(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 950 390 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.10.1999 Bulletin 1999/42

(51) Int. Cl.[6]: **A61H 1/02**

(21) Application number: **99106226.6**

(22) Date of filing: **13.04.1999**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **13.04.1998 US 59196**

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(54) Apparatus for relieving back pain

(57) A portable seat supportable apparatus for relieving lower back pressure of a user is provided. In one embodiment, the seat supportable apparatus includes a back portion having a rib cage engagement assembly connected thereto, the rib cage engagement assembly removably engaging the rib cage of the user when he is sitting on the bottom portion, and user controlled elevating apparatus for selectably elevating the rib cage assembly, thereby to relieve lower back pressure of the user. In a further embodiment, the seat supportable apparatus includes a bottom portion for placing on a seat, the bottom portion for seating the user.

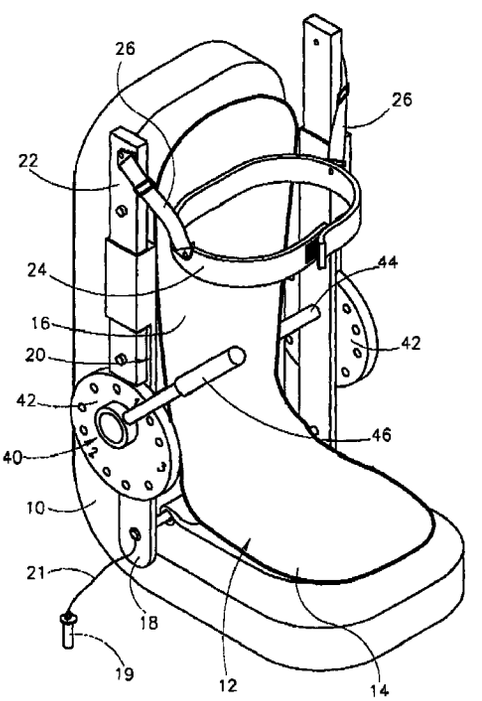

FIG.1A

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Description

[0001] The present invention relates to apparatus for relieving lower back pressure.

[0002] Various devices are known for relieving lower back pressure. These include devices for transferring stress to the rib cage of a person. The state of the art as reflected in the U.S Patent literature is represented by the following U.S. Patents: 5,224,924; 5,195,949; 4,996,978; 4,715,362; 4,565,409; 3,029,810; 2,886,031; 2,667,913; 1,722,205; and 1,650,650.

[0003] The present invention seeks to provide improved apparatus for relieving lower back pressure.

[0004] There is thus provided in accordance with a preferred embodiment of the present invention, a portable seat supportable apparatus for relieving lower back pressure. The apparatus includes a back portion arranged to be supported on a seat, a portable rib cage engagement assembly connected to the back portion and user controlled elevating apparatus for selectably elevating the rib cage assembly, thereby to relieve lower back pressure of said user. The rib cage engagement assembly, which is removable, engages the rib cage of the user when he is sitting on the seat.

[0005] Additionally, there is also provided in accordance with a preferred embodiment of the present invention, a portable seat supportable apparatus for relieving lower back pressure of a user which includes a bottom portion to be supported on a seat to be sat upon by the user, a back portion having a rib cage engagement assembly connected thereto, the rib cage engagement assembly removably engaging the rib cage of the user when he is sitting on the bottom portion and user controlled elevating apparatus for selectably elevating the rib cage assembly, thereby to relieve lower back pressure of the user.

[0006] The user controlled apparatus may include user arm engageable apparatus or alternatively powered apparatus, such as electrically powered, pneumatically powered or hydraulically powered apparatus.

[0007] The rib cage engagement portion may be in the form of a strap which surrounds the chest of a user, apparatus which engages the arms or shoulders of the user or any other apparatus which can be used for applying an upward vertical force to the upper portion of the spine.

[0008] Furthermore, in accordance with a preferred embodiment of the present invention, the user controlled elevating apparatus includes at least one support member attached to the back portion, a piston unit having an adjustable ram element coupled at one end thereof to the at least one support member, a member attached to the rib cage engagement assembly and the ram element and an operating device for adjusting the adjustable ram element, thereby elevating the rib cage engagement assembly. The operating device is operated by any one of a group including hydraulic, pneumatic or manual power.

[0009] In accordance with a preferred embodiment of the present invention, the user controlled elevating apparatus includes upper and lower support members attached to the back portion, a lead screw freely supported at each end by the upper and lower support members, a nut threaded onto the lead screw, the nut being attached to the rib cage engagement assembly and an operating device for rotating the screw.

[0010] In accordance with a preferred embodiment of the present invention, the user controlled elevating apparatus includes upper and lower support members attached to the back portion, a third support member attached to the rib cage engagement assembly, a tensioning cable coupled at one end thereof to the third support member and coupled to the upper support member and an operating device for applying tension to the tensioning cable.

[0011] In accordance with a preferred embodiment of the invention, the user controlled elevating apparatus includes a lever arm engageable by a user's arm when sitting on the seat portion and when his rib cage is engaged by the rib cage engagement portion and which is operative when pivoted to apply a user-controlled amount of tension between the seat portion and the rib cage engagement portion.

[0012] In accordance with another preferred embodiment of the present invention, the user controlled tensioning apparatus includes a motor.

[0013] There is also provided in accordance with a preferred embodiment of the present invention a method for relieving lower back pressure. The method includes the steps of:

sitting on a seat having a portable seat supportable apparatus thereon, the portable seat supportable apparatus including a rib cage engagement assembly;

engaging the rib cage engagement assembly with the rib cage of the user; and

elevating the rib cage engagement assembly.

[0014] There is also provided in accordance with a preferred embodiment of the present invention a portable seat supportable apparatus for relieving lower back pressure of a user which includes a seat portion arranged to be supported on a seat, the seat portion includes a bottom portion and a back portion, the back portion being movable with respect to the bottom portion about an axis formed by a connection element therebetwee, a rib cage engagement assembly arranged to removably engage the rib cage of the user, the rib cage engagement assembly being connected to the back portion and means for removably mounting the rib cage to the back portion when the user is sitting on the bottom portion, wherein the rib cage is engaged to the user and to the back portion, wherein movement of the back portion relative to the bottom portion selectably elevates the rib cage assembly, thereby to relieve lower back

pressure of the user.

[0015] Furthermore, in accordance with a preferred embodiment of the present invention, movement of the rib cage assembly relative to the back portion selectably elevates the rib cage assembly, thereby to relieve lower back pressure of the user.

[0016] In addition, in accordance with a preferred embodiment of the present invention, the back portion includes a plurality of "upwardly sloping" integrally formed slats and the rib cage assembly includes a plurality of "downwardly sloping" ribs integrally formed on the external face thereof, the "downwardly sloping" ribs being similarly dimensioned to the plurality of the "upwardly sloping" integrally formed slats to connectably engage each other.

[0017] The present invention will be understood and appreciated more fully from the following detailed description, taken in conjunction with the drawings in which:

Figs. 1A and 1B are simplified pictorial illustrations of a chair mounted device for relieving lower back pressure constructed and operative in accordance with a preferred embodiment of the present invention in respective first and second operative orientations;

Figs. 2A and 2B are simplified pictorial illustrations of a user employing the chair mounted device for relieving lower back pressure of Figs. 1A and 1B in the first and second operative orientations shown respectively in Figs. 1A and 1B;

Figs. 3A, 3B and 3C are illustrations of a typical ratchet assembly preferably employed in the apparatus of Figs. 1A - 2B;

Figs. 4A and 4B are simplified pictorial illustrations of a chair mounted device for relieving lower back pressure constructed and operative in accordance with another preferred embodiment of the present invention in respective first and second operative orientations;

Figs. 5A and 5B are simplified structural illustrations of the chair mounted device for relieving lower back pressure of Figs. 4a and 4B in the first and second operative orientations shown respectively in Figs. 4A and 4B;

Fig. 6 is a simplified pictorial illustration of another embodiment of the present invention;

Fig. 7 is a simplified pictorial illustration of yet another embodiment of the present invention;

Figs. 8A and 8B are illustrations of the apparatus of Fig. 7 in respective first and second operative modes;

Fig. 9 is a simplified pictorial illustration of another embodiment of the invention;

Figs. 10A - 10C are illustrations of the apparatus of Fig. 9 in respective first second and third operative modes;

Figs. 11A and 11B are simplified pictorial illustration of yet other embodiments of the invention;

Figs. 12A - 12C are illustrations of the apparatus of Figs. 11A and 11B in respective first and second operative modes;

Fig. 13 is a simplified pictorial illustration of yet another embodiment of the present invention;

Figs. 14A - 14C are illustrations of the apparatus of Fig, 13 in respective first second and third operative modes;

Fig. 15 is a simplified pictorial illustration of yet another embodiment of the present invention;

Fig. 16 is a simplified pictorial illustration of yet another embodiment of the present invention;

Fig. 17 is a simplified pictorial illustration of yet another embodiment of the present invention;

Fig. 18 is a simplified pictorial illustration of yet another embodiment of the present invention; and

Fig. 19 is a simplified pictorial illustration of yet another embodiment of the present invention.

[0018] Reference is now made to Figs. 1A, 1B, 2A and 2B, which illustrate apparatus for relieving lower back pressure constructed and operative in accordance with a preferred embodiment of the present invention.

[0019] The apparatus for relieving lower back pressure constructed and operative in accordance with a preferred embodiment of the present invention is arranged to be mounted onto an ordinary chair 10 or other seat, such as an automobile seat. A preferably flexible seat supported element 12 is located on a seat and preferably includes a bottom portion 14 and a back portion 16, preferably integrally formed therewith. The bottom portion 14 and the back portion 16 are preferably ergonometrically designed.

[0020] The bottom portion 14 is fixedly mounted onto a fixed bottom portion 18 of a generally vertically extending frame assembly 20, which also includes an upper vertically sliding portion 22. A rib cage engaging belt 24 is supported onto the vertically sliding portion 22 by means of adjustable resilient straps 26.

[0021] Preferably the bottom portion 18 and the upper portion 22 are arranged in mutually telescopic arrangement.

[0022] In accordance with a preferred embodiment of the present invention a lever arm driven frame extension assembly 40 is provided for selectably raising the upper portion 22 and thus, via resilient straps 26, raising the rib cage of a user relative to the lower part of his body. The assembly 40 preferably comprises a pair of eccentrically mounted cams 42 which are fixed to an axle 44 rotatably mounted in the bottom portion 18 of frame assembly 20. Axle 44 is preferably bifurcated to enable frame 20 to be of expandable width so as to accommodate seats and users of differing widths.

[0023] A lever arm 46 is operative to rotate cams 42 and axle 44 via a ratchet assembly illustrated in Figs. 3A - 3C so as to selectably raise or lower upper portion 22 relative to bottom portion 18.

[0024] Referring now to Figs. 3A - 3C it is seen that a toothed wheel 50 is fixedly mounted onto cam 42 and is centered about the axis of axle 44. Lever arm 46 is pivotably mounted about the axis of axle 44 and is provided with a pivotably mounted ratchet engagement member 52, which engages the teeth of the toothed wheel 50, such that when the lever arm is moved downward in the sense indicated by arrow 54, both the toothed wheel 50 and the cam 42 together therewith are rotated about the axis of axle 44 in the sense of arrow 54. When the lever arm 46 is raised in the direction opposite to arrow 54, engagement member 52 slides over the teeth of wheel 50.

[0025] After rotating cam 42 to a desired position, cam 42 may be secured by means of a safety pin 19 which engages a hole on cam 42 and fixes cam 42 with bottom portion 18, as seen in Fig. 1B. As seen in Figs. 1A and 1B, safety pin 19 may be attached to portion 18 with a string or chain 21. Safety pin 19 is illustrated in Figs. 1A and 1B for engagement with the cam 42 on the side of frame 20 with lever arm 46. Alternatively, safety pin 19 may be mounted for engagement with cam 42 on the other side of frame 20.

[0026] Fig. 3A illustrates the arrangement prior to downward movement of the lever arm 46. Fig. 3B illustrates the arrangement when the lever arm 46 has been moved downward in the sense indicated by arrow 54. Fig. 3C illustrates the arrangement after the lever arm 46 has been raised by movement in a sense opposite to that indicated by arrow 54.

[0027] The operation of the apparatus of Figs. 1A - 3C will now be described with reference to the drawings:

[0028] Considering on initial state of operation represented by Figs. 1A, 2A and 3A, it is seen that cams 42 located such that the bottom of each upper portion 22 lies on a location "1" on the edge surface of a cam 42. Rotation of lever arm 46 via the ratchet assembly shown in Figs. 3A - 3C causes the cams 42 to rotate about an axis defined by axle 44, thus causing the bottom of each upper portion 22 to lie at a location "2" on the edge surface of cam 42. Since location "2" is distanced further from the axis defined by axle 44 than is located "1", the rotation of the cams 42 causes the upper portion 22 to be raised relative to the bottom portion 18.

[0029] Raising of the upper portion 22 imparts a raising force to the rib cage engaging belt 24 via resilient straps 26. It is appreciated that resilient straps 26 are employed to prevent possibly harmful over-tensioning of the user's rib cage and to absorb sudden forces which might otherwise by applied directly to the user's rib cage.

[0030] Upper portion 22 may be lowered relative to the bottom portion 18 by further rotation of cams 42 using lever arm 46.

[0031] Reference is now made to Figs. 4A, 4B, 5A and 5B, which illustrate a chair mounted device for relieving lower back pressure constructed and operative in accordance with another preferred embodiment of the present invention in respective first and second operative orientations.

[0032] The apparatus of Figs. 4A - 5B is essentially similar to that of Figs. 1A - 3C except in that upper portion 22 and resilient straps 26 are replaced by an intermediate portion 62, which is generally vertically slidable with respect to the bottom portion 18, and an upper portion 64, which is generally vertically slidable with respect to the to the intermediate portion 62. Preferably the bottom portion 18 and the upper portion 64 are arranged in a mutually telescopic arrangement with respect to the intermediate portion 62, as illustrated. A pair of springs 66 are preferably arranged between the intermediate and upper portions 62 and 64 of frame assembly 20 for urging the two portions towards each other.

[0033] A rib cage engagement assembly 70 is mounted onto the upper portion 64 of frame assembly 20 by means of adjustable attachment straps 72 and includes a removable rib cage engaging strap assembly 74.

[0034] The operation of the apparatus of Figs. 4A - 5B will now be described with reference to the drawings:

[0035] Considering an initial state of operation represented by Figs. 4A and 5A, it is seen that cams 42 are located such that the bottom of each intermediate portion 62 lies on a location "1" on the edge surface of a cam 42. Rotation of lever arm 46 via the ratchet assembly shown in Figs. 3A - 3C causes the cams 42 to rotate about on axis defined by axle 44, thus causing the bottom of each intermediate portion 62 to lie at a location "2" on the edge surface of cam 42. Since location "2" is distanced further from the axis defined by axle 44 than is location "1", the rotation of the cams 42 causes the intermediate portion 62 to be raised relative to the bottom portion 18.

[0036] Raising of the intermediate portion 62 causes springs 66 to be tensioned, which applies a raising force to the upper portion 64, causing raising of upper portion 64. Assuming that straps 72 are taut, the tension on the springs 66 applies a raising force on the rib cage of a user engaged by strap assembly 74. It is appreciated that springs 66 are employed to prevent possibly harmful over-tensioning of the user's rib cage and to absorb sudden forces which might otherwise be applied directly to the user's rib cage.

[0037] Reference is now made to Fig. 6, which illustrates an alternative embodiment of the invention which is incorporated into a seat, such as a vehicle seat 80. Other than being incorporated into a seat, the structure of the apparatus of Fig. 6 may by identical to that shown and described hereinabove with respect to Figs. 1A-5B.

[0038] Reference is now made to Figs. 7, 8A and 8B which illustrate yet another embodiment of the present invention. Here a rib cage engaging belt 90 is supported via a spring 92 on a crane 94 via a cable 96 and pulley 98. The cable is wound or unwound by an electric motor 100 controlled by a user-operated controller 102.

[0039] Fig. 8A illustrates the rib cage engaging belt 90 being raised, while Fig. 8B illustrates the rib cage engaging belt 90 being lowered.

[0040] Reference is now made to Figs 9, 10A, 10B and 10C which illustrate apparatus for relieving lower back pressure, generally designated **200**, constructed and operative in accordance with another preferred embodiment of the present invention. Apparatus **200** is arranged to be mounted onto another seat **202** such as a car seat (Figs. 10A - 10C) and comprises a seat element **204** having a bottom portion **206** flexibly connected to a back portion **208**.

[0041] The bottom portion **206** comprises a raised element **210** connected at one end **212** thereof to a generally flat element **214**. Raised element **210** is open at its other end **216** and rests on air cushion **218**. At least one coiled spring **220** is preferably inserted between raised element **210** and flat element **214** proximate to end **212**. A pump arrangement **222**, which is connected via a flexible tube **224** to cushion **218**, allows for the release and pumping of air from and into cushion **218**.

[0042] Back portion **208** is preferably constructed of a rigid material and includes an integrally formed wing component **226** on each side of the hack portion **208**. Preferably, the internal face of back portion **208** is faced with a soft padding **228**. Optionally, adjustable straps **230** can be fitted to each of the wing components **226** to restrain the occupant in seat **204**. Straps **230** may be adjusted by any suitable means known in the art such as a "Velcro" type fastening.

[0043] Reference is now made to Figs. 10A - 10C which illustrate the apparatus **200** in respective first second and third operative modes. When not in use, raised element **210** is maintained in a raised position by spring **220**. Air cushion **218**, which is connected to raised element **210** and is under partial vacuum becomes filled with air through a unidirectional valve (not shown) in pump arrangement **222**.

[0044] The occupant seats himself on the raised element **210** of the seat **204** causing springs **220** to be tensioned. The occupant tautly fastens straps **230** around his rib cage (Fig. 10A). He can then reduce the height of raised element **210** to a comfortable position by operating pump arrangement **222** to release air from cushion **218** (Fig. 10B). Raising adjustments can be made by operating pump arrangement **222**, which changes the volume of air within cushion **218**.

[0045] The lowering of seat element **210** imparts a raising force on the users ribs (Fig. 10C). The use of flexibly straps **230** prevents possible harmful over-tensioning on the rib-cage.

[0046] When the occupant leaves the seat, spring **220** causes raised element **210** to be lifted up and cushion **218** again becomes filled with air.

[0047] Reference is now made to Figs. 11A, 11B, 12A, 12B and 12C which illustrate apparatus for relieving lower back pressure, generally designated **300**, constructed and operative in accordance with another preferred embodiment of the present invention.

[0048] Referring to the embodiment of Fig. 11A, apparatus **300** comprises a bottom portion **302** and a separate back portion **304**.

[0049] Bottom portion **302** comprises an generally flat element **306** having an upstand **308** integrally formed at its back end **310**. A compressibie element **316**, such as a plurality of coiled springs, are suitably attached to upstand **308**.

[0050] Back portion **304** comprises a receiving element **312**, integrally formed with the lower end **314** of the back portion **304**. Receiving element **312** is suitably dimensioned so as to receivably encompass compressible element **316**. The height of receiving element **312** is less than the height of compressible element **316** to allow for the compression of element **316**.

[0051] Reference is now made to Figs. 12A - 12C which illustrate the apparatus **300** in operative mode. Initially, the back portion **304** is strapped to the occupant's upper body by means of the adjustable straps **230**, as shown in Fig. 12A. The bottom portion **302** is placed in position on the supporting seat **202**. The occupant, wearing the back portion **304** lowers himself onto the seat **302** so that the receiving element **312** encompasses compressible element **316** (Fig. 12B).

[0052] The engaging of the back portion **304** with the seat portion **302** causes the compression of compressible element **316**. The compression imparts a raising force on the users ribs (Fig. 12C).

[0053] It will be appreciated by persons skilled in the art, that the compression of compressible element **316** may be effected by back portion **304** directly making contact with element **316**.

[0054] Reference is now made to Fig. 11B, which illustrates an alternative embodiment of apparatus **300**. In this embodiment, the apparatus comprises a bottom portion **303** and a back portion **320** which comprises adjustable straps **322** integrally formed with a rigid or semi-rigid projecting component **324**.

[0055] In operation, back portion **320** is strapped to the occupant's rib cage by means of the adjustable straps **230** (similar to Fig. 12A). The bottom portion **303** is placed in position on the supporting seat **202**. The occupant, wearing the back portion **320** lowers himself onto the seat **303**. Projecting component **324** engages bottom portion **303**. The contact of projecting component **324** with bottom portion **303** pushes projecting component **324** upwards and imparts a raising force on the user's rib cage (similar to Fig. 12C). In an alternative embodiment, projecting component **324** engages seat **202** itself obviating seat portion **303**.

[0056] It will be appreciated to persons knowledgeable in the art, that the embodiment of Fig. 11B is particularly suitable for motorbike riders and the like who, only need to strap back portion **320** to their upper body. The action of sitting on the seat pushes projecting component **324** upwards and imparts a raising force on the user's ribs by elevating the upper trunk.

[0057] Reference is now made to Figs. 13, 14A, 14B and 14C which illustrate apparatus far relieving lower back pressure, generally designated **400**, constructed and operative in accordance with another preferred embodiment of the present invention.

[0058] Apparatus **400** comprises a seat support element **402** located on a seat and preferably comprising a back portion **404** pivotally connected to a bottom portion **406**. Apparatus **400** further comprises a rib cage assembly **408**.

[0059] Bottom portion **406** is generally flat having a raised upstand **410**, integrally formed with the back end **412** thereof.

[0060] Back portion **404** is a generally rectangular in shape and comprises a plurality of "upwardly sloping" integrally formed slats **414**. An aperture **415** is molded within back portion **404** and is located approximately in the center of back portion **404** proximate to the lower of plurality of integrally formed slats **414**. Back portion **404** is pivotally connected at one end to the raised upstand **410**. Preferably, the pivot connection includes a spring-like device (not shown) so that back portion **404** maintains an acute angle with bottom portion **406** (Fig. 14B).

[0061] Rib cage assembly **408** is preferably constructed of a rigid material. Rib cage assembly **408** includes integrally formed wing component **416** on each side of the rib cage assembly **408**. Preferably, the internal face of rib cage assembly **408** is faced with a soft padding **418**. Optionally, adjustable straps **419** can be fitted to each of the wing components **416** to restrain the occupant to rib cage assembly **408**. Straps **419** may be adjusted by any suitable means known in the art such as a "Velcro" type fastening.

[0062] As best seen in Fig. 14A, rib cage assembly **408** further comprises a plurality of "downwardly sloping" ribs **420**. The plurality of ribs **420** are integrally formed on the external face thereof. The "downwardly sloping" ribs **420** are similarly dimensioned to the plurality of "upwardly sloping" integrally formed slats **414**, so that they may connectably engage each other.

[0063] Reference is now made to Figs. 14A - 14C which illustrate the apparatus **400** in operative mode. Initially, the rib cage assembly **408** is strapped to the occupant's upper body by means of the adjustable straps **419**, as shown in Fig. 14A. Seat support element **402** is placed in position on the supporting seat **422**. As best seen in Fig. 14B, the occupant, wearing the rib cage assembly **408** bends forward and lowers himself onto the bottom portion **406** and positions himself so that the plurality of ribs **420** on the external face of rib cage assembly **408** engages the plurality of integrally formed slats **414** of the back portion **404**.

[0064] As the user leans back against the supporting seat **422** and sits up straight, the relative motion between rib cage assembly **408** and slats **414** imparts a raising force to the user's ribs, indicated by arrow **424** (Fig. 14C).

[0065] Reference is now made to Figs. 15 and 16 which illustrate apparatus for relieving lower back pressure, generally designated **500** and **600**, respectively, constructed and operative in accordance with other preferred embodiments of the present invention.

[0066] Fig. 15 illustrates the use of compressed air operating means for relieving lower back pressure.

[0067] Apparatus **500** comprises a seat support element **502** having a bottom portion **504** connected to a back portion **506**. Bottom portion **504** is generally flat having a raised upstand **508**, integrally formed with the back end thereof. Back portion **506** comprises an air cushion **510**. An air compressor **512** is connected via a flexible tube **514** to cushion **510**. Air compressor **512** is any known in the art compressor connected to suitable controls **516** to allow for the entry and release of air from cushion **510**.

[0068] Back portion **506** further comprises adjustable straps **518** for firmly securing the occupant's upper body to back portion **506**, as described hereinabove. Adjustable straps **518** are suitably attached to the top of air cushion **510**.

[0069] In operation, the air cushion **510** is deflated and the occupant sits on seat support element **502** and fastens adjustable straps **518** around his rib cage. By adjustable use of controls **516**, the occupant can regulate the compressor **512** to inflate air cushion **510**. By increasing the amount of air within the cushion **510** lifts straps **518** thereby exerting pressure on the lower back of the restrained occupant.

[0070] It will be appreciated by persons skilled in the art that air can be manually entered or released by means of any suitable arrangement such as the valve arrangement described with reference to the embodiment of Figs. 9 - 10. It will also be appreciated that other suitable means replacing cushion **510**, such as the use of hydraulic pistons may be used.

[0071] Fig. 16 illustrates the use of an electric motor to selectably impart an upward pressure to an user's rib cage.

[0072] Fig. 16 is generally similar to apparatus **500** described hereinabove with reference to Fig. 15. Elements having similar components are similarly designated and are not further described.

[0073] Apparatus **600** comprises a seat support element **602** having a bottom portion **504** connected to a back portion **606**. Back portion **606** comprises an lead screw device **608** enclosed within padding **610**. Lead screw device **608** comprises a lead screw **612** attached to a motor **614** at its lower end and freely restrained at it top end by mount **615**. Mount **615** is suitably connected to padding **610** to allow screw **612** to freely rotate along a generally vertical axis. A nut **616** is threaded onto lead screw **612** and a plate **618** is welded or otherwise suitably connected to nut **616**.

[0074] Back portion **606** further comprises adjustable straps **518** for firmly securing the occupant's upper body to back portion **606**, as described hereinabove. Adjustable straps **518** are attached to plate **618**. Thus, rotation

of lead screw **612** causes nut **616** to rise or fall, thereby causing the attached straps **518** to also move up or dawn and release lower back pressure.

[0075] Motor **614**, which may be an electric motor or similar device, is connected to and operable by a suitable switch device **620**, such as a three-way switch.

[0076] In operation, the occupant lowers screw **612** to a non-tensioning position. The occupant sits on seat support element **602** and fastens adjustable straps **518** around his rib cage. By use of switch **620**, the occupant can operatably cause screw **612** to rotate clockwise or anti-clockwise. The rotation of screw **612** causes nut **616** to rise or fall thereby causing straps **518**, around the occupant, to rise up or down. Lifting the straps **518** raises the rib cage of the occupant relative to his lower body so as to release lower back pressure.

[0077] Reference is now made to Figs. 17 and 18 which illustrate apparatus for relieving lower back pressure, generally designated **700** and **800**, respectively, constructed and operative in accordance with other preferred embodiments of the present invention.

[0078] The embodiments of Figs. 17 and 18, comprise a seat support element **701** and an adjustable rib cage component **702** having a member **704** extending from the back thereof. Seat support element **701** comprises a bottom portion **705** connected to a back seat support element **706**. A slot **708** is formed in the back seat support element **706** to allow member **704** to move in a generally vertical direction. Member **704** which may be hollow, for example a nut, generally similar to nut **616**, described with reference to the embodiment of Fig. 16, or alternatively, member **704** may be solid such as component designated **805** (described hereinbelow Fig. 18). Member **704** extends beyond the back seat support element **706**. Upper and lower support members, **710a** and **710b** are attached to back seat support element **706** either side of member **704**,

[0079] Rib cage component **702** comprises adjustable straps **710** for firmly securing the occupant's upper body, generally similar to the straps described hereinabove.

[0080] The apparatuses **700** and **800** of Figs. 17 and 18, respectively further comprise raising mechanisms generally designated **712** and **802**, respectively, which will be separately described.

[0081] Referring now to Fig. 17, raising mechanism **712** comprises a lead screw **714** which is threaded through nut **704** and is freely supported at either end by upper and lower support members, **710a** and **710b**, respectively. An operating device **720** for rotating screw **714** is attached via a suitable semi-flexible cable **722** to screw **714**. A suitable control is attached to cable **722** for operatably controlling the rotation of screw **714**.

[0082] The rotation of screw **714** causes the rise and fall of nut **704** which adjustably raises (or lowers) rib cage component **702**. To raise the occupant's rib cage, the occupant sits on the seat, lowers rotating screw **714** so that it is a non-tensioning position. The occupant fastens the adjustable straps **710** around his rib cage. By rotating the screw **714** and lifting the nut **704**, upward tension is applied via the adjustable straps **710** to the user rib cage so as to release lower back pressure.

[0083] Referring now to Fig. 18, raising mechanism **802** comprises a tensioning cable **804** coupled at one end thereof to a tensioning device **806**. One end of tensioning cable **804** extends below upper support member **710a** and is coupled to component **805**. A return spring **812**, is attached at one end to lower support member **710b** and at its other end to component **805**.

[0084] By manually applying pressure to tensioning device **806**, the occupant can operate mechanism **802** to raise rib cage component **702**. Tensioning device **806** operates in a manner generally similar to the gearing system on a bicycle, whereby pressure on tensioning device **806** increases the strain on tensioning cable **804**. The tensioning of cable **804** is transferred via component **805** (member **704**) thereby to raise rib cage component **702**. Since the occupant is restrained by the adjustable straps **710**, the occupant's rib cage is also raised. The raising of component **805** increases the strain on return spring **812**.

[0085] It will appreciated by persons skilled in the art that any or all of the various devices and mechanisms described hereinabove with reference to a particular embodiment are also applicable to any of the other embodiments. That is, any of the user controlled elevating devices may be used with different rib cage assemblies. For example, the motor **614** of Fig. 16 may also be used with the embodiments of Figs. 17 or 18.

[0086] It will also appreciated by persons skilled in the art that user controlled elevating devices are not restricted to the apparatus described but may include any other suitable apparatus such as power mechanism operated by a piston device, for example.

[0087] Reference is now made to Fig. 19 which illustrates a further embodiment of the apparatus for relieving lower back pressure, generally designated **900**, constructed and operative in accordance with preferred embodiments of the present invention. Elements of the embodiment of the invention which are similar to elements which have been previously described are similarly designated and will not be further described.

[0088] The embodiment of Fig. 19 utilizes an adjustable rib cage component **702** connected to an user controlled elevating device to relieve lower back pressure. Rib cage component **702**, which comprises adjustable straps **710** for firmly securing the occupant's upper body, is attached to a back support element **706** of a seat **701**. A slot **708** is formed in the back seat support element **706** to allow a member **852** (attached to back support element **706**) to move in a generally vertical direction.

[0089] In a preferred embodiment of Fig. 19, the user controlled elevating device of apparatus 900 comprises a piston device **854** which is operable connected to a power mechanism **850**. Piston device **854** is any suita-

ble device which is operated by hydraulically or pneumatically operated, power mechanism **850** supplying the necessary power. Alternatively, piston device **854** can be manually operated. The operation of the device **854** activates a piston ram **856** which is connected to member **852** to effectively raise or lower the rib cage component **702** (indicated by arrows **858**).

[0090] To raise the occupant's rib cage and elevate the upper trunk, the occupant sits on a seat **701** and fastens the adjustable straps **710** around his rib cage. By activating piston device **854** to raise piston ram **856**, upward tension is applied via the adjustable straps **710** to the user rib cage so as to relieve lower back pressure.

[0091] It will appreciated by persons skilled in the art that, in alternative embodiments, the user controlled elevating device, may comprise any of the devices described hereinabove, with respect to Figs. 17 and 18. For example, the elevating device may utilize apparatus such as the lead screw 714 of Fig. 17 or the tensioning cable 804 of Fig. 18.

[0092] It will further appreciated by persons skilled in the art that invention is not limited by what has been particular shown and described hereinabove. Rather the scope of the present invention is defined only by the claims which follow:

Claims

1. A portable seat supportable apparatus for relieving lower back pressure of a user comprising:

   a. a bottom portion for placing on a seat, said bottom portion for seating the user;
   b. a back portion having a rib cage engagement assembly connected thereto, said rib cage engagement assembly removably engaging the rib cage of said user when he is sitting on said bottom portion; and
   c. user controlled elevating apparatus for selectably elevating the rib cage assembly, thereby to relieve lower back pressure of said user.

2. Apparatus according to claim 1 and wherein said user controlled elevating apparatus comprises:

   a. at least one support member attached to said back portion;
   b. a piston unit having an adjustable ram element coupled at one end thereof to said at least one support member;
   c. a member attached to said rib cage engagement assembly and said ram element; and
   d. an operating device for adjusting said adjustable ram element, thereby elevating said rib cage engagement assembly.

3. A portable seat supportable apparatus for relieving lower back pressure of a user comprising:

   a. a back portion arranged to be supported on a seat;
   b. a portable rib cage engagement assembly connected to said back portion, said rib cage engagement assembly removably engaging the rib cage of said user when he is sitting on said seat; and
   c. user controlled elevating apparatus for selectably elevating the rib cage assembly, thereby to relieve lower back pressure of said user.

4. Apparatus according to claim 3 and wherein said user controlled elevating apparatus comprises:

   a. at least one support member attached to said back portion;
   b. a piston unit having an adjustable ram element coupled at one end thereof to said at least one support member;
   c. a member attached to said rib cage engagement assembly and said ram element; and
   d. an operating device for adjusting said adjustable ram, thereby elevating said rib cage engagement assembly.

5. Apparatus according to any of claims 2 and 4 wherein said operating device is operated by any one of a group including hydraulic, pneumatic or manual power.

6. Apparatus according to claim 3 and wherein said user controlled elevating apparatus comprises:

   a. upper and lower support members attached to said back portion;
   b. a lead screw freely supported at each end by said upper and lower support members;
   c. a nut threaded onto said lead screw, said nut being attached to said rib cage engagement assembly; and
   d. an operating device for rotating said screw.

7. Apparatus according to claim 3 and wherein said user controlled elevating apparatus comprises:

   a. upper and lower support members attached to said back portion;
   b. a third support member attached to said rib cage engagement assembly;
   c. a tensioning cable coupled at one end thereof to said third support member and coupled to said upper support member; and
   d. an operating device for applying tension to said tensioning cable.

8. A method for relieving lower back pressure of a user, said method comprising the steps of:

   a. engaging a portable seat supportable apparatus with the rib cage of the user, seat supportable apparatus comprising a rib cage engagement assembly; and
   b. elevating said rib cage engagement assembly.

9. A portable seat supportable apparatus for relieving lower back pressure of a user comprising;

   a. a seat portion arranged to be supported on a seat, said seat portion comprising a bottom portion and a back portion, said back portion being movable with respect to said bottom portion about an axis formed by a connection element therebetween;
   b. a rib cage engagement assembly arranged to removably engage the rib cage of said user, said rib cage engagement assembly being connected to said back portion; and
   c. means for removably mounting said rib cage to said back portion when said user is sitting on said bottom portion, wherein said rib cage is engaged to said user and to aid back portion, wherein movement of said back portion relative to said bottom portion selectably elevates the rib cage assembly, thereby to relieve lower back pressure of said user.

10. Apparatus according to claim 9 and wherein movement of said rib cage assembly relative to said back portion selectably elevates the rib cage assembly, thereby to relieve lower back pressure of said user.

11. Apparatus according to claim 9 and wherein said back portion comprises a plurality of "upwardly sloping" integrally formed slats and said rib cage assembly comprises a plurality of "downwardly sloping" ribs integrally formed on the external face thereof, said "downwardly sloping" ribs being similarly dimensioned to the plurality of said "upwardly sloping" integrally formed slats to connectably engage each other.

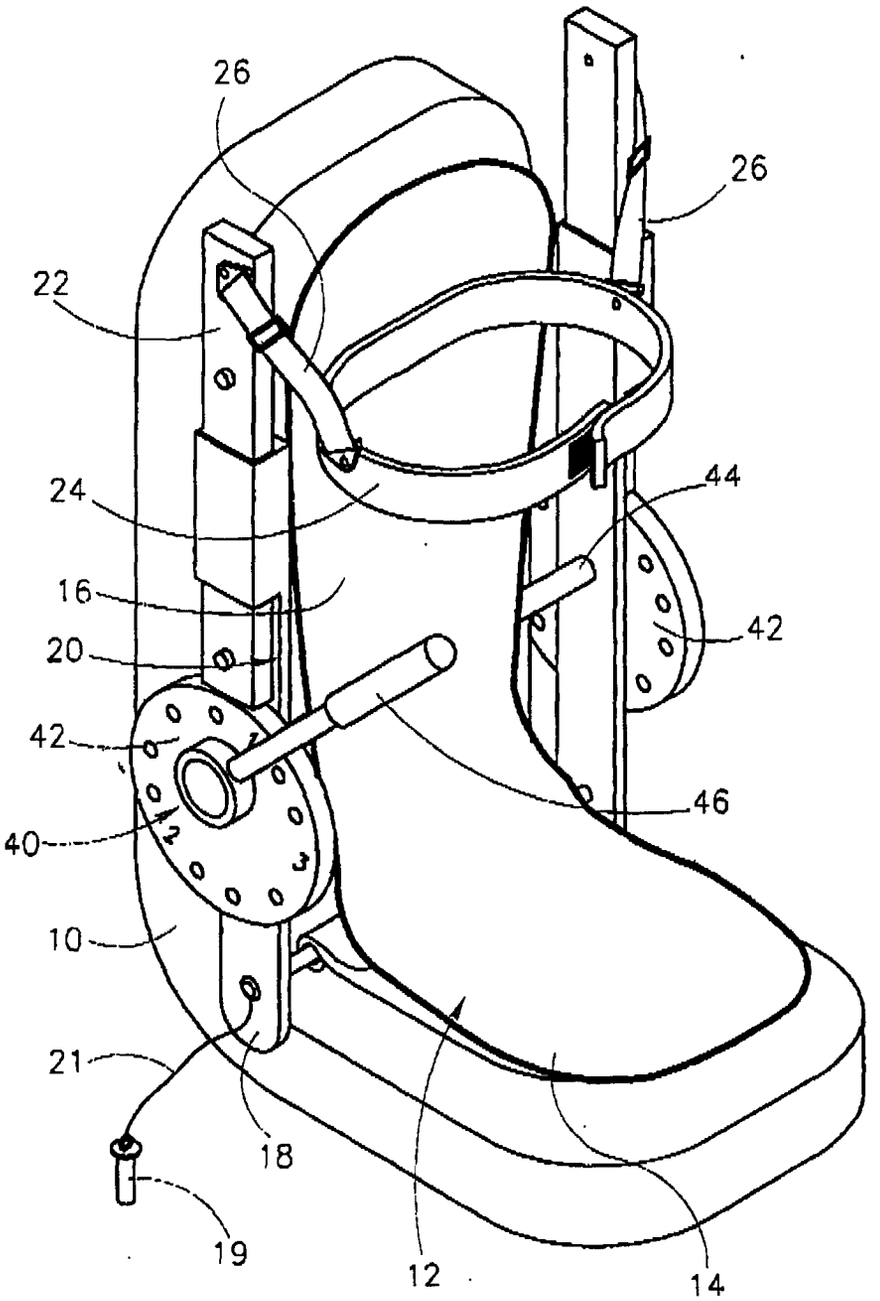


FIG.1A

FIG. 1B

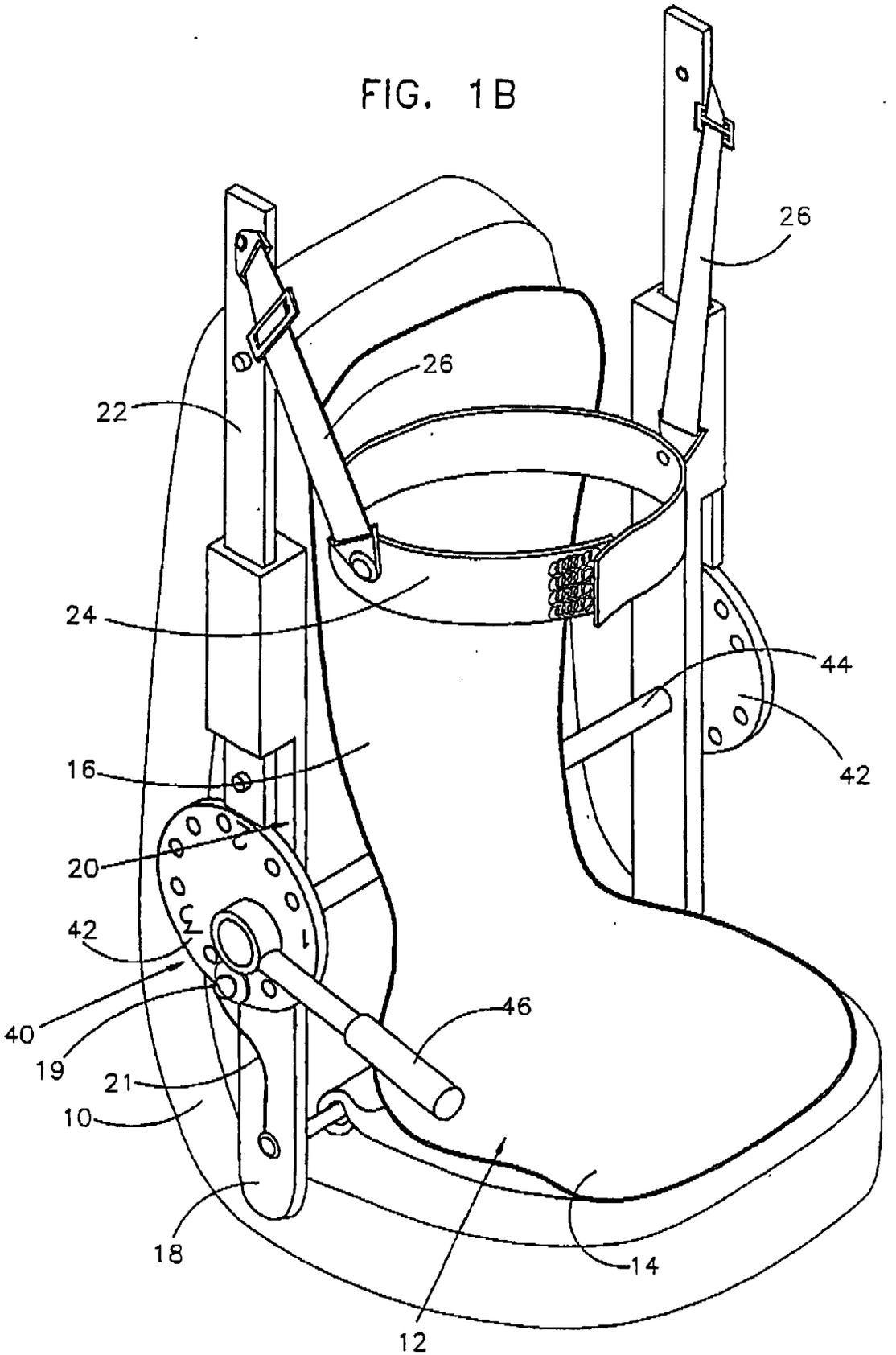


FIG. 2A

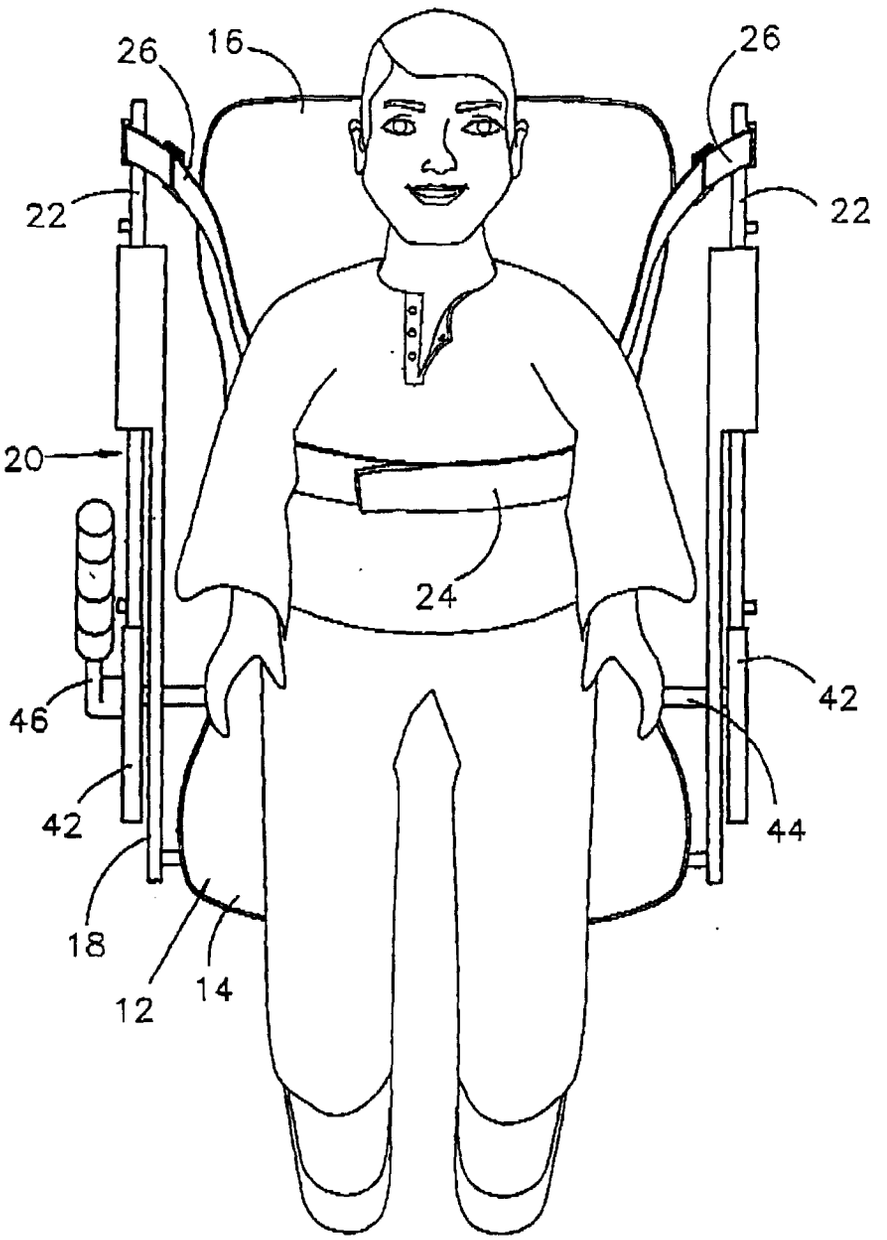


FIG. 2B

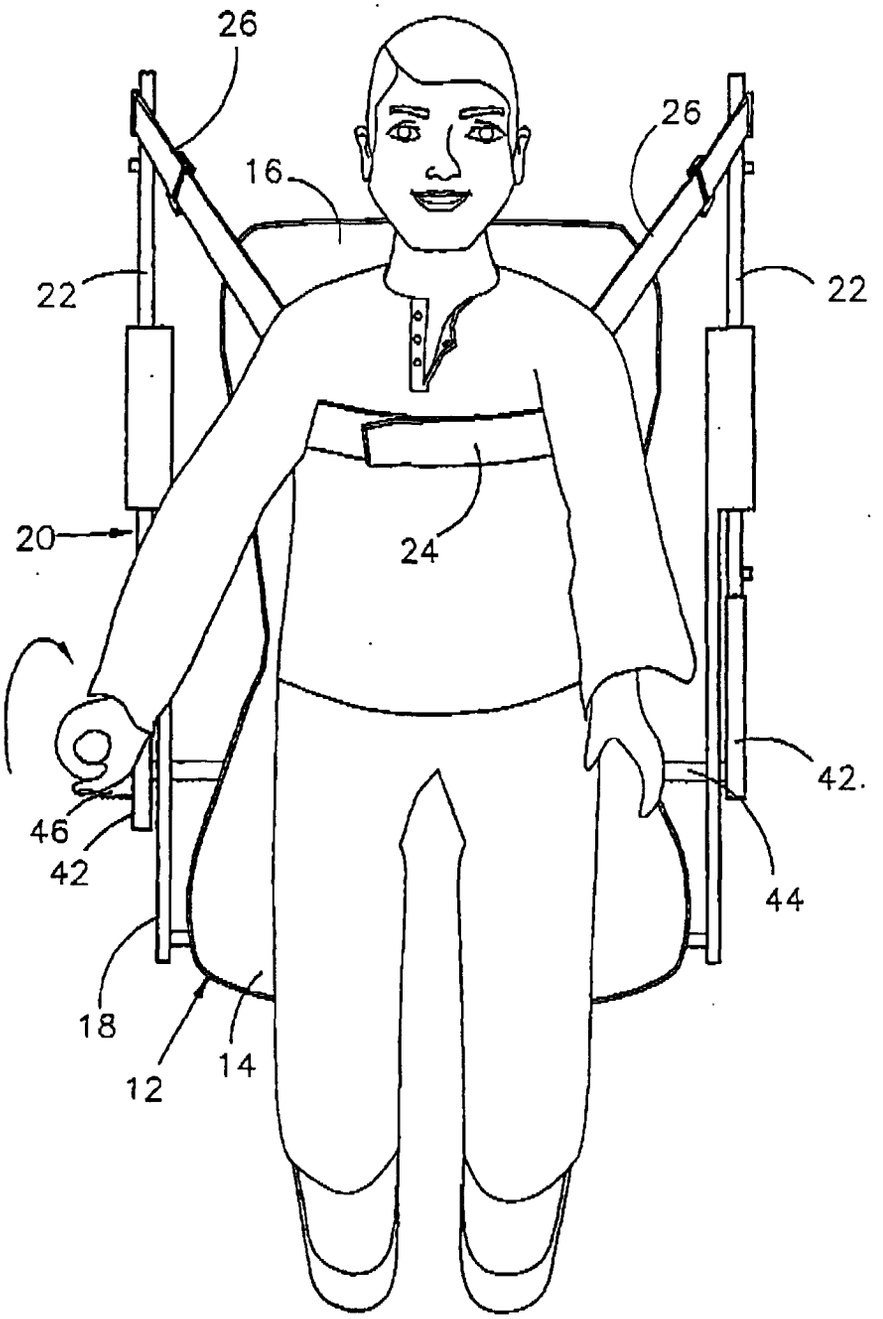


FIG. 3A

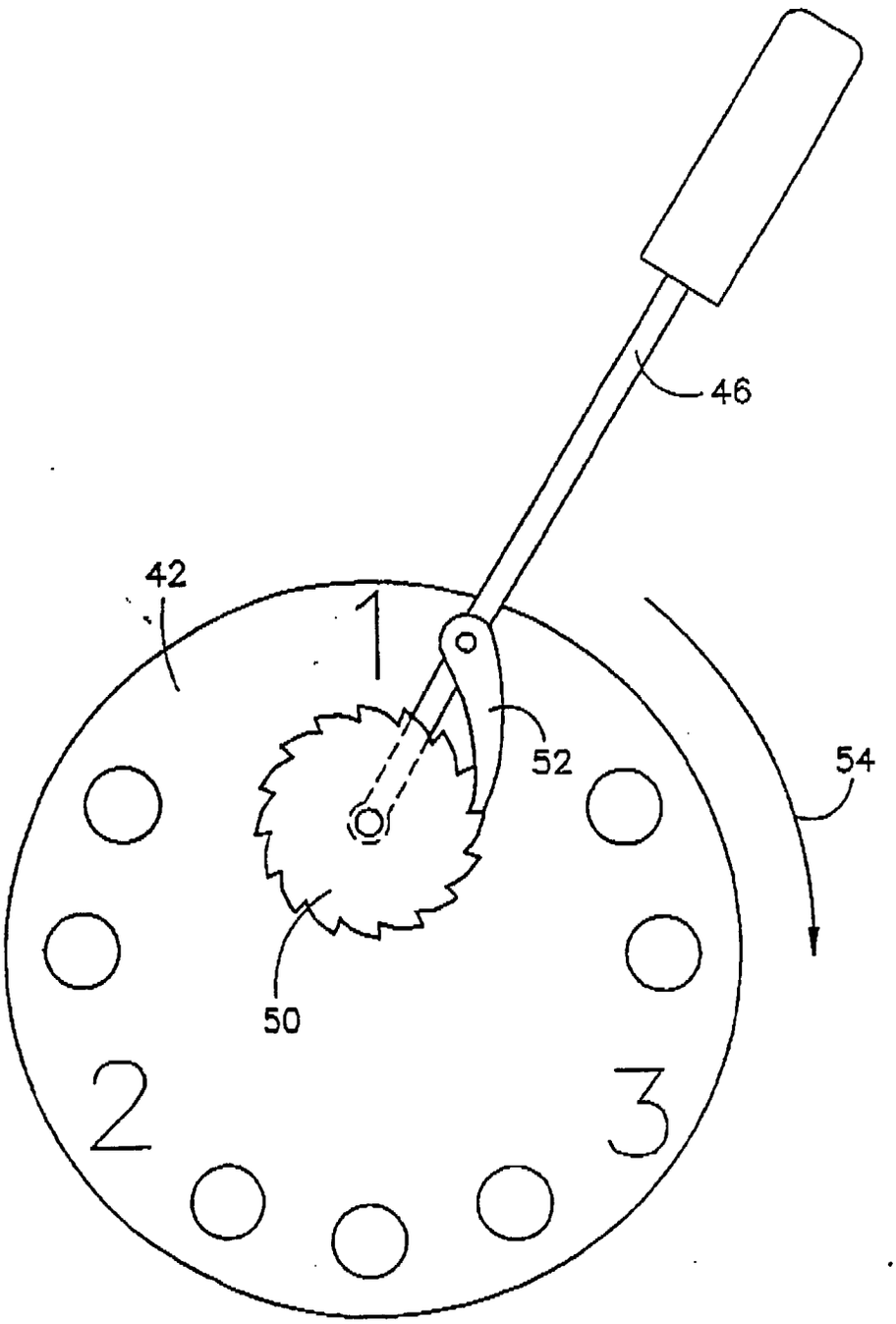


FIG. 3B

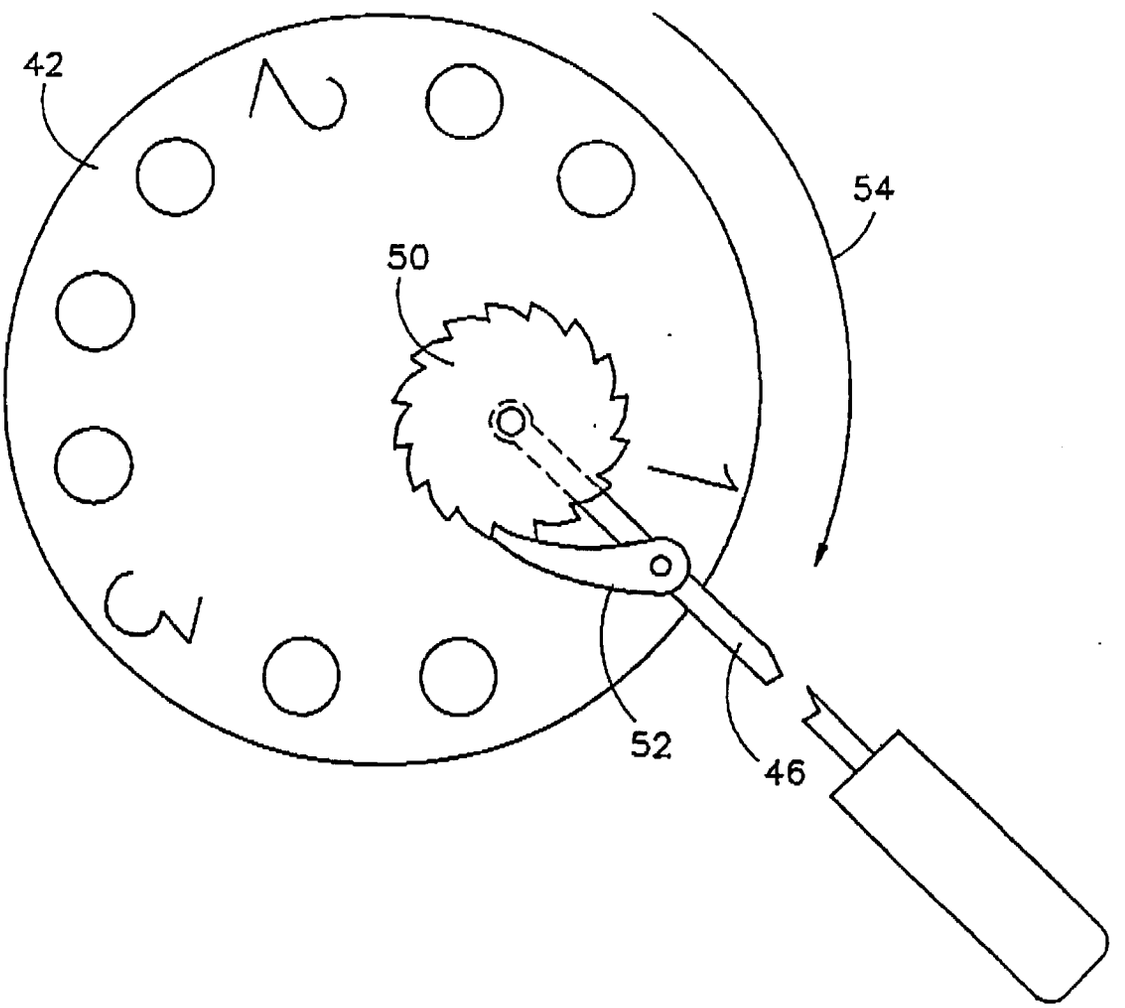


FIG. 3C

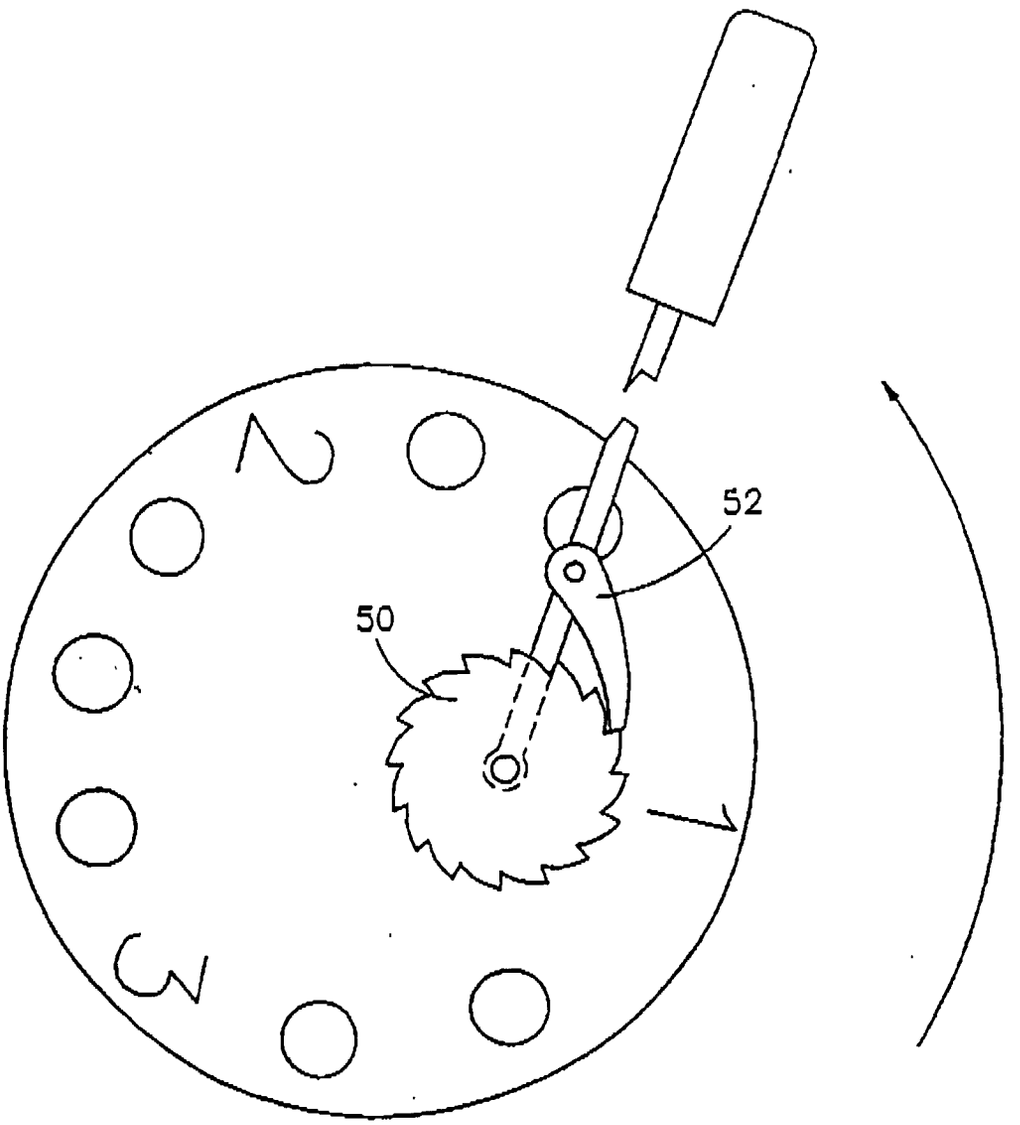


FIG. 4A

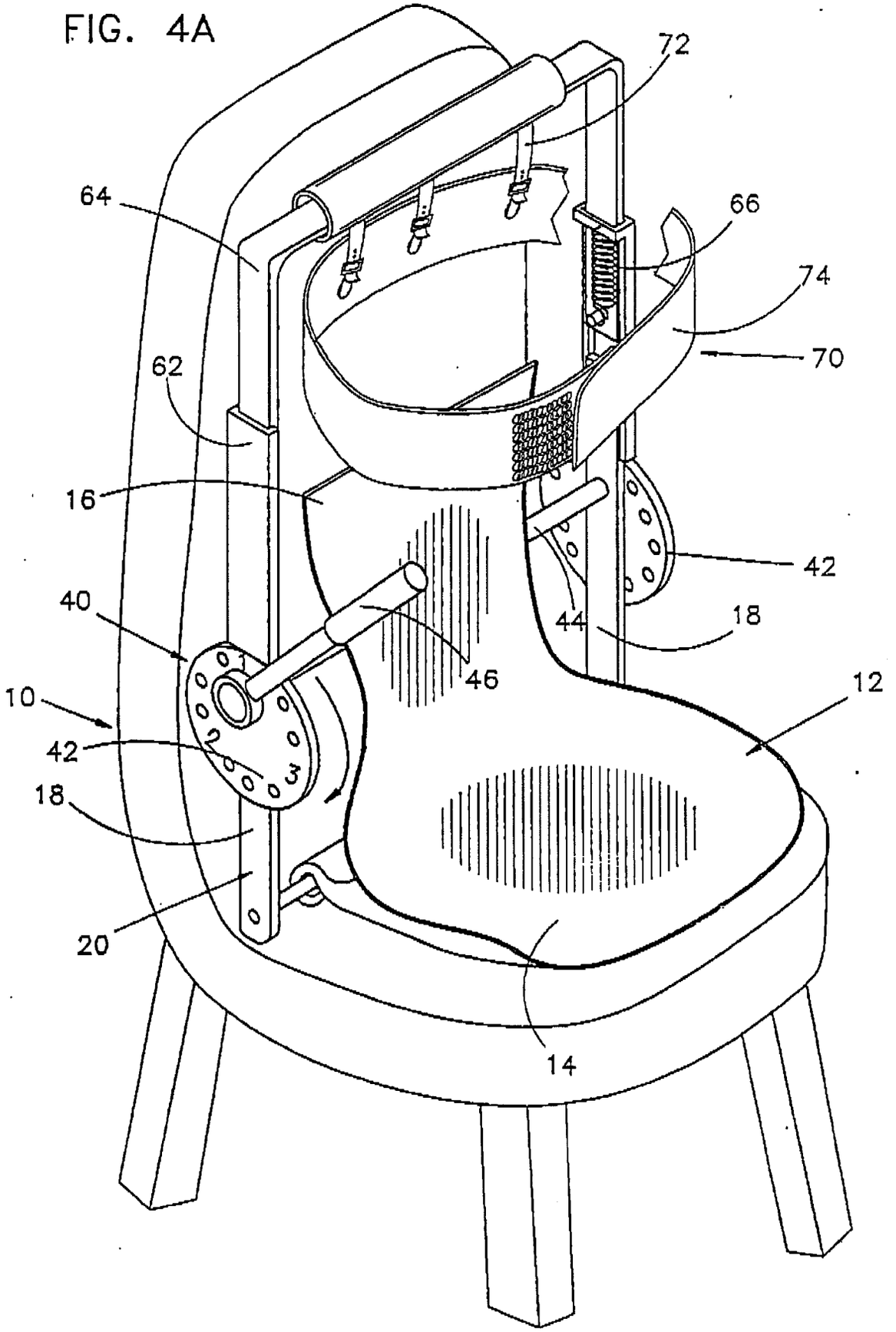
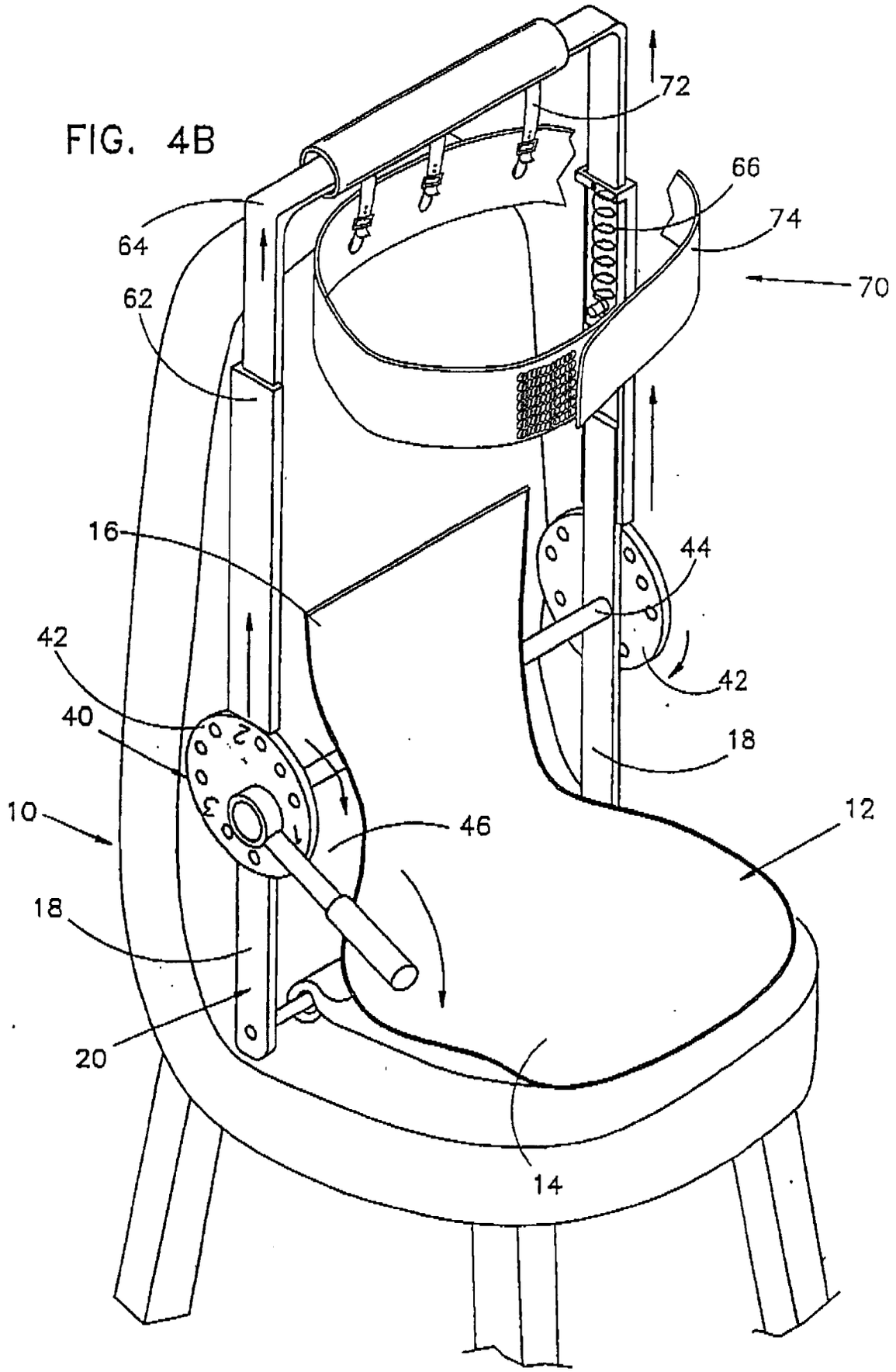


FIG. 4B



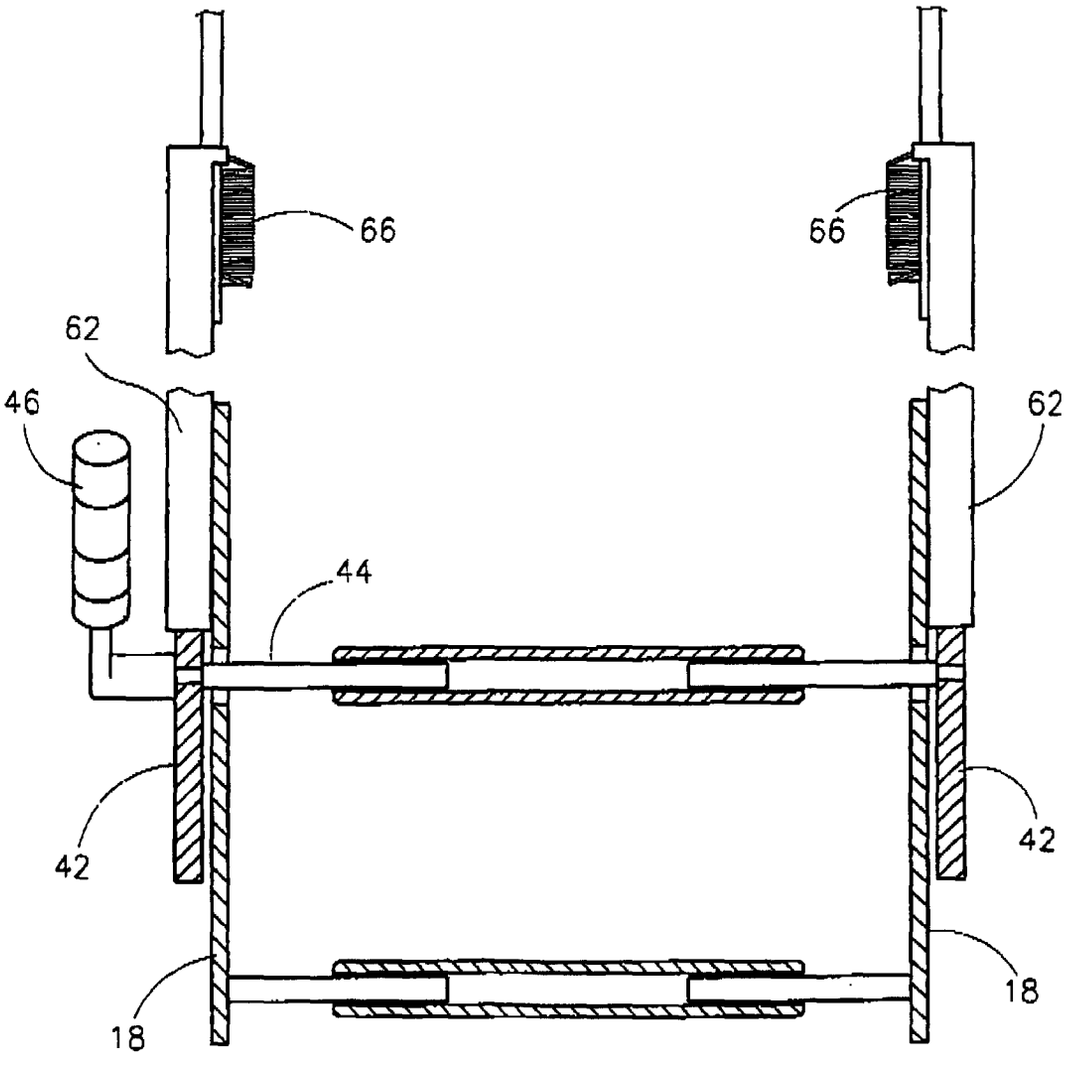


FIG.5A

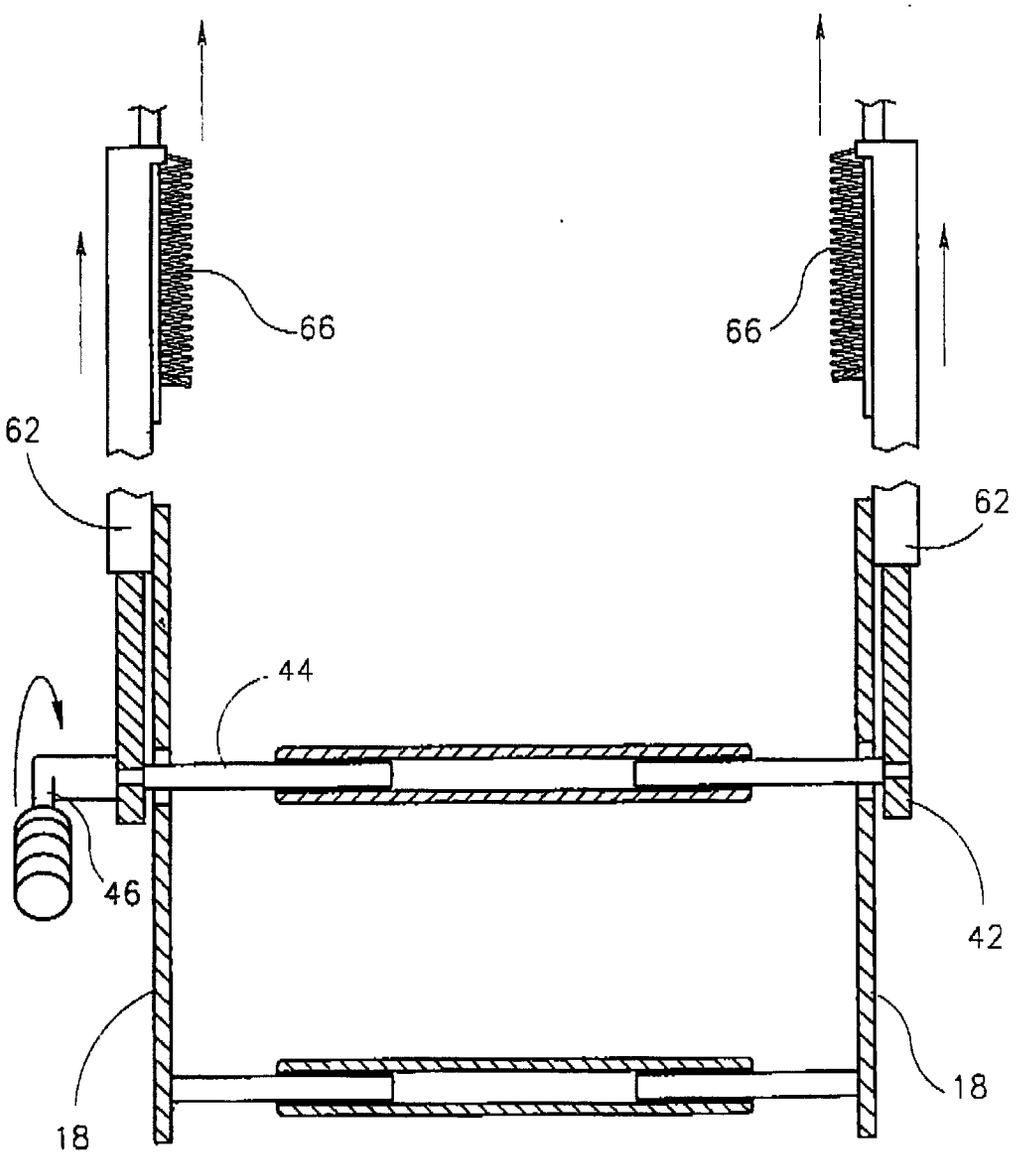
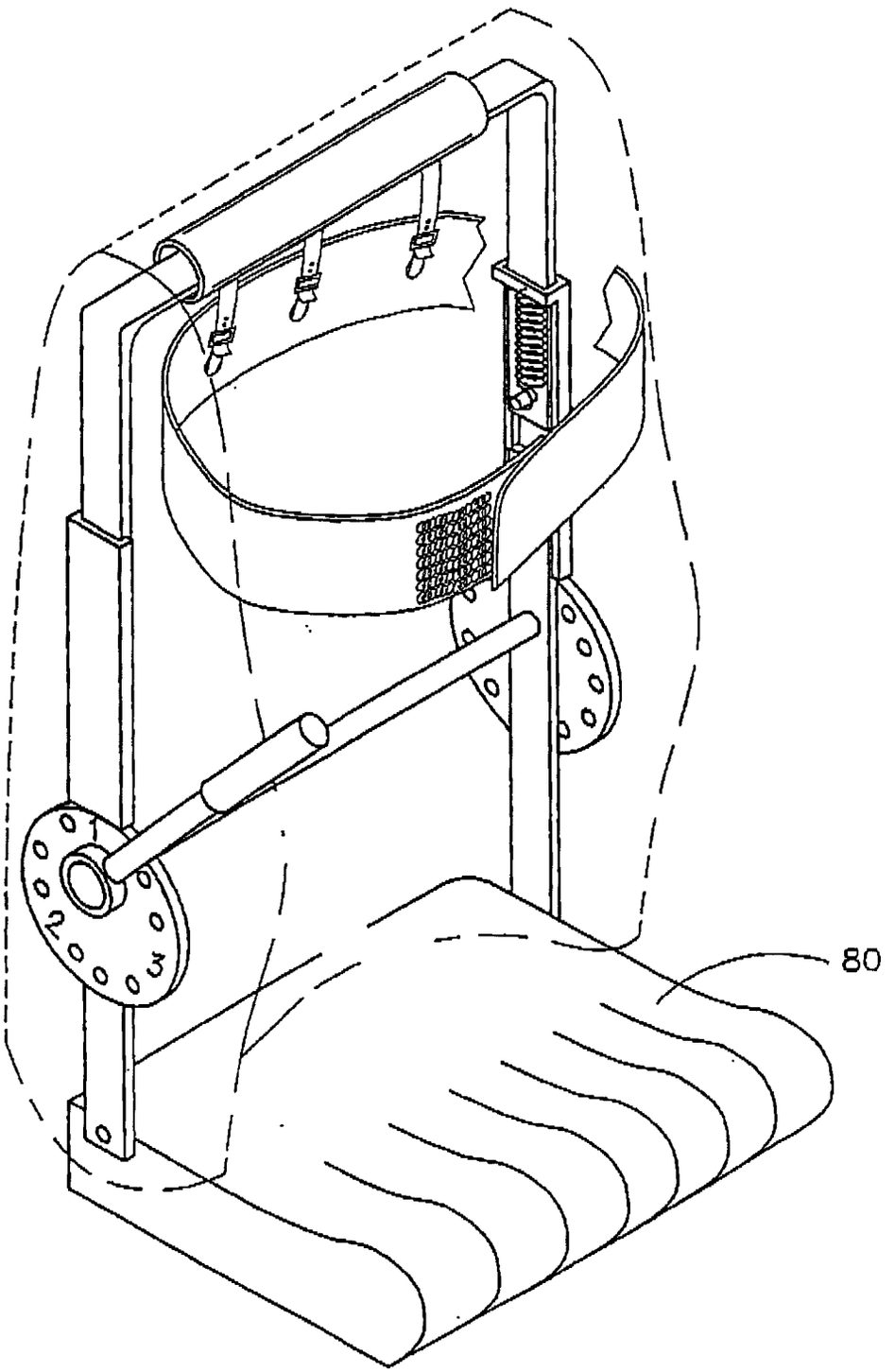


FIG.5B

FIG. 6



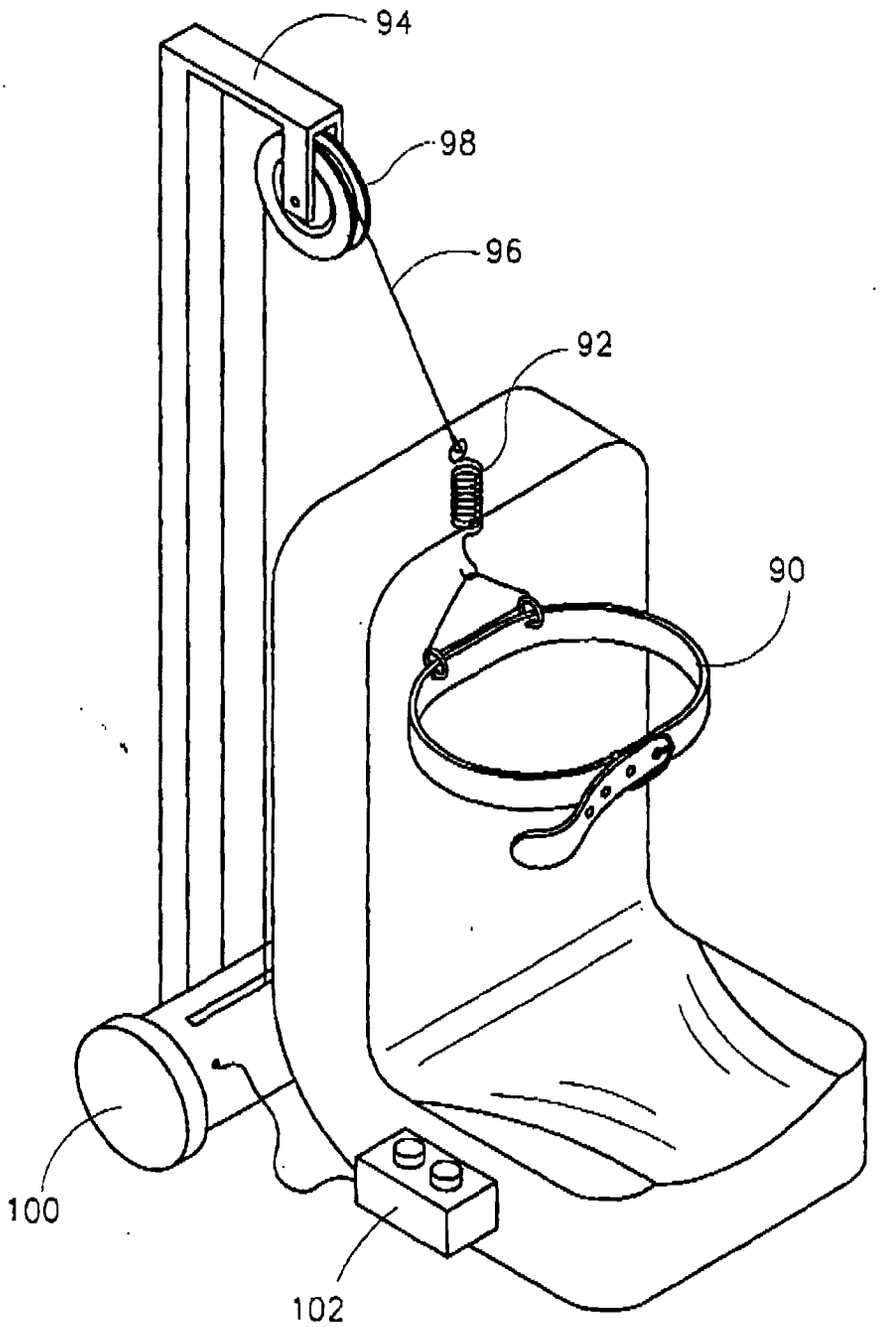


FIG.7

FIG. 8A

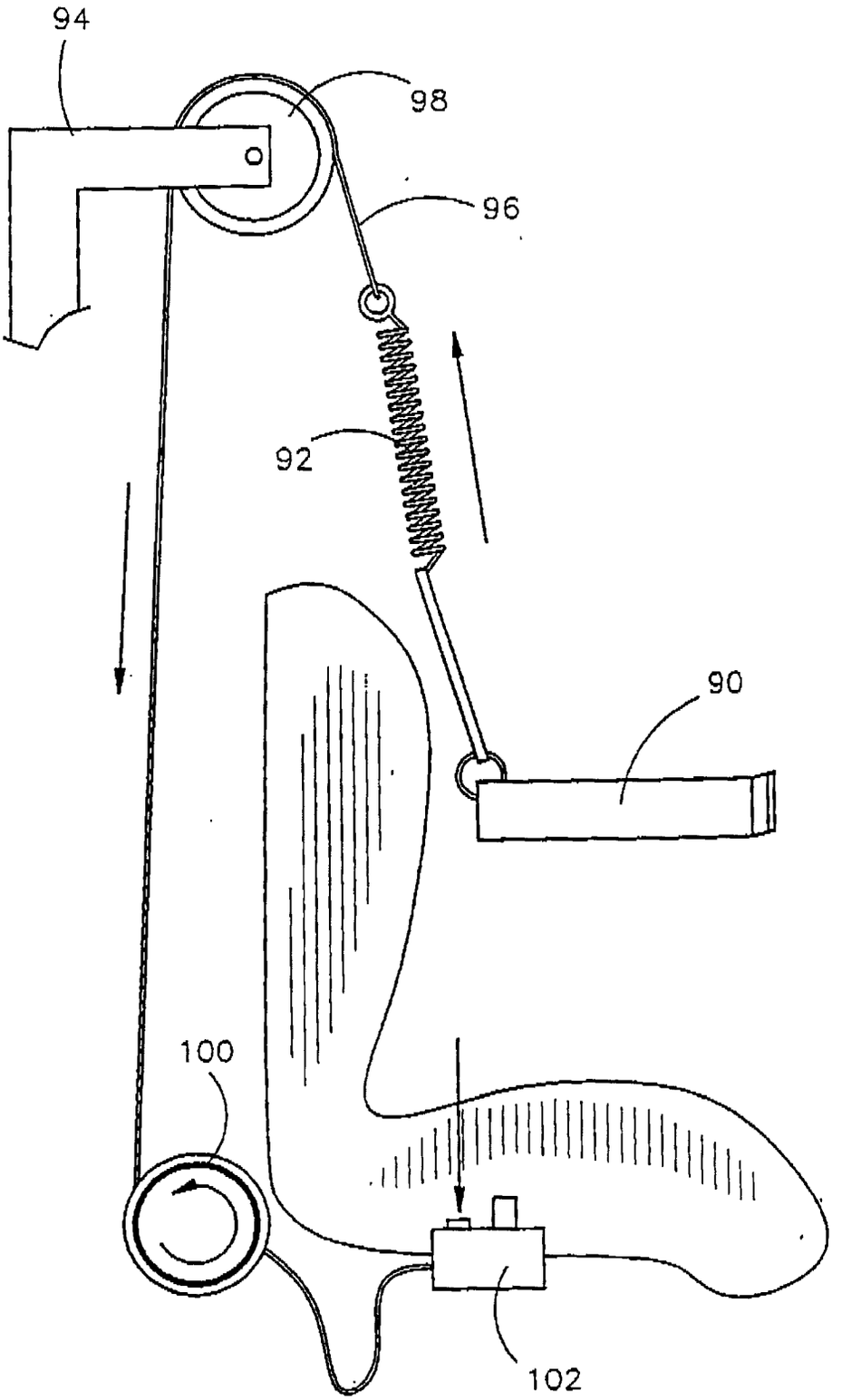
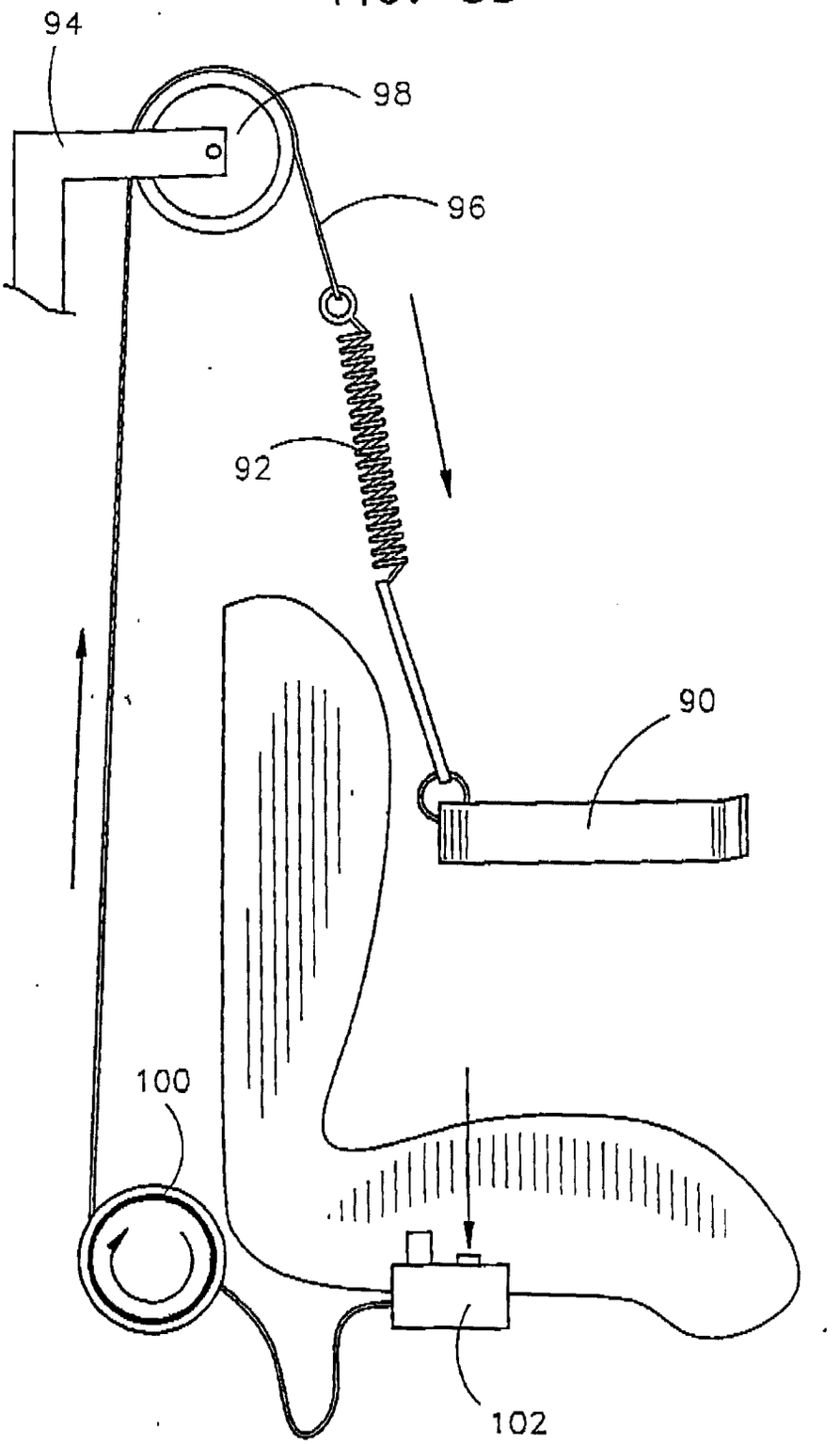


FIG. 8B



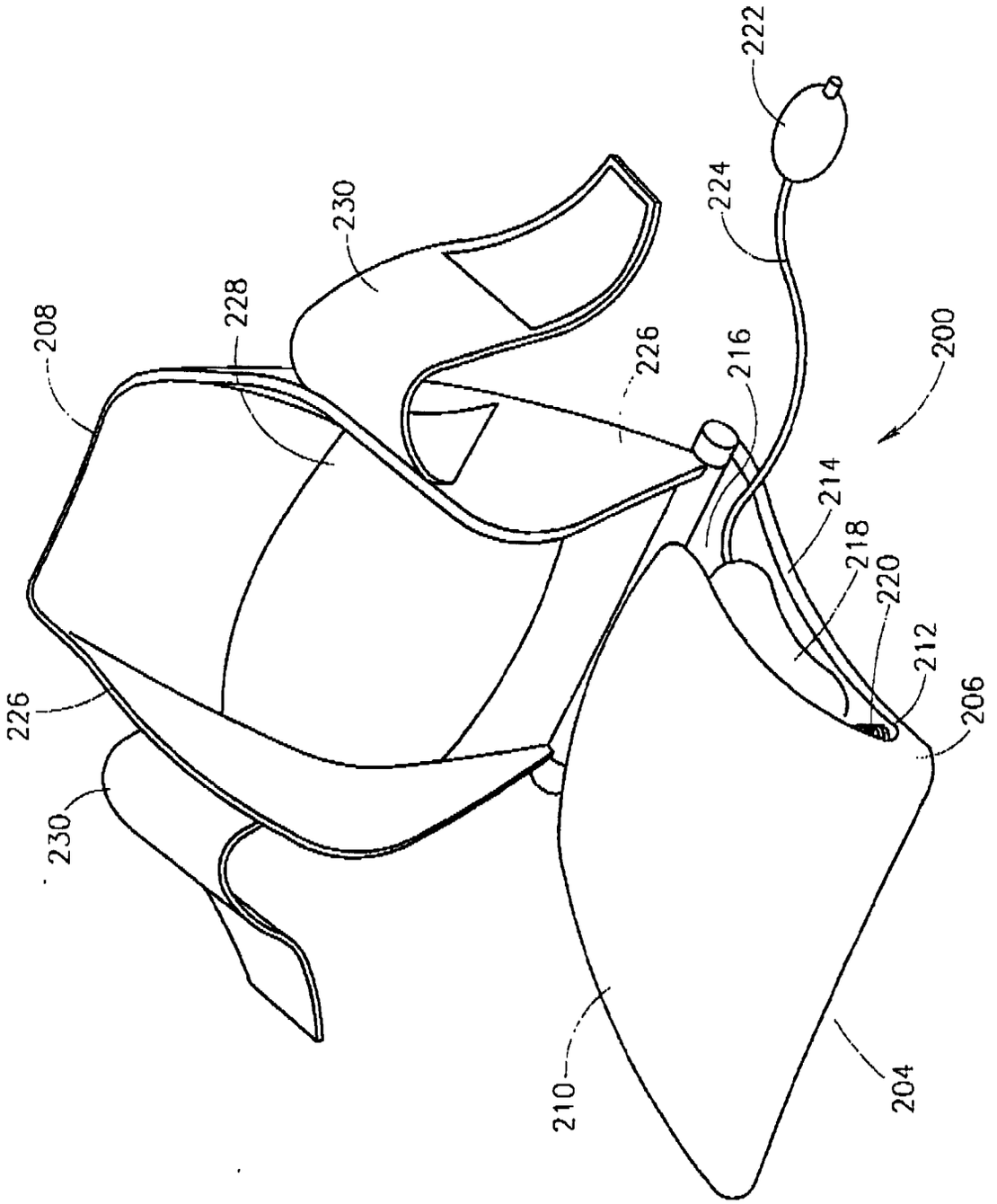

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FIG.9

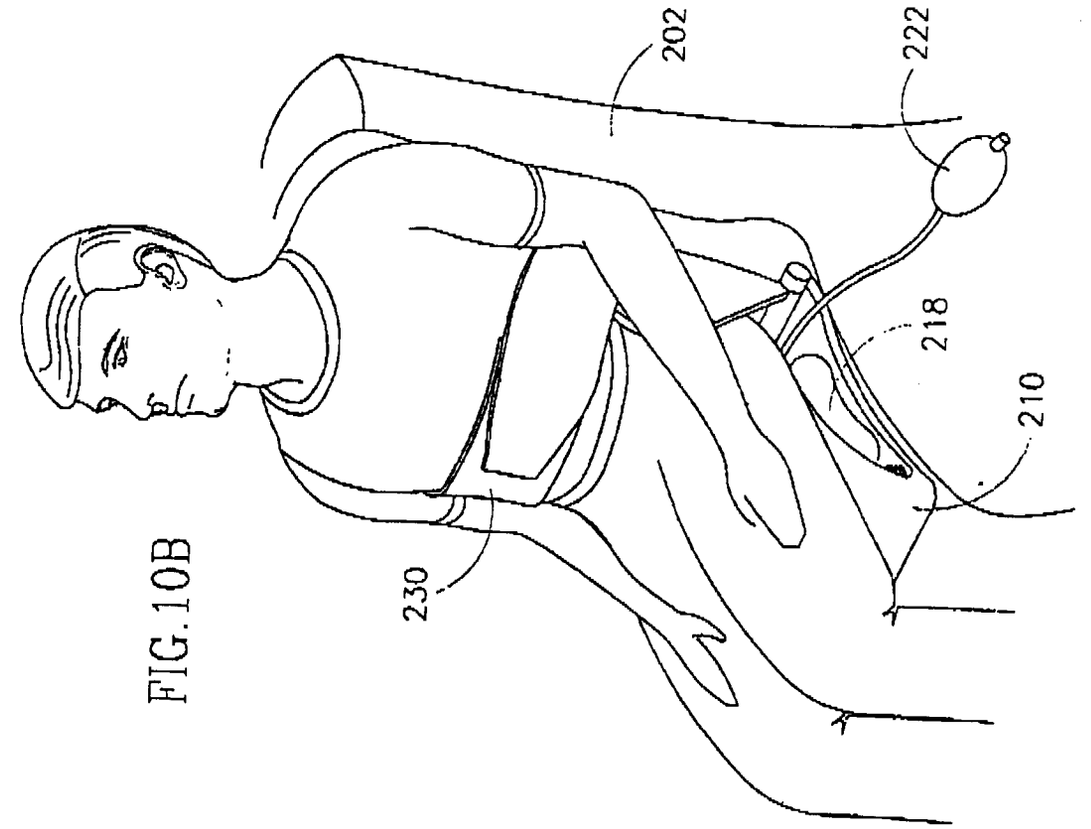

FIG.10B

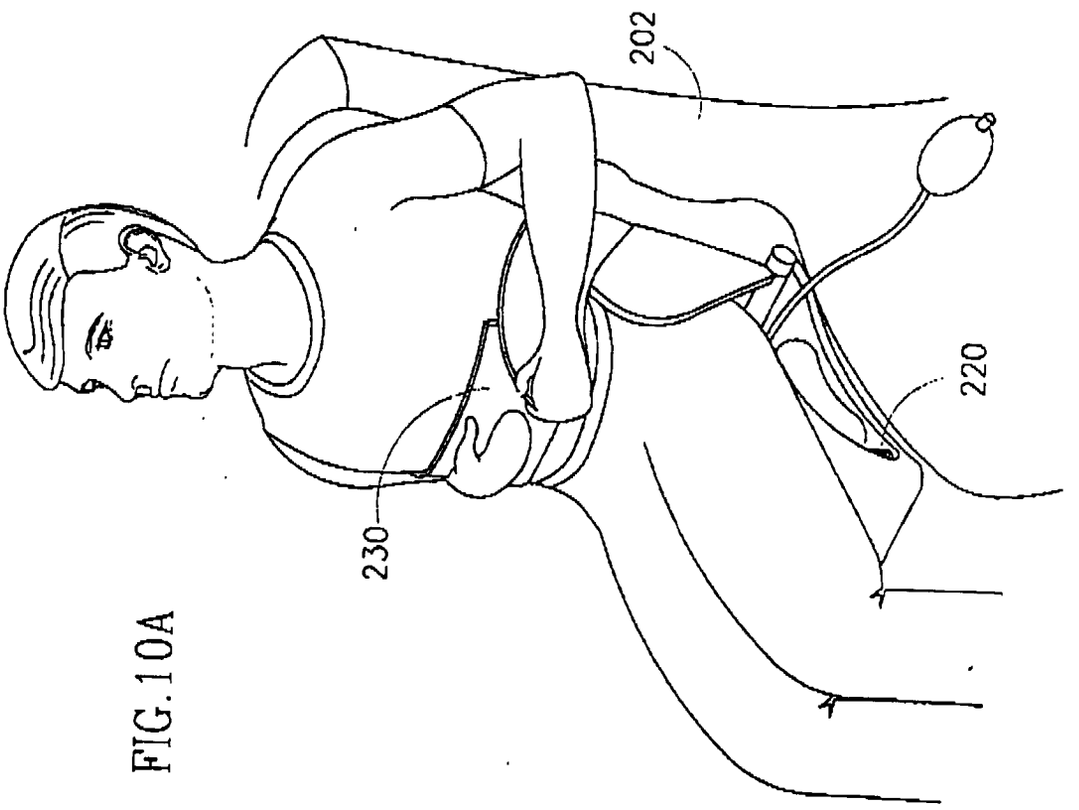

FIG.10A

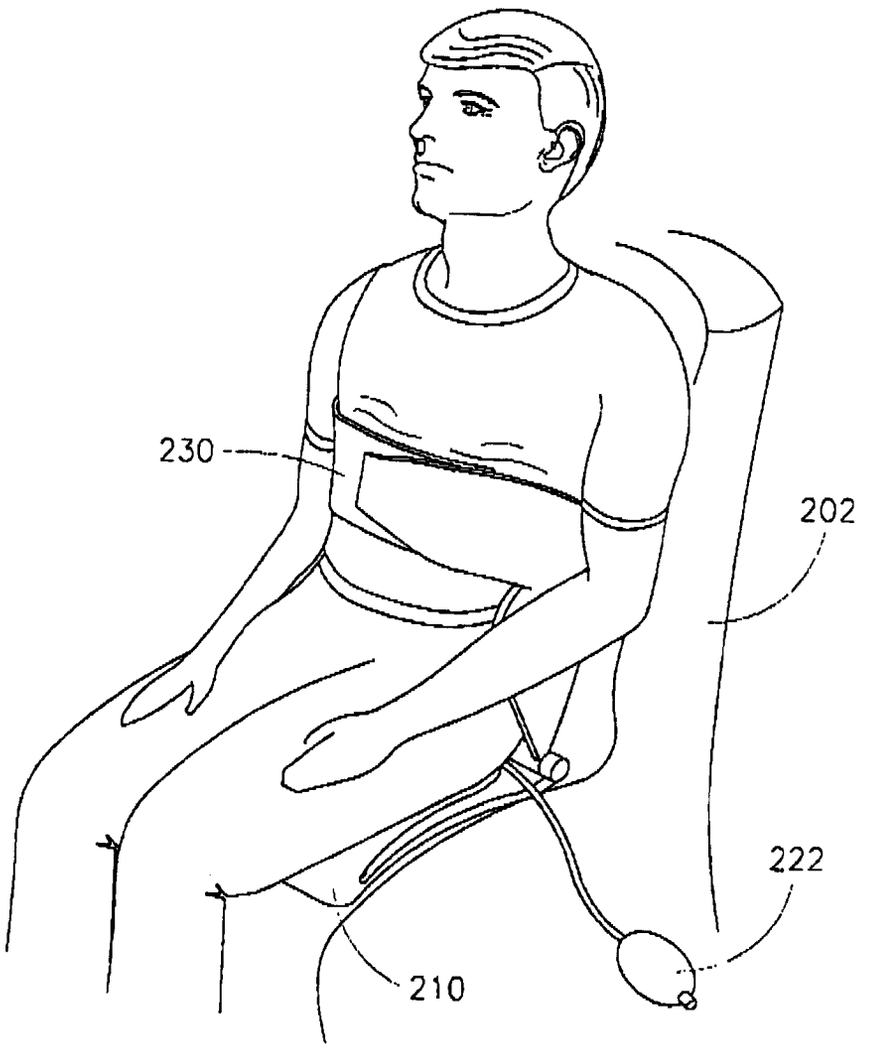

FIG.10C

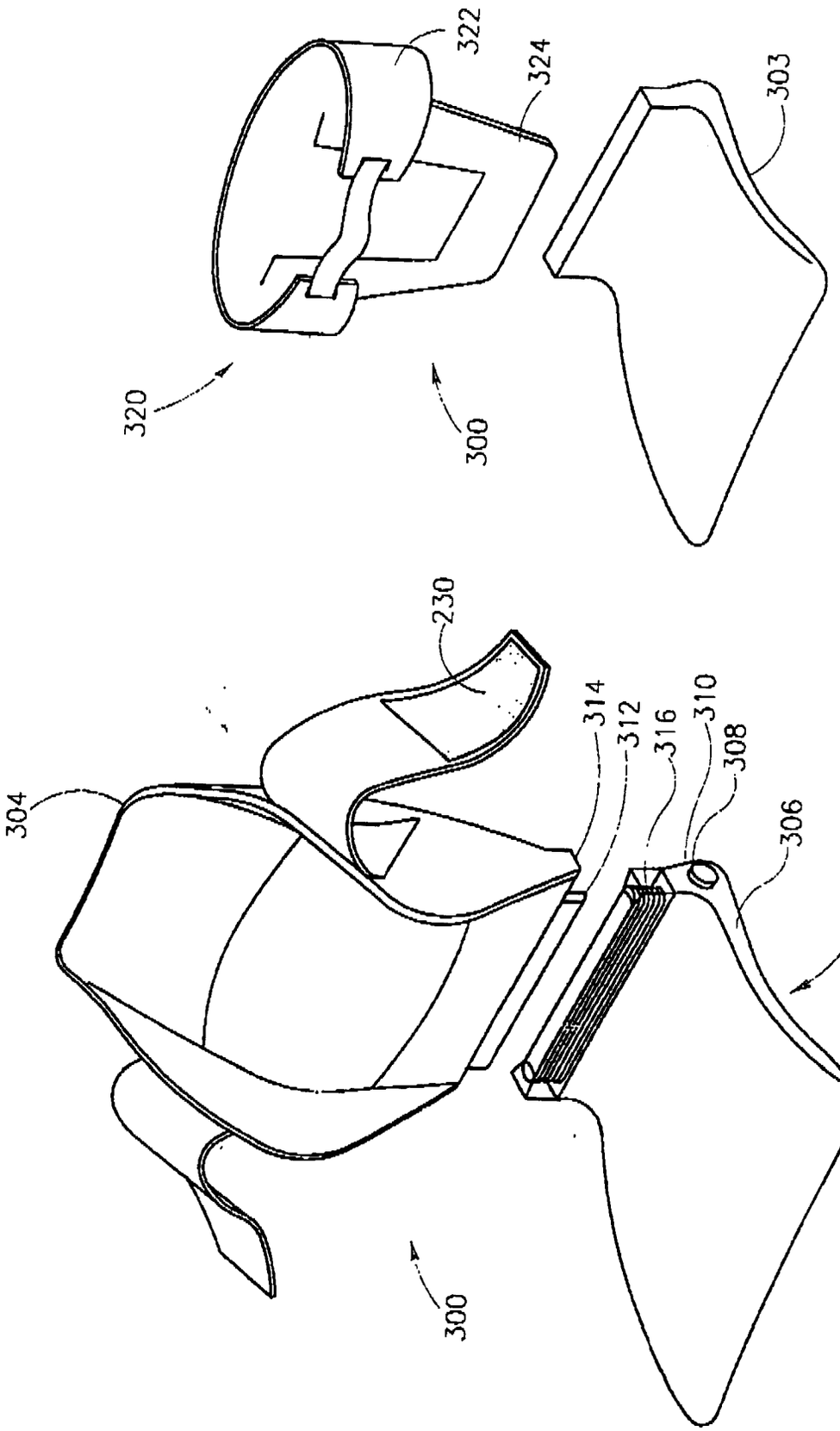

FIG.11B

FIG.11A

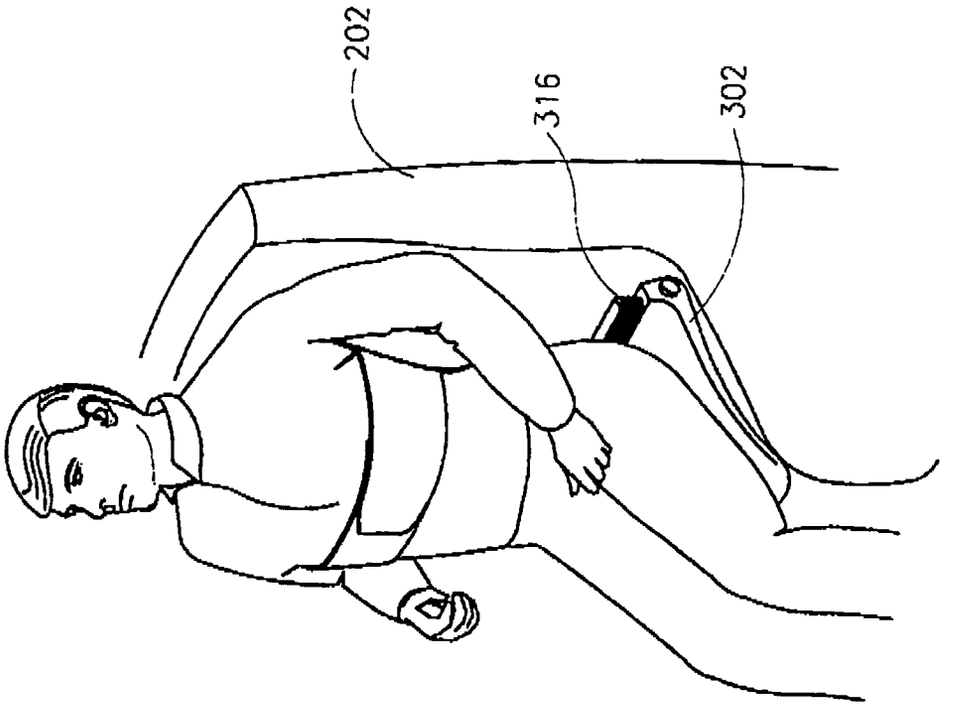

FIG.12B

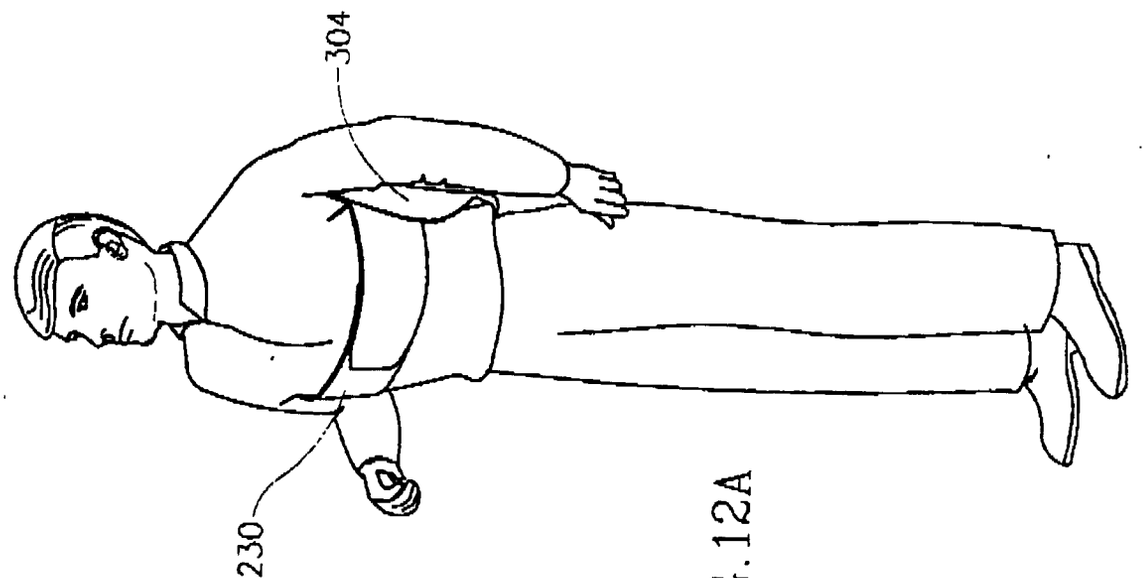

FIG.12A

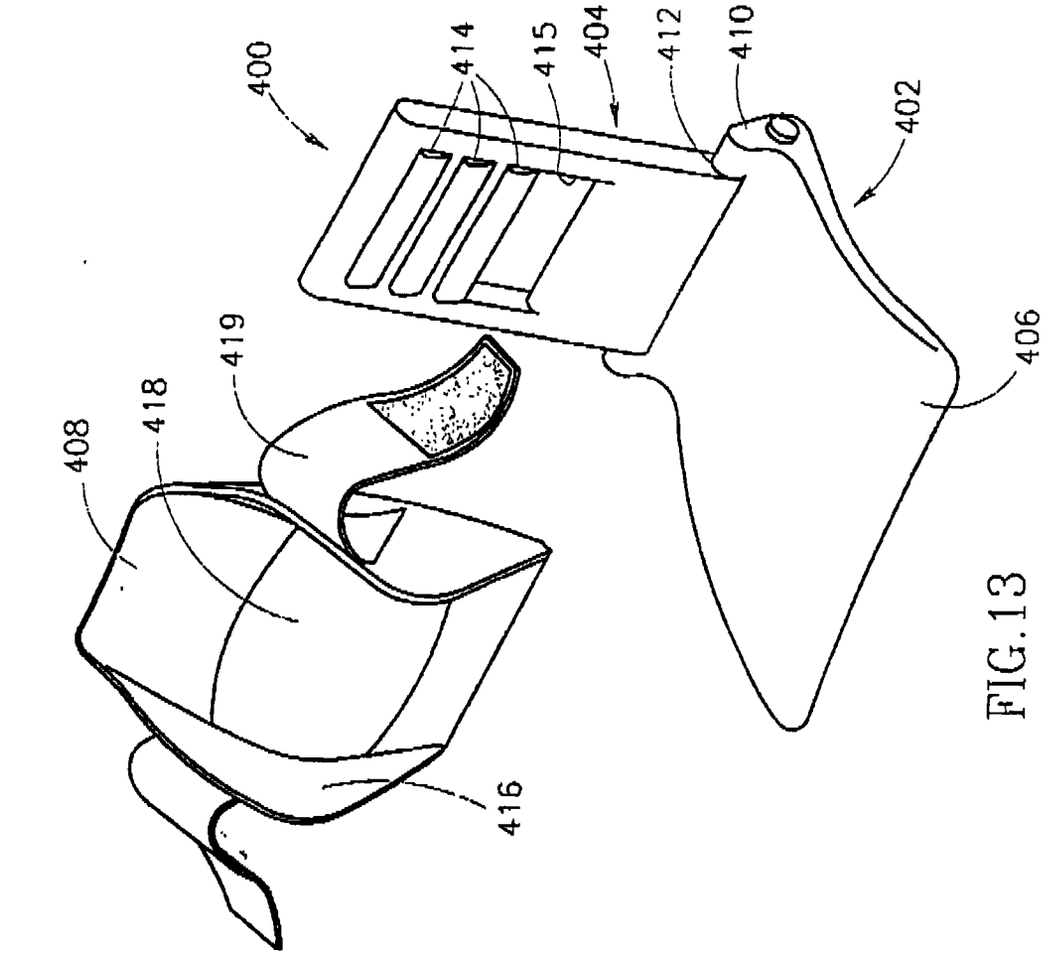

FIG.13

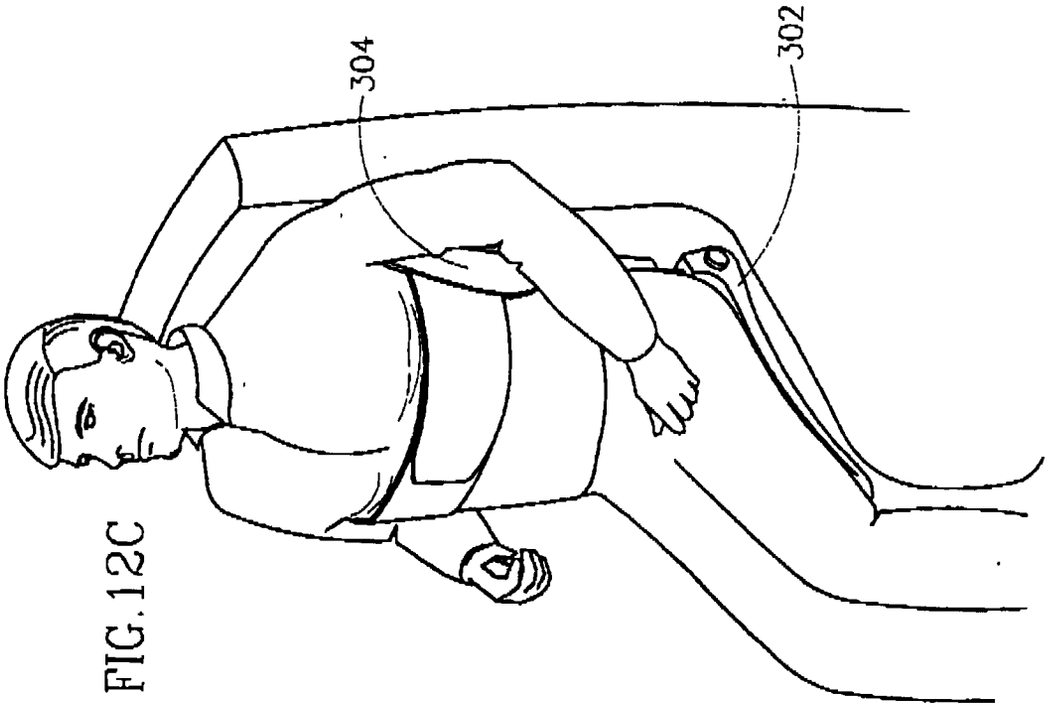

FIG.12C

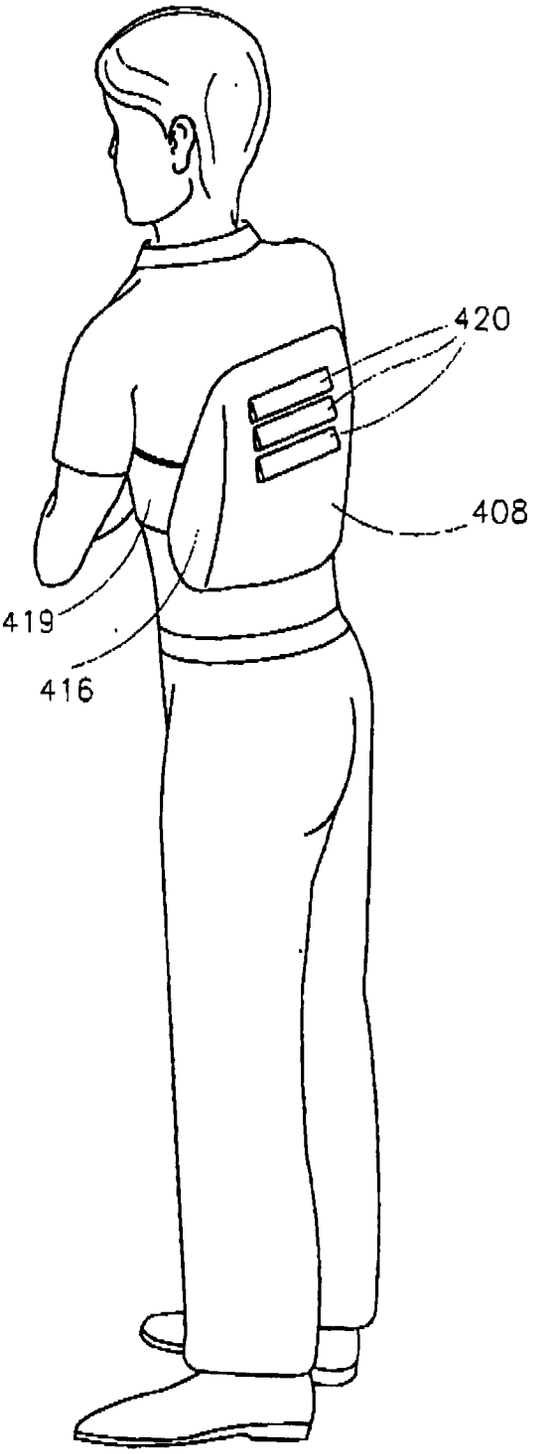

FIG. 14A

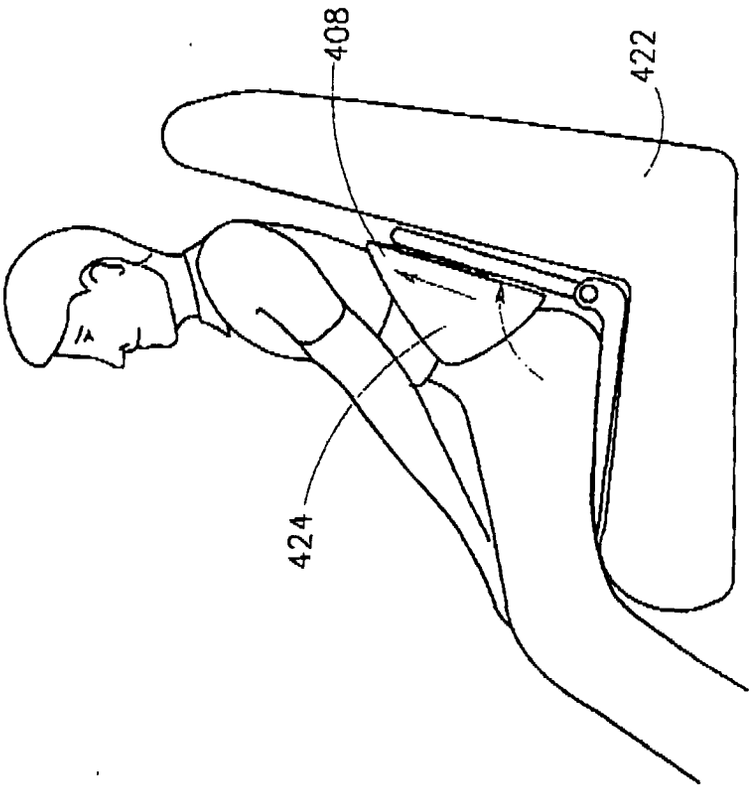

FIG.14C

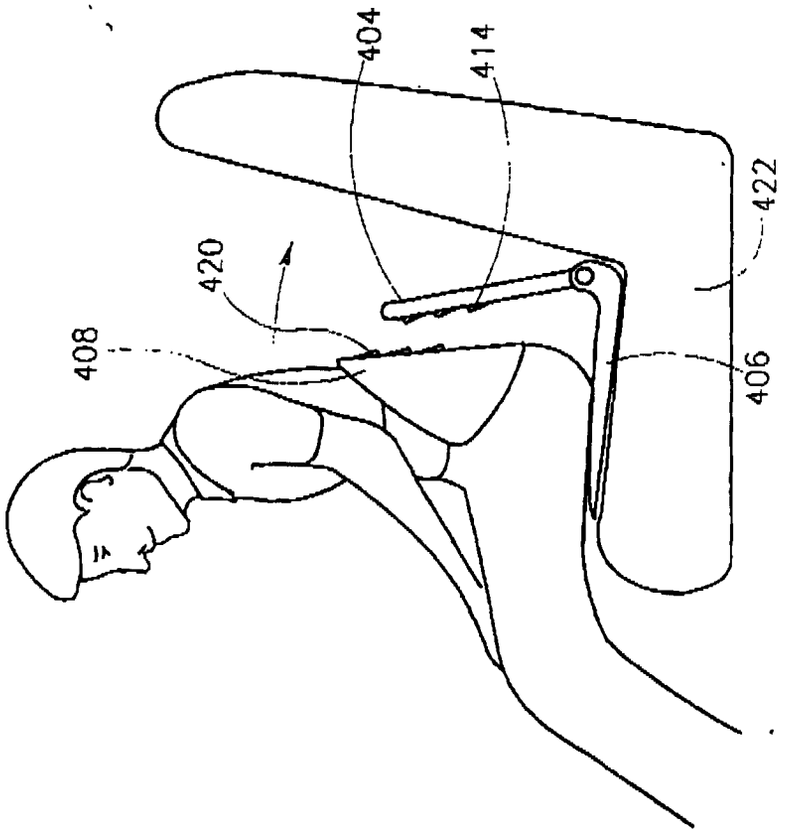

FIG.14B

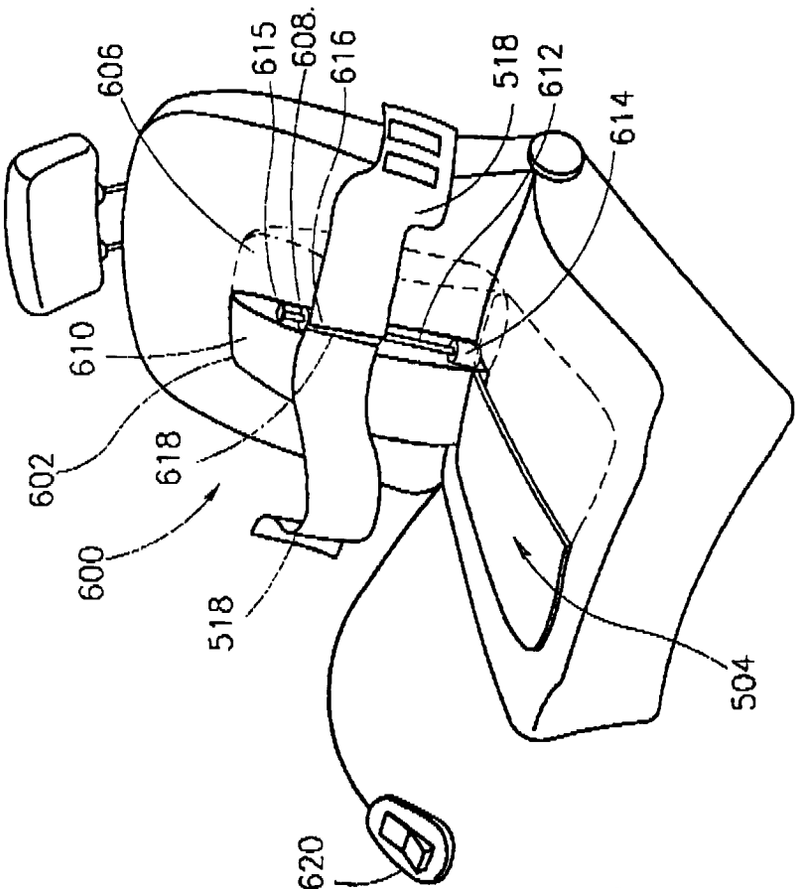
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FIG.16

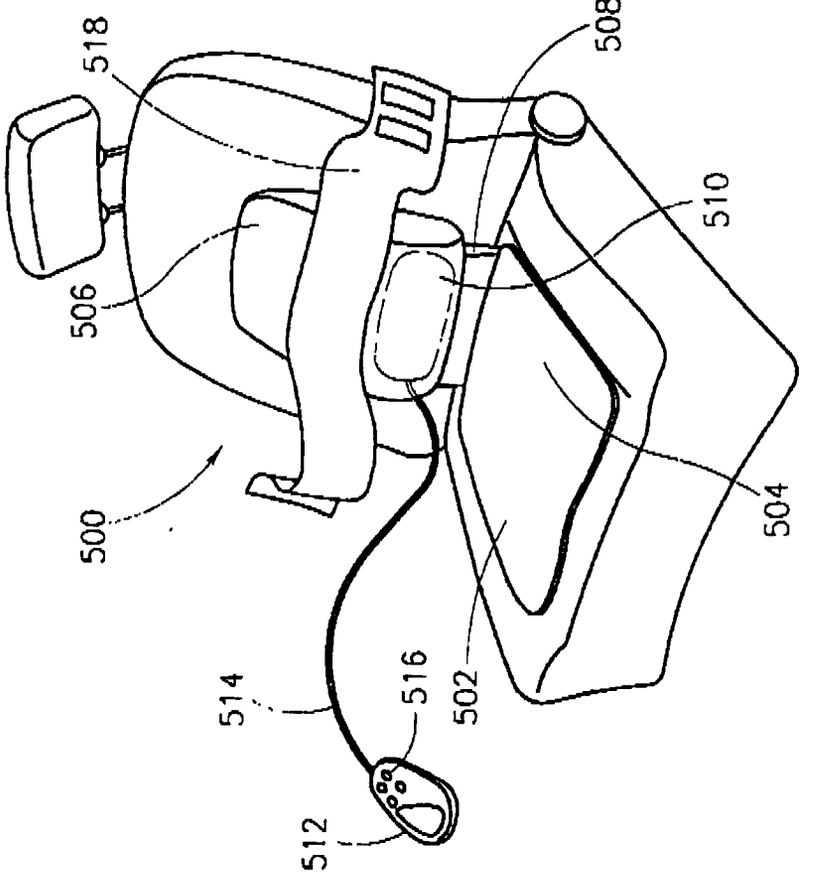
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FIG.15

FIG.17

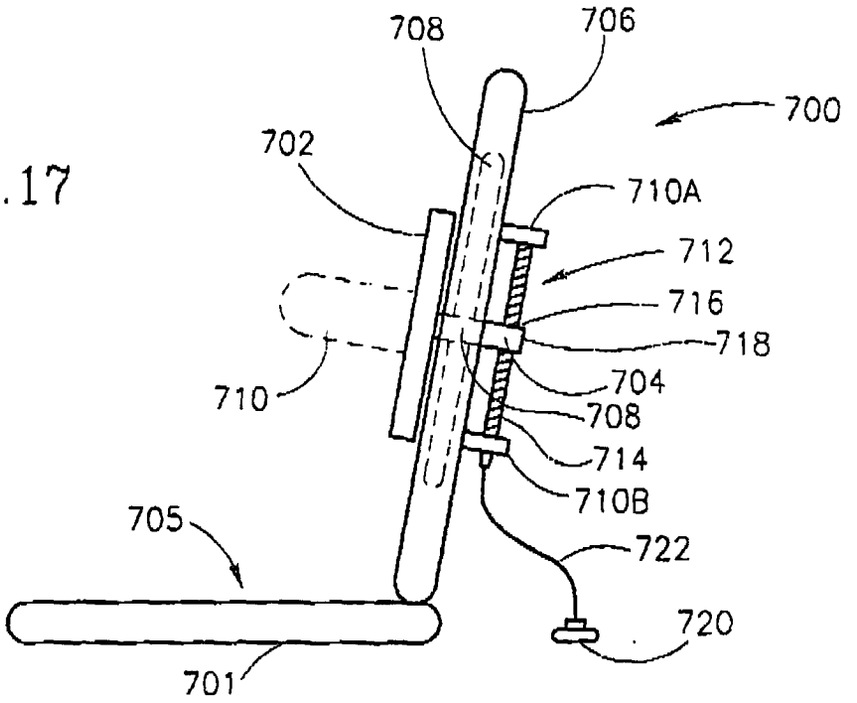
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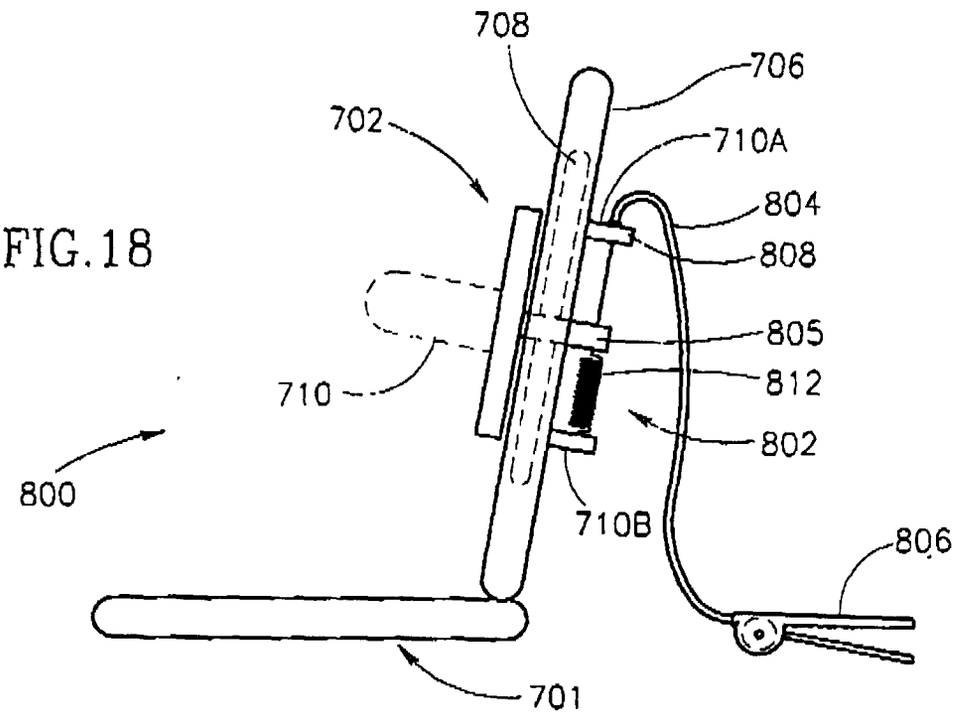
FIG.18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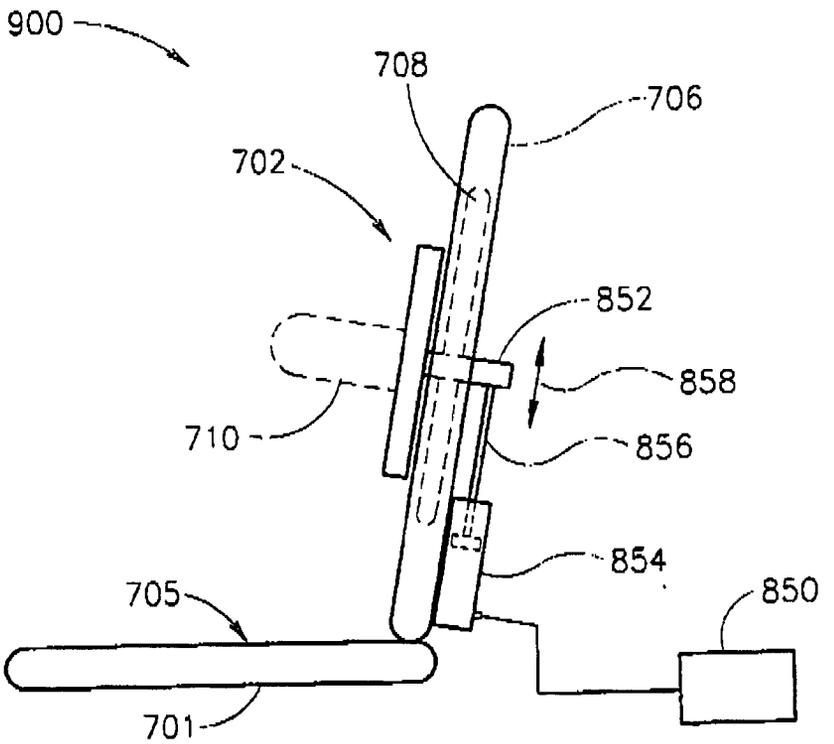

FIG. 19