(19) **United States**

(12) **Patent Application Publication** (10) Pub. No.: **US 2007/0021282 A1**

Karp (43) **Pub. Date:** **Jan. 25, 2007**

(54) **ABDOMINAL EXERCISING AND STRENGTH TESTING SYSTEMS**

(76) Inventor: **Shaun A. Karp**, Coquitlam (CA)

Correspondence Address:
OYEN, WIGGS, GREEN & MUTALA LLP
480 - THE STATION
601 WEST CORDOVA STREET
VANCOUVER, BC V6B 1G1 (CA)
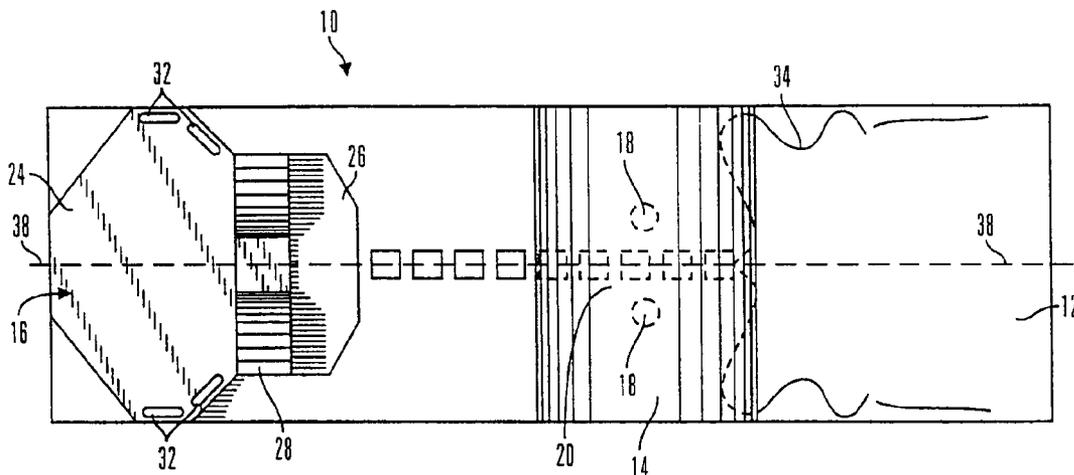
Publication Classification

(57) **ABSTRACT**

A postural awareness apparatus includes a pad, a signal generating element and an element for detecting a weight applied to the pad and activating the signal generating element when the weight so detected exceeds a predetermined weight.
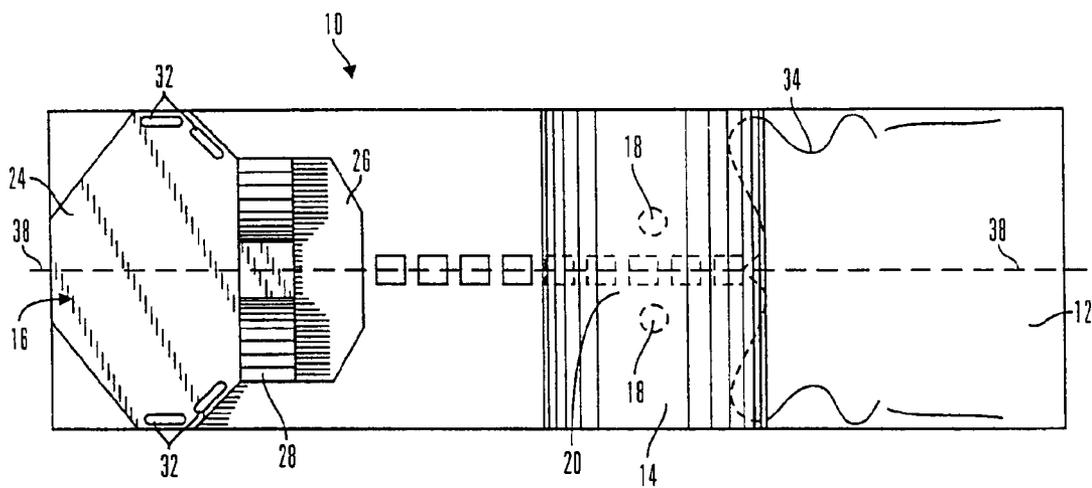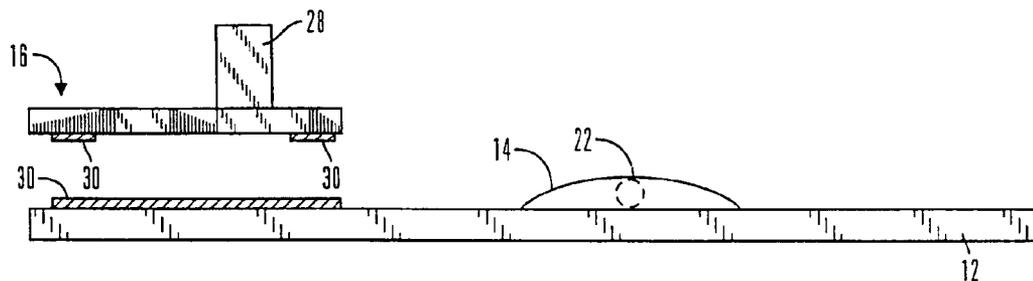
FIG. 1A

FIG. 1B

FIG. 2A

FIG. 2B

FIG. 2C

36   18   18   36

38

FIG. 3

116   124   118

128

FIG. 4A

128

130

FIG. 4B

122

130   128

FIG. 4C

16

30

54

30

14A   14   14A

18   12

FIG. 5

44   42   44

40   46

FIG. 6A

44   42   44

40   46

FIG. 6B

48

50

52

FIG. 7   10

116   118   18   14

FIG. 8   12
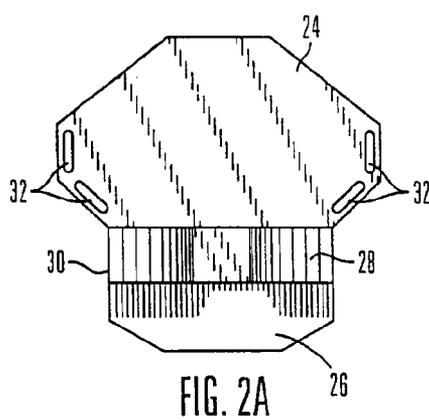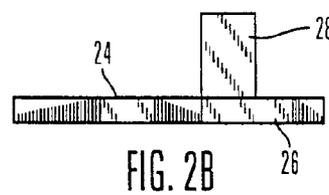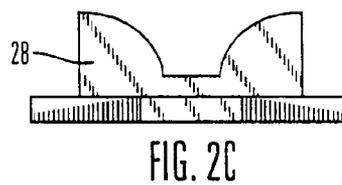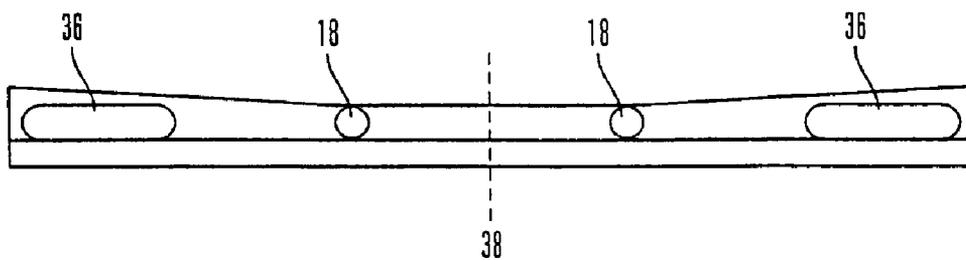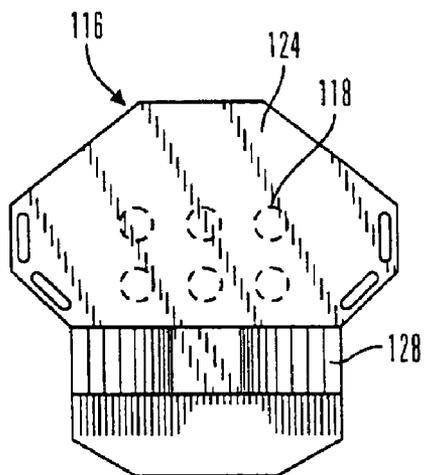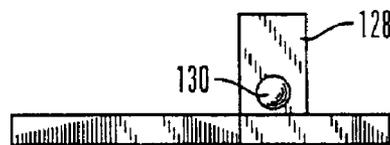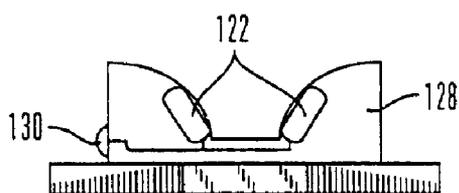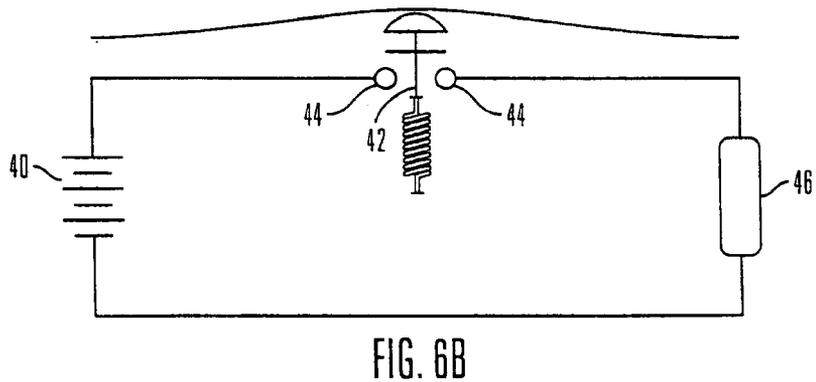
ABDOMINAL EXERCISING AND STRENGTH TESTING SYSTEMS

[0001] This is a continuation of U.S. patent application Ser. No. 09/023,038, filed Feb. 13, 1998, which is incorporated in its entirety herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to devices for strengthening the lower back, low abdomen and posture on multiple planes, and for teaching a neutral spine.

BACKGROUND OF THE INVENTION

[0003] Devices for monitoring, controlling and correcting posture are described, for example, in U.S. Pat. No. 3,582,935, to Verhaeghe; U.S. Pat. No. 3,981,032, to Brooks; U.S. Pat. No. 4,730,625, to Fraser et al.; U.S. Pat. No. 5,146,929, to Sawhill; U.S. Pat. No. 5,279,310, to Hsien; and U.S. Pat. No. 5,522,401, to Brucker. However, such corrective devices are not designed specifically for use in strengthening the low abdomen and lower back of the user.

[0004] A need exists for an apparatus that is useful in an exercise regimen for strengthening the low abdomen and lower back of a human. A need also exists for an apparatus that informs the user when the neutral spine position is maintained during exercise in multiple positions (e.g., sitting, lying, standing).

SUMMARY OF THE PREFERRED EMBODIMENTS

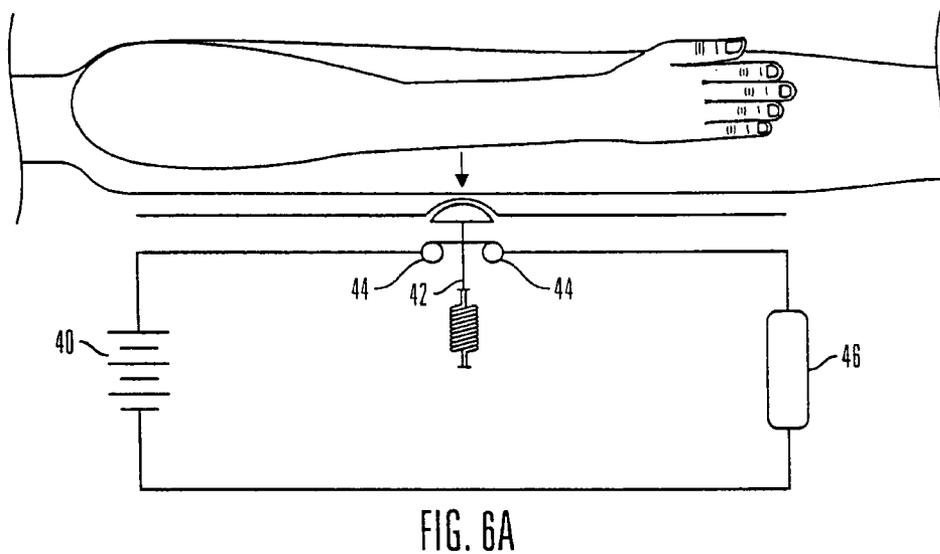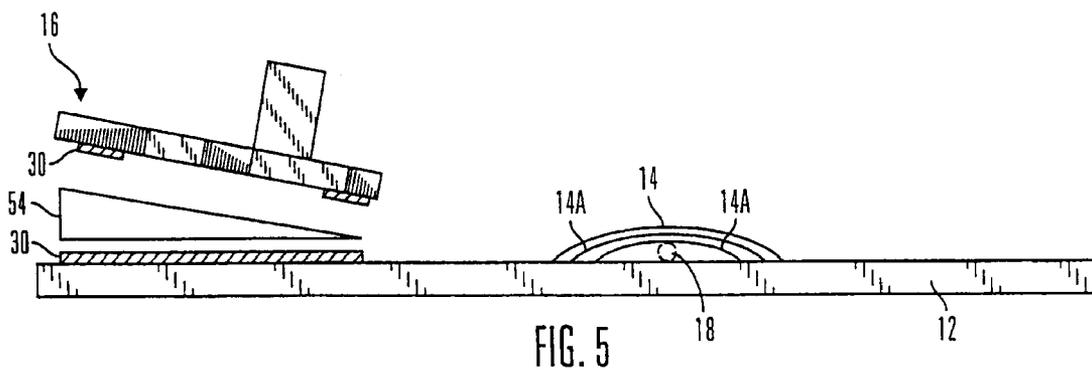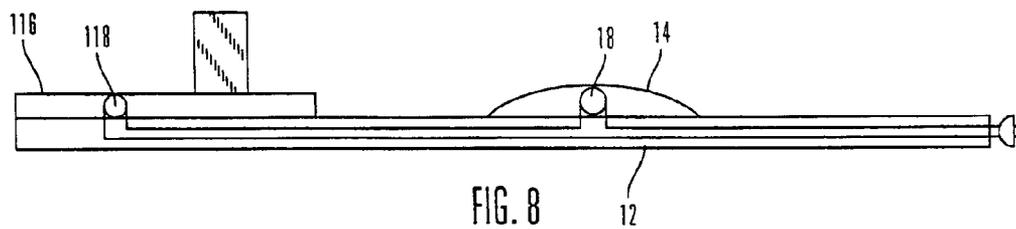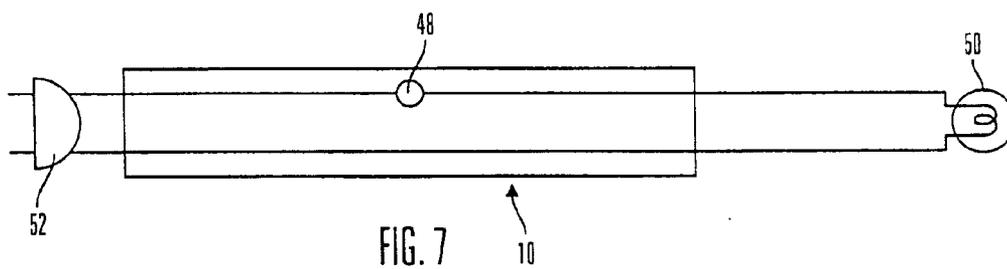[0005] In accordance with one aspect of the present invention, there is provided an apparatus including a pad, signal means and detection means. The signal means is affixed to the pad, and the detection means detects a weight applied to the pad and activates the signal means when the weight so detected exceeds a predetermined weight.

[0006] In preferred embodiments, the signal means produces a vibratory signal, an auditory signal or a visible signal. More preferably, the signal means produces a vibratory signal and includes at least one vibrator unit.

[0007] According to another preferred embodiment, the inventive apparatus includes a head rest affixed to the pad, preferably detachably affixed to the pad and spaced from the signal means. Preferably the head rest includes a plurality of handles.

[0008] According to a more specific embodiment, the inventive apparatus includes a a wedge for insertion between the head rest and the pad.

[0009] In another preferred embodiment, the detection means includes a mechanical switch which closes when a weight applied thereto exceeds a predetermined pressure. According to an alternative preferred embodiment, the detection means includes a pressure sensor and an electronic circuit which generates an output when pressure measured by the pressure sensor exceeds a predetermined pressure.

[0010] In accordance with another aspect of the present invention, there is provided a method of strengthening the abdomen and lower back of a human by use of an apparatus as described herein.

[0011] Other objects, features and advantages of the present invention will become apparent to those skilled in the art from the following detailed description. It is to be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the present invention, are given by way of illustration and not limitation. Many changes and modifications within the scope of the present invention may be made without departing from the spirit thereof, and the invention includes all such modifications.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The invention may be more readily understood by referring to the accompanying drawings in which

[0013] FIGS. 1a-b are top plan and exploded side views, respectively, of a first embodiment employing a detachable head rest and a lumbar pad, with vibrator units and pressure sensors disposed within the lumbar unit shown in phantom;

[0014] FIGS. 2a-c are top, side and end views of a detachable head rest employed with the embodiments of FIGS. 1a-b;

[0015] FIG. 3 is a sectional view of the lumbar pad of FIGS. 1a-b showing the location of pressure sensors and vibrator units within the pad;

[0016] FIGS. 4a-c are top, sectional and side views of an alternative embodiment of a head rest with separate pressure sensors, vibrator units and a control switch;

[0017] FIG. 5 is a side exploded view of an alternative embodiment including a kyphosis wedge;

[0018] FIGS. 6a-b are schematic diagrams showing a mechanical switch useful as a pressure sensor, showing activated and inactivated states;

[0019] FIG. 7 is a schematic diagram of a pressure sensor with light-generating signal means and an external power supply;

[0020] FIG. 8 is a schematic diagram of an alternative embodiment in which two pressure sensors are employed in sequence, one in the head rest and one in the lumbar pad.

[0021] Like numerals refer to like parts throughout the several views of the drawings.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] The present invention provides devices and methods for strengthening the lower back and low abdomen, and for teaching the user to maintain a neutral spine. By "neutral spine" is meant a biomechanically correct spinal position in which muscular balance is maintained. Neutral spine positions vary with the posture of the user; for example, the neutral spine position of a user with kyphosis will differ from the neutral spine position of a user having a normal posture.

[0023] Turning now to the figures, in FIGS.1-3, a first embodiment of an apparatus 10 of the invention includes a mat 12, preferably comprised of a non-slip material, with a lumbar pad 14 and a head support 16.

[0024] Lumbar pad 14 preferably is unitary with mat 12, that is, is formed from a section of mat 12. Disposed within

lumbar pad **14** are means **18** for detecting a weight applied to a surface **20** of lumbar pad **14**. The weight detecting means **18** can include means such as one or more mechanical switches, one or more pressure sensors, or other means known to those skilled in the art for detecting a weight applied to a surface.

[0025] The weight detecting means **18** are connected to one or more means **22** for producing a signal. The signal means **22** are activated when the selected weight detecting means **18** detect a weight applied to the surface **20** of mat **12**. Once activated, the signal means **22** produce a signal that is perceptible by a person using the inventive apparatus.

[0026] Exemplary signal means **22** include, without limitation, devices for producing a vibratory signal, such as a mechanical vibrator; devices for producing an auditory signal, such as an electronic tone generator; devices for producing a visible signal, such as a light bulb or a light-emitting diode (LED); and the like, as well as combinations of such devices. The signal means **22** can be affixed to or within the apparatus **10**, for example within lumbar pad **14**, or can be located externally. The detection means **18** and the signal means **22** are connected together, for example as parts of an electrical circuit, or by means such as low-power radio transmitters. Any means for enabling detection means **18** to activate signal means **22** are considered to be within the scope of the present invention.

[0027] Optionally, lumbar pad **14** can accommodate one or more lordosis inserts **14a** disposed above detection means **18** in order to support users having excessive lordotic sway. Lumbar pad **14** can also optionally include a switch (not shown) for disabling signal means **22** to allow use of the apparatus without generation of a signal.

[0028] Head support **16** includes a head/neck base **24** and a cervico-thoracic support **26**. A neck support **28**, which optionally is adjustable in width, is disposed on head support **16** between head/neck base **24** and cervico-thoracic support **26**. As illustrated in FIG. 1*b*, head support **16** is detachably affixed to mat **12** by attachment means **30**, for example hook/loop devices such as Velcro® fasteners, snaps, etc., in order to allow selectable positioning of the head support **16**, and also to allow head support **16** to be used separately if desired. In the alternative, head support **16** can be permanently affixed to mat **12**.

[0029] In a preferred embodiment, head support **16** is provided with a plurality of handles **32**. Handles **32** can be formed by cutting openings in base **24**, for example, or can be separately formed and affixed to base **24**.

[0030] If desired, mat surface **20** can be provided with graphics **34**, such as a stylized representation of a human pelvis and lower backbone, in order to facilitate orientation of a user with respect to the mat surface. Illustrations of the positions of TLC pressure points and the locations of the detection means **18** are also beneficial to assist the user in properly orientation with respect to the apparatus **10**.

[0031] In a preferred embodiment illustrated in FIG. **3**, signal means **22** include two vibrators **36** disposed within lumbar pad **14** along either side of the longitudinal axis **38** of mat **12**. Vibrators **36** are connected to detection means **18** and are activated when detection means **18** detect a weight (e.g., the weight of a user's body) applied to the surface **20** of mat **12**.

[0032] An example of detection means **18**, illustrated in FIGS. **6***a-b*, include a power source **40**, which can be a battery disposed, for example, within lumbar support **14** or at another location within, on or external to apparatus **10**, or A/C power supplied via a plug; a mechanical switch **42** energized by a spring having a preselected spring constant; and a pair of contacts **44**, which with signal means **22**, such as a vibrator, form a circuit. In FIG. **6***a*, a weight, for example the weight of a user's body (indicated by a downward arrow), exceeds the spring force and causes the mechanical switch **42** to close, closing the circuit and activating signal means **22**. Thus, when the user remains in contact with detection means **18**, the circuit remains closed and the signal means **22** remains activated. When the signal means includes a vibrator unit **46** (shown in FIGS. **6***a-b*), the user perceives a vibratory signal applied to his back; in the alternative, when the signal means **22** includes a tone generator, light bulb, or LED, the user hears and/or sees the signal generated by the signal means **22**. In any event, the user is informed when his back is in contact with the detection means **18** and exerts sufficient downward force to cause switch **42** to close.

[0033] An alternative embodiment of detection means **18** includes a pressure sensor and an associated electronic circuit in place of the mechanical switch.

[0034] Such accompanying circuits are readily produced by those skilled in the art to generate an output signal in response to application of a predetermined pressure to the pressure sensor. This output signal in turn activates signal means **22**. Detection means **18** can also include means for measuring the **25** weight (or force) exerted by the thoracolumbar area of the user.

[0035] FIG. **7** illustrates another embodiment of the inventive apparatus in which a pressure sensor **48** is employed rather than a mechanical switch. The signal means includes a light bulb **50**. Power is supplied from an external A/C power supply via plug **52**.

[0036] Optionally, a kyphosis wedge **54** is inserted between head support **16** and mat **12**, to accommodate users with a head-forward position.

[0037] FIGS. **4***a-c*illustrate an alternative embodiment of a head support **116** which includes detection means **118** disposed within head/neck base **124**, and signal means **122**. As illustrated, the signal means include vibrators disposed within neck support **128**. Detection means **118** activate the signal means **122** (e.g., vibrators) when the user's head leaves contact with detection means **118**. For example, when detection means **118** includes a mechanical switch, the switch is in an open position when the user's head is in contact with it, rather than in a closed position as with detection means **18** described above. When detection means **118** includes a pressure sensor, the accompanying electronic circuit produces a signal when the pressure detected falls below a predetermined level, rather than exceeding a predetermined level.

[0038] If desired, a 3-way switch **130** can be connected to detection means **118** and the vibrators. The switch **130** allows the user to selectively enable or disable the detection means **118** and to separately control activation of the vibrators. Thus, in one position, the detection means **118** are enabled to activate the vibrators as described above with

respect to detection means **18** and signal means **22**. In a second position, the detection means **118** are disabled, and the vibrators are deactivated. In a third position, the detection means are disabled, and the vibrators are activated, thus allowing selective user relaxation and massage while using the inventive apparatus.

[0039] The detector means **118** in the foregoing embodiment of the head support **116** can be connected in series to the detector means **18** disposed, for example, within lumbar support **14** as shown in FIG. **8**. In this embodiment, the signal means **22** (and optionally vibrators disposed within head support **116**) are activated only when both detector means **118** and detector means **18** detect a weight, such as the weight of a user's head and body, respectively.

[0040] The signal (vibratory, auditory, visual, etc.) provided by the inventive apparatus allows the user to heighten the intensity of muscles being worked by eliminating momentum. When in use, the signal informs the user that his thoraco-lumbar area compresses the detection means **18** sufficiently to ensure the isolation of the correct muscles usage.

[0041] The inventive apparatus preferably is used on a horizontal surface such as a floor or exercise bench. If desired, mat **12** can be provided with attachment means, such as a hook or clamp, which allows the apparatus to be affixed to a vertical surface such as a door. The apparatus can also be used on surfaces such as chairs.

[0042] The signal provided by the inventive apparatus constitutes feedback to the user while exercising, which permits the user to minimize momentum and maximize intensity. To begin exercise using the inventive apparatus in a supine position, the belt line of the user is lined up with the lumbar pad **14**, and the head/neck support **16** is positioned under the user's neck where it is comfortable. If necessary, the position of the head/neck support **16** is adjusted to accommodate the user. In use, the low back is compressed into lumbar pad **14** until a signal is generated by the signal means **22**. Constant tension is maintained isometrically by tightening the involved muscles.

[0043] Use of the alternative embodiment of the head/neck support **116** permits the user to avoid neck strain. If the user lifts his head during abdominal training, resulting in neck strain, the head lift is signaled to the user by the signal means **122**, such as a vibration to the neck. The user can then lower his head to contact the head/neck support **116**.

[0044] A progressive exercise routine designed specifically for the inventive apparatus will allow the user to start with the short (e.g., **4** minute) drill series and progress at his own pace. Precision postural positioning for strong "neutral spine" occurs when the user re-educates the neuro-muscular system using the inventive apparatus.

[0045] The invention has been illustrated herein as a self-contained apparatus. However, the invention can also be incorporated into another object, including without limitation objects such as an exercise apparatus (e.g., an inclined rowing machine), an exercise bench, a chair, a bed, etc. The invention can also be separately produced and subsequently affixed to another object.

What is claimed is:

1. An apparatus comprising

a) a pad,

b) signal means for producing a signal, and

c) detection means for detecting a weight applied to said pad and activating said signal means when said weight exceeds a predetermined weight.

2. The apparatus of claim 1 wherein said signal means produces a signal selected from the group consisting of a vibratory signal, an auditory signal and a visible signal.

3. The apparatus of claim 2 wherein said signal means comprises at least one vibrator unit.

4. The apparatus of claim 1 further comprising a head rest affixed to said pad.

5. The apparatus of claim 4 wherein said head rest is detachably affixed to said pad.

6. The apparatus of claim 5 wherein said head rest is spaced from said signal means.

7. The apparatus of claim 6 wherein said head rest is adjustably spaced from said signal means.

8. The apparatus of claim 5 wherein said pad has a longitudinal axis and wherein said signal means comprise a plurality of vibrator units, a portion of said plurality of vibrator units being affixed to said pad at opposed locations on either side of said longitudinal axis.

9. The apparatus of claim 4 wherein said head rest comprises at least one vibrator unit disposed within said head rest.

10. The apparatus of claim 9 further comprising means for activating said at least one vibrator unit disposed within said headrest independent of said detection means.

11. The apparatus of claim 4 wherein said head rest comprises a plurality of handles.

12. The apparatus of claim 4 further comprises a wedge for insertion between said head rest and said pad.

13. The apparatus of claim 1 wherein said detection means comprises a mechanical switch which closes when a weight applied thereto exceeds a predetermined pressure.

14. The apparatus of claim 13 wherein said mechanical switch comprises a spring.

15. The apparatus of claim 1 wherein said detection means comprises a pressure sensor and an electronic circuit which generates an output when pressure measured by said pressure sensor exceeds a predetermined pressure.

16. The apparatus of claim 4 wherein said detection means is spaced from said head rest.

17. The apparatus of claim 6 wherein said detection means and said signal means are affixed to said pad adjacent one another and wherein said detection means and said signal means are spaced from said head rest.

18. The apparatus of claim 1 wherein said pad has an upper surface on which graphics depicting at least a portion of a human spine and pelvis are disposed.

19. The apparatus of claim 1 further comprising a lordosis insert.

20. The apparatus of claim 1 further comprising means for attaching said pad to a horizontal or vertical surface.

21. The apparatus of claim 4 wherein said head rest comprises second detector means for detecting a weight applied to said head rest and second signal means, said second detector means activating said second signal means when said weight is below a predetermined weight.

4

22. The apparatus of claim 1 wherein said detection means comprises means for measuring said weight.

23. An apparatus comprising

a) a pad having a longitudinal axis, proximal and distal ends and an upper surface,

b) a head rest adjustable affixed to said proximal end of said pad,

c) at least one vibrating unit affixed to said pad, said vibrating unit being in spaced relationship to said head rest, and

d) detection means for detecting a weight applied to said pad and activating said signal means when said weight exceeds a predetermined weight, said detection means and said signal means being affixed to said pad adjacent each other.

24. A method of strengthening the abdomen and lower back of a human comprising the steps of:

i) contacting the back of a person to be strengthened to an apparatus comprising

a) a pad having a longitudinal axis, proximal and distal ends and an upper surface,

b) a head rest adjustably affixed to said proximal end of said pad,

c) at least one vibrating unit affixed to said pad, said vibrating unit being in spaced relationship to said head rest, and

d) detection means for detecting a weight applied to said pad and activating said signal means when said weight exceeds a predetermined weight, said detection means and said signal means being affixed to said pad adjacent each other,

ii) adjusting the position of said head rest on said pad to align said head rest with the neck of the person to be strengthened and simultaneously align said at least one vibrating unit and said detection means with the lumbar region of the person to be strengthened,

iii) compressing the lumbar region of the person to be strengthened to contact said detection means, whereby said detection means in response to said compression activates said at least one vibrating unit, and

iv) compressing and relaxing the abdomen of the person to be strengthened while maintaining compression of the lumbar region of the person to be strengthened, whereby said at least one vibrating unit continues to vibrate throughout said abdominal compression and relaxation.

25. The method of claim 24 wherien said pad is placed on a horizontal surface and the person to be strengthened lies on said upper surface of said pad.

26. The method of claim 25 wherein said pad is affixed to a vertical surface and the person to be strengthened stands against said upper surface of said pad.

* * * * *