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(54) **Air bed system**

Luftmatratzensystem

Système de matelas à air

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US-A- 3 391 414 **US-A- 4 991 244**

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Description

[0001] The present invention relates to air beds generally, and more particularly, to an improved air bed system with independently inflatable sections for providing varying degrees of support over a sleeper's body.

[0002] Air beds having independently inflatable mattresses for separate sleepers are known from NL 7 906 927 A, but they could be improved. For example, currently available air mattresses may "bottom out" when the weight thereon is too high, resulting in an uncomfortable mattress. Single mattresses or pairs of independently inflatable mattresses connected together for separate sleepers may also create a rolling effect when one person lays down on the bed, resulting in the other person being jostled. Moreover, the support for the sleeper's body in many conventional air mattresses is not always satisfactory. Often, due to the sleeper's weight distribution, additional support is needed in the lumbar region. With conventional air mattresses, increasing the inflation pressure to provide the needed lumbar support results in a mattress which is then uncomfortable for the sleepers head and leg positions. Failure to provide adequate lumbar support may result in the sleeper sinking into a "valley" as the mattress compresses in the lumbar region and expand under the sleeper's head and feet due to the reduced weight distribution in those areas.

SUMMARY OF THE INVENTION

[0003] Among the several objects and advantages of the present invention are:

The provision of an air bed system with improved comfort and adjustability;

The provision of such an air bed system which provides a separate mattress for each user;

The provision of such an air bed system in which each separate mattress comprises three or more individual airtight compartments; and

The provision of such an air bed system which allows the user to separately control the air pressure in each individual compartment comprising the mattress, providing individual support, comfort, and adjustability.

[0004] Briefly stated, an air bed system of the present invention comprises three separate airtight segments secured together in a linear fashion to form an air mattress sized to fit a standard twin-sized bed. Each segment of the air mattress is independently inflatable, allowing sleeper to adjust the level of support provided by altering the air pressure within each segment. A full, queen, or king sized bed may be formed for two separate sleepers by placing two air mattresses of the present invention side by side, allowing each sleeper to retaining individual support level and comfort adjust-

ments.

[0005] The foregoing and other objects, features, and advantages of the invention as well as presently preferred embodiments thereof will become more apparent from the reading of the following description in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the accompanying drawings which form part of the specification:

Figure 1 is a perspective view of a prior art contiguous air mattress;

Figure 1 A is an enlargement of the valve portion of Fig. 1;

Figure 2 is a perspective view of the separate segments comprising an air mattress of the present invention;

Figure 2A is an enlarged view of the hook and loop fasteners shown in Fig 2;

Figure 3 is a perspective view of a partition used in the segments of Fig. 2;

Figure 4 is a perspective view of an air mattress of the present invention with the individual segments secured together, suitable for a single sleeper;

Figure 5 is a perspective view of the foundation system employed in conjunction with an air mattress of the present invention shown in Fig. 4; and

Figure 6 is a perspective view of an air bed system of the present invention suitable for two sleepers.

[0007] Corresponding reference numerals indicate corresponding parts throughout the several figures of the drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0008] The following detailed description illustrates the invention by way of example and not by way of limitation. The description will clearly enable one skilled in the art to make and use the invention, describes several embodiments, adaptations, variations, alternatives, and uses of the invention, including what we presently believe is the best mode of carrying out the invention.

[0009] Referring to Figure 1, a standard air mattress 10 is shown formed from a single air-tight bladder 12. Support is provided by air introduced into the air-tight bladder 12 through a suitable valve 14, preferably a double valve with a reverse flow inhibitor. It is well known in the art that these valves (sometimes known as Boston valves) simplify the inflation of air mattresses and avoid undesired releases of air from the air-tight bladder 12. The air mattress 10 additionally has a plurality of internal partitions 16 extending across its width. The partitions 16 are internally secured to both the top 18 and bottom 20 surfaces of the bladder 12 by means of continuous seams 22. The partitions 16 define a plurality of inter-

connected chambers 24 therebetween and their structure substantially strengthens the air mattress 10, increasing support after inflation. The air-tight bladder 12 shown in Fig. 1 is dimensioned to fit a standard twin sized bed, and suitable for use by a single sleeper. Typically, to provide for a second sleeper and fit larger standard bed sizes such as full, queen, and king-size beds, a second air-mattress substantially identical in size (length, height, and width) is positioned adjacent the first mattress 10.

[0010] Referring now to Figure 2, the segments comprising an air mattress 26 of the present invention are shown disassembled in a linear arrangement. A head segment 28 is positioned adjacent one end of a lumbar segment 30. A foot segment 32 is positioned on the opposite side of the lumbar segment 30 from the head segment 28. Preferably composed of a high plasticizer content PVC vinyl with a laminated coating of canvas-like rayon material, each segment forms an individual air-tight compartment. A suitable valve 34, 36, and 38 of the type describe above for adjusting the internal air-pressure is incorporated within each segment. An additional layer of a quilting material may be provided to cover the upper surface of the lumbar segment 30.

[0011] Each segment contains several double-walled internal partitions 40 (Fig. 3) which extend across the segment width, creating interconnected chambers 42 and providing additional support upon inflation. As can be seen in Fig. 3, each partition 40 is hollow, with openings 44 at the ends and openings 46 in the middle which allow air to flow from chamber to chamber as weight is applied to the segment. Each partition 40 is preferably welded at its top 48 and its bottom 50 to the corresponding top and bottom surfaces of the segment (28, 30, or 32 as applicable). This welded seam runs horizontally and is preferably about 1/2" in width for each partition 40. This partition design provides greater seam surface area and two partition walls (52 and 54) for added air containment and strength. The number of partitions 40 per segment varies depending upon the desired size and strength of the air mattress 26.

[0012] Shown in Fig. 4, an assembled air mattress 26 is formed by securing the head segment 28 to the adjacent side of the lumbar segment 30, and the foot segment 32 to the adjacent side of the lumbar segment 30, opposite the head segment 28. The preferred method for securing the individual segments together is by means of matching hook and loop fastener strips 56a, 56b, such as those sold under the trade name Velcro, arrayed along the adjacent upper edges 57 and lower edges 58 of each of the segments as seen in Figs. 2 and 2a.

[0013] Once assembled, the air mattress 26 is preferably placed on a foundation 60 (Fig. 5) consisting of form perimeter rails 62 covered in a textured vinyl material. The valves 34, 36, and 38 are then connected to two or more pneumatic pumps 64, 66, housed within the foundation 60 to keep operational noise levels to a minimum.

Separate controls 68 operate the pneumatic pumps 64, 66, permitting an individual using the air mattress 26 to separately inflate or deflate the head segment 28, the lumbar segment 30, and/or the foot segment 32, or to simultaneously adjust both the head and foot segments separate from the lumbar segment.

[0014] Application of the above-described air bed system to larger sized beds such as full, queen or king beds, a second air mattress is employed (Fig. 6). The second mattress is a mirror image of the first, having a second set of identical pneumatic pumps and separate controls placed within the foundation 60. By providing a second set of pneumatic pumps and controls, an individual sleeper may adjust the second portion of the air bed system to his or her individual comfort levels without affecting the comfort of a first sleeper on the first air mattress.

[0015] In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results are obtained. As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

Claims

1. An air bed comprising:

a first air mattress (26), the air mattress (26) including a plurality of independently inflatable air-tight segments (28, 30, 32) disposed in a plane and having the same width, the dimensions of each segment (28, 30, 32) being in proportion to the dimensions of said air mattress (26),
a foundation (60) disposed around and below the segments (28, 30, 32), said foundation (60) supporting and retaining said segments (28, 30, 32), and
means (56a, 56b) for securing linearly adjacent segments (28, 30, 32) together in said plane,

characterized in that said plurality of independently inflatable air-tight segments (28, 30, 32) comprises at least a first air-tight segment having a substantially different cross-sectional area in said plane from the cross-sectional area in the plane of at least a second air-tight segment (30) of said plurality of independently inflatable air-tight segments (28, 30, 32).

2. The air bed as set forth in claim 1, **characterized in** comprising a second air mattress adjacent said first air mattress, said second air mattress being substantially a mirror image of said first air mattress.

3. The air bed as set forth in claim 2, **characterized in that** said first and second air mattresses are independently inflatable.
4. The air bed as set forth in claim 1, **characterized in that** said first air mattress includes a head segment (28), a lumbar segment (30), and a foot segment (32), the head segment (28) and the foot segment (32) being linearly disposed on opposite sides of the lumbar segment (30) within said plane.
5. The air bed as set forth in claim 4, **characterized in that** said head segment (28) and said foot segment (32) are sealed with respect to said lumbar segment (30), so that said head and foot segments (28, 32) inflate independently from said lumbar segment (30).
6. The air bed as set forth in claim 5, **characterized in that** said head segment (28) is sealed with respect to the foot segment (32) so that said head segment (28) inflates independently from said foot segment (32).
7. The air bed as set forth in claim 5, **characterized in** including means (64, 66, 68) to inflate said head segment (28) simultaneously with said foot segment (32).
8. The air bed as set forth in claim 4, **characterized in that** each segment (28, 30, 32) has its own filling valve (34, 36, 38), said filling valves (34, 36, 38) having means to inhibit reverse air flow out of the segments (28, 30, 32) during inflation.
9. The air bed as set forth in claim 4, **characterized in** further including a plurality of pneumatic pumps (64, 66) contained inside said foundation (60), said pneumatic pumps (64, 66) being operatively connected to said air-tight segments (28, 30, 32), and means (68) for controlling said pneumatic pumps (64, 66), said control means (68) being contained inside said foundation (60).
10. The air bed as set forth in claim 9, **characterized in that** a first pneumatic pump (64) is operatively connected to both said head segment (28) and said foot segment (32), and a second pneumatic pump (66) is operatively connected to said lumbar segment (30).
11. The air bed as set forth in claim 9, **characterized in that** a first pneumatic pump is operatively connected to the head segment (28), a second pneumatic pump is operatively connected to the lumbar segment (30), and a third pneumatic pump is operatively connected to the foot segment (32).
12. The air bed as set forth in claim 4, **characterized in that** said lumbar segment (30) includes an upper surface, said upper surface being covered in quilting.
13. The air bed as set forth in claim 1, **characterized in that** each segment (28, 30, 32) has therein a plurality of partitions (40) extending across its width, said partitions (40) being secured to both a top (48) and a bottom (50) of the respective segment (28, 30, 32) and defining a plurality of compartments therebetween.
14. The air bed as set forth in claim 13, **characterized in that** the partitions (40) are in the shape of loops extending across the width of their respective segments (28, 30, 32).
15. The air bed as set forth in claim 14, wherein the loops have openings (44, 46) therein to allow the controlled passage of air from compartment to compartment.
16. The air bed as set forth in claim 1, **characterized in that** the securing means (56a, 56b) includes matching hook and loop fasteners (56a, 56b) arrayed on adjacent edges of said segments (28, 30, 32).
17. The air bed as set forth in claim 1, **characterized in that** said segments (28, 30, 32) are composed of a PVC vinyl of high plasticizer content.
18. The air bed as set forth in claim 17, **characterized in that** said segments (28, 30, 32) are composed of a PVC vinyl of high plasticizer content.
19. The air bed as set forth in claim 1, **characterized in that** said foundation (60) is composed of a foam material (62).
20. The air bed as set forth in claim 19, **characterized in that** said foundation (60) is covered in a textured vinyl material.

Patentansprüche

1. Luftbett umfassend:

eine erste Luftmatratze (26), wobei die Luftmatratze (26) eine Vielzahl unabhängig aufblasbarer, luftdichter, in einer Ebene angeordneter Segmente (28, 30, 32) aufweist, die dieselbe Breite haben, wobei die Abmessungen eines jeden Segments (28, 30, 32) zu den Abmessungen der Luftmatratze (26) in Proportion stehen;

eine Basis (60), die um die und unterhalb der Segmente (28, 30, 32) angeordnet ist, wobei die Basis (60) die Segmente (28, 30, 32) trägt und hält; und

Einheiten (56a, 56b) zum Zusammenhalten linear benachbarter Segmente (28, 30, 32) in der Ebene,

dadurch gekennzeichnet, dass die Vielzahl unabhängig aufblasbarer, luftdichter Segmente (28, 30, 32) wenigstens ein erstes luftdichtes Segment mit einer Querschnittsfläche in der Ebene aufweist, die sich im Wesentlichen von der Querschnittsfläche in der Ebene wenigstens eines zweiten luftdichten Segments (30) der Vielzahl unabhängig aufblasbarer, luftdichter Segmente (28, 30, 32) unterscheidet.

2. Luftbett nach Anspruch 1, **dadurch gekennzeichnet, dass** dieses eine zur ersten Luftmatratze benachbarte zweite Luftmatratze aufweist, welche im Wesentlichen spiegelbildlich zur ersten Luftmatratze ausgebildet ist. 20
3. Luftbett nach Anspruch 2, **dadurch gekennzeichnet, dass** die erste und die zweite Luftmatratze unabhängig aufblasbar sind. 25
4. Luftbett nach Anspruch 1, **dadurch gekennzeichnet, dass** die erste Luftmatratze ein Kopfsegment (28), ein Lendensegment (30) und ein Fußsegment (32) aufweist, wobei das Kopfsegment (28) und das Fußsegment (32) innerhalb der Ebene linear an gegenüberliegenden Seiten des Lendensegments (30) angeordnet sind. 30
5. Luftbett nach Anspruch 4, **dadurch gekennzeichnet, dass** das Kopfsegment (28) und das Fußsegment (32) gegenüber dem Lendensegment (30) abgedichtet sind, so dass das Kopf- und das Fußsegment (28, 32) unabhängig vom Lendensegment (30) aufblasbar sind. 35
6. Luftbett nach Anspruch 5, **dadurch gekennzeichnet, dass** das Kopfsegment (28) im Hinblick auf das Fußsegment (32) abgedichtet ist, so dass das Kopfsegment (28) unabhängig vom Fußsegment (32) aufblasbar ist. 40
7. Luftbett nach Anspruch 5, **gekennzeichnet durch** eine Vorrichtung (64, 66, 68) zum gleichzeitigen Aufblasen des Kopfsegments (28) und des Fußsegments (32). 45
8. Luftbett nach Anspruch 4, **dadurch gekennzeichnet, dass** jedes Segment (28, 30, 32) sein eigenes Füllventil (34, 36, 38) aufweist, wobei das Füllventil (34, 36, 38) eine Vorrichtung zum Verhindern des

Luftrückflusses aus den Segmenten (28, 30, 32) während des Aufblasens aufweist.

9. Luftbett nach Anspruch 4, **dadurch gekennzeichnet, dass** es weiterhin eine Vielzahl von Luftpumpen (64, 66) umfasst, welche innerhalb der Basis (60) aufgenommen ist, wobei die Luftpumpen (64, 66) betriebsmäßig mit den luftdichten Segmenten (28, 30, 32) verbunden sind, und dass Vorrichtungen (68) zur Steuerung der Luftpumpen (64, 66) vorgesehen und innerhalb der Basis (60) aufgenommen sind. 5
10. Luftbett nach Anspruch 9, **dadurch gekennzeichnet, dass** eine erste Luftpumpe (64) betriebsmäßig sowohl mit dem Kopfsegment (28) als auch mit dem Fußsegment (32) verbunden ist, und dass eine zweite Luftpumpe (66) betriebsmäßig mit dem Lendensegment (30) verbunden ist. 10
11. Luftbett nach Anspruch 9, **dadurch gekennzeichnet, dass** eine erste Luftpumpe betriebsmäßig mit dem Kopfsegment (28), eine zweite Luftpumpe betriebsmäßig mit dem Lendensegment (30) und eine dritte Luftpumpe betriebsmäßig mit dem Fußsegment (32) verbunden ist. 15
12. Luftbett nach Anspruch 4, **dadurch gekennzeichnet, dass** das Lendensegment (30) eine obere Oberfläche aufweist, welche mit Steppmaterial bezogen ist. 20
13. Luftbett nach Anspruch 1, **dadurch gekennzeichnet, dass** jedes Segment (28, 30, 32) eine Vielzahl von sich über die Breite erstreckenden Trennwänden (40) umfasst, wobei die Trennwände (40) an der Oberseite (48) und am Boden (50) des jeweiligen Segments (28, 30, 32) angeordnet sind und eine Vielzahl von Zwischenabteilungen zwischen sich definieren. 25
14. Luftbett nach Anspruch 13, **dadurch gekennzeichnet, dass** die Trennwände (40) in der Form von Schleifen über die gesamte Breite des jeweiligen Segments (28, 30, 32) erstreckend ausgebildet sind. 30
15. Luftbett nach Anspruch 14, **dadurch gekennzeichnet, dass** die Schleifen Öffnungen (44, 46) aufweisen, um den kontrollierten Durchfluss von Luft von Zwischenabteilung zu Zwischenabteilung zuzulassen. 35
16. Luftbett nach Anspruch 1, **dadurch gekennzeichnet, dass** die Sicherungseinheiten (56a, 56b) zueinander passende Haken- und Schlaufenverbinder (56a, 56b) aufweisen, welche auf benachbarten Kanten der Segmente (28, 30, 32) angeordnet sind. 40

17. Luftbett nach Anspruch 1, **dadurch gekennzeichnet, dass** die Segmente (28, 30, 32) aus einem PVC-Vinyl mit einem hohen Weichmachergehalt gebildet sind.

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18. Luftbett nach Anspruch 17, **dadurch gekennzeichnet, dass** die Segmente (28, 30, 32) aus einem PVC-Vinyl mit einem hohen Weichmachergehalt gebildet sind.

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19. Luftbett nach Anspruch 1, **dadurch gekennzeichnet, dass** die Basis (60) aus einem Schaummaterial (62) gebildet ist.

20. Luftbett nach Anspruch 19, **dadurch gekennzeichnet, dass** die Basis (60) mit einem texturierten Vinylmaterial bezogen ist.

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Revendications

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1. Lit pneumatique comprenant :

un premier matelas pneumatique (26), le matelas pneumatique (26) englobant plusieurs segments étanches à l'air (28, 30, 32) qui peuvent être gonflés de manière indépendante, disposés dans un seul plan et possédant la même largeur, les dimensions de chaque segment (28, 30, 32) étant proportionnelles aux dimensions dudit matelas pneumatique (26) ;

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une structure de base (60) disposée autour des segments (28, 30, 32) et en dessous de ces derniers, ladite structure de base (60) supportant et retenant desdits segments (28, 30, 32) ;

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et

des moyens (56a, 56b) pour fixer des segments (28, 30, 32) adjacents en direction linéaire les uns aux autres dans ledit plan ;

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caractérisé en ce que lesdits plusieurs segments étanches à l'air (28, 30, 32) qui peuvent être gonflés de manière indépendante comprennent au moins un premier segment étanche à l'air possédant une superficie de section essentiellement différente dans ledit plan par rapport à la superficie de section dans le plan d'au moins un deuxième segment étanche à l'air (30) parmi lesdits plusieurs étanches à l'air (28, 30, 32) qui peuvent être gonflés de manière indépendante.

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2. Lit pneumatique selon la revendication 1, **caractérisé en ce qu'il** comprend un deuxième matelas pneumatique en position adjacent audit premier matelas pneumatique, ledit deuxième matelas pneumatique étant essentiellement une image spéculaire dudit premier matelas pneumatique.

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3. Lit pneumatique selon la revendication 2, **caractérisé en ce que** lesdits premier et deuxième matelas pneumatiques peuvent être gonflés de manière indépendante.

4. Lit pneumatique selon la revendication 1, **caractérisé en ce que** ledit premier matelas pneumatique englobe un segment pour la tête (28), un segment pour les lombaires (30) et un segment pour les pieds (32), le segment pour la tête (28) et le segment pour les pieds (32) étant disposés en direction linéaire sur les côtés opposés du segment (30) pour les lombaires dans ledit plan.

5. Lit pneumatique selon la revendication 4, **caractérisé en ce que** ledit segment pour la tête (28) et ledit segment pour les pieds (32) sont rendus étanches par rapport audit segment (30) pour les lombaires, de telle sorte que l'on peut gonfler lesdits segments pour la tête et pour les pieds (28, 32) indépendamment dudit segment (30) pour les lombaires.

6. Lit pneumatique selon la revendication 5, **caractérisé en ce que** ledit segment pour la tête (28) est rendu étanche par rapport au segment pour les pieds (32) de telle sorte que ledit segment pour la tête (28) peut être gonflé indépendamment dudit segment pour les pieds (32).

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7. Lit pneumatique selon la revendication 5, **caractérisé en ce qu'il** englobe des moyens (64, 66, 68) pour gonfler ledit segment pour la tête (28) de manière simultanée avec ledit segment pour les pieds (32).

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8. Lit pneumatique selon la revendication 4, **caractérisé en ce que** chaque segment (28, 30, 32) possède sa propre valve de remplissage (34, 36, 38), lesdites valves de remplissage (34, 36, 38) possédant des moyens pour inhiber l'écoulement inverse de l'air à l'extérieur des segments (28, 30, 32), lors du gonflage.

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9. Lit pneumatique selon la revendication 4, **caractérisé en ce qu'il** englobe plusieurs pompes pneumatiques (64, 66) qui sont contenues à l'intérieur de ladite structure de base (60), lesdites pompes pneumatiques (64, 66) étant connectées de manière opérante auxdits segments étanches à l'air (28, 30, 32), et des moyens (68) pour commander lesdites pompes pneumatiques (64, 66), lesdits moyens de commande (68) étant contenus à l'intérieur de ladite structure de base.

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10. Lit pneumatique selon la revendication 9, **caractérisé en ce qu'une** première pompe pneumatique (64) est connectée de manière opérante à la fois

audit segment pour la tête (28) et audit segment pour les pieds (32), et une deuxième pompe pneumatique (66) est connectée de manière opérante audit segment (30) pour les lombaires.

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térisé en ce que ladite structure de base (60) est recouverte d'une matière vinylique texturée.

11. Lit pneumatique selon la revendication 9, **caractérisé en ce qu'**une première pompe pneumatique est connectée de manière opérante au segment pour la tête (28), une deuxième pompe pneumatique est connectée de manière opérante au segment (30) pour les lombaires et une troisième pompe pneumatique est connectée de manière opérante au segment pour les pieds (32). 10
12. Lit pneumatique selon la revendication 4, **caractérisé en ce que** ledit segment (30) pour les lombaires englobe une surface supérieure, ladite surface supérieure étant recouverte par matelassage. 15
13. Lit pneumatique selon la revendication 1, **caractérisé en ce que** chaque segment (28, 30, 32) englobent plusieurs cloisons (40) s'étendant sur la largeur des premiers cités, lesdites cloisons (40) étant fixées à la fois au sommet (48) et la base (50) dudit segment respectif (28, 30, 32) et définissant plusieurs compartiments entre elles. 20 25
14. Lit pneumatique selon la revendication 13, **caractérisé en ce que** les cloisons (40) prennent la forme de boucles s'étendant sur la largeur de leurs segments respectifs (28, 30, 32). 30
15. Lit pneumatique selon la revendication 14, **caractérisé en ce que** les boucles possèdent des ouvertures (42, 46) pour permettre le passage contrôlé d'air d'un compartiment à l'autre. 35
16. Lit pneumatique selon la revendication 1, **caractérisé en ce que** les moyens de fixation (56a, 56b) englobent des bandes velcro (56a, 56b) arrangées sur les bords adjacents desdits segments (28, 30, 32). 40
17. Lit pneumatique selon la revendication 1, **caractérisé en ce que** lesdits segments (28, 30, 32) sont composés d'un vinyle PVC possédant une teneur élevée en plastifiant. 45
18. Lit pneumatique selon la revendication 17, **caractérisé en ce que** lesdits segments (28, 30, 32) sont composés d'un vinyle PVC possédant une teneur élevée en plastifiant. 50
19. Lit pneumatique selon la revendication 1, **caractérisé en ce que** ladite structure de base (60) est composée d'une matière en mousse (62). 55
20. Lit pneumatique selon la revendication 19, **carac-**

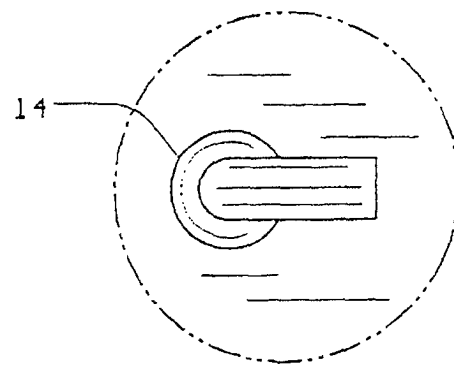
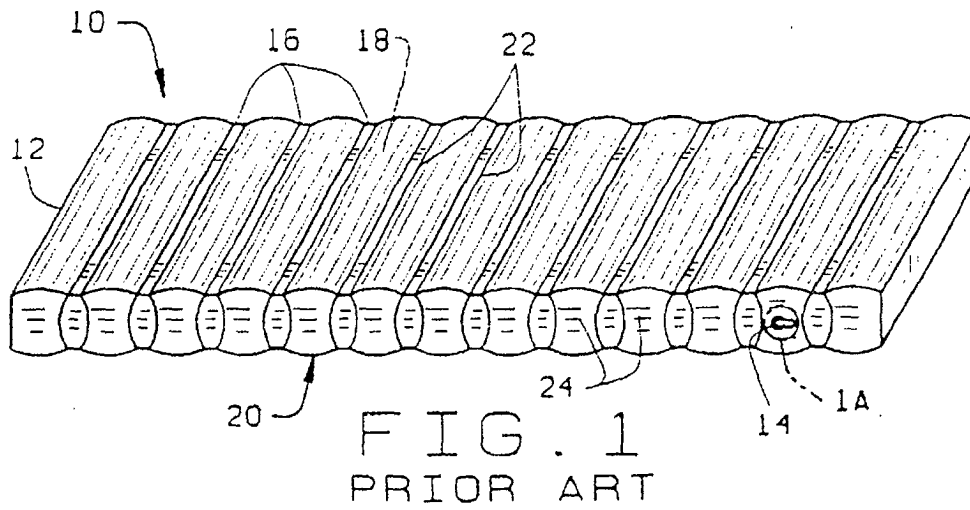
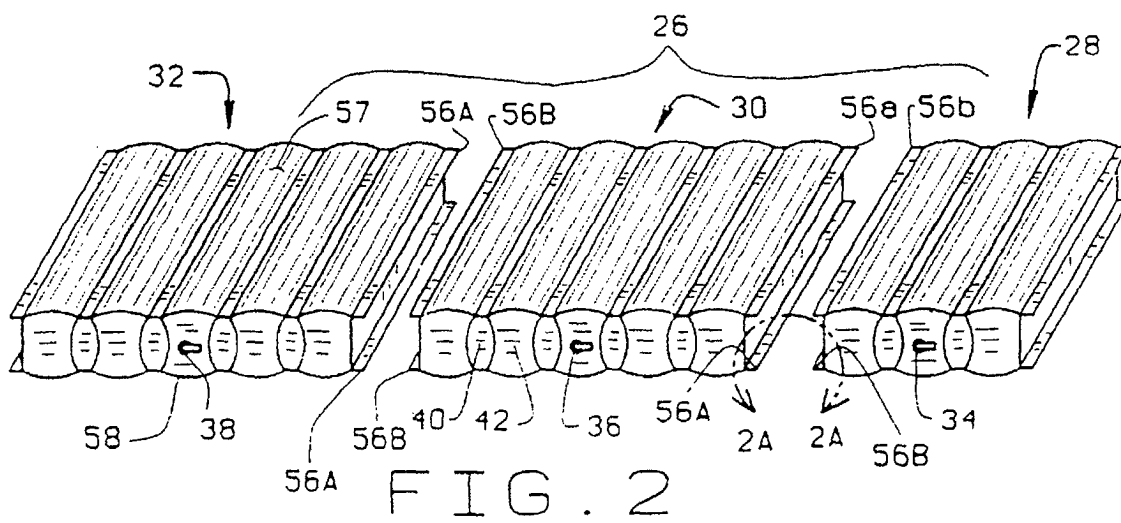
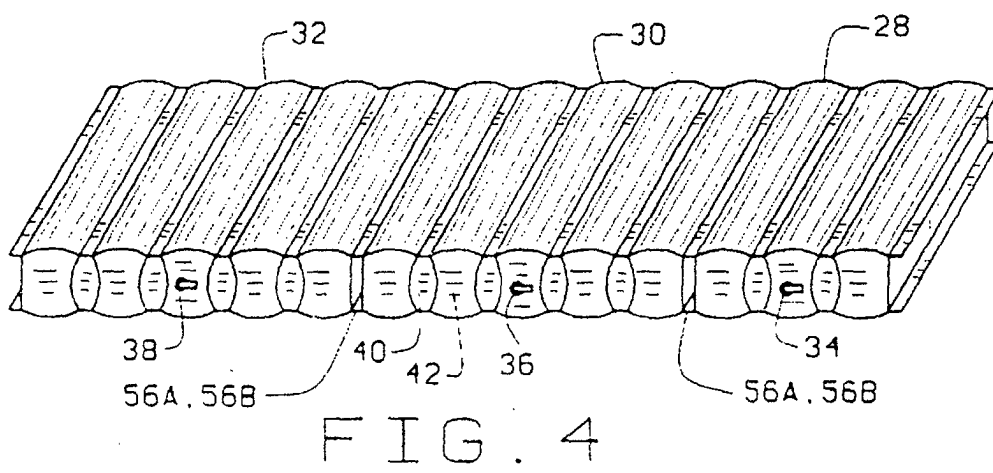
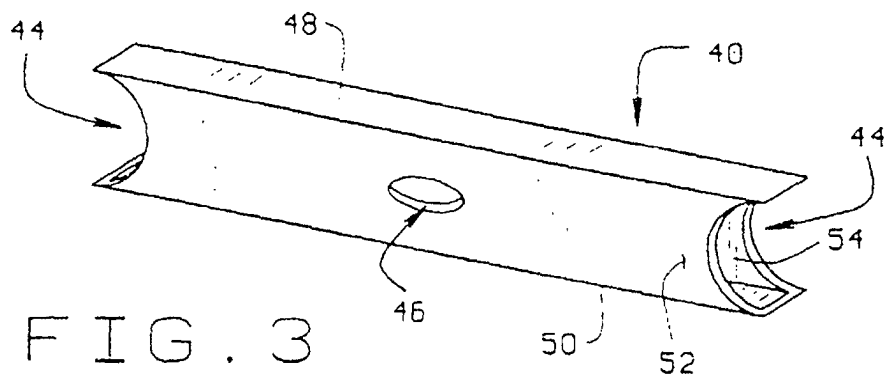
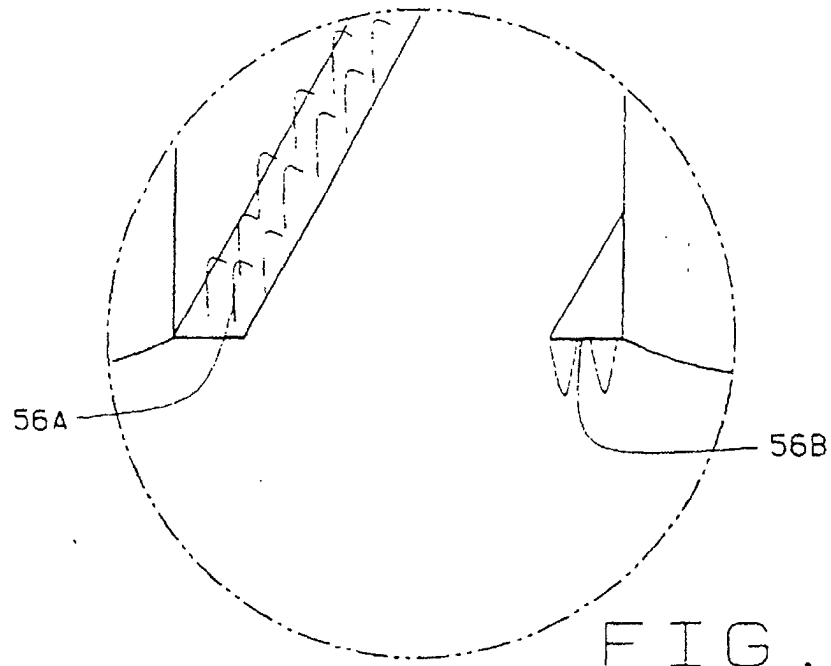


FIG. 1A





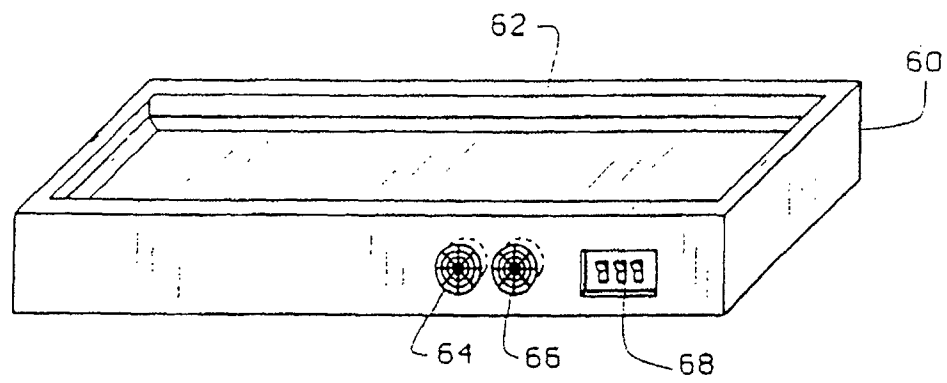


FIG. 5

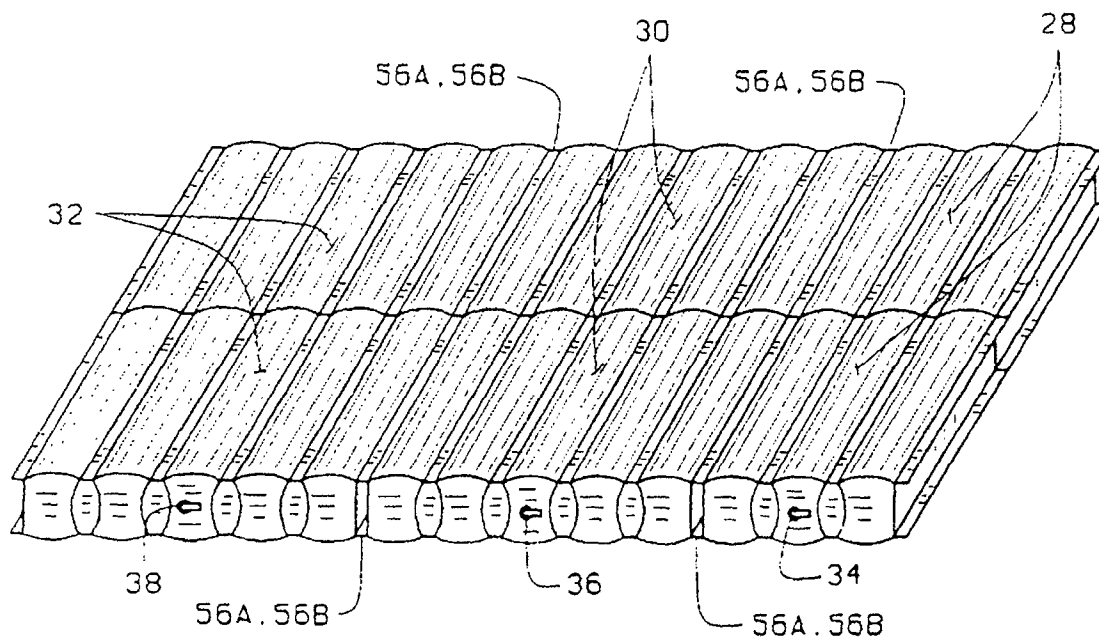


FIG. 6