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(54) Title: AIR BED WITH ELEVATED AND SELF-EXPANDING SUPPORT STRUCTURE

(57) Abstract: A collapsible bed (10) having an air mattress (14) and a support frame (18). The support frame (18) includes a number of frame members (2), which are joined by pivot assemblies (36), such that the support frame (18) as a whole expands outwardly from a central area (42), when a portion of the frame (18) is pulled outwardly. A second preferred embodiment is a self-expanding bed (100) having an air mattress (14) and an articulated support frame (18), which as a whole expands outwardly from a central area (42). The air mattress (14) is attached to the support frame (18) at a number of points, so that when the air mattress (14) is inflated and expands outwardly, the support frame (18) also expands outwardly. An electric air pump (60) is preferably included which may be activated by a remote control (64), so that the bed (100) is self-expanding.

AIR BED WITH ELEVATED AND SELF-EXPANDING SUPPORT STRUCTURE

This application claims priority from U.S. Provisional Applications Serial Nos. 60/238,662, filed 10/4/2000, and 60/262,767, filed 01/19/2001.

TECHNICAL FIELD

The present invention relates generally to collapsible furniture, and more particularly to bedding which may be used for temporary purposes such as for overnight guests.

BACKGROUND ART

Temporary beds have been used for many years and come in many forms, from a simple futon or air mattress to more complex "hide-a-bed" style devices. Such temporary beds are most often used when guests, either expected or otherwise, stay overnight. In such cases, it is desirable that the temporary bed be quick and easy to assemble, comfortable, and collapse to a small configuration which can be easily and conveniently stored in a closet or storage cabinet. An air mattress has the advantage of deflating to a very compact size when the internal air pressure is released, and can be set up in a relatively short amount of time. The air pressure in the mattress gives good support to body members and the air can redistribute within the mattress slightly in response to greater weight loads in certain areas. It can thus conform to the user's body, is lightweight, and is generally easily portable, even when inflated.

However, air mattresses which are pitched on the floor of a dwelling, may be perceived as being less gracious than beds which are elevated from the floor. Elevated beds may have less intimate contact with floor dirt and grime, thus be more suitable for those with allergies or aversions to dirt. Furthermore, an elevated bed may be easier to get into and out of for those who may have trouble squatting on the floor, or for those with stiff joints or arthritis.

Additionally, those who go camping out of trailers, etc. may wish to sleep out-of-doors, but may wish to isolate themselves from insects, snakes and other forest denizens which may roam the forest floor. For such purposes, an elevated bed, which is easily collapsible and portable, may be very useful. It also may be useful in rocky terrain, or in areas of thorns or burrs, which would otherwise contact the air mattress and possibly puncture it.

Generally, the less effort involved in constructing the bed, the more desirable the typical user would consider the bed to be. People who are contemplating retiring to bed are often already in a state of fatigue or unsteadiness in which the construction of a bed from a collapsed configuration to an expanded configuration may seem a daunting prospect. Therefore, a bed structure which requires minimal involvement by the user in its construction, or, even better, is largely self-erecting, would be very desirable in a variety of situations.

Thus there is a need for a collapsible bed which is elevated from contact with the ground or floor, and which is both very portable and comfortable for the user. There is also a need for a bed which requires minimal involvement by the user in its construction, or, even better, is largely self-erecting.

DISCLOSURE OF INVENTION

Accordingly, it is an object of the present invention to provide a bed that is collapsible and portable.

Another object of the invention is to provide a bed which stores in a very small space.

And another object of the invention is to provide a bed which uses an air mattress which is elevated up off the floor.

A further object of the invention is to provide a bed which requires a minimum of human effort to construct from a collapsed configuration to an expanded one.

An additional object of the invention is to provide a self-expanding bed in which the self-erecting mechanism is operated by remote control.

Briefly, one preferred embodiment of the present invention is a collapsible bed having an air mattress and a support frame. The frame includes a number of frame members, which are joined by pivot assemblies, such that the support frame as a whole expands outwardly from a central area, when a portion of the frame is pulled outwardly.

A second preferred embodiment is a self-expanding bed having an air mattress and an articulated support frame. The frame includes a number of frame members, which are joined by pivot assemblies, such that the support frame as a whole expands outwardly from a central area. The air mattress is attached to the support frame at a number of points, so that when the air mattress is inflated and expands outwardly, the support frame also expands outwardly. An electric air pump may also be included, which may be activated by a remote control, so that the bed is self-expanding.

An advantage of the present invention is that it uses an external frame and independent air mattress.

Another advantage of the invention is that the air mattress can be replaced if damaged, without replacing the whole bed.

And another advantage of the invention is that the frame is constructed with permanently joined members connected with pivot joints so that the frame collapses and expands as a unit, and requires very little construction or hunting for lost pieces.

An additional advantage of the invention is that it contains an air-pump which can be activated by a remote control to cause the pump to fill the mattress. The force of the air in the mattress as it expands causes the frame structure to expand and move from its collapsed to its expanded configuration, with minimal, or no manual effort by the user.

These and other objects and advantages of the present invention will become clear to those skilled in the art in view of the description of the best presently known mode of carrying out the invention and the industrial applicability of the preferred embodiment as described herein and as illustrated in the several figures of the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The purposes and advantages of the present invention will be apparent from the following detailed description in conjunction with the appended drawings in which:

FIG. 1 is an isometric view of the air bed with elevated support structure used in the preferred embodiment of the present invention;

FIG. 2 is an isometric view of the air mattress used in the preferred

embodiment of the present invention;

FIG. 3 is an isometric view of the frame structure used in the preferred embodiment of the present invention;

FIG. 4 is a top isometric view of the air bed with elevated support structure of the present invention;

FIG. 5 is a bottom isometric view of the air bed with elevated support structure of the present invention;

FIG. 6 is a detail view of the pivot assembly seen in detail circle A of Fig. 4;

FIG. 7 is a detail view of the pivot assembly seen in detail circle B of Fig. 4; FIG. 8 is a detail view of the pivot assembly seen in detail circle C of Fig. 4; FIG. 9 is a detail view of the pivot assembly seen in detail circle D of Fig. 5;

FIG. 10 is a detail view of the pivot assembly seen in detail circle E of Fig.5;

FIG.11 is a detail view of the pivot assembly seen in detail circle F of Fig. 5;

FIG. 12 is an isometric view of a self-expanding bed and frame, which is in a collapsed configuration;

FIG. 13 is an isometric view of a self-expanding bed and frame, which is in transition from a collapsed to an expanded configuration;

FIG. 14 shows an isometric view of the air mattress of the present invention; and

FIG. 15 is a detail view of the corner of the air mattress containing a pump and inflation port.

BEST MODE FOR CARRYING OUT THE INVENTION

A preferred embodiment of the present invention is an air bed with a support structure. As illustrated in the various drawings herein, and particularly in the view of FIG. 1, a form of this preferred embodiment of the inventive device is depicted by the general reference character **10**.

FIGS. 1-3 illustrates an air bed with an elevated support structure **10**, having generally an air bed **12** which includes an air mattress **14** (not visible in Fig. 1) and a fabric covering **16**, and a support frame **18**. The fabric covering **16** includes generally a bag enclosure **20** having an entry mouth **22** which is sealed with a closure fastener **24**, which is preferably a zipper **26**, but which is also possibly any conventional device such as Velcro, hook-and-eye fasteners, etc. The fabric covering **16** can be plastic, cloth, leather, etc. and encloses at least a portion of the air mattress **14**, shown in Fig. 2, which is inserted into the entry mouth **22**, either before or after inflation. The zipper **26** is then closed to complete the installation of the air mattress **14**. The air mattress **14** can also be removed as desired through the same entry mouth **22**, again, either before or after the air mattress **14** is deflated. The air mattress **14** preferably has a number of cells **28** and at least one inflation port **30** through which air is introduced to inflate the air mattress **14**. The fabric covering **16** need not completely enclose the entire air mattress, but may enclose only a portion or portions such as the ends or sides of the air mattress **14**.

FIG. 3 shows the articulated support frame **18** which includes a number of frame members **32** which are attached to each other at pivots **34**, some of which are positioned at the midpoints of the frame members **32,** and some of which are included in pivot assemblies **36** in the feet **38** and upper connector assemblies **40**. These pivot assemblies **36** and pivots **34** connect all the frame

members **32** to each other, so there are no loose pieces to be gathered and assembled. The frame can be thought of as an extended scissors-frame assembly **33** since the tops and bottoms of each pair of frame members **32** scissor together or apart. These scissor pairs **35** are then joined in an extended assembly where the ends of multiple pairs **35** are joined at the pivot assemblies **36**. They also allow the frame **18** as a whole to be collapsed or expanded in a very easy and efficient manner. Force directed at any one of the corners causes movement in all the other corners, so that there is movement of the whole frame in either an inward or outward direction, relative to a central area. The pivots **34** allow the frame structure **18** to move towards a central area **42** from all sides as a unit when the frame **18** is to be collapsed, and to move away from this central area **42** when expanding.

This configuration will be spoken of as "expanding outwardly from a central area", although it is to be understood that one of the feet may actually remain in fixed position, while the remainder of the feet move outward. In other words, the central reference area from which the feet move, may itself move laterally. One example of this occurs when the collapsed support frame is placed in the corner of a room, where, say, the left rear foot of the frame is in the left rear corner of the room, and thus is constrained from movement in a further leftward or rearward direction. When the frame expands, all the other, non-constrained feet will expand outwardly from a central area to the right, or forward, or both, even as the central area itself will move to the right and forward, relative to the immobile left rear foot.

It should also be understood that all the lines of direction of the movement of the feet are not expected to intersect at a precise point. The central area **42** is thus a relatively small region from which the feet **38** move outwardly, but there should be no inference that all feet must move in a specific lines, such as radially from a single specific center point. To one skilled in the art, it will be apparent that if such precise directionality were attempted, manufacturing

errors would inevitably introduce variations. Thus, the expansion is considered to move outwardly from a central area or region, and should not be construed to imply any particular lines of direction, other than generally outward from this central area. The direction arrows and central area **42** shown in Fig. 3, and later in Figs. 12 and 13 below, are therefore not provided to show specific lines of movement which must be followed, but merely a general direction of movement towards, or away from, a general central area **42**.

The articulated frame **18** also optionally includes support webbing **44**, which may have hooks (not shown) which anchor the support webbing to the frame members **32** and/or the upper connector assemblies **40**, and may also have attachment points (not shown) for securing the fabric covering **16** to the webbing **44** and thus to the frame **18**.

FIGS. 4 and 5 show closer views of the assembled air bed **10** in which several of the pivot assemblies **36** are selected for detail views in detail circles **A-F.** The pivot assemblies **36** of the feet **38** and the upper connector assemblies **40** in this embodiment are made to receive 4 connections and thus will be called four-pivot connectors **46**. These are preferably reversible, so that the same four-pivot connector **46** can be used as a foot **38** and as an upper connector assembly **40**, thus making for uniformity, and ease of manufacturing. The frame members **32** too are preferably interchangeable and of uniform length, with the exception of the corner uprights **48**, which are positioned in each of the four corners. These are composed of two or more corner members **50**, which may slide within each other in order to extend or contract in length. This is desirable because when the frame **18** is in collapsed position, the corner uprights **48** must be of greater length than when the frame **18** is expanded. In the expanded position therefore, one of the corner members will preferably slide within the other, as shown in Figs. 6 and 10 below.

FIG. 6 illustrates a foot **38**, a type of four-pivot connector **46**, which is seen in detail circle **A** of Fig. 4. Frame members **32**, pivots **34**, and corner upright **48** and its included corner members **50** are shown.

FIG. 7 shows a foot **38**, a type of four-pivot connector **46**, which is seen in detail circle **B** of Fig. 4. Frame members **32**, and pivots **34** are also shown.

FIG. 8 illustrates a foot **38**, a type of four-pivot connector **46**, which is seen in detail circle **C** of Fig. 4. Frame members **32**, and pivots **34** are shown.

FIG. 9 shows an upper connector assembly **40**, a type of four-pivot connector **46**, which is seen in detail circle **D** of Fig. 5. Frame members **32**, corner upright **48** and its included corner member **50** are also shown.

FIG. **10** illustrates a foot **38**, a type of four-pivot connector **46**, which is seen in detail circle **E** of Fig. 5. Frame members **32**, corner upright **48**, pivots **34** and its included corner members **50** are shown.

FIG. **11** shows an upper connector assembly **40**, a type of four-pivot connector **46**, which is seen in detail circle **F** of Fig. 5. Frame members **32**, and pivots **34** are also shown.

Referring now also to Figs. 1 and 2, thus the assembly sequence allows for the support frame **18** to be placed upright, expanded, the fabric covering **16** attached to the frame **18** and the air mattress **14** inserted into the entry mouth **22** of the bag enclosure **20**, and the fastener **24** closed, and the bed is ready to receive bed clothes, or be otherwise used.

A useful variation on this invention is an air-bed with a self-expanding support structure. This is shown in FIG. 12 as element **100**. The structure and

elements are much the same, and when elements correspond to those used previously, the same element numbers will be used.

The air-bed **12** with air mattress **14** is attached to a support frame **18**, either directly, or preferably through a bag enclosure **20**. The attachment may be permanent or removable, by such conventional means as buttons, snaps, Velcro®, etc., but it is important that the air mattress **14**, as it expands, is attached at multiple points to the frame **18**, so that the frame **18** is urged to move with the expansion of the air mattress **14**, as discussed below. There is a fabric covering **16** as described previously, which may also be the bag enclosure **20**, which protects the air mattress **14** from damage at points where it is rubbed against the frame structure **18** while inflating or deflating.

An air pump **60** is connected to an inflation port **30**. The air pump **60** is electrically operated, and can be powered either by wall current or by batteries. If batteries are used, they may be included in a battery pack (not shown). The air pump **60** preferably includes a sensor **62**, which can be operated by a beam **66** or communicating means from a remote control **64**. The beam **66** or communicating means is preferably cordless, such as radio or infra-red diode laser beam, etc. The remote control **64** preferably has an on-off button **68**, which activates and deactivates the electric pump **60**. This remote control **64** is by no means a necessity, and the air pump **60** will preferably have a manual on-off switch **70** for back-up operation if the remote **64** is misplaced or the remote's batteries are low, or if the bed **100** is designed not to be operated by remote control at all.

In operation, the bed **100** will be assumed to start in a collapsed configuration **72**, as in Fig. 12. The mattress **14** is squeezed together and is generally surrounded by the support frame **18**, the frame **18** previously having been drawn together towards the central area **42**, discussed above. The frame **18** is set upon its feet **38**, and the air pump **60** is activated, either by operation of

a manual on-off switch, or by pressing the button **68** on a remote control **64**. The air pump **60** begins filling the air mattress **14** which then begins to expand generally out from the central area **42**, as indicated by the direction arrows **76** in Fig. 13. As the mattress **14** expands it presses on the members of the frame **18**, which pushes them also in the direction away from the central area **42**. The feet **38** may be optionally fitted with low friction pads which can thus slide across floor surfaces, or may also be fitted with wheels to allow the frame **18** to expand easily and without hindrance.

The air pump **60** may be permanently attached to the mattress **14**, or it may be removable in order to allow access to the inflation port **30** by either a hand pump or by mouth in case electrical power is unavailable for the electrical pump **60**, or if it breaks down.

FIG. 14 shows an isometric view of an air mattress **14** and air pump **60** which has been attached to the inflation port **30** of the air mattress **14**. FIG. 15 shows a detail view of the inflation port **30** from which the air pump **60** has been removed. Referring to both Figs. 14 and 15, the air mattress **14** preferably has a recess area **78** into which the inflation port **30** has been seated. This recess area **78** allows the air pump **60** to fit smoothly without extending far beyond the perimeter of the mattress **14**, thus protecting it from being bumped or knocked away from its position at the inflation port **30**. Thus, the air pump **60** can be maintained in position after the inflation is complete. Of course, the use of a recess area is optional and should not be considered as a limitation. Also, the air pump **60** may be made to be routinely removed after operation. In this case a self-sealing valve (not shown) is provided for the air mattress **14**. A manual on-off switch **70** is also shown, which is preferably included even when the pump **60** is expected to be operated by remote control.

Another optional feature is a secondary inflation port **80**, which may be used for attachment of a manual air pump or for inflation by lung power. This

may be a conventional air valve as generally used in air mattresses. It may also be used as a venting port **82** for allowing air pressure out of the mattress **14** if the air pump **60** is to be maintained in position, perhaps permanently.

The preferred embodiment **100** of this invention uses an air pump **60** which is removable. The air pump **60** and inflation port **30** are preferably fitting with a friction lock (not visible) similar to those used to attach lens to cameras, and which forms an airtight seal between the two parts.

The pump **60** also preferably contains a pressure sensor or self-regulator (not visible) which detects or acts when the air pressure in the mattress **14** has reached a predetermined level, and which then shuts off the air pump **60**. This is also not a required feature and should not be construed as a limitation.

As mentioned above, the electrical air pump **60** may be operated from batteries, perhaps from a battery pack. The bed **100** is thus usable in the outdoors or in a cabin which is not equipped with power lines.

While various embodiments have been described above, it should be understood that they have been presented by way of example only, and not limitation. Thus, the breadth and scope of a preferred embodiment should not be limited by any of the above described exemplary embodiments, but should be defined only in accordance with the following claims and their equivalents.

INDUSTRIAL APPLICABILITY

The embodiments of the present invention **10, 100** present an easy and attractive way of providing bedding for overnight guests or visitors. The articulated support frame **18** which includes a number of frame members **32** which are attached to each other at pivots **34**, which are positioned at the midpoints of the frame members **32** and at pivot assemblies **36** in the feet **38**

and upper connector assemblies **40**. These pivot assemblies **36** and pivots **34** connect all the frame members **32** to each other, so there are no loose pieces to be gathered and assembled. They also allow the frame **18** as a whole to be collapsed or expanded in a very easy and efficient manner. Force directed at any one of the corners causes movement in all the other corners, so that there is movement of the whole frame in either an inward or outward direction, relative to a central area **42**. The pivots **34** allow the frame structure **18** to move towards a central area **42** from all sides as a unit when the frame **18** is to be collapsed, and to move away from this central area **42** when expanding.

In operation, the bed **10, 100** will be assumed to start in a collapsed configuration **72.** The mattress **14** is squeezed together and is generally surrounded by the support frame **18**, the frame **18** previously having been drawn together towards the central area **42**, discussed above. The air mattress **14** is preferably attached to the frame **18** at multiple points, either directly, or by being at least partially enclosed by a fabric covering **16** which is, in turn, attached at multiple points to the frame **18**. The frame **18** is set upon its feet **38**, and inflated, either by the user's lung power or by activation of an electric pump **60**. If the preferred air pump **60** is used, it is activated, either by operation of a manual on-off switch, or by pressing the button **68** on a remote control **64**. The air pump **60** begins filling the air mattress **14** which then begins to expand generally out from the central area **42**. As the mattress **14** expands it presses laterally on the members of the frame **18**, which pushes them also in the direction away from the central area **42**. The feet **38** may be optionally fitted with low friction pads which can thus slide across floor surfaces, or may also be fitted with wheels to allow the frame **18** to expand easily and without hindrance.

The present invention **10, 100** will find much application in user's homes, in commercial travel lodges, such as hotels, etc. where an extra bed may be needed, and may also find use in business offices to replace the occasional folding cot presently used by workaholics.

For the above, and other, reasons, it is expected that the air bed with elevated and self-expanding support structure **10, 100** of the present invention will have widespread industrial applicability. Therefore, it is expected that the commercial utility of the present invention will be extensive and long lasting.

IN THE CLAIMS

What is claimed is:

1. A collapsible bed comprising:

an air mattress; and

a support frame, including a plurality of frame members, each frame member having an upper end and a lower end, said upper ends of said frame members being pivotally attached to upper connector assemblies, and said lower ends being pivotally attached to feet, such that the support frame as a whole expands outwardly from a central area.

2. The collapsible bed of claim 1, wherein:

said air mattress is attached to said support frame at a plurality of points, so that when said air mattress is inflated and expands outwardly, said support frame also expands outwardly.

3. The collapsible bed of claim 1, further comprising:

a fabric covering, which encloses a portion of said air mattress, said fabric covering being attached to said support frame at a plurality of points, so that when said air mattress is inflated and expands outwardly, said fabric covering expands outwardly, causing said support frame to also expand outwardly.

4. The collapsible bed of claim 1, further comprising:

support webbing positioned between said air mattress and said support frame.

5. The collapsible bed of claim 2, wherein:
said air mattress is releasably attached.

6. The collapsible bed of claim 3, wherein:
said fabric covering is releasably attached.

7. The collapsible bed of claim 1, further comprising:
an electric pump, which pumps air at higher than ambient pressure into said air mattress.

8. The collapsible bed of claim 7, wherein:
said electric pump is remote controlled.

9. The collapsible bed of claim 7, further comprising:
a pressure sensor, which serves to deactivate said electric pump when a pre-determined pressure level of air within said mattress has been reached.

10. The collapsible bed of claim 7, wherein:
said electric pump is detachably secured to said air mattress.

11. The collapsible bed of claim 1, wherein:
said frame members include feet at their lower ends, and further comprising low friction devices attached to the lower ends of said frame members to allow the frame to expand easily and with minimal frictional opposition.

12. The collapsible bed of claim 11, wherein:
said low friction devices are chosen from a group consisting of low friction pads and wheels.

13. The collapsible bed of claim 1, further comprising:
primary and secondary inflation ports.

14. The collapsible bed of claim 1, wherein said support frame further comprises:
corner uprights to support corners of said support frame, said corner uprights including corner members which extend vertically as said support frame is collapsed toward said central area.

15. A self-expanding bed comprising:
an air mattress;
an articulated support frame, including a plurality of frame members, said frame members being joined by pivot assemblies, such that the support frame as a whole expands outwardly from a central area; and
said air mattress is attached to said support frame at a plurality of points, so that when said air mattress is inflated and expands, said fabric covering expands, causing said support frame to also expand.

16. The self-expanding bed of claim 15, wherein:
said air mattress is attached to said support frame through use of a fabric covering, which encloses a portion of said air mattress, said fabric covering being attached to said support frame at a plurality of points, so that when said air mattress is inflated and expands outwardly, said fabric covering expands outwardly, causing said support frame to also expand outwardly.

17. The self-expanding bed of claim 16, wherein:
said fabric covering is releasably attached.

18. The self-expanding bed of claim 15, further comprising:

support webbing positioned between said air mattress and said support frame.

19. The self-expanding bed of claim 15, further comprising:

an electric pump, which pumps air at higher than ambient pressure into said air mattress.

20. The self-expanding bed of claim 19, wherein:

said electric pump is remote controlled.

21. The self-expanding bed of claim 19, further comprising:

a pressure sensor, which serves to deactivate said electric pump when a pre-determined pressure level of air within said mattress has been reached.

22. The self-expanding bed of claim 19, wherein:

said electric pump is detachably secured to said air mattress.

23. The self-expanding bed of claim 15, wherein:

said frame members include feet at their lower ends, and further comprising low friction devices attached to the lower ends of said frame members to allow the frame to expand easily and with minimal frictional opposition.

24. The self-expanding bed of claim 15, wherein said support frame further comprises:

corner uprights to support corners of said support frame, said corner uprights including corner members which extend vertically as said support frame is collapsed toward said central area.

25. A self-expanding bed comprising:

an air mattress;

an articulated support frame, including a plurality of frame members, each frame member having an upper end and a lower end, said upper ends of said frame members being pivotally attached to upper connector assemblies, and said lower ends being pivotally attached to feet, such that the support frame as a whole expands outwardly from a central area;

a fabric covering, which encloses a portion of said air mattress, said fabric covering being attached to said support frame at a plurality of points, so that when said air mattress is inflated and expands, said fabric covering expands, causing said support frame to also expand;

support webbing positioned between said air mattress and said support frame: and

said frame members include feet at their lower ends, and further comprising low friction devices attached to the lower ends of said frame members to allow the frame to expand easily and with minimal frictional opposition.

26. The self-expanding bed of claim 25, wherein said support frame further comprises:

corner uprights to support corners of said support frame, said corner uprights including corner members which extend vertically as said support frame is collapsed toward said central area.

27. A method of installing a collapsible bed, comprising the steps of:

A) providing a collapsible bed having an air mattress and a support frame, said support frame including a plurality of frame members, said frame

members being joined by pivot assemblies, such that the support frame as a whole expands outwardly from a central area; and

B) expanding said collapsible bed outwardly from said central area.

28. The method of installing a collapsible bed of claim 27, wherein step B includes:

a) grasping said support frame at some point and pulling outward from said central area, thus causing said support frame to expand outwardly as a whole from said central area; and

b) inflating said air mattress.

29. The method of installing a collapsible bed of claim 27, wherein said air mattress is attached to said support frame at a plurality of points, so that when said air mattress is inflated and expands outwardly, said support frame also expands outwardly, wherein step B includes:

a) introducing air at pressure higher than ambient pressure into said air mattress thus causing air mattress to inflate and expand outwardly, causing said attached support frame to expand outwardly as a whole from said central area.

30. The method of installing a collapsible bed of claim 29, wherein:
said air at higher than ambient pressure is introduced by an electric pump.

31. The method of installing a collapsible bed of claim 30, wherein:
said electric pump is remote controlled.

32. The method of installing a collapsible bed of claim 29, wherein:
said air mattress is attached to said support frame through use of a fabric covering, which encloses a portion of said air mattress, said fabric covering

being attached to said support frame at a plurality of points, so that when said air mattress is inflated and expands outwardly, said fabric covering expands outwardly, causing said support frame to also expand outwardly.

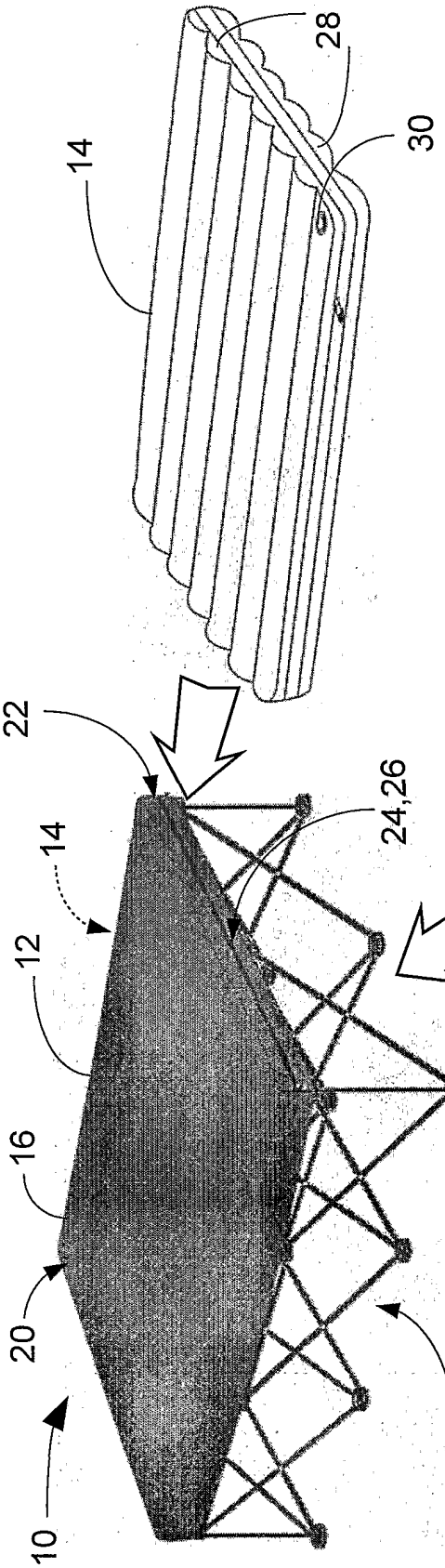

FIGURE 1

FIGURE 2

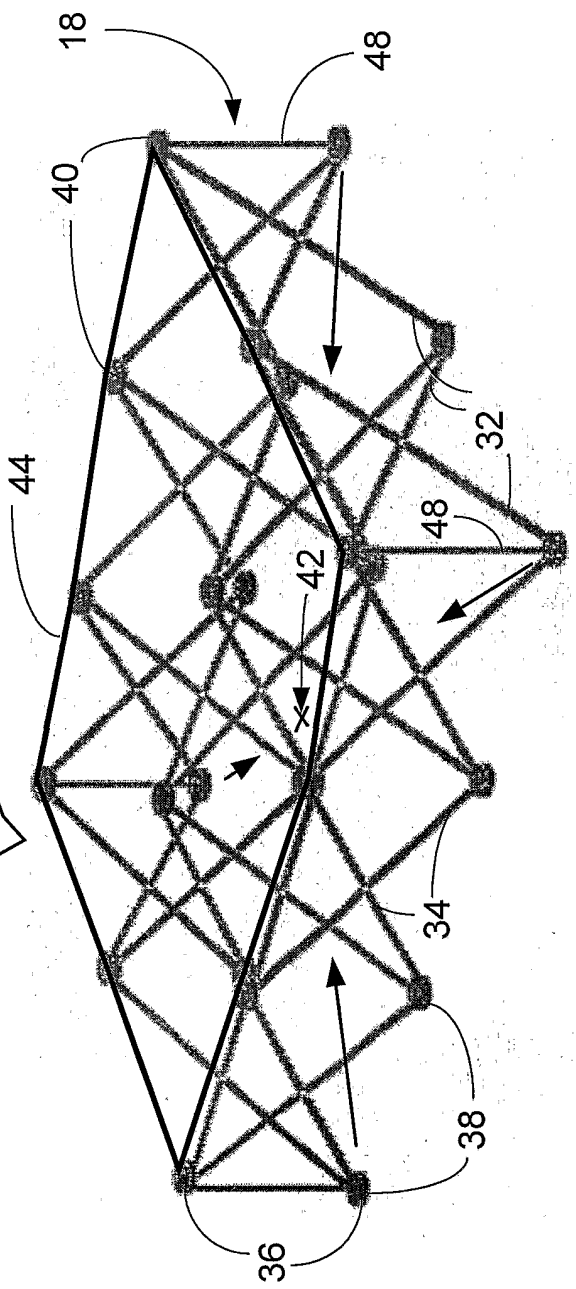

FIGURE 3

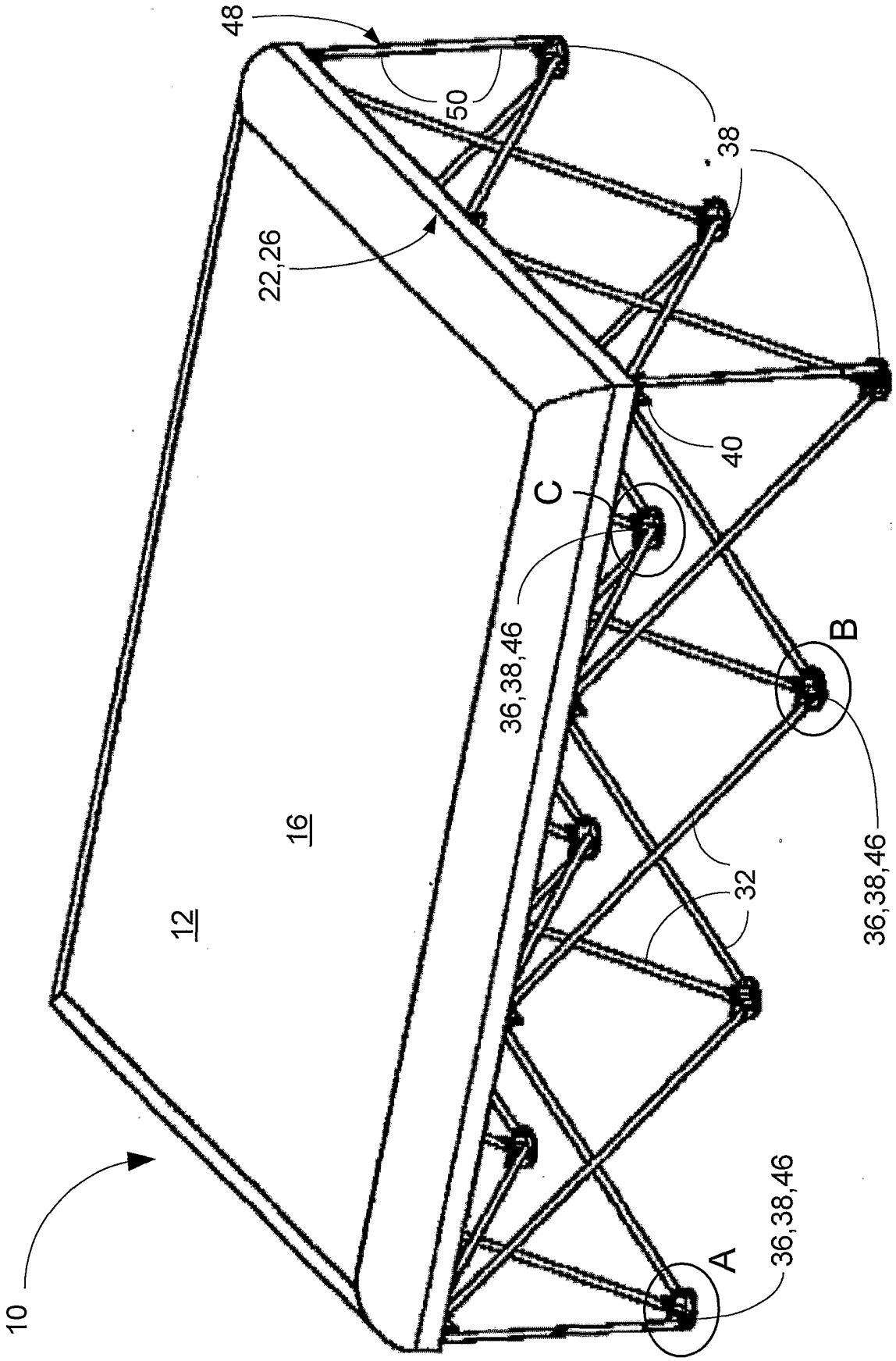

FIGURE 4

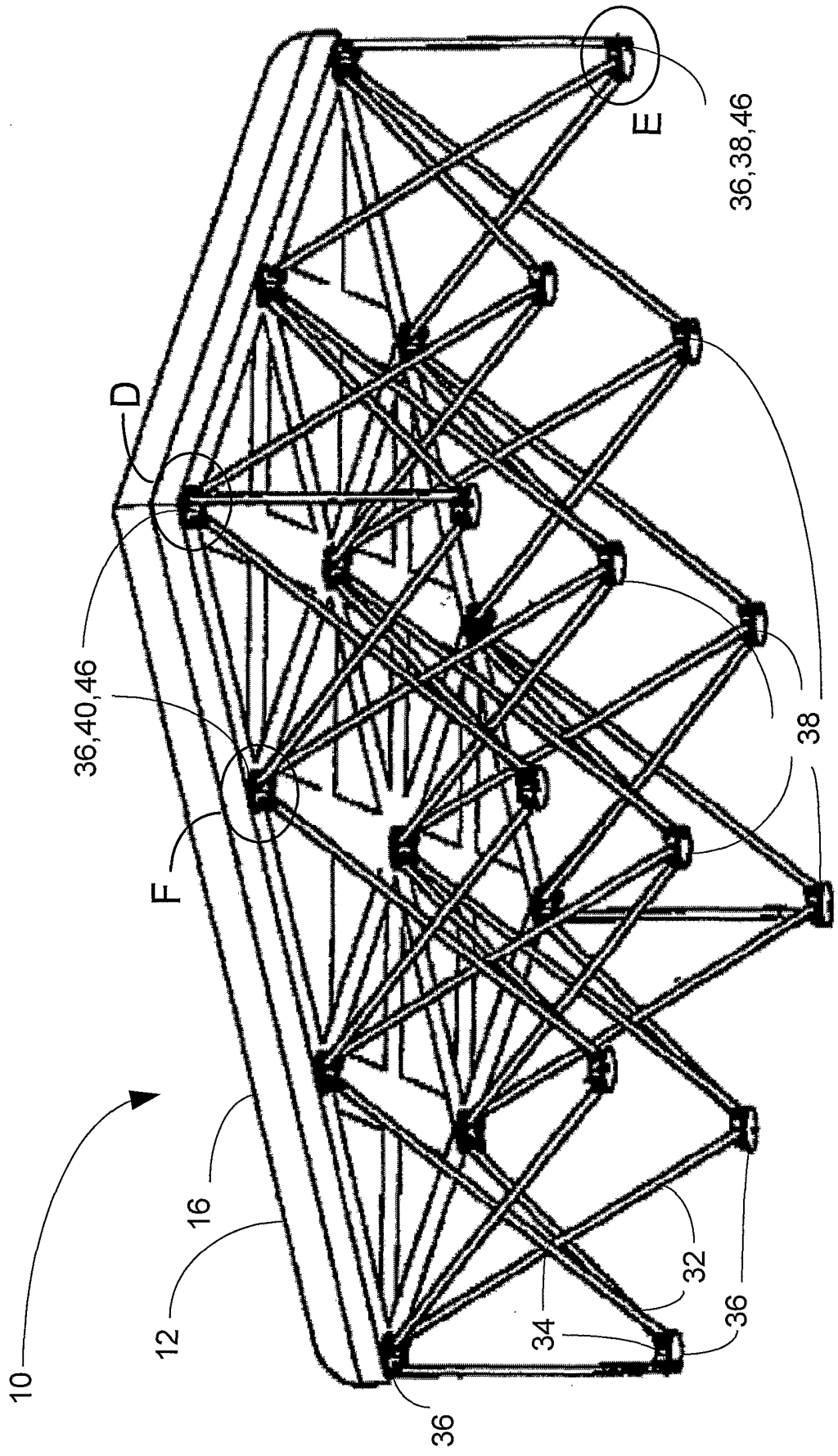

FIGURE 5

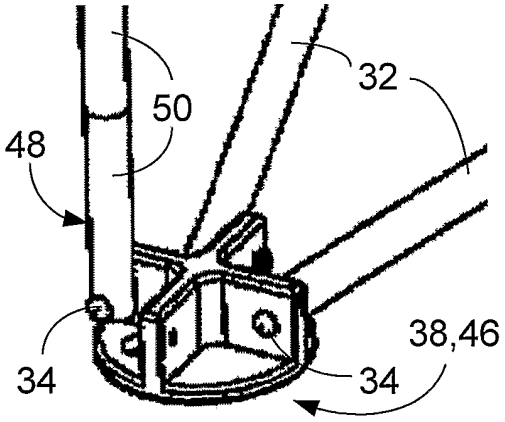

FIGURE 6

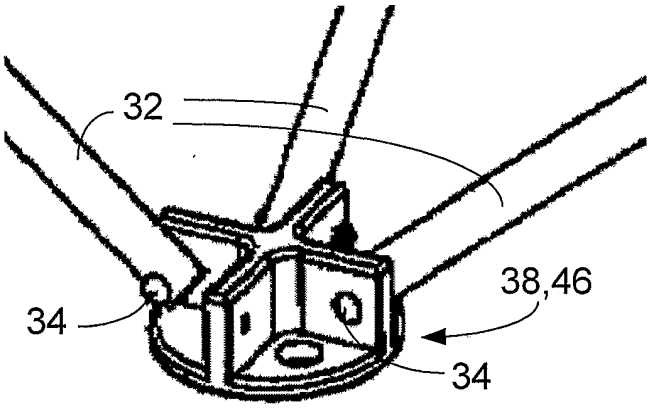

FIGURE 7

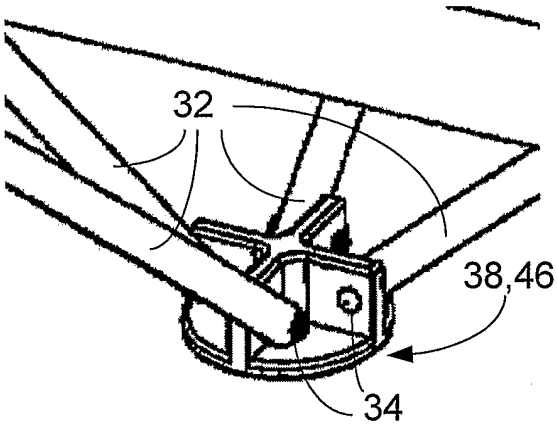

FIGURE 8

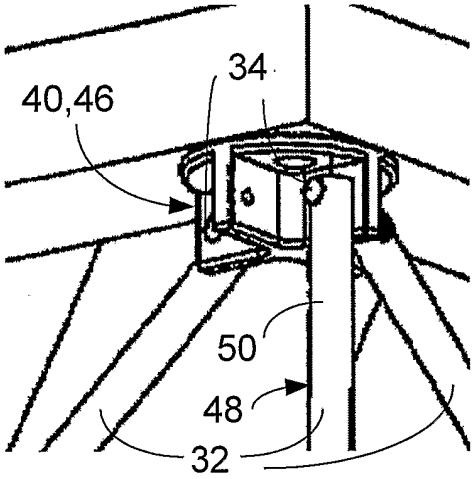

FIGURE 9

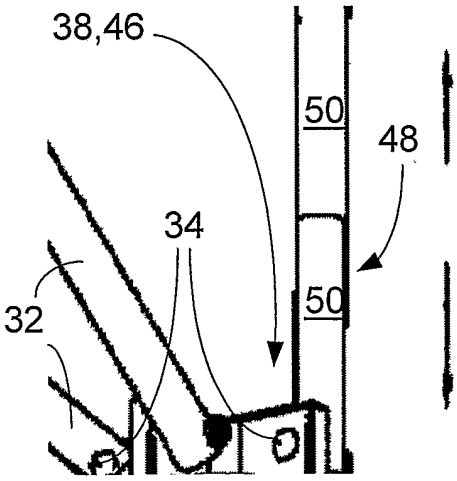

FIGURE 10

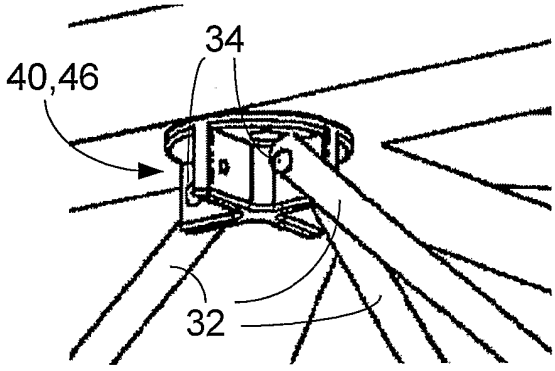

FIGURE 11

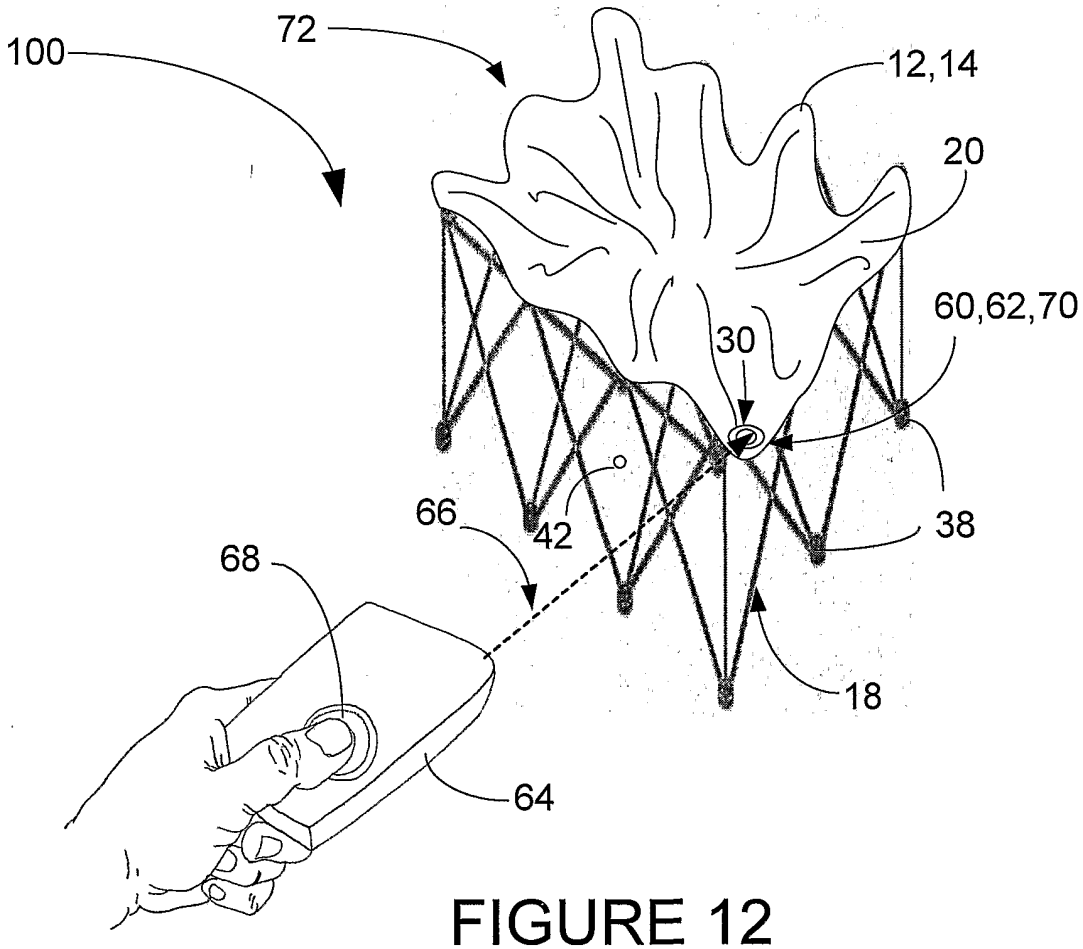

FIGURE 12

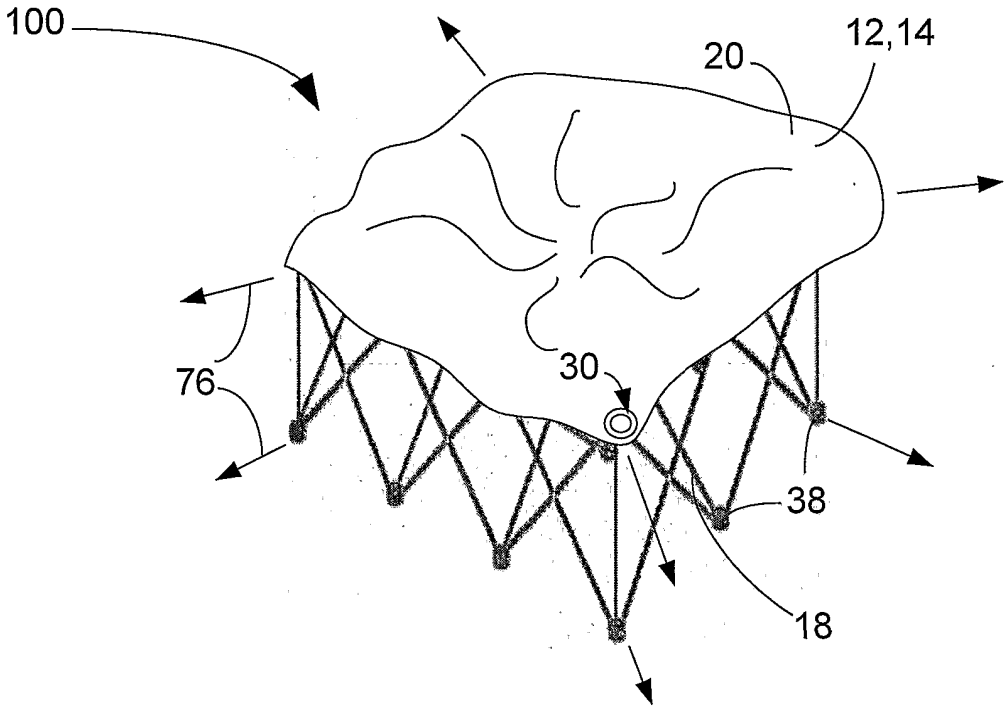

FIGURE 13

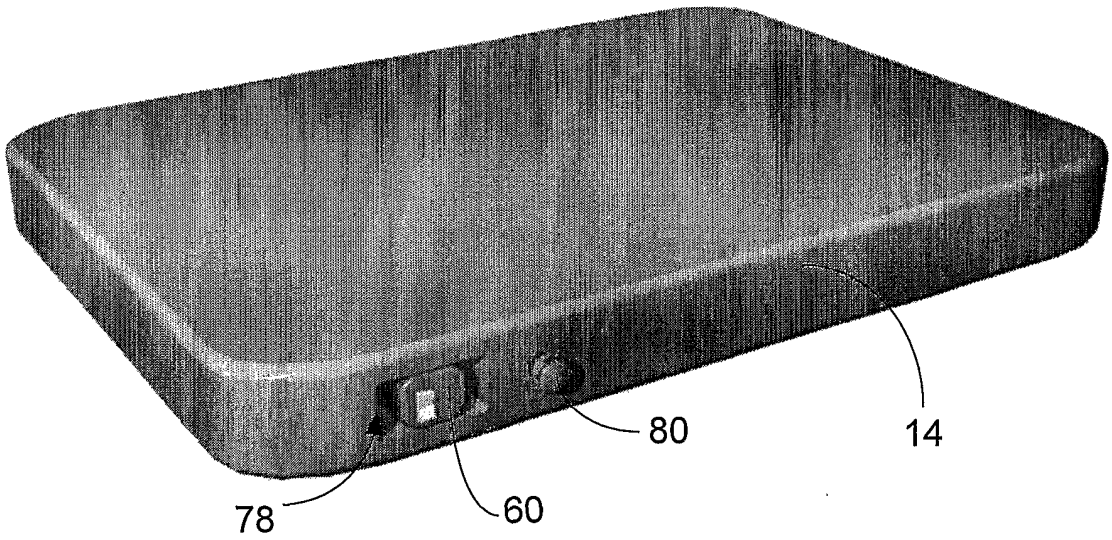

FIGURE 14

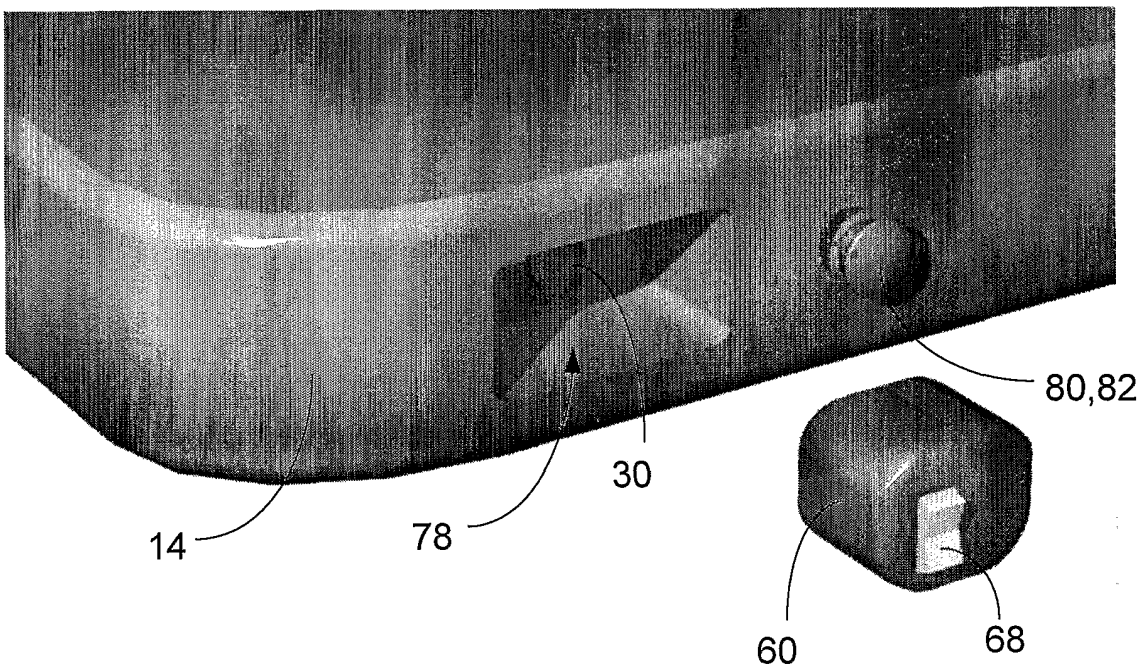

FIGURE 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/22535

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A47C 17/64, 19/12, 27/08
US CL : 5/112, 114, 115, 706, 708, 713

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)
U.S. : Please See Continuation Sheet

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 practicable, search terms used)
Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 4,594,743 A (OWEN et al) 17 June 1986 (17.06.86), column 1, lines 54-60, column 2, lines 12-24 & 62-66, column 3, lines 33-48, column 4, lines 5-43 & 64-68, column 5, lines 1-16 & 21-31.	1, 2, 4, 5, 7, 10, 14, 15, 18, 19, 22, 24, 27-30 --- 3, 6, 8, 9, 11-13, 16, 17, 20, 21, 23, 25, 26, 31, 32
Y	US 3,959,835 A (NOS) 01 June 1976 (01.06.1976), column 3, lines 37-46.	3, 6, 16, 17, 32
Y	US 5,020,176 A (DOTSON) 04 June 1991 (04.06.1991), column 5, lines 20-51, column 6, lines 5-33.	8, 9, 20, 21, 31
A, T	US 6,287,095 B1 (SAPUTO et al) 11 September 2001 (11.09.2001).	7, 10, 19, 22, 29, 30
A, P	US 6,202,239 B1 (WARD et al) 20 March 2001 (20.03.2001).	7, 8, 10, 19, 20, 22, 29-31
A	US 6,058,537 A (LARSON) 09 May 2000 (09.05.2000).	7, 8, 10, 19, 20, 22, 29-31

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent 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	Date of mailing of the international search report
17 November 2001 (17.11.2001)	28 DEC 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703)305-3230	Authorized officer Robert G. Santos Telephone No. (703) 308-1113

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/22535

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,037,723 A (SHAFER et al) 14 March 2000 (14.03.2000).	7, 8, 10, 19, 20, 22, 29-31
A	US 5,903,941 A (SHAFER et al) 18 May 1999 (18.05.1999).	7, 8, 10, 19, 20, 22, 29-31
A	US 5,652,484 A (SHAFER et al) 29 July 1997 (29.07.1997).	7, 8, 10, 19, 20, 22, 29-31
A	US 5,509,154 A (SHAFER et al) 23 April 1996 (23.04.1996).	7, 8, 10, 19, 20, 22, 29-31
A	US 4,890,344 A (WALKER) 02 January 1990 (02.01.1990).	7, 8, 10, 19, 20, 22, 29-31
A	US 4,694,515 A (ROGERS, Jr) 22 September 1987 (22.09.1987).	1, 2, 5, 13, 15, 16, 25, 27-29
A	US 4,442,556 A (CRAIGIE) 17 April 1984 (17.04.1984).	1-3, 5, 6, 13, 15-17, 25, 27-29, 32
A	US 4,169,295 A (DARLING) 02 October 1979 (02.10.1979).	1, 2, 5, 7, 10, 15, 19, 22, 25, 27-30
A	US 3,967,330 A (ZAWADOWSKY) 06 July 1976 (06.07.1976).	1, 4, 15, 18, 25
A	US 3,045,257 A (KNAPP) 24 July 1962 (24.07.1962).	1, 2, 5, 15, 25, 27-29
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A	US 2,253,801 A (NEAL) 26 August 1941 (26.08.1941).	3, 16, 25, 32
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A	US 1,317,235 A (STONEBRIDGE) 30 September 1919 (30.09.1919).	3, 16, 25, 29, 32
A	US 1,185,568 A (ZEUNERT) 30 May 1916 (30.05.1916)	1, 14, 15, 24-26
A	FR 2554335 A (WAYSER) 03 November 1983 (03.11.1983).	1, 2, 4, 5, 15, 18, 25, 27-29
A	IT 329338 A (LUONI) 05 September 1935 (05.09.1935).	1, 14, 15, 24-26

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/22535

Continuation of B. FIELDS SEARCHED Item 1:
5/112, 114, 115, 706, 708, 713, 116, 117, 174, 175, 176.1, 177, 181, 182, 184, 710, 644, 654, 655.3, 737, 738, 482, 496, 499, 659, 925, 926

Continuation of B. FIELDS SEARCHED Item 3:
EAST
search terms: remote control, (5/706 or 5/710 or 5/713).ccls.