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(54) **EXERCISE APPARATUS**

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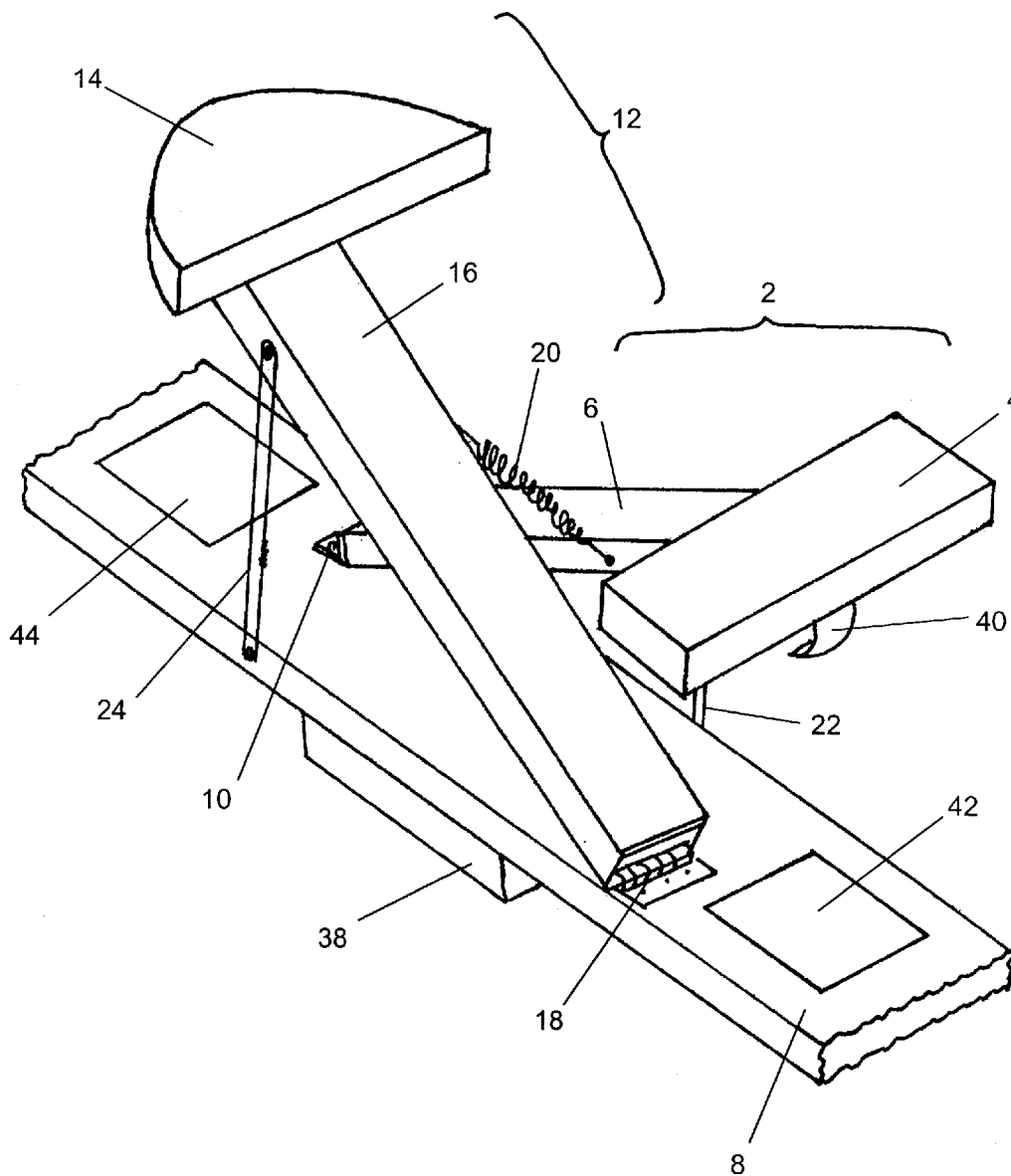
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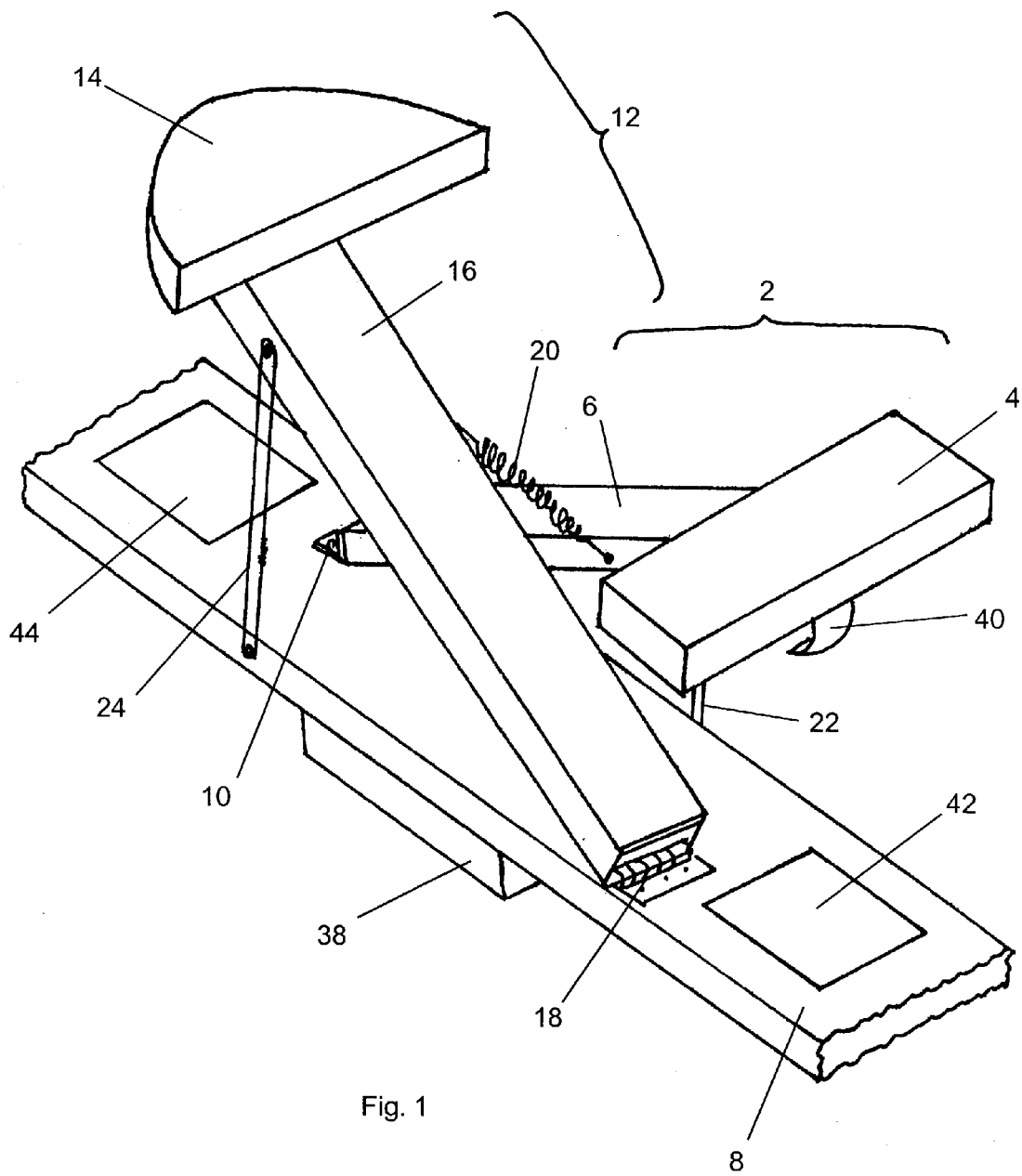
(57) **ABSTRACT**

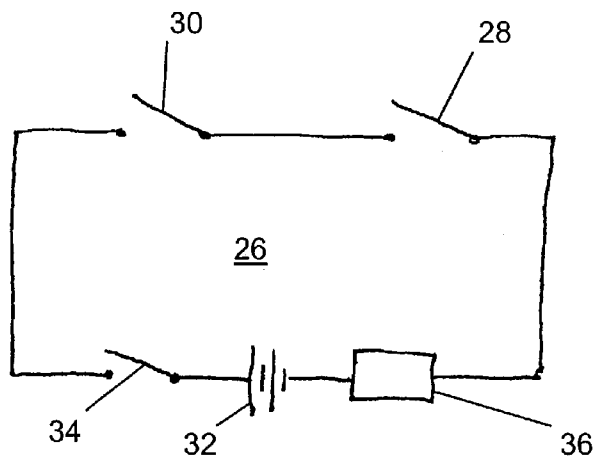
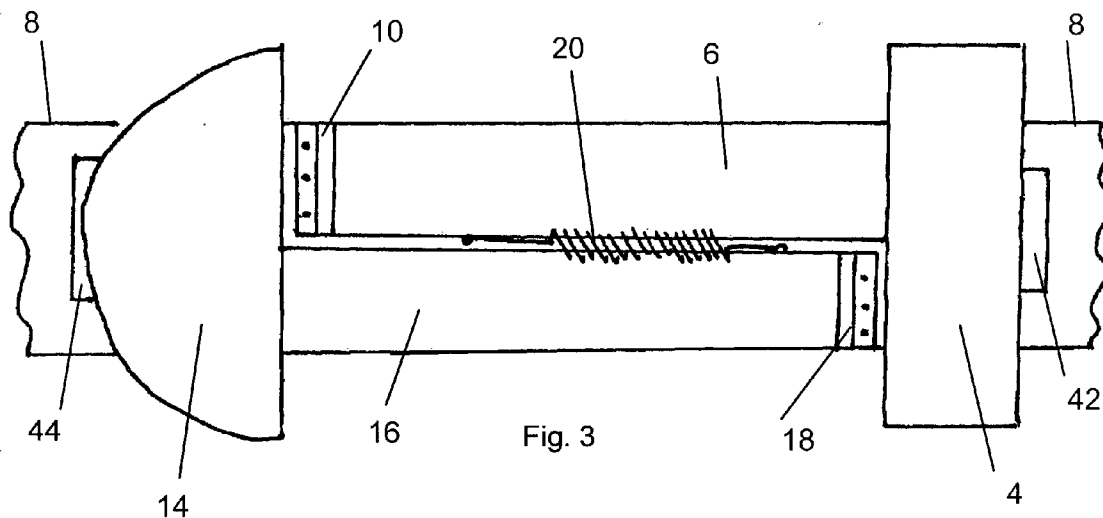
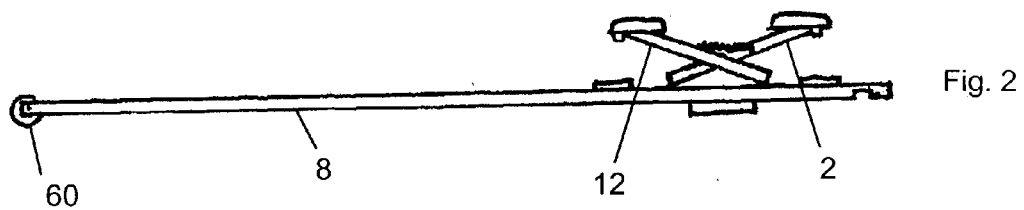
The present Invention is an apparatus to provide feedback to a user as to the user's posture during exercise, particularly during push ups and during pull ups using a horizontal bar. Two members are connected to a frame by hinges. The members are resiliently connected to each other and touch the user. The members activate electrical switches, notifying the user when the user has fully completed a cycle of the push up or pull up. The members also provide tactile feed back to the user.

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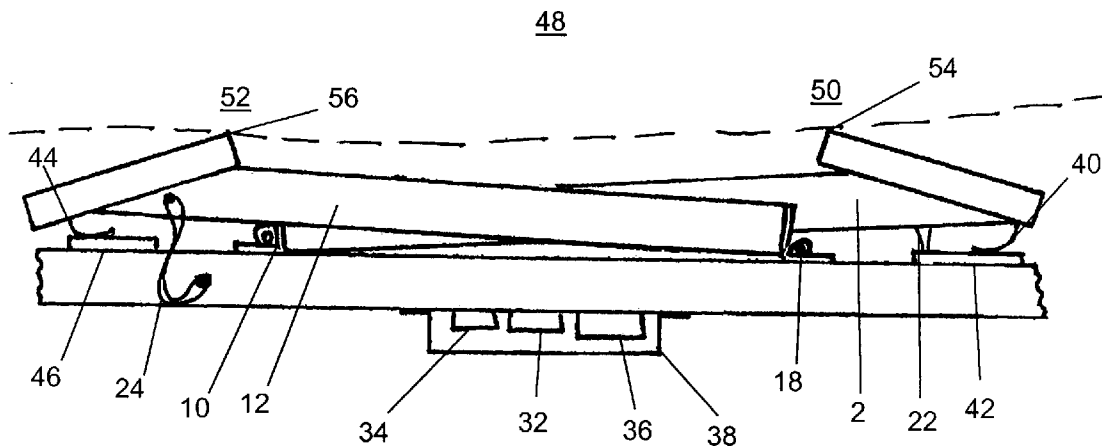


Fig. 5

48

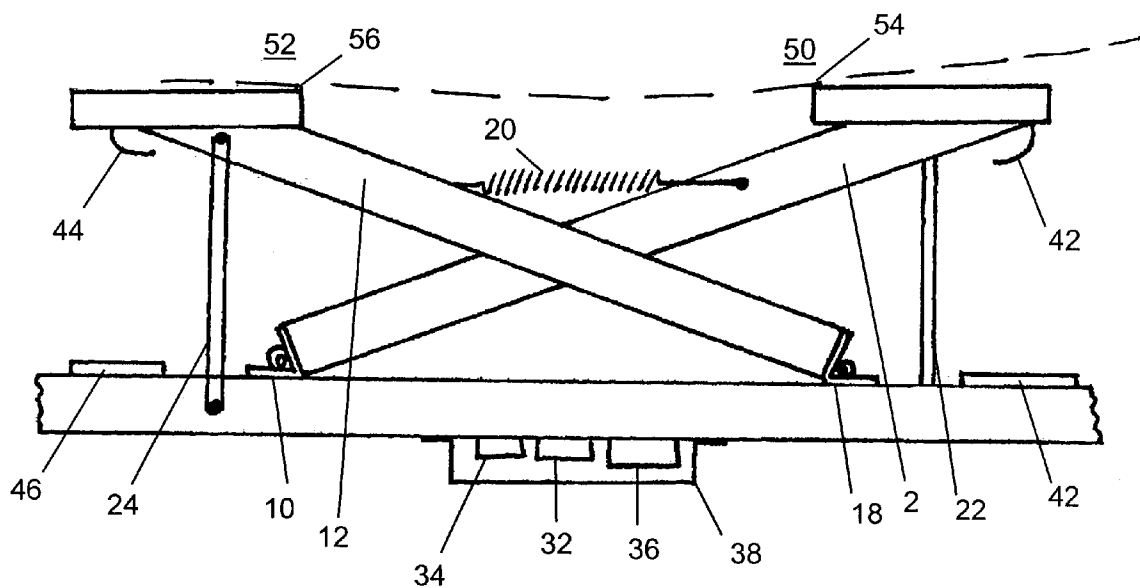


Fig. 6

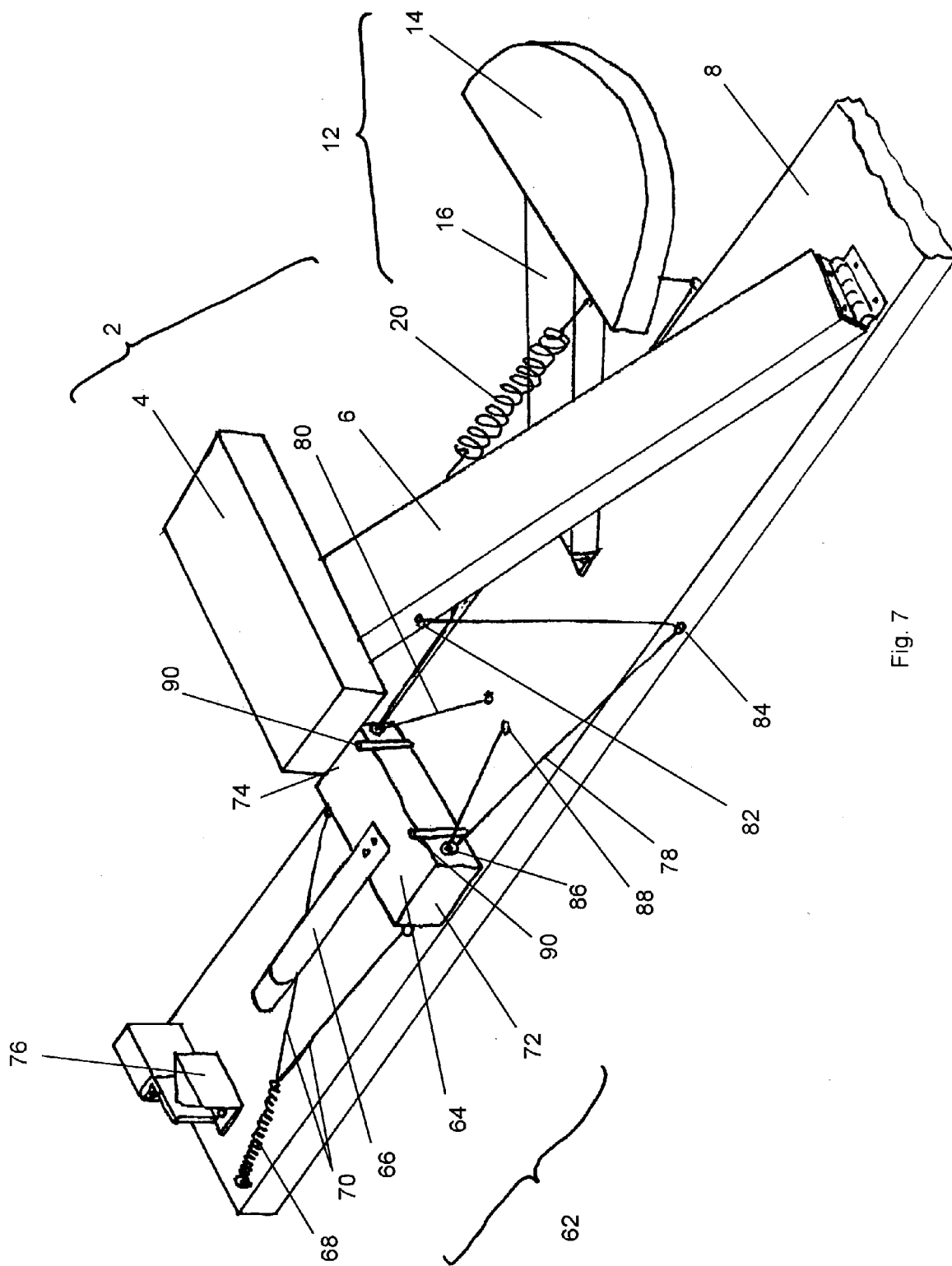


Fig. 7

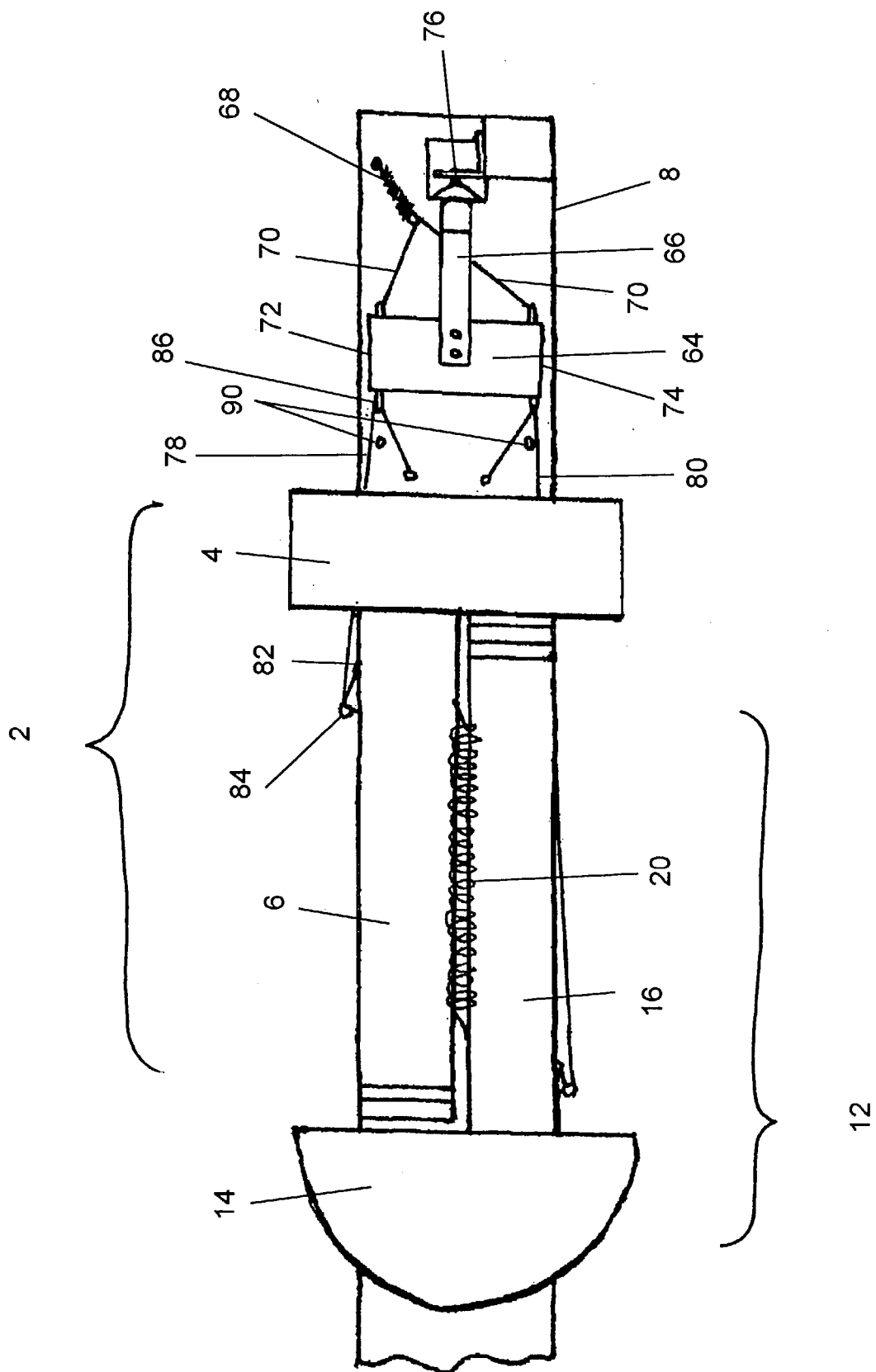
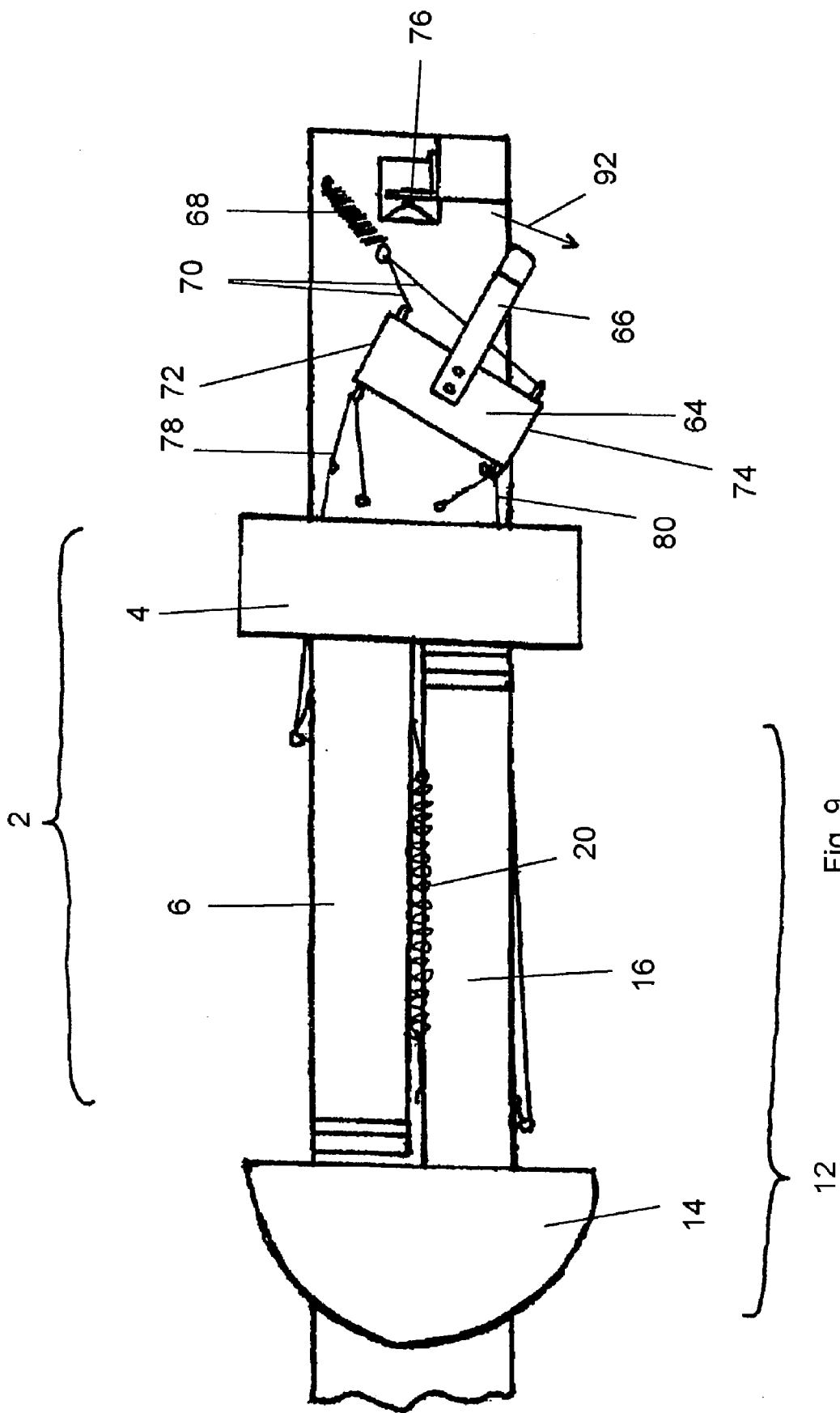


Fig. 8





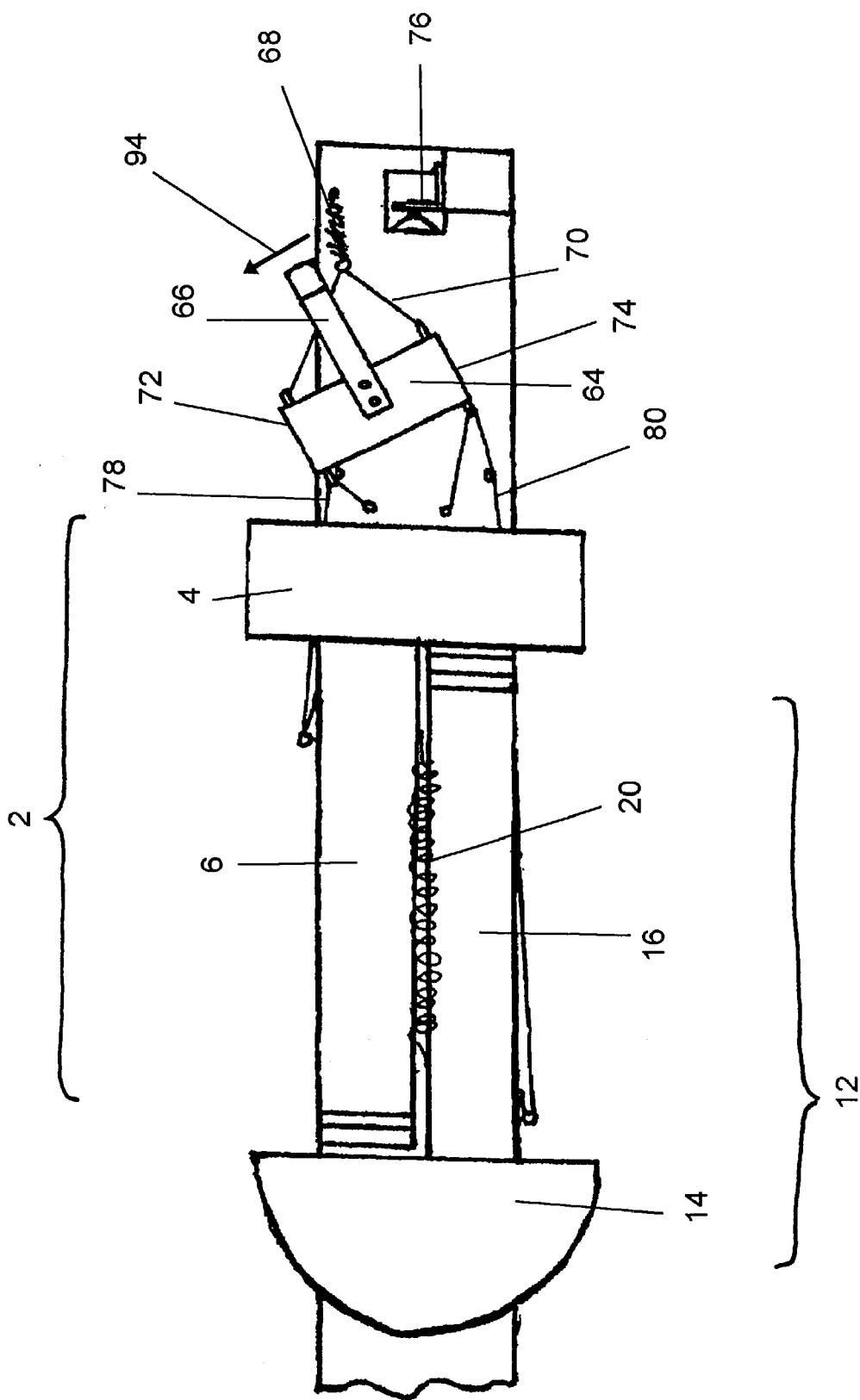


Fig. 10

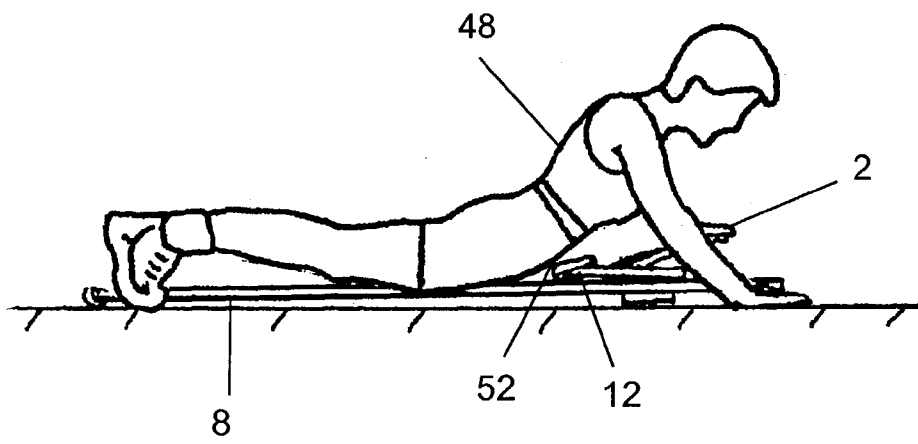


Fig. 11

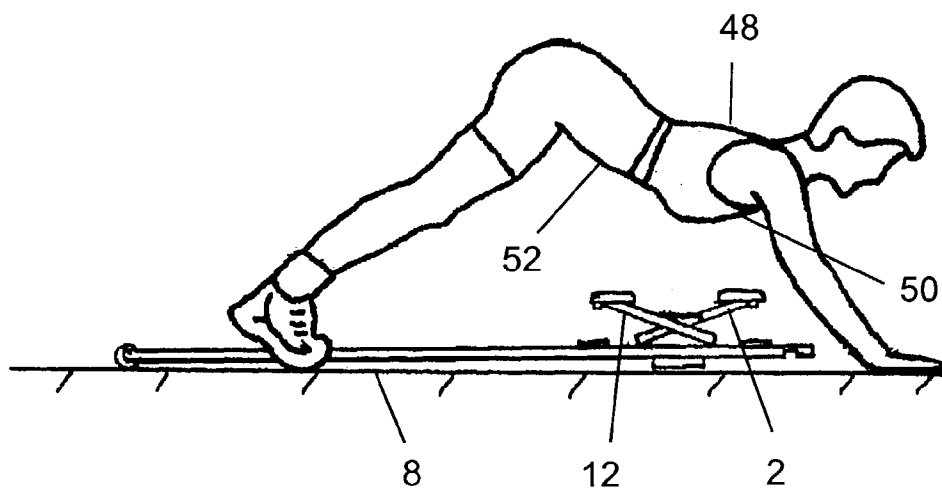


Fig. 12

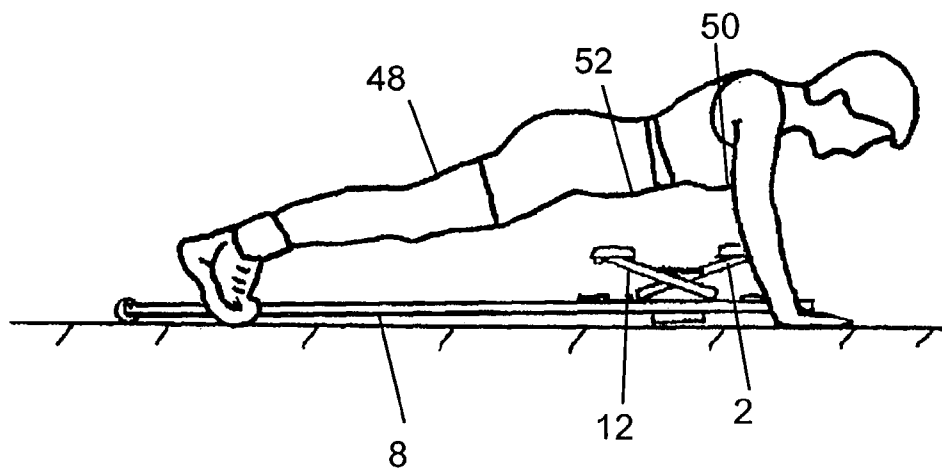


Fig. 13

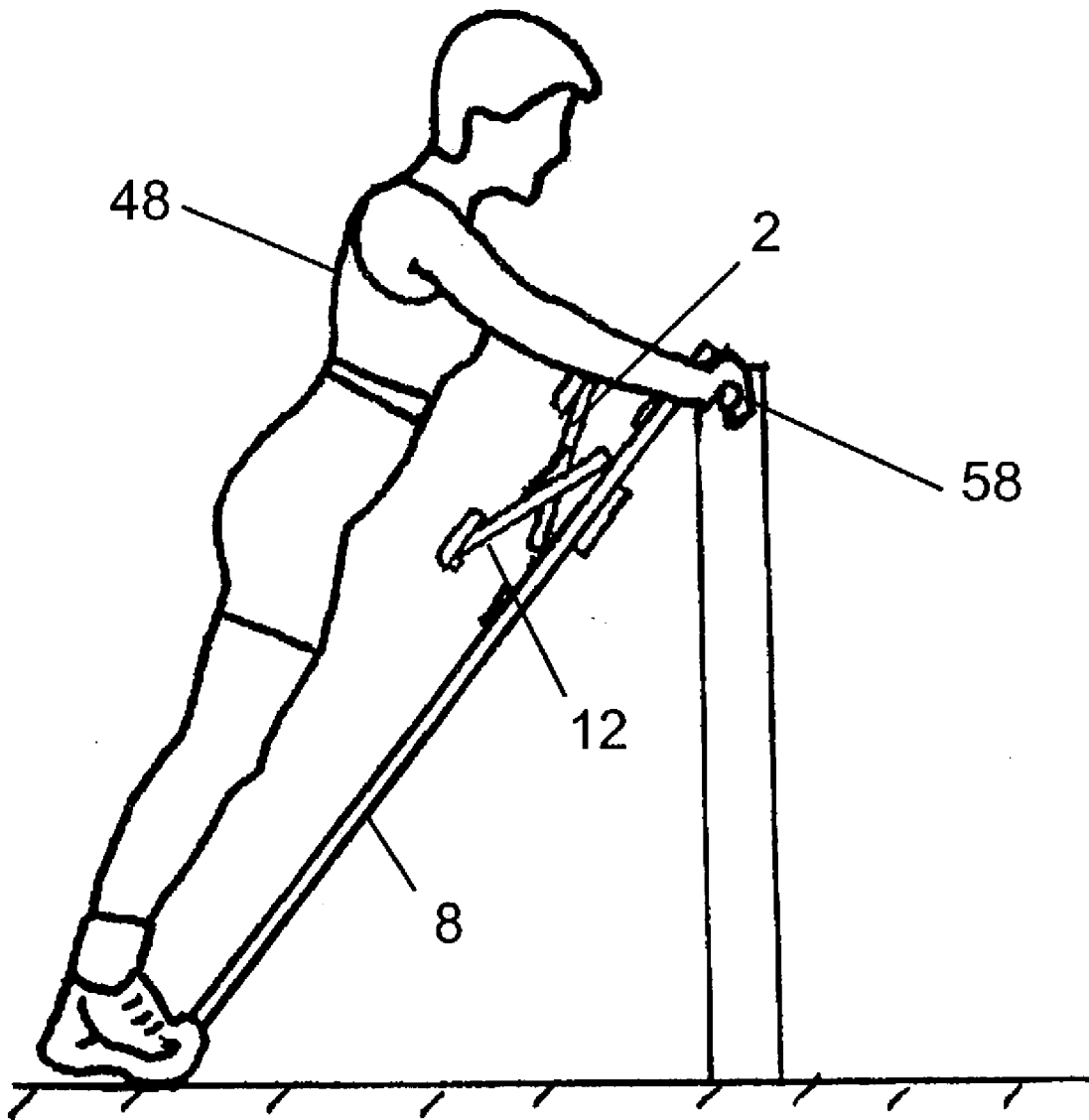


Fig. 14

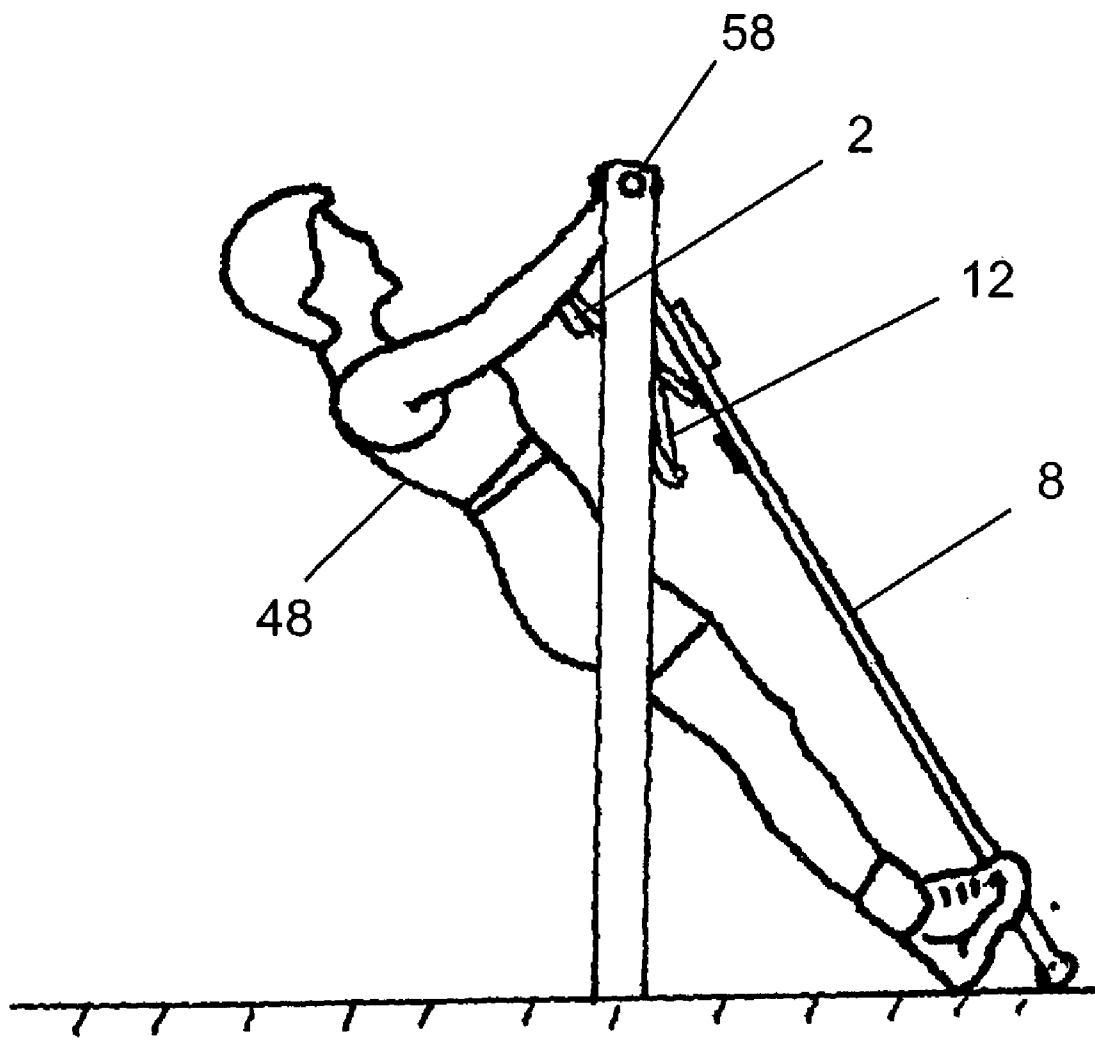


Fig. 15

## EXERCISE APPARATUS

### BACKGROUND

#### [0001] 1. Field of the Invention

[0002] The invention relates to an apparatus for physical exercise and specifically to an apparatus to improve an athlete's posture and conformation during exercise.

#### [0003] 2. Description of the Related Art

[0004] Exercise improves physical conditioning and serves to preserve health and to achieve weight loss. For a child or other person performing exercise, the exercise has the most benefit and the least chance of causing injury if the person uses the proper posture during the exercise. A person in poor physical condition tends to compensate for poor conditioning by adopting a poor posture during exercise, which reduces the efficacy of the exercise and increases the risk of injury.

[0005] Push-ups and pull-ups are useful for building upper body strength. A push-up is performed by a person starting in a horizontal position and with the toes resting on the floor. The person presses with his or her hands against the floor or other surface, raising his or her body from the horizontal position until his or her arms are fully extended. The person then lowers his or her body to the surface, ending one cycle of the push-up. To perform a pull-up a person pulls with his or her hands on an overhead bar, lifting his or her body weight. The principal advantages of the push-up and pull-up are that resistance is supplied by the body weight of the person and little or no apparatus is required.

[0006] The push-up and pull-up described above have the disadvantage that significant upper body strength is required to perform even one repetition of either exercise. These exercises therefore may be inaccessible to a child or other person with little upper body strength.

[0007] A horizontal bar of adjustable height is particularly useful for teaching basic exercise skills to children. The height of the horizontal bar may be adjusted, allowing an instructor or the child to adjust the angle of the child's body with respect to the bar and therefore to adjust the portion of the child's weight supported by his or her arms and the portion of the child's weight supported by his or her legs. The adjustment to the height of the bar therefore allows adjustment of the weight against which the child works to perform a push up or pull up. The height of the bar is adjusted to correspond to the level of physical conditioning of the child.

[0008] For a child with little upper body strength, the height of the bar is set so that most of the child's weight is supported by his or her legs and little of the child's weight is supported by his or her arms, allowing the child to successfully complete push ups and pull ups. As the physical conditioning of the child improves, the horizontal bar may be progressively lowered, increasing the resistance offered by the child's body weight.

[0009] The proper posture for a push-up is with the body and legs forming a continuous straight line so that the arms support the full weight of the body through the full extension of the arms. What is needed is an apparatus to provide feedback to a child or other person performing a pull-up

using an adjustable horizontal bar or performing a push-up to advise a child or other person that the person is using a proper posture.

### SUMMARY OF THE INVENTION

[0010] The invention is an exercise equipment apparatus that provides feedback to a person performing exercise. The apparatus is useful for push-ups on a flat surface, such as a floor, or push-ups using an adjustable horizontal bar. The apparatus also is useful for pull-ups using an adjustable horizontal bar. The feedback provided by the Invention advises the person whether the person is using the proper posture and is fully performing the exercise.

[0011] The apparatus includes a frame and two resiliently-mounted body-engaging members. When a person performs a push-up using the apparatus of the Invention, the chest of the person encounters one of the two body-engaging members and the abdomen of the person encounters the other of the body-engaging members. The two body engaging members provide tactile feedback to the person while the person is moving his or her body.

[0012] The apparatus also may include an audible or visible indicator advising the person whether the person is using the correct posture in performing the exercise. The visible or audible indicator may be a source of light or sound that is activated when both body engaging members are depressed by a predetermined amount. When the person completes a full cycle of the exercise in the proper position, the body-engaging members activate electrical switches, closing an electrical circuit and causing a signal to be provided to the person. The person is thereby advised that the person is employing the proper posture.

[0013] Alternatively, the visible or auditory indicator may be a mechanical linkage visually notifying the user of the relative positions of the first and second body engaging members, thereby providing feedback to the person of the relative positions of the person's chest and abdomen during the exercise. The mechanical linkage also may activate a sound or light source notifying the person when the person has performed the exercise using the proper posture.

### BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 is a perspective view of a detail of the apparatus.

[0015] FIG. 2 is a side view of the apparatus.

[0016] FIG. 3 is a top view of a detail of the apparatus.

[0017] FIG. 4 is a circuit diagram of the apparatus.

[0018] FIG. 5 is a first side view of a detail of the apparatus.

[0019] FIG. 6 is a second side view of a detail of the apparatus.

[0020] FIG. 7 is a perspective view of an alternative embodiment.

[0021] FIG. 8 is a plan view of the alternative embodiment in a first position.

[0022] FIG. 9 is a plan view of the alternative embodiment in a second position.

[0023] FIG. 10 is a plan view of the alternative embodiment in a third position.

[0024] FIG. 11 is a first improper posture being detected by the apparatus.

[0025] FIG. 12 is a second improper posture to be detected by the apparatus.

[0026] FIG. 13 is a correct posture to be detected by the apparatus.

[0027] FIG. 14 illustrates use of the apparatus with a horizontal bar for a push up.

[0028] FIG. 15 illustrates use of the apparatus with a horizontal bar for a pull up.

#### DESCRIPTION OF AN EMBODIMENT

[0029] As shown by FIGS. 1-3, the apparatus includes a first member 2 having a first body engaging part 4 and a first arm part 6. The first arm part 6 is connected to a frame 8 by a first hinge 10. The first hinge 10 allows the first member 2 to move with respect to the frame 8.

[0030] A second member 12 has a second body engaging part 14 and a second arm part 16. The second arm part 16 is connected to the frame 8 by a second hinge 18. The second hinge 18 allows the second member 12 to move with respect to the frame 8 and with respect to the first member 2.

[0031] The first and second members 2, 12 are connected together by a resilient member 20. The resilient member 20 may be a metal spring. The resilient member 20 urges the first member 2 and the second member 12 together, the motion of the first and second members 2, 12 being constrained by the first and second hinges 10, 18.

[0032] As shown by FIGS. 1, 5, and 6, the motion of the first member 2 is further constrained by a first motion-limiting member 22. The motion of the second member 12 is further constrained by a second motion-limiting member 24. The first and second motion-limiting members 22, 24 operate in tension and therefore each motion limiting member may be composed of a cord or string. The length of the first and second motion limiting members 22, 24 may be adjusted to provide an appropriate starting position and range of travel of the first and second members 2, 12. The motion limiting members 22, 24 and the resilient member 20 are selected and configured to provide an appropriate preload to the resilient member 20 and to therefore provide an appropriate initial resistance.

[0033] As shown by FIG. 4, an electrical circuit 26 is provided that includes a first switch 28, a second switch 30, a power supply 32, a system on-off switch 34 and a signaling device 36. The signaling device 36 can be any electrical device that will provide a signal to the user. The signaling device 36 may make a noise, such as a buzzer, may provide a light signal, such as an incandescent bulb or a light-emitting diode, or may provide a tactile signal, such as by vibrating. The power supply 32 may be any suitable conventional supply of electrical power, such as a battery. The system on-off switch 34, the power supply 32 and the signaling device 36 are located in an electrical box 38.

[0034] As shown by FIGS. 1, 5 and 6 the first switch 28 consists of a first member switch contact 40 attached to the first member 2 and a first switch plate 42 attached to the

frame 8. When the first member 2 is in the first position as illustrated by FIG. 5, the first member switch contact 40 touches the first switch plate 42, thereby closing the first switch 28.

[0035] The second switch 30 is configured in a similar fashion to the first switch 28. The second switch 30 consists of a second switch contact 44 affixed to the second member 12 and a second switch plate 46 attached to the frame 8. When the second member 12 is in a first position, also illustrated by FIG. 5, the second switch contact 44 touches the second switch plate 46, thereby closing the second switch 30.

[0036] When both the first and second members 2, 12 are in the first position, both the first and second switches 28, 30 are closed, completing the electrical circuit 26 and causing the signaling device 36 to provide a signal to the user. The illustrated first and second switches 28, 30 are only one of many switch constructions and configurations that may be used to make and break the circuit 26 based on the position of the first and second members 2, 12. Any of the switches well known in the art may be used to selectively complete the circuit 26.

[0037] FIGS. 13, 5 and 6 illustrate the use of the apparatus of the Invention by a user 48 to perform a push up. The user 48 positions the apparatus so that the chest of the user 48 will contact one of the first and second members 2, 12 during the push up and the abdomen of the user 48 will contact the other of the first and second members 2, 12. As used in this application, the term 'first portion' 50 refers to the body part of user 48 contacted by the first member 2 and 'second portion' 52 refers to the body part of the user contacted by the second member 12. Although the terms are illustrated in FIG. 13 by reference to the chest and abdomen of the user, any of the body parts of the user may be the first and second portions 50, 52 provided that the relative locations of the body parts indicate the posture of the user 48 during exercise.

[0038] From the position illustrated by FIG. 6, the user 48 lowers him or herself until the first member 2 contacts the first portion 50 of user, the second member 12 contacts the second portion 52, or both the first and second members 2, 12 contact the user 48. The first member 2 contacts the user 48 at a first location 54 on the first portion 50 of user 48, and the second member 12 contacts the user at a second location 56 on the second portion 52 of user 48. The preload of the resilient member 20 causes the first and second members 2, 12 to press slightly against user 48, allowing the user 48 to perceive the touch of the first member 2, the second member 12, or both the first and second members 2, 12. The restraining members 22, 24 are adjusted so that the user 48 contacts the first and second members 2,12 at the same time when the user 48 is performing the exercise with the proper posture. If the user 48 perceives tactilely that he or she contacts the first and second members 2,12 at different times, the user 48 knows that he or she is not using the proper posture.

[0039] As the user 48 progresses with the exercise, the user 48 lowers his or her body, moving the first and second members 2,12 toward the first position illustrated in FIG. 5. The increase in tension on the resilient member 20 causes the first and second members 2,12 to exert an increase in pressure on the user 48, providing the user 48 with tactile

feed back as to the user's 48 position and the user's 48 posture. The first and second locations 54, 56 where the first and second members 2, 12 touch the user 48 also change with the change in position and posture of the user 48. The user 48 may perceive the change in the first and second locations 54, 56, providing additional feedback to the user 48 as to the user's 48 posture.

[0040] When the first and second members 2, 12 are depressed, corresponding to completion of the exercise, the first and second switches 28, 30 close, completing the electrical circuit and sounding a buzzer, illuminating a light, or otherwise providing a signal 36 to the user 48. The user 48 then reverses the movement, perceiving in reverse the tactile signals discussed above. The degree of depression of the first and second members 2, 12 required to activate the first and second switches 28, 30 may be adjusted to compensate for differences in users 48.

[0041] FIGS. 7-10 illustrate an alternative embodiment of the Invention. An indicator 62 includes a body 64 and pointer 66 attached to body 64. One end of body spring 68 is attached to frame 8 and the other end of body spring 68 is attached to body cords 70. Body cords 70 are attached to a first end 72 and a second end 74 of body 64.

[0042] Body spring 68 and body cords 70 urge body 64 toward electrical switch 76. Body 64 is restrained from moving toward switch 76 by first member cord 78 and second member cord 80. First member cord 78 is attached to first member 2 at connection point 82. First member cord 78 passes through ring 84 mounted on frame 8. Ring 84 acts as a pulley, redirecting the force exerted by first member cord 78. First member cord 78 passes through a second ring 86, which also acts as a pulley, and terminates at frame connection point 88. The force of spring 20 acting on first member 2 places a tension on first member cord 78, pulling body 64 against pins 90 and overcoming the tension on cords 70 applied by spring 68. The arrangement of cords and rings for second member cord 80 is the same as that for first member cord 78.

[0043] FIG. 8 shows motion of body 64 when first member 2 and second member 12 are both evenly depressed at the same time, corresponding to proper posture by the user. Depression of first member 2 and second member 12 allows spring 68 and body cord 70 to overcome the force exerted by spring 20 and first member cord 78 and second member cord 80. First end 72 and second end 74 of body 64 evenly advance toward switch 76. Because first end 72 and second end 74 evenly advance, the long axis of pointer 66 remains generally longitudinal to frame 8. When first member 2 and second member 12 are fully depressed, corresponding to completion of the exercise with proper posture, pointer 66 activates electrical switch 76, completing an electrical circuit and providing a visual or audible signal to the user.

[0044] FIG. 9 illustrates the alternate embodiment when first member 2 is depressed by more than second member 12. Depression of first member 2 extends first member cord 78, allowing body spring 68 and body cord 70 to draw the first end 74 of body 64 toward switch 76. Because first member 2 is depressed by more than second member 12, more of first member cord 78 is released than of second member cord 80. First end 72 therefore moves by more than second end 74, causing pointer 66 to move in first direction 92. The user is provided with visible feedback of the pointer

66 pointing in first direction 92, demonstrating that user 48 is not exhibiting proper posture. Pointer 66 does not engage switch 76, further providing user with feedback.

[0045] FIG. 10 illustrates the second embodiment when second member 12 is depressed by more than first member 2. Second member cord 80 is released to a greater extent than first member cord 78. Body spring 68 and cord 70 pull first end 74 of body 64 toward switch 76. The greater motion of second end 74 than first end 72 causes body 64 and pointer 66 to move in second direction 94, providing user 48 feedback that user is utilizing improper posture. Pointer 66 does not contact electrical switch 76, further providing feedback to user 48.

[0046] The second embodiment of FIGS. 7-10 has the advantage that the mechanical linkage provides feedback to the user while the exercise is in progress, not merely at the end of a cycle of the exercise as in the first embodiment.

[0047] FIGS. 11 and 12 illustrate improper posture that will be detected by the apparatus. In FIG. 11, the user 48 allows the user's 48 abdomen to descend, but not the user's 48 chest. The user 48 will depress the second member 12 but not the first member 2 and the signaling device 36 will not be activated. The user 48 will perceive the touch of the second member 12, but will not touch the first member 2, further providing the user with feedback as to the user's posture.

[0048] In FIG. 12, the user 48 exhibits a posture in which the user's chest will touch and depress the first member 2, but the user's abdomen will not fully depress the second member 12. The user 48 will perceive the touch of the first member 2 and not the second member 12, which will provide feedback to the user 48. The signaling device 36 also will not operate because the electrical switch 30 connected to the second member 12 will not close, further providing the user with feedback.

[0049] FIG. 13 illustrates proper posture for a push up that will be detected by the Invention.

[0050] FIG. 14 illustrates use of the invention in conjunction with a horizontal bar 58 to teach exercise skills to a user 48 with little upper body strength. The majority of the user's 48 weight is supported by his or her legs, reducing the effort required to perform a push up or pull up. The apparatus of the Invention in conjunction with the horizontal bar allows the user to learn proper posture for the exercise while building additional upper body strength.

[0051] FIG. 15 illustrates use of the invention to perform a pull up using a horizontal bar 58. The user 48 raises his or her body toward the bar 58 by pulling with his or her arms and then lowering him or herself to the starting position. The horizontal bar 58 again reduces the effort required to perform the exercise by shifting some of the user's 48 weight to his or her legs. The apparatus of the Invention teaches the user 48 to use proper posture while the user is building his or her upper body strength.

[0052] The frame 8 may be equipped with wheel 60 to reduce the chance of damage to a floor.

[0053] In describing the above embodiments of the invention, specific terminology was selected for the sake of clarity. However, the invention is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents that operate in a similar manner to accomplish a similar purpose.

I claim:

- 1. An exercise apparatus, the apparatus comprising:
  - a. a first member adapted to engage a first portion of a user;
  - b. a second member adapted to engage a second portion of said user;
  - c. said first and second members each having a position, said positions of said first and said second members in combination corresponding to a posture of said user;
  - d. said first and second members being adapted to provide a signal corresponding to said posture of said user.
- 2. The apparatus of claim 2 wherein:
  - a. said position of said first member corresponds to a position of said first portion of said user;
  - b. said position of said second member corresponds to a position of said second portion of said user, said positions of said first and said second portions of said user in combination corresponding to said posture of said user.
- 3. The apparatus of claim 2 wherein said signal being a tactile signal, said adaptation of said first and second members to provide said signal to said user comprising: said first member being in user-perceptible tactile engagement with said first portion of said user, said second member being in user-perceptible tactile engagement with said second portion of said user, said user-perceptible tactile engagements of said first member and said second member in combination providing said signal to said user.
- 4. The apparatus of claim 3 wherein said first member being in said user-perceptible tactile engagement at a first location on said first portion of said user, said second member being in said user-perceptible tactile engagement at a second location on said second portion of the user, said first and said second locations in combination being determined by said posture of said user, said tactile engagement at said first and said second locations providing said signal to said user.
- 5. The apparatus of claim 2 further comprising: a frame, said first and said second members each being connected to said frame.
- 6. The apparatus of claim 5, said connection of each of said first and second members to said frame being a hinged connection, each of said first and second members having a body-engaging part, each of said first and second members being resiliently urged to rotate about said hinged connections and to engage said user with said body-engaging parts.
- 7. The apparatus of claim 6 further comprising: a resilient member urging said body-engaging parts of said first and second members to engage said user.
- 8. The apparatus of claim 7 wherein said resilient member is a spring.
- 9. The apparatus of claim 6 wherein said adaptation of said first and said second members to provide said signal comprising:
  - a. a first electrical switch, said first electrical switch being adapted to be actuated by said first member based on predetermined criteria;
  - b. a second electrical switch, said second electrical switch being adapted to be actuated by said second member based on predetermined criteria;

- c. an electrical circuit, said first and second electrical switches completing said circuit when said first and second electrical switches are actuated, said electrical circuit activating said signal to the user.
- 10. The apparatus of claim 9 wherein said predetermined criteria for actuation of said first and second electrical switches are determined by a position of said first member and a position of said second member corresponding to completion of an exercise by said user.
- 11. The apparatus of claim 10, further comprising: a sound or light source, said sound or light source being activated by said electrical circuit and providing said signal to said user.
- 12. The apparatus of claim 11 further comprising:
  - a. a first motion-limiting member operably connected to said first member and to said frame;
  - b. a second motion-limiting member operably connected to said second member and to said frame.
- 13. The apparatus of claim 12 further comprising: a horizontal bar, said horizontal bar being adapted to receive said frame.
- 14. The apparatus of claim 7 wherein said adaptation of said first and said second members to provide said signal comprising: a mechanical linkage, said mechanical linkage being operably connected to said first and said second members, said mechanical linkage providing said signal to said user.
- 15. The apparatus of claim 14, said mechanical linkage comprising: an indicator, said indicator being adapted to move in a first direction in response to a motion by said first member that is disproportionate to a motion by said second member, said indicator being adapted to move in a second direction in response to said motion by said second member that is disproportionate to said motion by said first member, said motion by said indicator in said first direction or said second direction providing said signal to said user.
- 16. The apparatus of claim 15, said indicator comprising: a pointer and a body connected to said pointer, said body having a first end and a second end, said first end of said body being adapted to move in response to said motion by said first member, said second end of said body being adapted to move in response to said motion by said second member, said motion of said first and second ends in response to said motions of said first and second members moving said pointer, said motion of said pointer providing said signal to said user.
- 17. The apparatus of claim 16 wherein said adaptation of said first and second ends of said body to move in response to said motions of said first and second members comprises: a first member cord operably connecting said first member and said first end of said body; a second member cord operably connecting said second member and said second end of said body.
- 18. The apparatus of claim 17, said apparatus further comprising:
  - a. an electrical switch, said indicator being adapted to activate said electrical switch;
  - b. an electrical circuit activated by said switch;
  - c. a visible or auditory indicia activated by said switch, said visible or auditory indicia providing said signal to said user.

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