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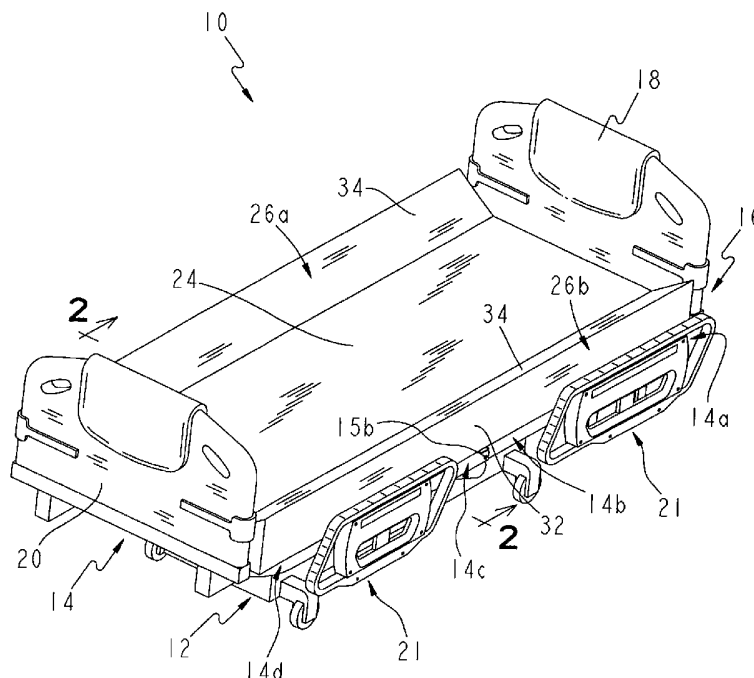
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(54) Title: MATTRESS



(57) Abstract: A mattress (16) including side cushions (26a, 26b) configured to retain a patient thereon.

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MATTRESSBackground and Summary of the Invention

The present invention relates to patient supports, such as hospital beds. More
5 particularly, the present invention relates to a mattress for retaining patients in
hospital beds.

In an illustrative embodiment of the present invention, a mattress includes a
base cushion, a first side cushion positioned horizontally adjacent to the base cushion
and having a height greater than the base cushion, and an accessory cushion
10 positioned vertically above the base cushion and horizontally adjacent to the first side
cushion. The accessory cushion is selectively inflatable.

In a further illustrative embodiment of the present invention, a method of
assisting egress and retention from a patient support includes the steps of providing a
base cushion, providing a plurality of side cushions having an upper surface
15 positioned vertically above and horizontally adjacent to the base cushion, and
providing an accessory cushion above the base cushion and intermediate the side
cushions. The illustrated method further includes the steps of inflating the accessory
cushion to assist patient egress from the patient support, and deflating the accessory
cushion to assist in patient retention on the patient support.

In another illustrative embodiment of the present invention, a mattress
20 includes a base cushion having opposing first and second sides, a first side cushion
positioned laterally adjacent the first side of the base cushion and extending vertically
higher than the base cushion, and a second side cushion positioned laterally adjacent
the second side of the base cushion and extending vertically higher than the base
25 cushion. The first and second side cushions include bending relief members.

Illustratively, the first and second side cushions are formed of substantially
stiff foam and the bending relief members each comprise at least one slit.

Further illustratively, the mattress is configured to be located on an articulating
deck, and the bending relief members comprise a plurality of slits formed in sets
30 within the first and second side cushions and positioned such that each set is located
above a pivot point on the articulating deck.

Further illustratively, the first and second side cushions have a stiffness greater
than the base cushion.

Brief Description of the Drawings

The detailed description of the drawings particularly refers to the accompanying figures in which:

- 5 Fig. 1 is perspective view of a patient support including an illustrative embodiment mattress of the present invention;
- Fig. 2 is a cross-sectional view of the mattress of Fig. 1 taken along line 2-2;
- Fig. 3 is a cross-sectional view similar to Fig. 2 showing an inflated accessory cushion or bladder;
- 10 Fig. 4 is a diagrammatical view of the connections of the bladder of Fig. 1;
- Fig. 5 is a cross-sectional view similar to Fig. 3 showing a further illustrative embodiment mattress of the present invention with an inflated accessory cushion or bladder;
- Fig. 6 is a perspective view of another illustrative embodiment mattress of the present invention;
- 15 Fig. 7 is a cross-sectional view taken along line 7-7 of Fig. 6;
- Fig. 8 is a cross-sectional view similar to Fig. 7 showing an inflated accessory cushion or bladder;
- Fig. 9 is a perspective view of a further illustrative embodiment mattress of the present invention; and
- 20 Fig. 10 is a side elevational view of a patient support including the mattress of Fig. 9.

Detailed Description of the Drawings

- 25 A patient support 10 according to an illustrative embodiment of the present invention is shown in Fig. 1, and is typically used for supporting a patient before, after, or during medical treatment or for resting. Patient support 10 includes a frame 12, a deck 14 supported on frame 12, a mattress 16 supported by deck 14, a headboard 18 coupled to frame 12, and a footboard 20 coupled to frame 12. Optionally,
- 30 conventional siderails 21 may be attached to frame 12 or deck 14. Deck 14 is illustratively of conventional design and includes a head section 14a configured for pivoting movement relative to a seat section 14b, a thigh section 14c configured for pivoting movement relative to seat section 14b, and a foot section 14d configured for

pivoting movement relative to thigh section 14c. Illustratively, pivot points 15a, 15b, and 15c couple the respective deck sections 14a, 14b, 14c, and 14d for relative pivoting movement.

Referring now to Figs. 2 and 3, an illustrative embodiment mattress 16
5 includes a base cushion 22, an accessory cushion 24 positioned above base cushion 22, and edge cushions 26 located along edges of base cushion 22. More particularly, edge cushions 26 include opposing side cushions which are designated as 26a, 26b and are positioned adjacent opposing first and second sides of base cushion 22. Edge cushions 26 may also include a head end cushion and a foot end cushion (not shown)
10 which have structures substantially similar to side cushions 26a, 26b. Base cushion 22 has a height, a length, and a width, and is illustratively made of a polyurethane foam. It is also envisioned that base cushion 22 could be an air cushion, a water cushion, or any other type of cushion or support known in the art. Edge cushions 26 are also illustratively made of a polyurethane foam but may likewise be any cushion
15 type or support known in the art. More specifically, edge cushions 26 may be air bladders that adjust the width of the mattress 16 similar to mattresses disclosed in U.S. Patent No. 6,295,675, the disclosure of which is expressly incorporated herein by reference.

In the illustrative embodiment, the indentation force deflection (IFD), or
20 stiffness, of the base cushion 22 is less than the IFD of the edge cushions 26. The lower IFD of the base cushion 22 allows compression thereof upon the weight of the patient, while the higher IFD of the edge cushions 26 tends to resist displacement thereof. Each edge cushion 26 has a bottom 28, an inner side 30 coupled to bottom 28, an outer side 32 longer than inner side 30 and also coupled to bottom 28, and a top
25 or upper surface 34 extending between inner side 30 and outer side 32. Inner sides 30 of edge cushions 26 abut base cushion 22 and have a height slightly greater than a height of base cushion 22. Upper surface 34 angles upwardly as it extends in a direction from inner side 30 toward higher outer side 32. In an illustrative embodiment, base cushion 22 has a height, or thickness, of approximately seven
30 inches while outer sides 32 of edge cushions 26 have a height, or thickness, of approximately eight inches.

Higher outer sides 32 assist in retaining a patient above mattress 16. A patient purposefully or inadvertently rolling near a side of mattress 16 encounters edge

cushions 26. Movement by the patient so as to encounter edge cushions 26 causes the patient to either increase his height, thereby increasing the potential energy of the patient and absorbing the kinetic energy of the patient movement, or compress the edge cushion 26 which also absorbs energy of the patient. The absorption of the patient's kinetic energy makes it less likely that the patient will continue to move in the undesired direction. The increase in patient height or compression of edge cushion 26 also stores a portion of the absorbed energy and can then be used to urge the patient in a lateral direction back towards the center of mattress 16, either by allowing the patient to lower or by allowing the edge cushion 26 to assume its equilibrium position, both of which are allowed by the patient moving toward the center of mattress 16. Higher outer sides 32 also serve to narrow any gaps that may be present between mattress 16 and siderails 21 attached to frame 12 or deck 14. Mattress 16 of the present invention may be used with any number of types of siderails to reduce or eliminate gaps therebetween as discussed in U.S. Patent Application Serial No. 10/225,780, the disclosure of which is expressly incorporated herein by reference.

Accessory cushion 24 illustratively comprises a fluid fillable bladder coupled to base cushion 22. A controller 25 controls operation of a blower 27 that is fluidly coupled to the accessory cushion 24 as shown in Fig. 4. The blower 27 may be of conventional design and supplies a fluid, illustratively air, to the accessory cushion 24. Accessory cushion 24 may either be one large cushion or bladder, or may be segmented into a plurality of smaller cushions or bladders. Accessory cushion 24 has a first egress inhibiting position, or first mode of operation, as shown in Fig. 2 and a second egress assisting position, or second mode of operation, as shown in Fig. 3. First position of accessory cushion 24 is a deflated position such that a patient attempting egress from mattress 16 will encounter upper surfaces 34 of edge cushions 26 as previously described. Second position of accessory cushion 24 is an inflated position. The inflated position raises a top surface 36 of accessory cushion 24 to a height substantially even with outer side 32 of edge cushions 26 as shown in Fig. 3, thus creating a substantially planar top surface extending between the opposing outer sides 32. Furthermore, in the second inflated position, sides 37 of accessory cushion 24 abut upper surfaces 34 of edge cushions 26. A patient attempting egress with accessory cushion 24 in second inflated position generally does not encounter edge

cushions 26 and is not urged back toward the center of mattress 16, except to the extent that accessory cushion 24 is somewhat pliable and bottoms out near outer side 32 where accessory cushion 24 is not as thick as near the center of mattress 16.

Accessory cushion 24 is selectively inflated and deflated, commonly at the urging of the patient or caregiver through use of the controller 25 and blower 27.

Base cushion 22, accessory cushion 24 and edge cushions 26 may all be received within a conventional outer cover or ticking (not shown). The ticking illustratively comprises a stretchable, breathable thermoplastic which is impervious to bacteria.

A further illustrative embodiment mattress 169 including an accessory cushion 38 having a top surface 40 is shown in Fig. 5, with the cushion 38 in a second inflated position. Second embodiment accessory cushion 38 has a first deflated position similar to the first position of accessory cushion 24 as illustrated in Fig. 2. In the second inflated position, top surface 40 of accessory cushion 38 does not raise to the height of outer side 32 of edge cushions 26. Rather, accessory cushion 38 inflates such that the top surface 40 has a height less than outer side 32, thereby decreasing the retaining properties of edge cushions 26 but not totally eliminating the effect of edge cushions 26. Furthermore, when the accessory cushion 38 is in its second position, top surface 40 is substantially arcuate in shape and configured to define a crest 42 near the longitudinal center axis of mattress 16. Substantially arcuate top surface 40 extends upwardly from edge cushions 26 to the crest 42 proximate the center of the mattress 16. Crest 42 slightly urges the patient towards edge cushions 26 thereby assisting in egress from bed 10. Accessory cushion 38 is selectively inflated and deflated, commonly at the urging of the patient or caregiver through use of the controller 25 and blower 27.

Another illustrative embodiment mattress 160 including an accessory cushion 44 is shown in Figs. 6 - 8. Accessory cushion 44 illustratively includes a bladder or plurality of bladders coupled to base cushion 22 and edge cushions 26. Accessory cushion 44 has a top surface 46 and a bottom surface 48. Bottom surface 48 is coupled to base cushion 22 and edge cushions 26. Alternatively, top walls or upper surfaces 50, 34 of base cushion 22 and edge cushions 26 are fluid impermeable and form bottom surface 48 of accessory cushion 44 as part of base cushion 22 and edge cushions 26. Accessory cushion 44 has a first deflated position shown in Fig. 7 that

discourages egress from mattress 160 similarly to accessory cushions 24, 38 as detailed above. Accessory cushion 44 also has a second inflated position that places top surface 46 at a height substantially equal to outer sides 32 of edge cushions 26 as shown in Fig. 8 to facilitate patient egress. Accessory cushion 44 may also be formed to have a second inflated position such that top surface 40 defines a crest similar to the crest 42 of the second illustrative embodiment accessory cushion 38 as illustrated in Fig. 5.

Another illustrative embodiment of the mattress is also envisioned wherein base cushion 22 and edge cushions 26 are located within a bladder of an accessory cushion. In a first deflated position, accessory cushion would conform to the walls of base cushion 22 and edge cushions 26. In a second inflated position, accessory cushion would expand away from at least top walls 50 and 34 of base cushion 22 and edge cushions 26. Bladder of accessory cushion may be separate or integral with the outer sides 32 of edge cushions 26 and bottoms of base cushions 22 and edge cushions 26.

Figs. 9 and 10 show another embodiment of the mattress 60 of the present invention. Mattress 60 includes a base cushion 62 and edge cushions 64 that are located along sides of the base cushion 62. More particularly, the edge cushions 64 include side cushions which are designated as 64a, 64b and are positioned adjacent opposing first and second sides of the base cushion 62. Base cushion 62 is illustratively constructed of polyurethane foam and is similar to base cushion 22 as detailed above in connection with Figs. 1-3. Edge cushions 64 are illustratively polyurethane foam type cushions and are generally similar to the edge cushions 26 detailed above in connection with Figs. 1-3. While the cushions 62 and 64 are illustratively formed of polyurethane foam, they may likewise be made of any type cushion or other support known in the art. As detailed above, the indentation force deflection (IFD), or stiffness, of the base cushion 62 is illustratively less than the IFD of the edge cushions 64. The lower IFD of the base cushion 62 allows compression thereof upon the weight of the patient, while the higher IFD of the edge cushions 64 tends to resist displacement thereof and thereby assist in restraining a patient on the mattress 60. In one illustrative embodiment, the edge cushions 64 are formed of a substantially hard foam tending to resist compression. Each edge cushion 64 has a cross section similar to edge cushions 26. However, edge cushion 64 differs from

edge cushions 26 by the addition of bending relief members, illustratively in the form of lateral apertures or slits 66 extending in a substantially vertical direction downwardly from upper surface 34.

Lateral slits 66 are illustratively provided in three sets 68, 70, 72 of four slits 5 66 each. Each set 68, 70, 72 is located in edge cushion 64 so as to vertically align with one of the pivot points 15a, 15b, 15c of the articulating deck 14. During articulation, the slits 66 will either widen or contract depending on the direction of articulation. The slits 66 thereby give flexibility to the otherwise substantially stiff foam and facilitate bending or articulation of the mattress 60 without undesirable 10 bunching or creasing of the edge cushions 64.

While lateral slits 66 are illustrated in Figs. 9 and 10, other bending relief members may be substituted therefore. For example, apertures, slots, corrugations, accordion paths or serpentine paths may be substituted for the vertical slits 66 of Figs. 9 and 10.

15 Although the present invention has been described in terms of the foregoing embodiment, such description has been for exemplary purposes only and, there will be apparent to those of ordinary skill in the art, many alternatives, equivalents, and variations of varying degrees that will fall within the scope of the present invention. That scope, accordingly, is not to be limited in any respect by the foregoing 20 description, rather, it is defined only by the claims which follow.

Claims

1. A mattress including:
a base cushion;
a first side cushion positioned horizontally adjacent to the base cushion
5 and having a height greater than the base cushion; and
an accessory cushion positioned vertically above the base cushion and
horizontally adjacent to the first side cushion, the accessory cushion being selectively
inflatable.
2. The mattress of claim 1, wherein the first side cushion is configured to
10 urge retention of a patient positioned on the patient support.
3. The mattress of claim 1, wherein the accessory cushion, when inflated,
assists a patient in egress from the mattress over the first side cushion.
4. The mattress of claim 1, wherein the first side cushion includes at least
one bending relief member.
- 15 5. The mattress of claim 4, wherein the bending relief member includes a
slit formed in the first side cushion and located such that when the mattress is
positioned on an articulating frame the slit is above a pivot point of the articulating
frame.
6. The mattress of claim 1, wherein the mattress is configured to be
20 positioned on an articulating frame, and the first side cushion includes a plurality of
slits at each position that is configured to be located above a pivot point of the
articulating frame.
7. The mattress of claim 1, wherein the inflatable cushion, when inflated,
provides a substantially flat patient support surface having a height substantially level
25 with the first side cushion.
8. The mattress of claim 1, wherein the first inflatable cushion, when
inflated, provides an arced patient support surface having a crest substantially aligned
with a longitudinal axis of the mattress.
9. The mattress of claim 1, further including a second side cushion
30 positioned horizontally adjacent the base cushion and laterally spaced from the first
side cushion.
10. The mattress of claim 1, wherein the first side cushion has a stiffness
greater than the base cushion.

11. The mattress of claim 1, wherein the first side cushion is formed from substantially non-compressible foam.
12. The mattress of claim 1, wherein the accessory cushion is coupled to the base cushion.
- 5 13. A method of assisting egress and retention from a patient support, the method including the steps of:
- providing a base cushion;
 - providing a plurality of side cushions having an upper surface positioned vertically above and horizontally adjacent to the base cushion;
 - 10 providing an accessory cushion above the base cushion and intermediate the side cushions;
 - inflating the accessory cushion to assist patient egress from the patient support; and
 - deflating the accessory cushion to assist in patient retention on the
- 15 patient support.
14. The method of claim 13, wherein the upper surfaces of the side cushions increase in height as the distance from the base cushion increases.
15. The method of claim 13, wherein the side cushions include at least one bending relief member.
- 20 16. The method of claim 13, wherein the bending relief member includes a plurality of sets of slits formed in each of the side cushions, the slits positioned and sized to allow the side cushions to flex.
17. A mattress including:
- a base cushion having opposing first and second sides;
 - 25 a first side cushion positioned laterally adjacent the first side of the base cushion and extending vertically higher than the base cushion; and
 - a second side cushion positioned laterally adjacent the second side of the base cushion and extending vertically higher than the base cushion, the first and second side cushions including bending relief members.
- 30 18. The mattress of claim 17, wherein the first and second side cushions are formed of substantially stiff foam and the bending relief members each comprise at least one slit.

19. The mattress of claim 18, wherein the slits are positioned and sized to allow the mattress to flex when placed on an articulating deck.
20. The mattress of claim 17, wherein the side cushions include an angled upper surface that increases in height as the distance from the base cushion increases.
- 5 21. The mattress of claim 17, wherein the mattress is configured to be located on an articulating deck, and the bending relief members comprise a plurality of slits formed in sets within the first and second side cushions and positioned such that each set is located above a pivot point on the articulating deck.
- 10 22. The mattress of claim 17, wherein the first and second side cushions have a stiffness greater than the base cushion.

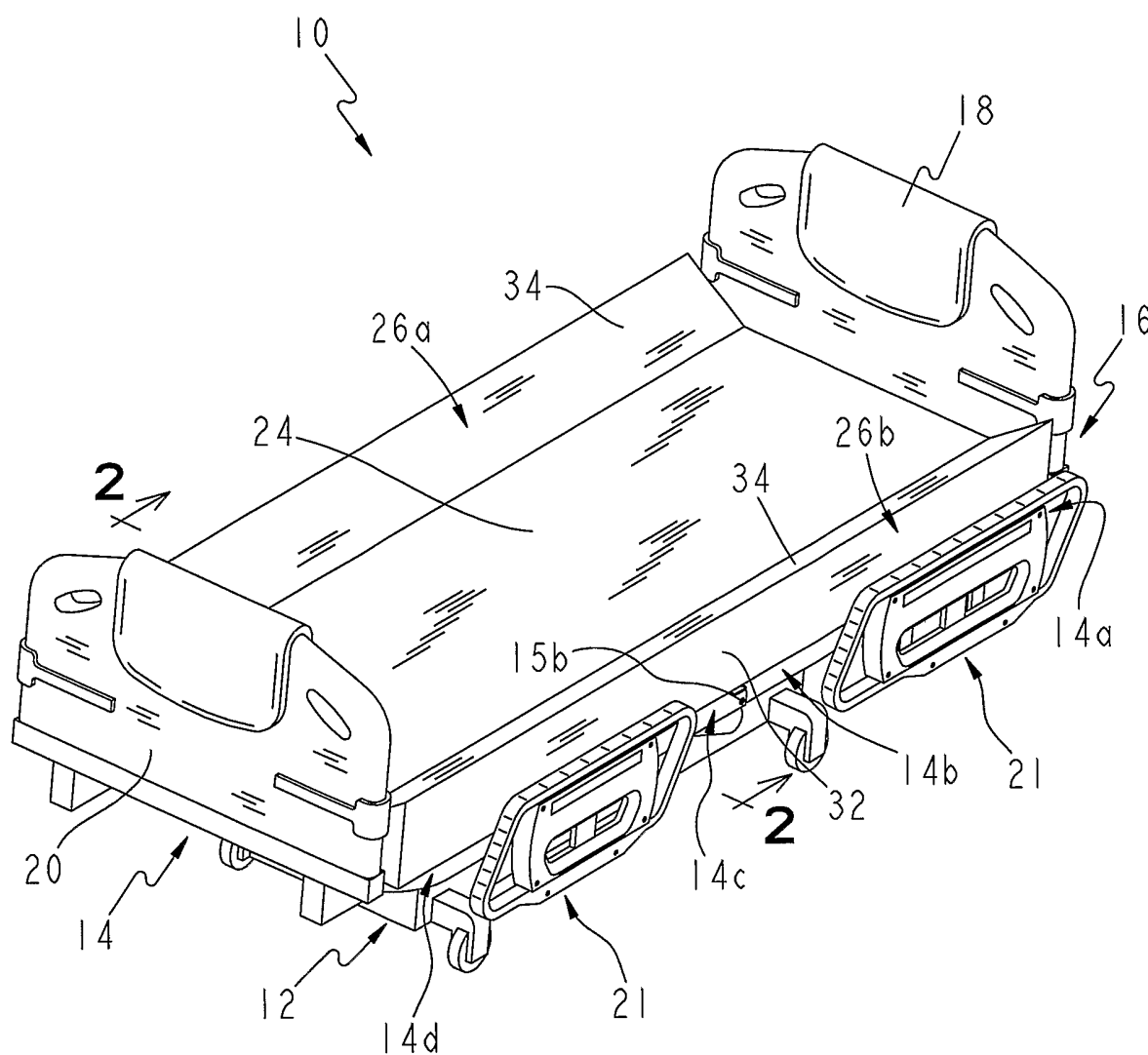


FIG. 1

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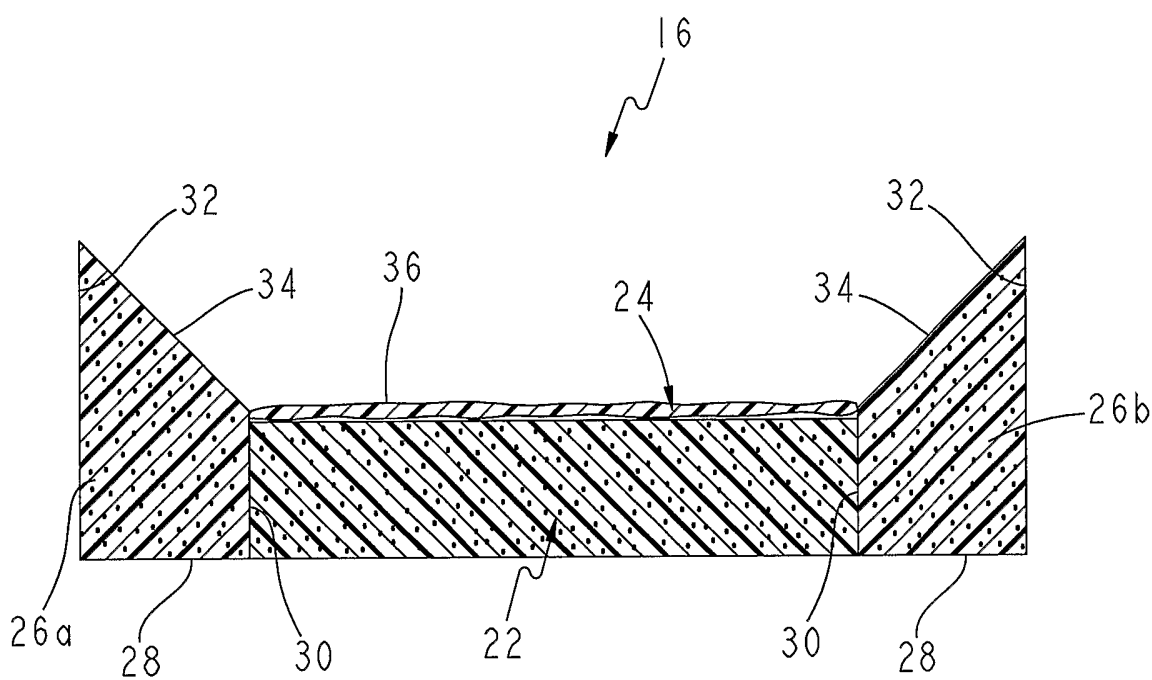


FIG. 2

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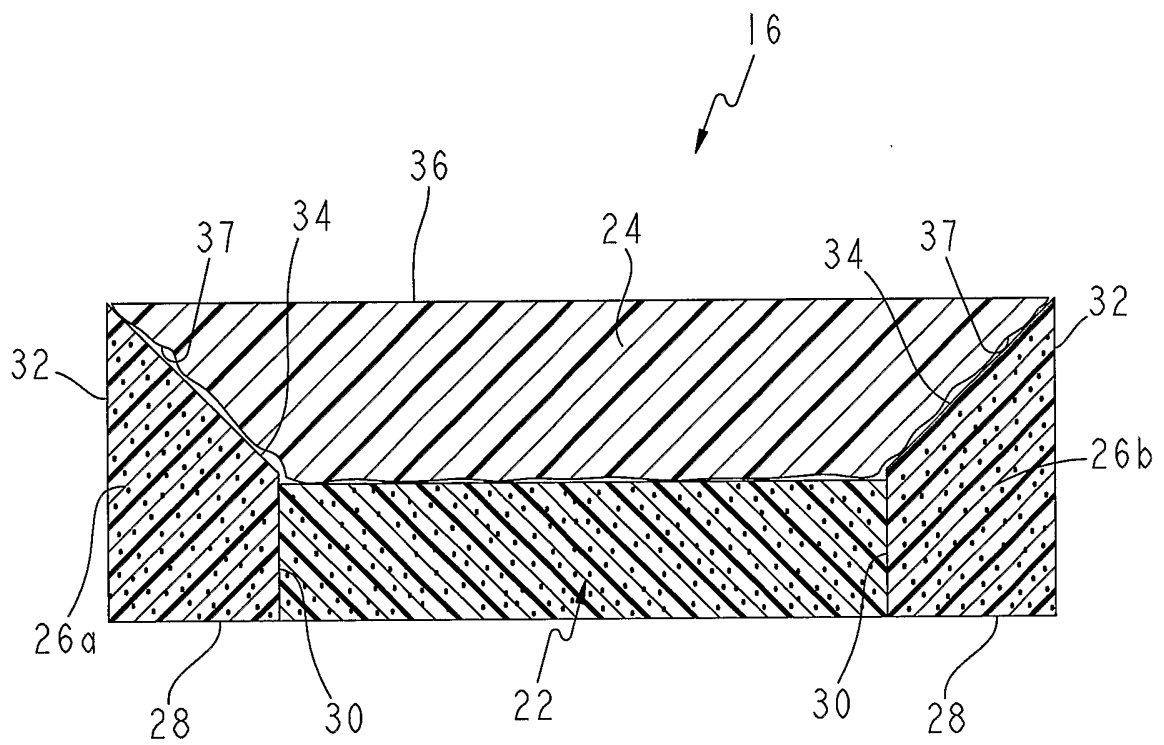


FIG. 3

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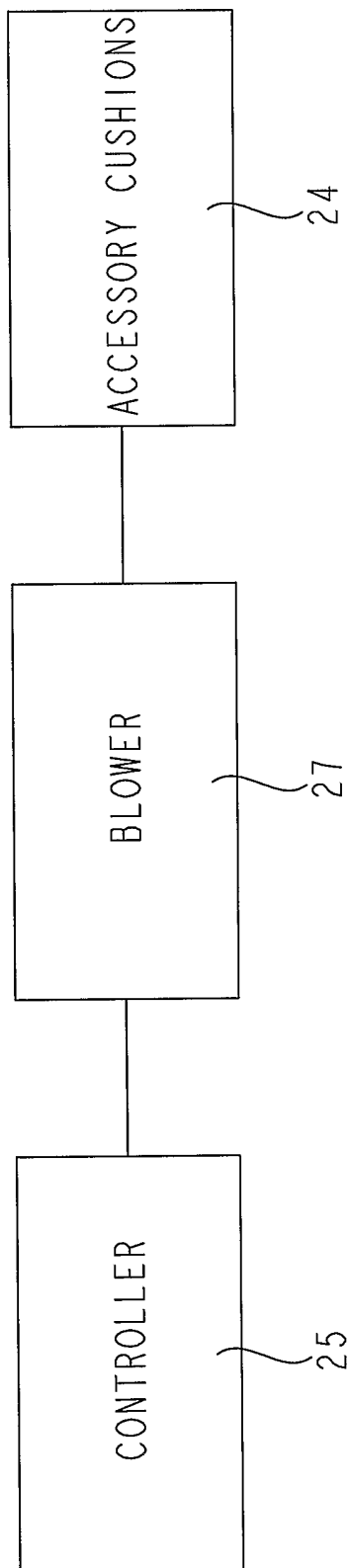


FIG. 4

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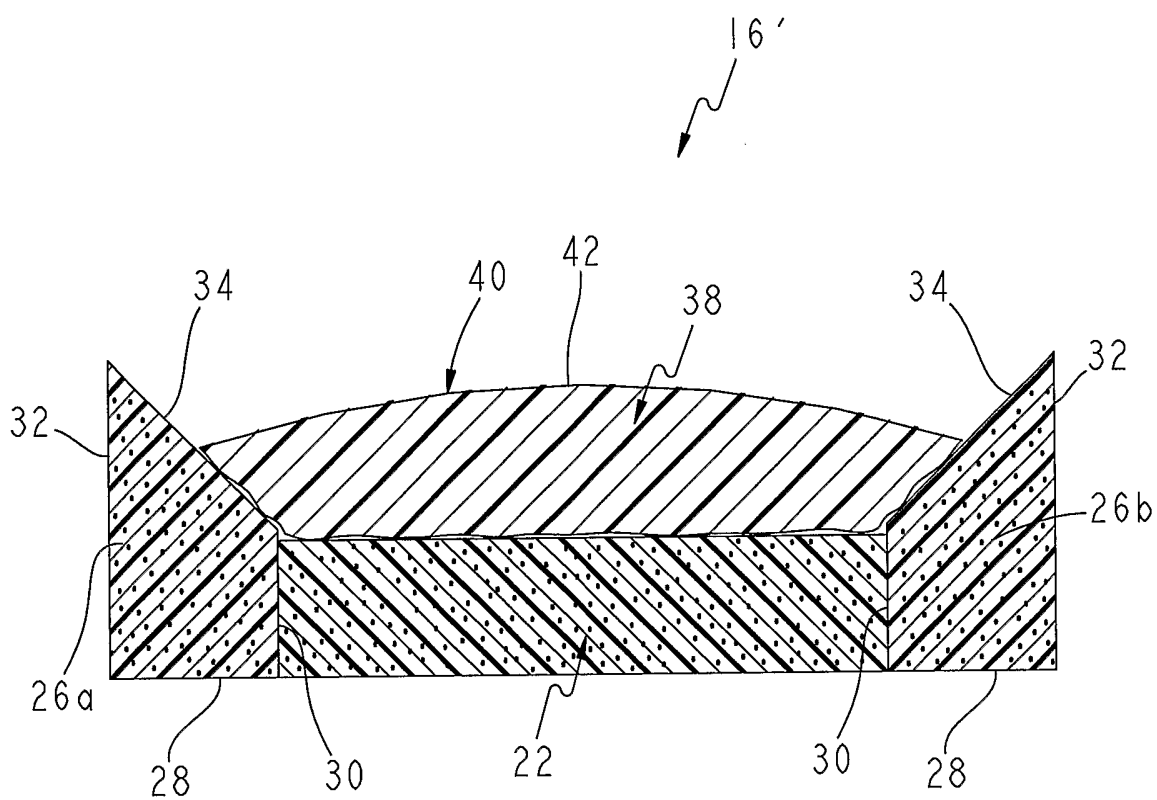


FIG. 5

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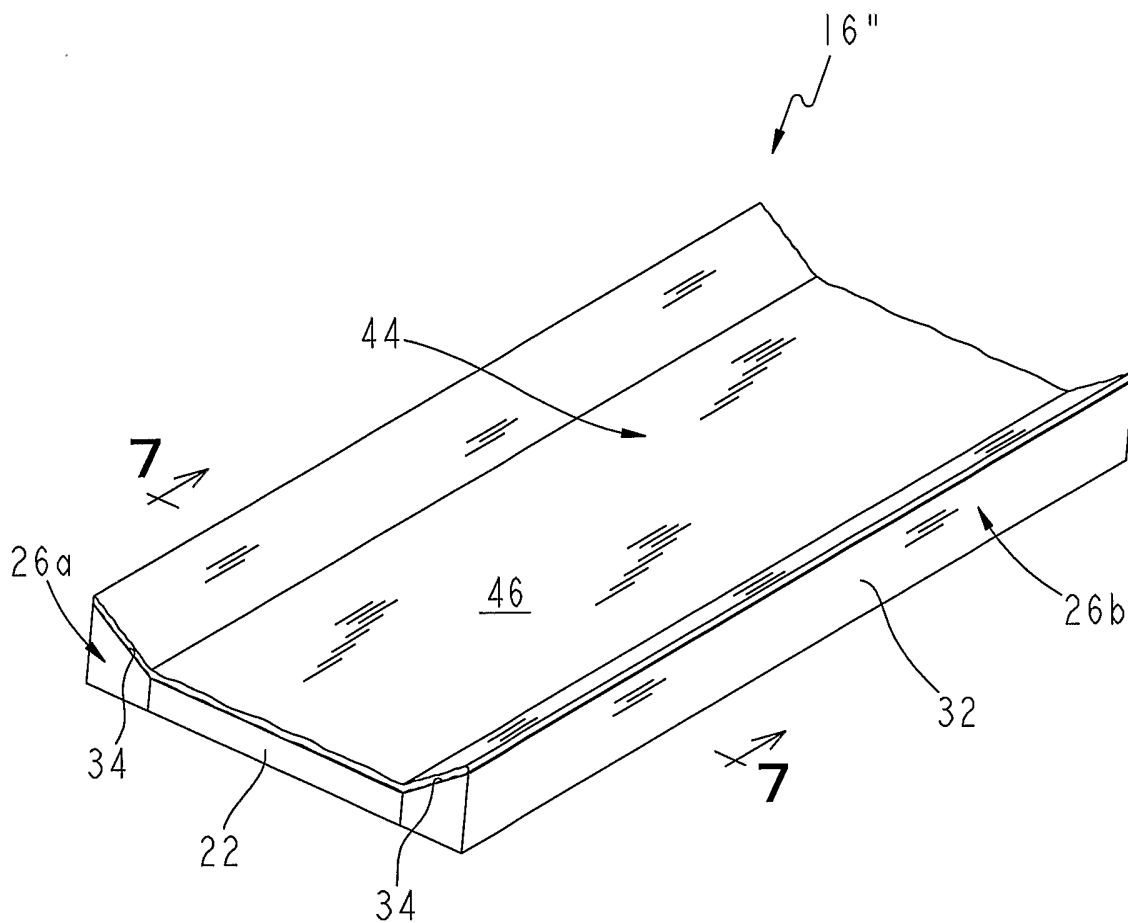


FIG. 6

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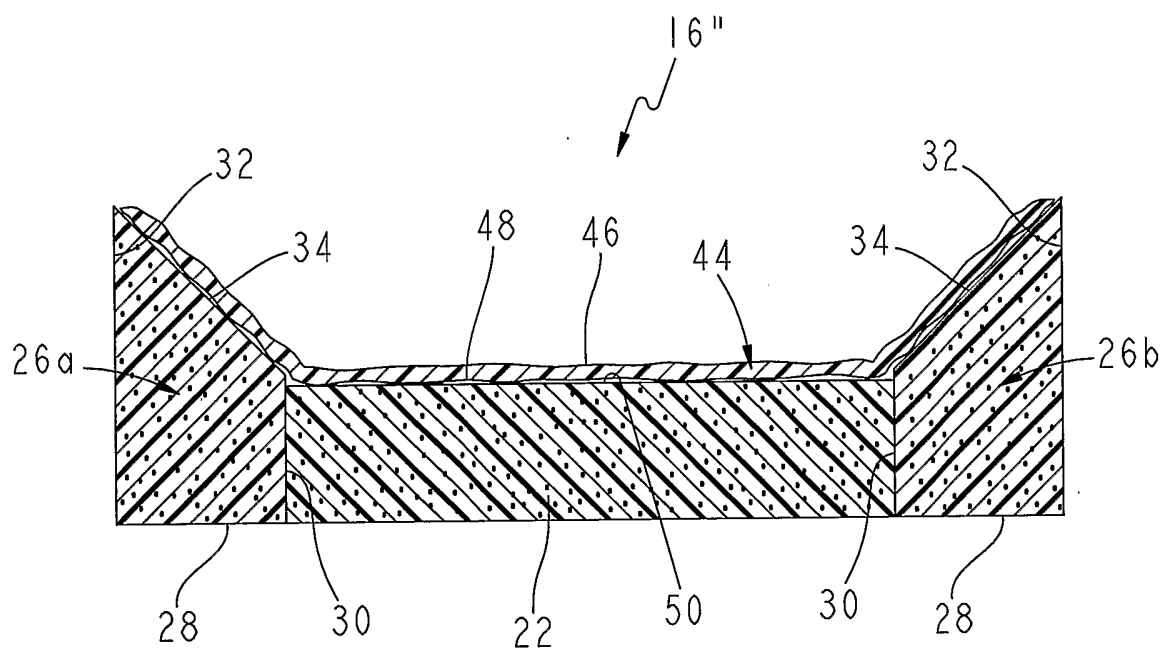


FIG. 7

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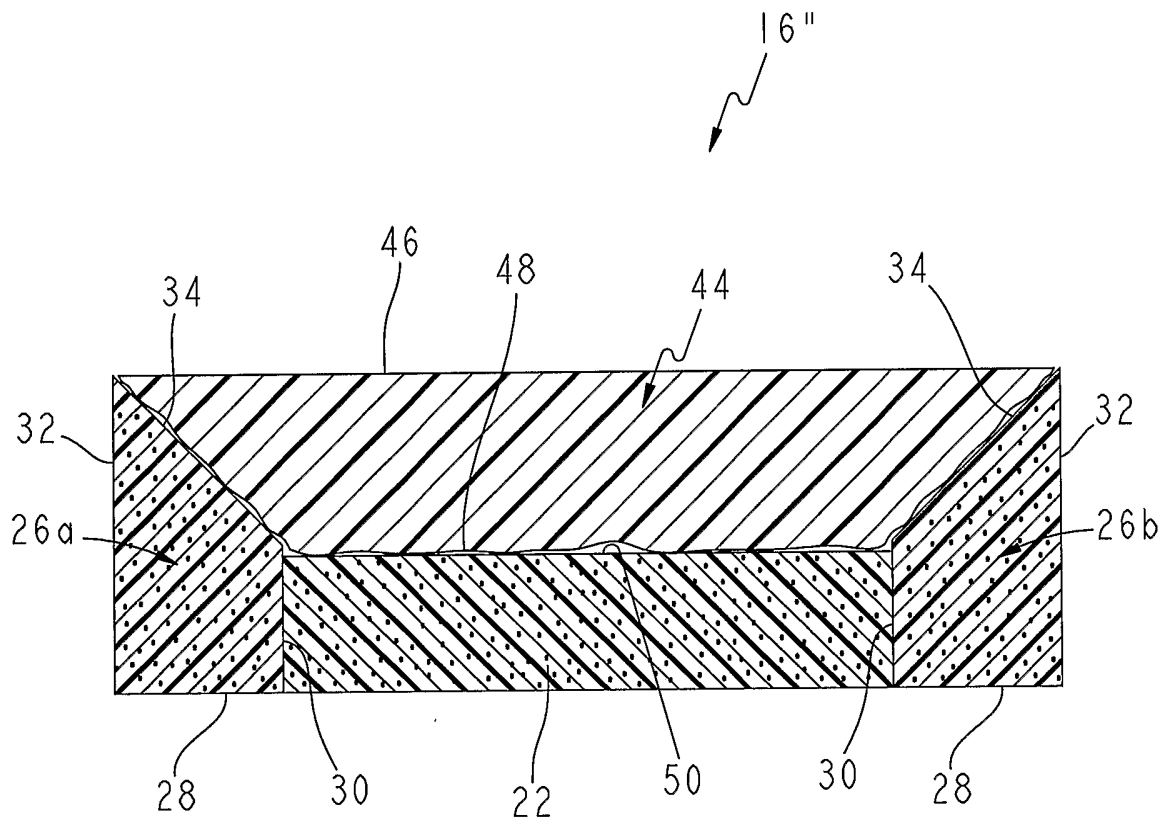


FIG. 8

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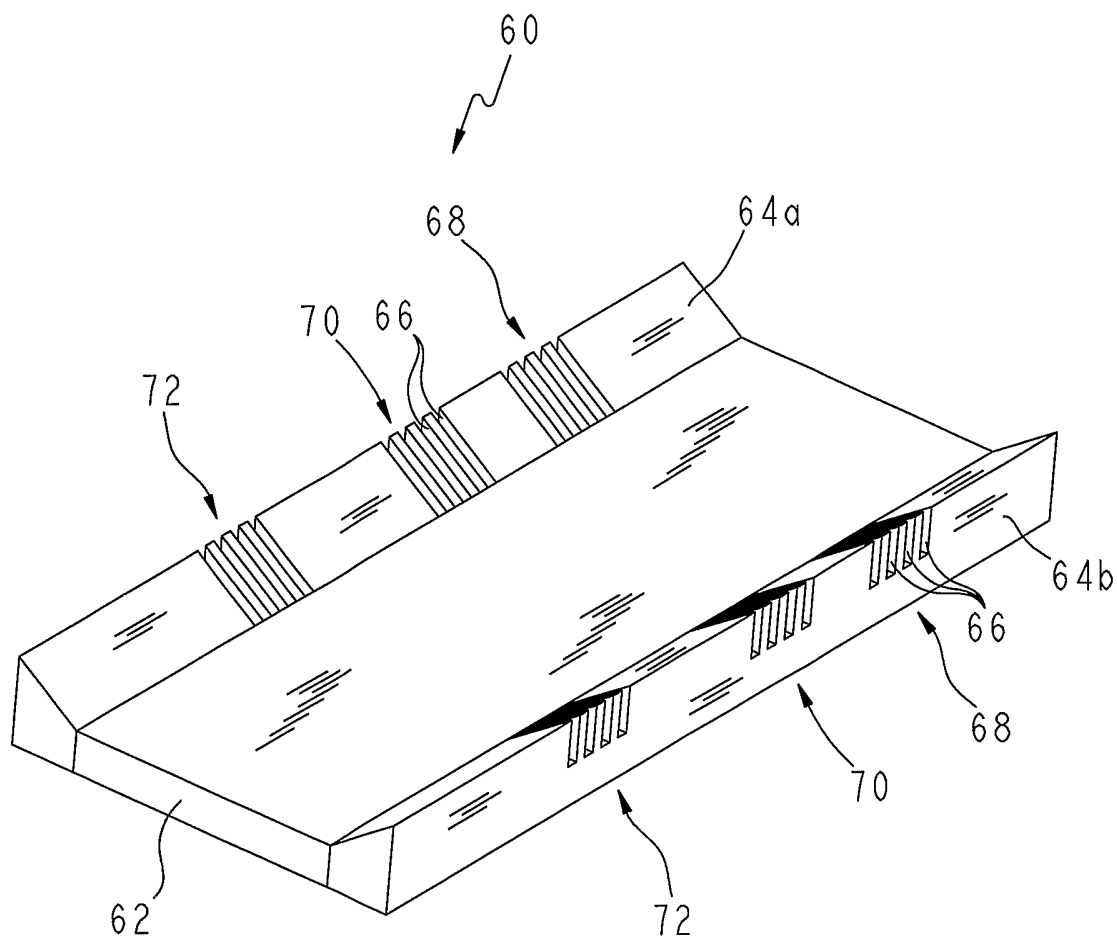


FIG. 9

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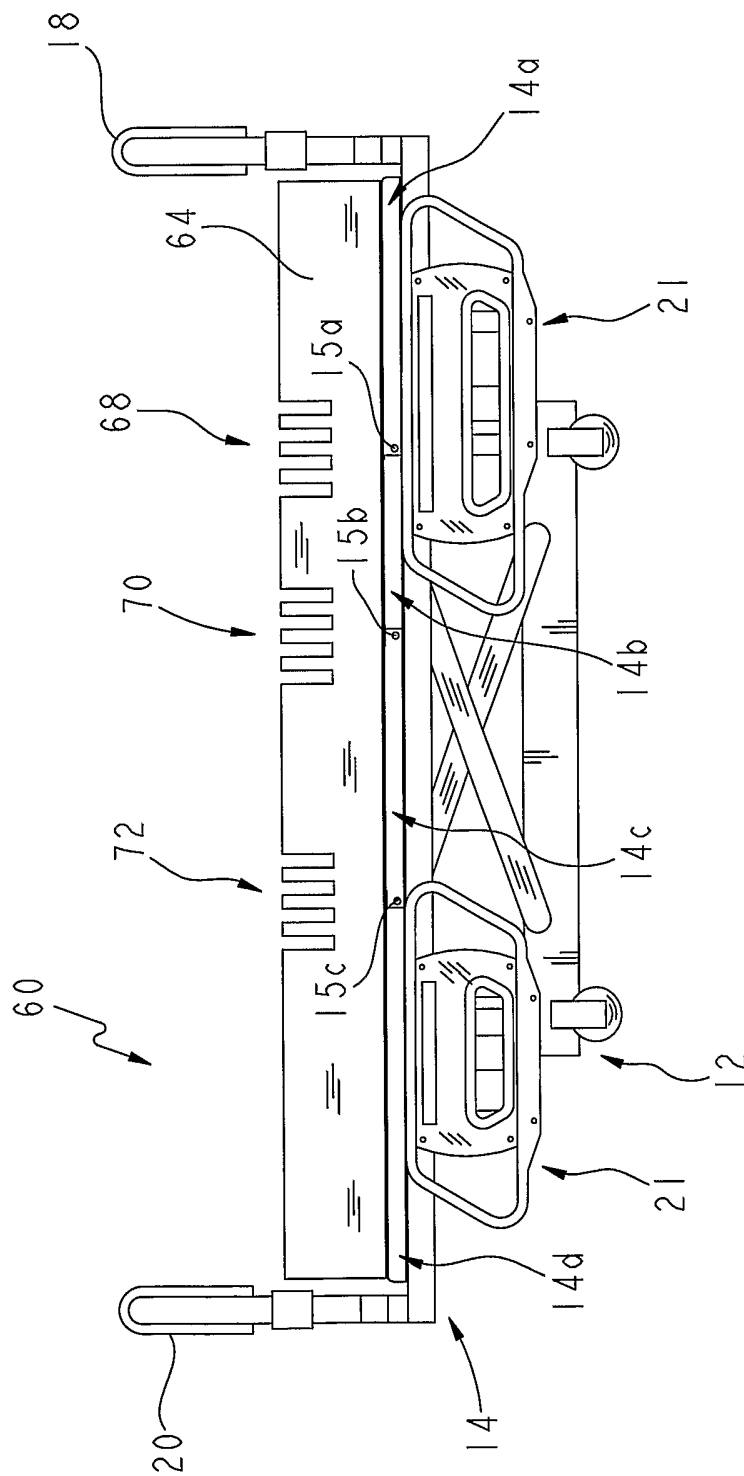


FIG. 10

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/25028

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 A47C27/08				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC 7 A47C A61G				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ				
C. DOCUMENTS CONSIDERED TO BE RELEVANT				
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X A A X A	US 4 945 588 A (CASSIDY DANIEL G ET AL) 7 August 1990 (1990-08-07) column 1, paragraph 1; claim 1; figures 1,2 --- EP 0 908 168 A (GAYMAR IND INC) 14 April 1999 (1999-04-14) abstract; figures 2-4 --- US 3 803 647 A (RESWICK J) 16 April 1974 (1974-04-16) column 4, line 39-46; figures --- NL 6 602 793 A (PIRELLI) 27 September 1966 (1966-09-27) figures --- -/--	1-3,7,9, 12-14 8 1,7, 9-11,13, 14,17 1-3,9, 13,14 4-7,15, 16,18, 19,21		
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.				
<input checked="" type="checkbox"/> Patent family members are listed in annex.				
° Special categories of cited documents :				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; border: none; vertical-align: top;"> *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family </td> </tr> </table>			*A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family
A document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *&* document member of the same patent family			
Date of the actual completion of the international search <p style="text-align: center; font-size: 1.2em;">16 December 2003</p>		Date of mailing of the international search report <p style="text-align: center; font-size: 1.2em;">29/12/2003</p>		
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer <p style="text-align: center; font-size: 1.2em;">Amghar, N</p>		

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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