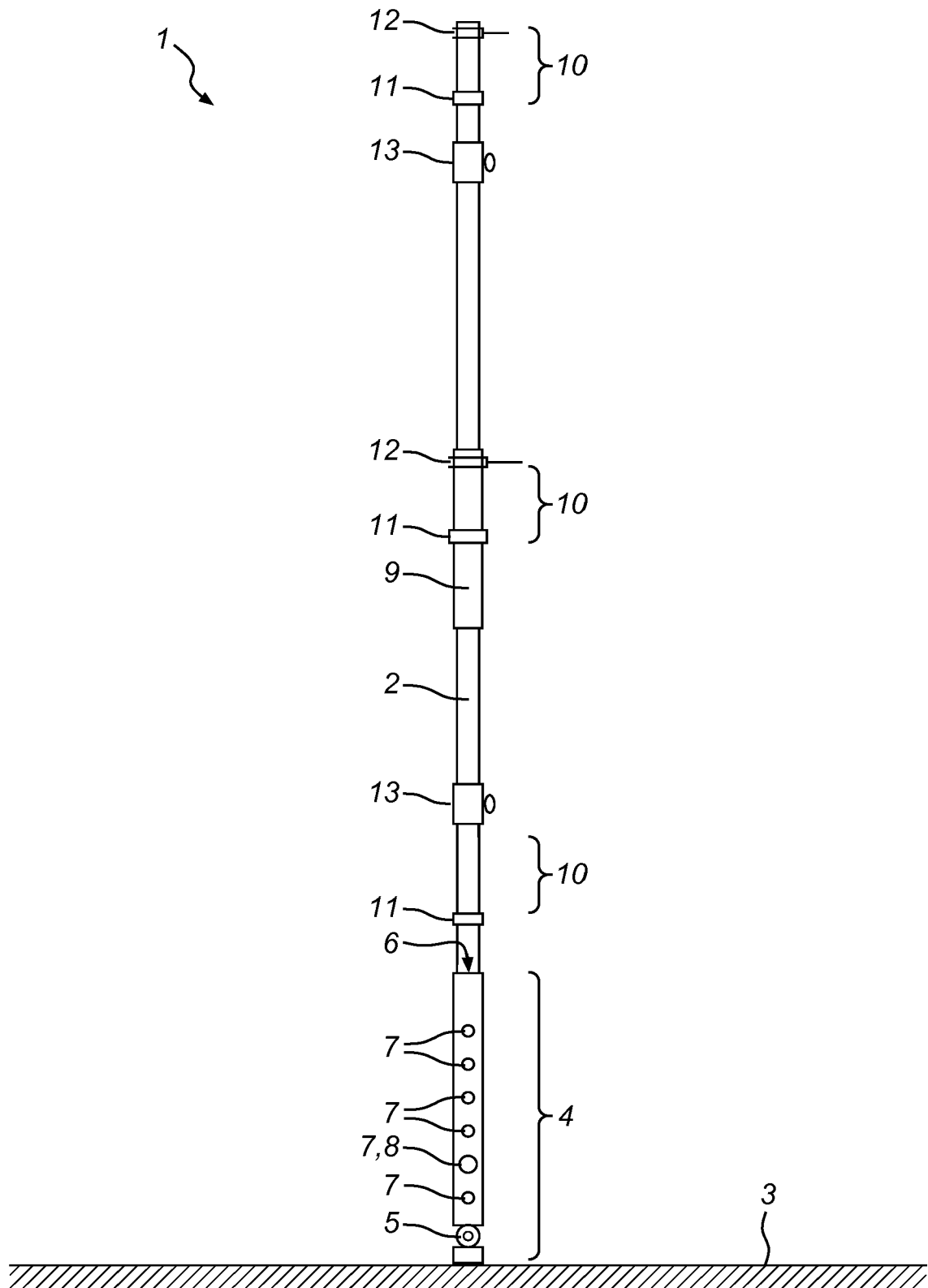


Fig. 1

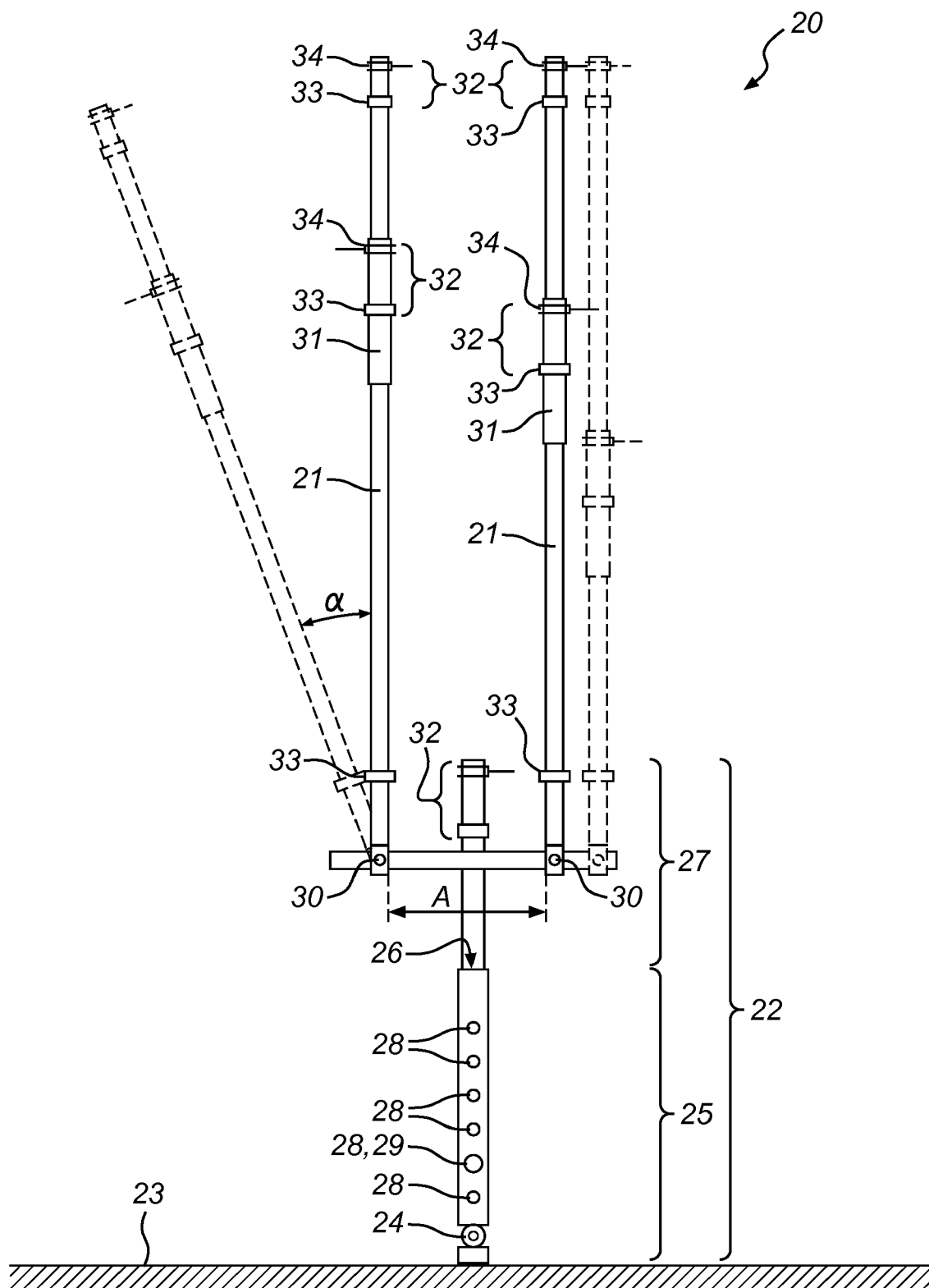
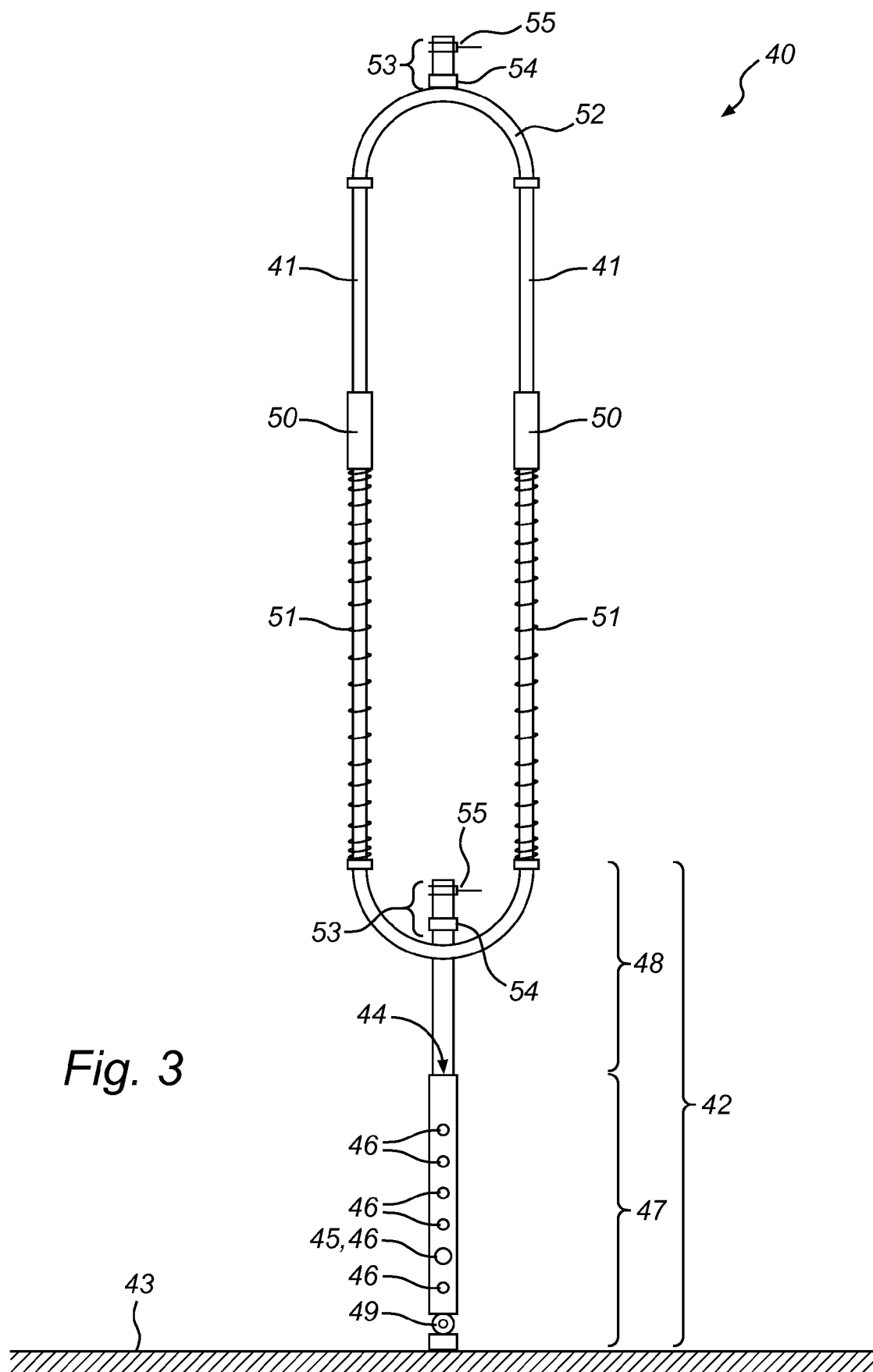


Fig. 2



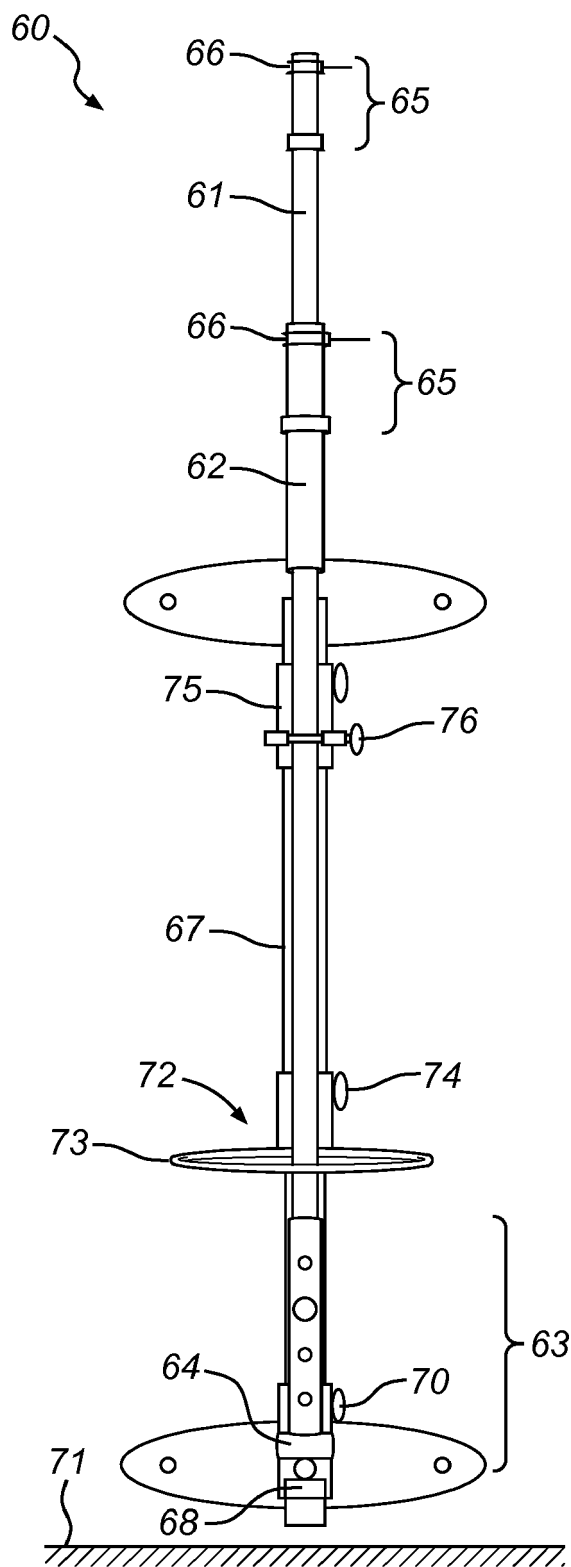


Fig. 4

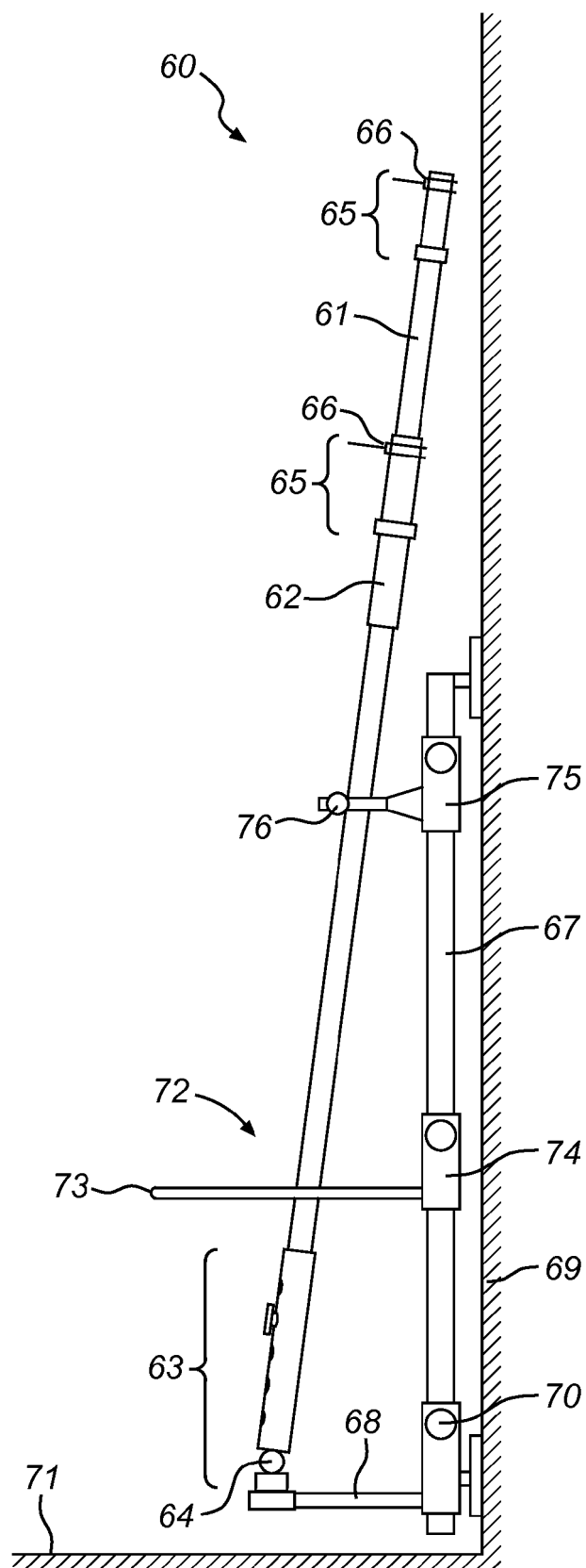


Fig. 5

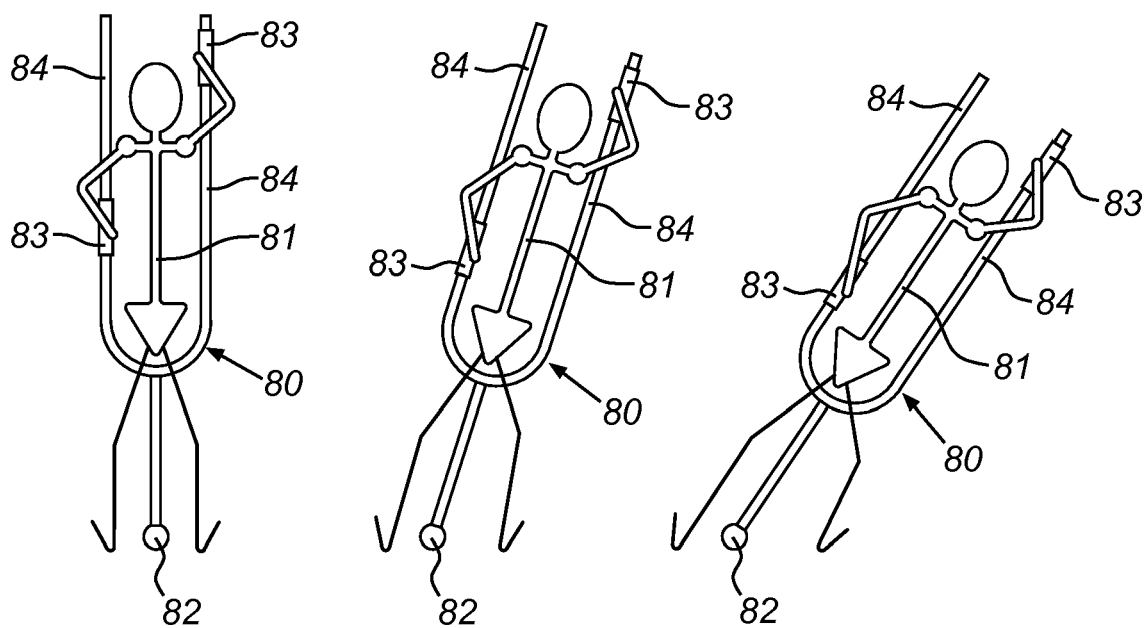


Fig. 6

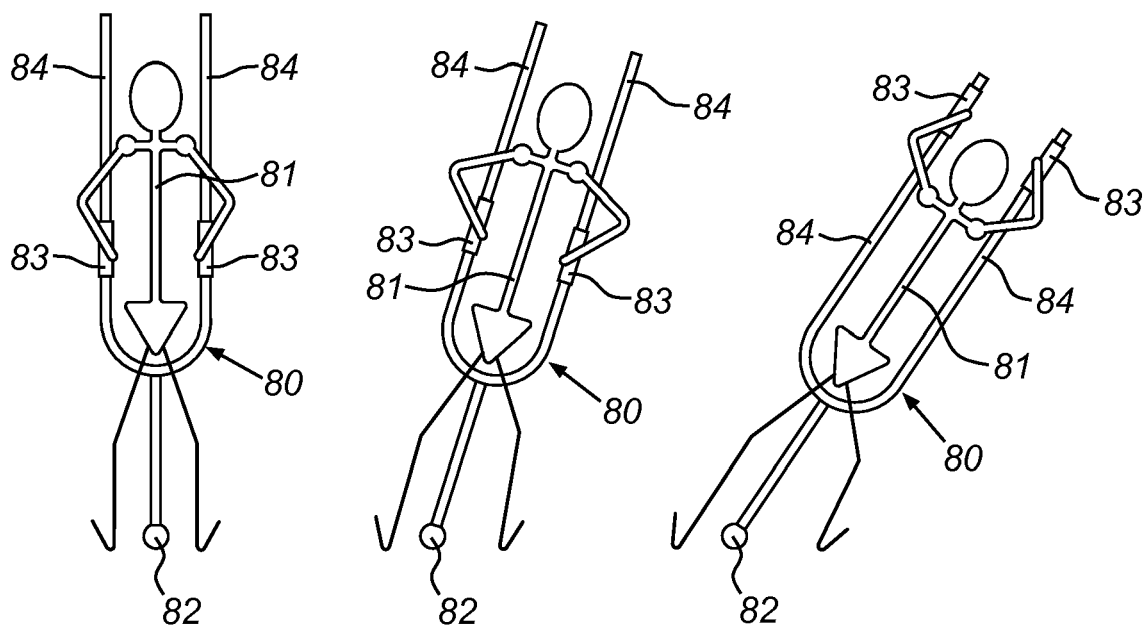


Fig. 7

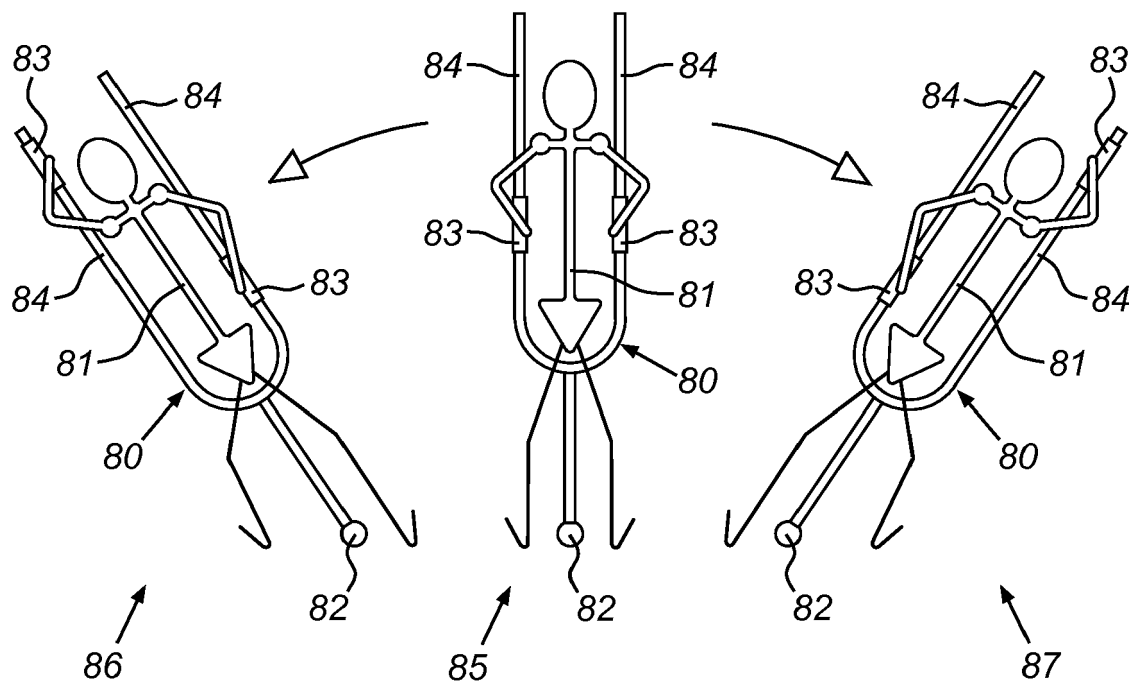


Fig. 8

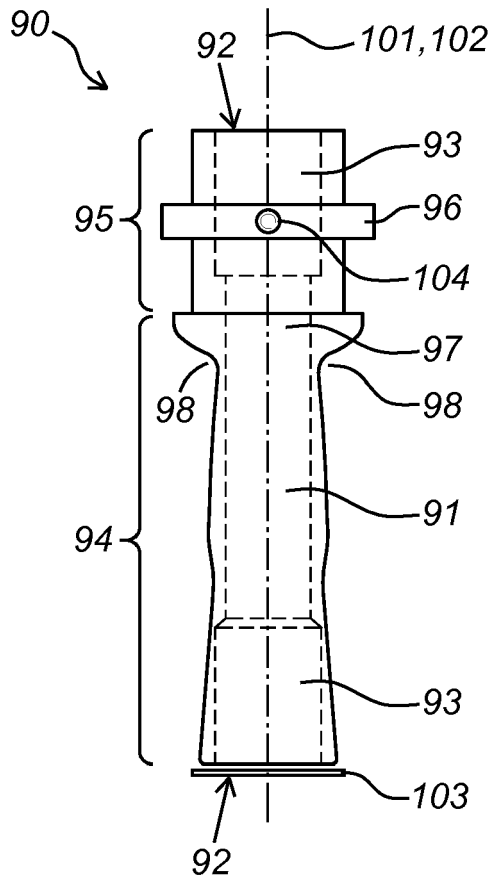


Fig. 9

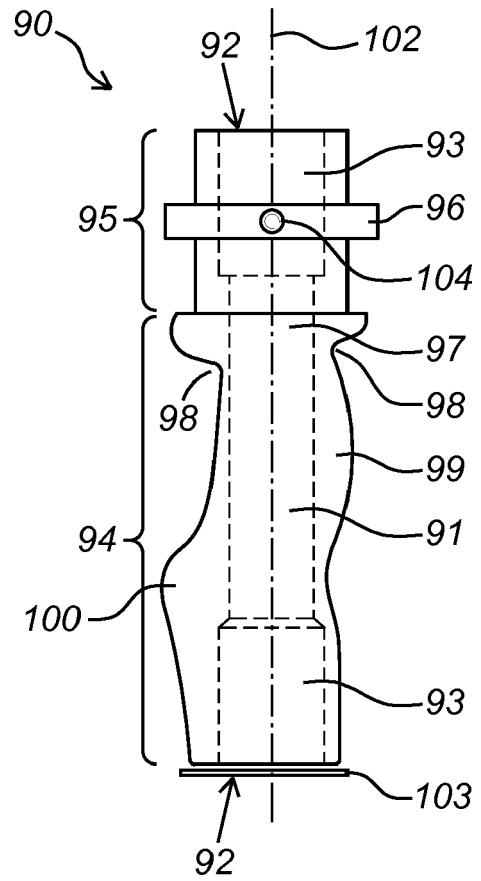


Fig. 10

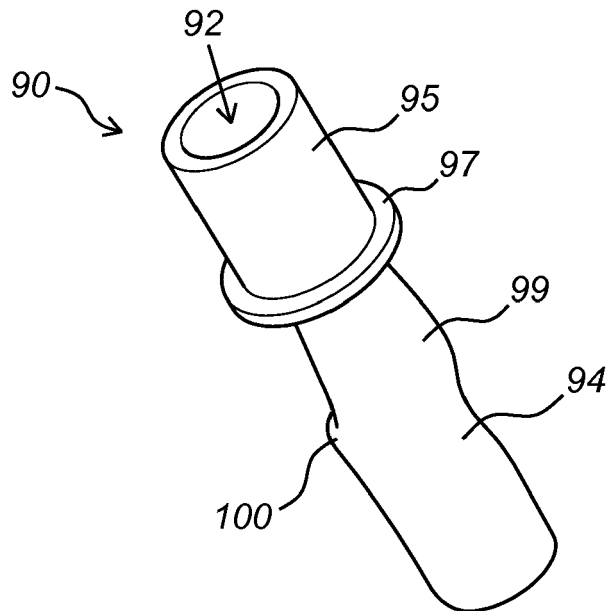


Fig. 11