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3,606,623

ADJUSTABLE BEDREST WITH IMPROVED BELLOWS STRUCTURE

Filed Jan. 9, 1970

2 Sheets-Sheet 1

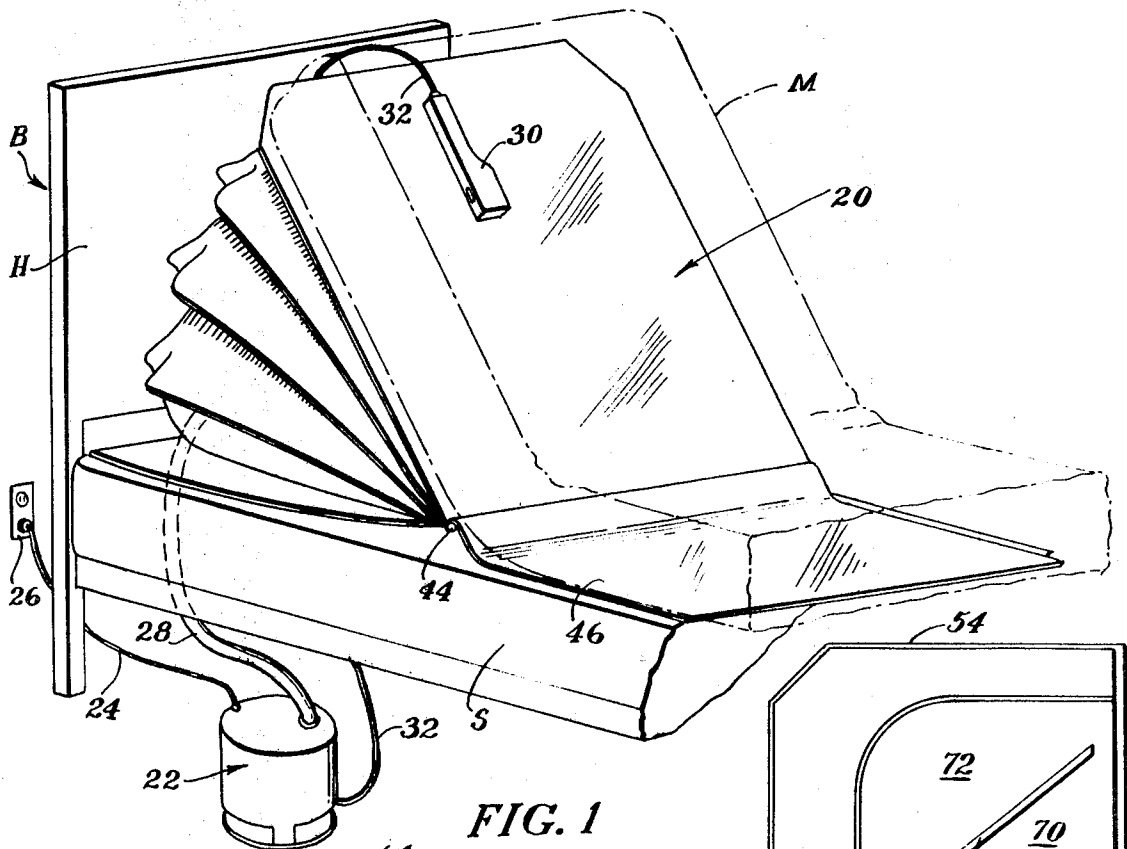


FIG. 1

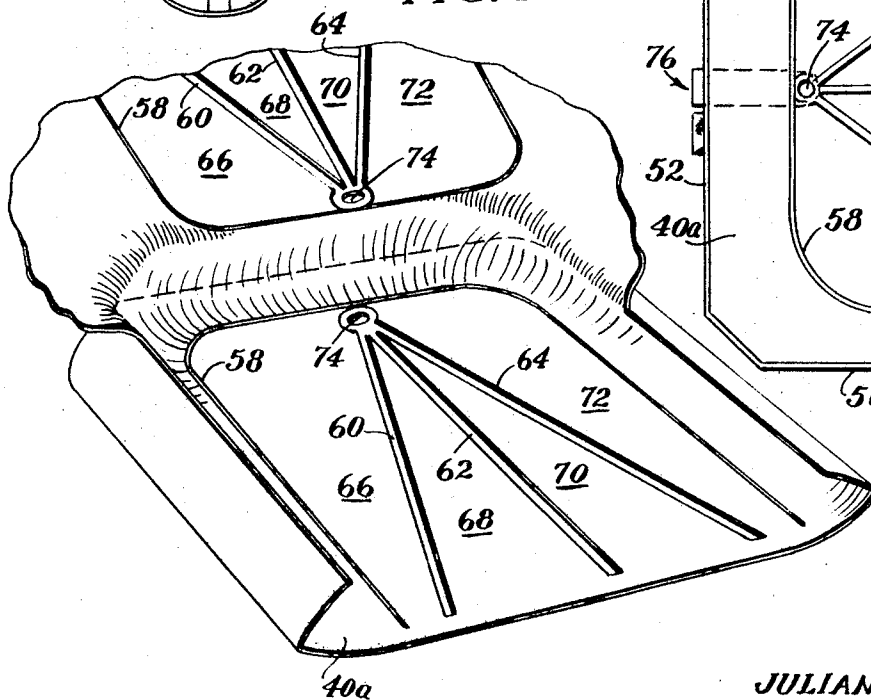


FIG. 2

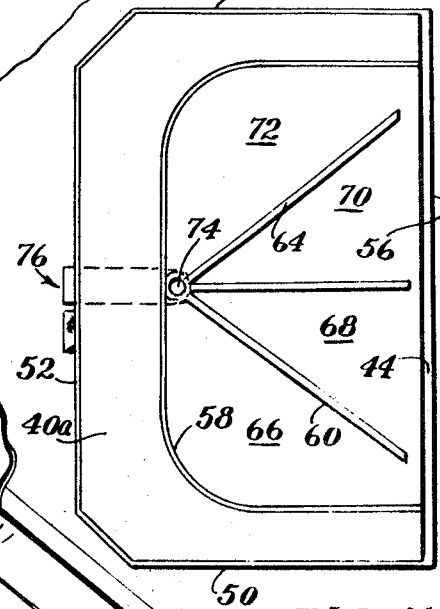


FIG. 11

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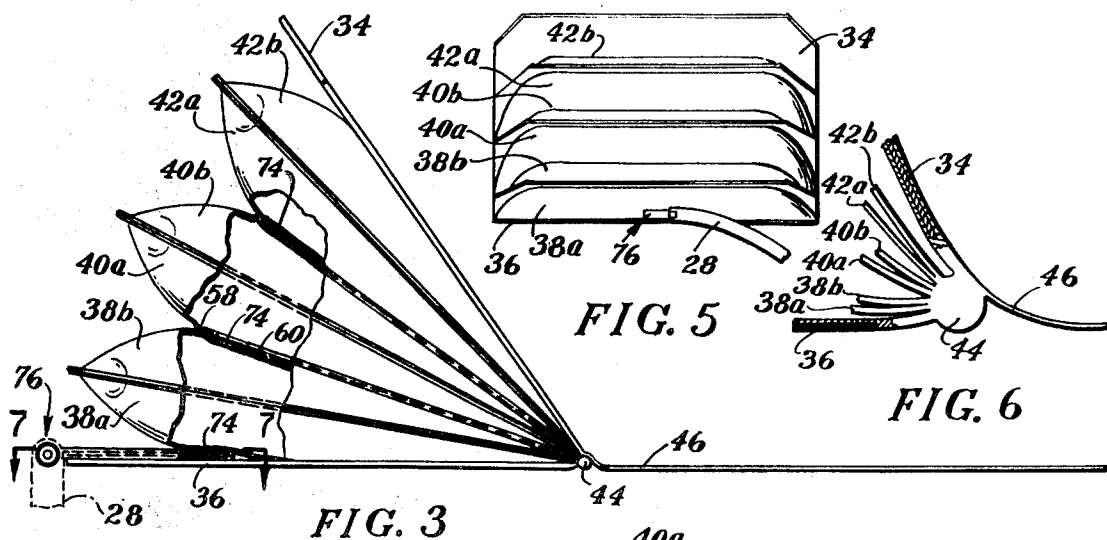
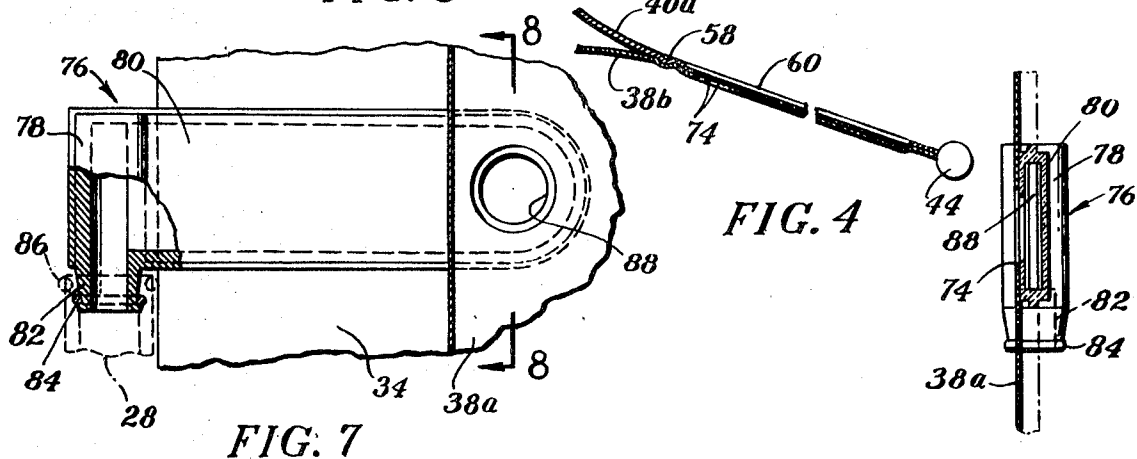
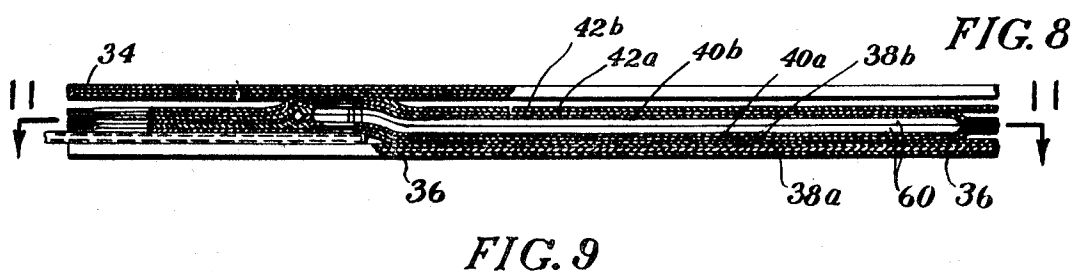
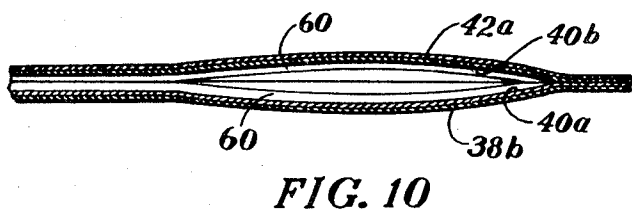
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ADJUSTABLE BEDREST WITH IMPROVED BELLOWS STRUCTURE

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11 Claims

ABSTRACT OF THE DISCLOSURE

A bellows assembly for a pneumatically operated adjustable bedrest is provided with integral channel means whereby pressurized air is introduced into what will ultimately be the wider end of the inflated bellows and is then channelled down into the opposed end or apex of the V-shaped bellows. From the apex the pressurized air is then free to move into the separate chambers defined by the channels and the adjacent confronting layers of the bellows. This provides a mechanical advantage which permits smooth elevating action.

The aforementioned abstract is neither intended to define the invention of the application, which, of course, is measured by the claims, nor is it intended to be limiting as to the scope of the invention in any way.

The present invention relates generally to adjustable bedrests and more particularly to an improved bellows construction for selectively lifting a portion of a mattress.

There are many instances wherein a person confined to bed finds it more convenient to have a portion of the mattress lifted in order to provide a more comfortable reclining position. The prior art has many examples of complex mechanisms that include linkages and drive means for selectively placing various portions of the mattress in an elevated position. Generally speaking, the prior art is characterized by complex construction. Therefore use of the prior art is limited because of the substantial cost of the structure. Further, the prior art structure does not readily lend itself to use in an individual's home. By way of contrast the most common prior art structure is usually found in a hospital, a rest home or a convalescence home where the initial cost of the equipment can be amortized over great lengths of time.

A specific form of prior art is a pneumatic bedrest illustrated, in French Pat. 1,422,606 that was published on Nov. 15, 1965. In the French patent a flexible bellows arrangement is used to lift a back support member and therefore, a portion of the torso of the patient. Because of its bulk the structure shown in the French patent is not adapted for placement under the mattress. Pressurized air is admitted into the bellows arrangement proximate one end thereof without any means for controlling the direction of air flow so that the bellows may be expanded to form a generally triangular shape. Expansion of the bellows lifts the back support member. The inlet means for the pressurized air must necessarily be positioned under the patient's torso so that in the inflated position, there will be some discomfort resulting from the thickness of the air inlet means.

Another similar example of the prior art construction is shown in German Pat. 581,796 issued on July 13, 1933. The construction of the German patent provides for air inlet means intermediate the front and rear transverse edges of the bellows. This too requires some extra thickness at a location which will necessarily be uncomfortable. Of particular importance is the fact that the German patentee provides separate air inlet means for each bellows

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section. As in the French patent discussed above, no means is disclosed for controlling the direction of pressurized air flow.

My own issued Pat. 3,392,412 granted on July 16, 1968 provides means for permitting air to be admitted into the bellows proximate the rearward end thereof which will form the wide end of the inflated bellows. Pressurized air is directed from the inlet means to the various bellows sections by means of aligned apertures in the bellows sheets. While this construction has proven to be highly satisfactory, I have found that improvements can be made in the bellows construction to insure that the pressurized air is admitted and channelled directly to the apex of the bellows uniformly and whereby the power source for the pressurized air is used most effectively.

In its broadest aspect the present invention provides means for introducing air into that portion of the bellows that will become the widest part when inflated. Channel means formed integrally with the heat sealable plastic bellows sheets direct the pressurized air from the inlet means to the narrow portion of the bellows which will become the apex. From the apex the pressurized air is allowed to enter the various bellows sections so that in effect there is a mechanical advantage used to inflate the bellows.

The air inlet means is a flat plastic member that is heat sealed to the lowermost bellows section so that in the deflated condition there is no bulge that will cause any discomfort to the user. The channels means are formed by a locally heat sealing various bellows sections to each other. While direct communication between the bellows sections is also provided, as disclosed in my aforementioned issued patent, the pressurized air does not initially flow directly to all bellows sections but instead is directed to the apex of the bellows by the channel means and from the apex is the pressurized air is then used to inflate the various bellows sections. This construction permits breaking the cohesion between the relatively smooth layers of the bellows material and also permits the displacement of air to take maximum advantage of the lifting area per square inch. It has been found that without the use of the channels that will be described hereinafter, the bellows will not lift uniformly. That is, there will be an erratic rise upon initial introduction of pressurized air.

Accordingly, it is a primary object of this invention to provide an improved, adjustable bedrest.

Another object of this invention is to provide an improved, bellows type adjustable bedrest that may be placed beneath a mattress without interfering with the normal usage of the mattress when the bellows is deflated.

An important object of this invention is to provide improved means for inflating the bellows as described above.

A particular object of the invention is to provide channel means integral with the bellows as described above, for initially directing pressurized air towards the apex of the bellows.

A further object of this invention is to provide an improved air filler piece for a bellows like bedrest.

These and other objects, features, and advantages of the invention, will, in part, be pointed out with particularity and will, in part, become obvious from the more detailed description of the invention, taken in conjunction with the accompanying drawing which forms an integral part thereof.

In the various figures, like reference characters designate like parts.

BRIEF DESCRIPTION OF THE DRAWING

In the drawing;

FIG. 1 is a perspective view illustrating the present invention in the inflated condition and installed on a

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bed, the mattress being shown fragmentarily in phantom outline;

FIG. 2 is a fragmentary perspective view partially broken away to illustrate a feature of the bellows construction, the upper layer of the bellows being peeled back to illustrate the integral channels;

FIG. 3 is a side elevational view illustrating the bed-rest comprising the present invention with a portion of the bellows being broken away;

FIG. 4 is a fragmentary, side elevational view in section and on an enlarged scale illustrating an adjacent layer of the bellows construction;

FIG. 5 is a rear view of the inflated bellows shown in FIG. 1;

FIG. 6 is an enlarged fragmentary side elevational view in section illustrating the apex of the bellows construction;

FIG. 7 is a fragmentary, sectional plan view taken along line 7—7 of FIG. 3 and illustrating the air filler piece in relation to the bellows;

FIG. 8 is a sectional elevational view taken along line 8—8 of FIG. 7;

FIG. 9 is a side elevational view, primarily in section, illustrating the bellows bedrest in the deflated condition and particularly showing the longitudinal air channels;

FIG. 10 is a fragmentary, side elevational view illustrating the air channel at the apex of the bellows at the point in time when the pressurized air is admitted; and

FIG. 11 is a plan view taken along line 11—11 of FIG. 9.

Referring now to the drawings and in particular in FIG. 1 there is shown a bed B including an inner spring S and a mattress M (shown in phantom outline). The bed B includes a head board H with the adjustable head rest 20 comprising the present invention positioned proximate thereto. There is also shown in FIG. 1 a conventional pump motor 22 that provides a source of pressurized air. Line cord 24 connects the pump motor 22 to a suitable source of electrical power indicated generally by the wall outlet 26. A conduit 28 extends from the pump motor 22 to the bellows assembly 20 and a switch 30 is connected by means of conductor 32 to the air pump motor 22. It should be noted at this time that the air pump motor 22 and the switch 30 are fully described in my aforementioned patent so that additional details thereof need not be provided at this time. However, it should be understood that other solenoid valves used in the air pump 22, for example, as shown in my co-pending application, Ser. No. 1,728, filed concurrently may also be used. It should be further noted that while the bellows assembly 20 is shown positioned adjacent and opening towards the head board H it may be placed elsewhere on the bed, for example near the foot of the bed. The bellows assembly 20 may, in fact, be positioned anywhere on the bed and may be opened in the direction of either the head board or the foot of the bed.

Turning now particularly to FIGS. 2, 3, 9, it will be seen that the bellows assembly 20 is comprised of upper and lower boards of 34, 36, respectively, both of which are encased by thin sheets of a flexible, heat sealable plastic material. The boards 34, 36 may be thin sheets of wood or similar rigid material. A plurality of pairs of heat sealable plastic sheets 38a, 38b, 40a, 40b, 42a, 42b, are joined to each other and to the plastic sheets that encase the boards 34 and 36 at a hinge point 44 shown in FIG. 6. Finally, there is provided a length of plastic sheet 46 extending from the hinge point 44 in a direction opposite to the bellows sheets 38, 40, 42 and the rigid boards 34 and 36. The sheet 46 is intended to be placed underneath the mattress and therefore underneath the patient's body so that when the bellows assembly 20 is inflated it will be restrained from moving longitudinally with respect to the bed B.

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Reference is now had to FIGS. 2 and 11 wherein the construction of the bellows is illustrated. The confronting sheets 38, 40, and 42 of the bellows 20 are heat sealed to each other in a conventional manner along three marginal edges 50, 52 and 54. The fourth marginal edge 56 is, in fact, the hinge 44 that is common to all the sheets as well as the upper and lower rigid panels 34 and 36. The hinge 44 is actually the apex of the bellows when it is in the expanded position. The pair of sheets 38, 40, 42 are additionally heat sealed to each other along an inner U-shaped line 58 the ends of which terminate proximate the heat sealed edge 56. In addition, the sheet 38b is heat sealed to sheet 40a and the sheet 40b is heat sealed to the sheet 42a along lines that define radiating channels 60, 62, and 64. It will be seen in FIG. 11 particularly that heat sealing lines 60, 62, and 64 in combination with heat sealing lines 58 define open ended air chambers 66, 68, 70, and 72. It should be noted that the portion of the bellows sheets intermediate the heat seal lines 50, 52, 54 and 58 act as a gusset when the bellows expand.

The heat sealed channels 60, 62, and 64 have a common terminus at an opening 74 provided in each of the bellows sheets except the uppermost sheet 42b. An air filler piece 76 is heat sealed to the lowest bellows sheet 38a. Thus pressurized air that is introduced through the filler piece 76 initially flows through the channels defined by the heat seals 60, 62, and 64. When air is introduced through the air filler piece 76 it will flow through the channels 60, 62, and 64 towards the apex 44 of the bellows 20. The pressurized air will leave the channels 60, 62, and 64 which terminate proximate but slightly spaced from the heat sealed edge 56 and then will fill the air chambers 66, 68, 70 and 72 starting from a position proximate the apex 44 of the bellows 20. This mode of operation is shown in FIG. 10 it being understood that the apex 44 is the right and in filling the chamber 66, 68, 70 and 72 the pressurized air flows to the left.

The air filler piece 76 is a molded plastic member having a first tubular portion 78 and a flat body portion 80. The tubular portion 78 includes a tapered neck 82 on which is externally positioned an O-ring 84. The conduit 28 is slipped over the neck portion 82 and the O-ring 84 and a second O-ring 86 is then slipped over the outer end of the conduit 28 in order to secure the conduit to the tapered neck 82. The flat hollow body portion 80 is positioned between the lower board 36 and the lower bellows sheet 38a and is provided with an opening 88 that is in communication with the several openings 74 in the bellows sheets. Thus, when the air filler piece 76 is in position, it will not interfere with the patient resting on the mattress.

As in my aforementioned patent the bellows are expanded by placing the switch 30 in a first position so that the pump motor 22 delivers pressurized air through the conduit 28 to the air filler piece 76 and then to the interior of the bellows 20. Movement of the switch 30 to a second position actuates a solenoid valve in the air pump motor 22 which bleeds the air from the bellows 20. When the switch 30 is in the first position the pressurized air travels through the conduit 28 through air filler piece 76 and out of the opening 88 thereof into the bellows 20. The pressurized air first flows through the openings 74 in the bellows and then through the channels 60, 62, and 64 that are formed by the heat sealing. Thus the pressurized air is first directed to the apex 44 of the bellows 20 and then into the chambers 66, 68, 70, and 72. In effect then, a mechanical advantage is obtained by this action since the pressurized air acts as a wedge and forces open the bellows. The mechanical advantage is the product of the distance from the openings 74 to the remote ends of the channels 60, 62, 64 times the force of the pressurized air in a direction perpendicular to the face of the bellows sheets and is comparable to the effect achieved with an inclined plane. This construction also permits the pres-

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surized air to break the cohesion between the adjacent bellows sheets and ensures a uniform lift without the erratic rise that was prevalent within the initial opening of the prior art devices.

There has been disclosed heretofore the best embodiment of the invention presently contemplated. However, it is to be understood that various changes and modifications may be made thereto without departing from the spirit of the invention.

What I claim as new and desire to secure by said Letters Patent is:

1. An adjustable bedrest of the type adapted to be inflated by a source of pressurized air that is coupled to said bedrest by means of a conduit, said bedrest comprising:

(a) a bellows assembly including a plurality of heat sealable plastic sheets, said bellows assembly being of substantially triangular cross section when inflated, the apex of said bellows assembly being defined by a heat sealed marginal edge common to all said bellows sheets;

(b) air inlet means for providing fluid communication between the source of pressurized air and the interior of said bellows, said air inlet means being positioned proximate an edge opposite said apex of said bellows assembly; and

(c) channel means extending from said air inlet means and terminating proximate said apex of said bellows assembly, said channel means being inside said bellows assembly and in direct fluid communication with the source of pressurized air whereby the pressurized air expands said bellows assembly starting at said apex thereof.

2. The bedrest in accordance with claim 1 wherein said channel means are defined by heat sealed lines joining adjacent ones of said bellows sheets.

3. The bedrest in accordance with claim 1 wherein said air inlet means is heat sealed to one of said bellows sheets.

4. The bedrest in accordance with claim 2 wherein pairs of said bellows sheets are heat sealed to each other along remaining marginal edges, selected pairs of said bellows sheets being heat sealed to each other along a boundary line dimensionally inward of said remaining marginal edges other than said apex marginal edge to define, in combination with said channel means, a plurality of separate air chambers that are in fluid communication with said channel means.

5. The bedrest in accordance with claim 4 wherein the areas of said bellows sheets intermediate said remaining marginal edges and said boundary line are not in fluid communication with the source of pressurized air, said

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areas of said bellows sheets acting as gussets when said bellows assembly is expanded.

6. The bedrest in accordance with claim 4 wherein said air inlet means is positioned inward of said boundary line, said channel means radiating from said air inlet means in a direction towards but terminating short of said apex edge.

7. The bedrest in accordance with claim 6 wherein all said bellows sheets except one include an opening aligned with said air inlet means.

8. The bedrest in accordance with claim 1 further including rigid members covering the upper and lower surfaces of said bellows assembly, said rigid members being secured to said bellows assembly at said apex edge.

9. The bedrest in accordance with claim 1 further including a flexible plastic sheet heat sealed to said bellows assembly proximate said apex edge, said flexible sheet extending in a direction away from said bellows assembly.

10. The bedrest in accordance with claim 1 wherein said air inlet means comprises a substantially flat, hollow plastic body member having an opening in one surface thereof in fluid communication with the interior of said bellows assembly and a tubular portion adapted to be secured to the air conduit.

11. The bedrest in accordance with claim 10 wherein said tubular portion includes a tapered neck and a first O-ring mounted on said neck, the end of the air conduit being positioned on said neck over said first O-ring, there being further included a second O-ring positioned over the end of the air conduit and about said neck in axially spaced relationship with said first O-ring.

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U.S. Cl. X.R.

5—68; 103—148