

United States Patent

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793,687, Jan. 24, 1969, now abandoned.

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[54] **LIQUID SUPPORT FOR HUMAN BODIES**
5 Claims, 12 Drawing Figs.

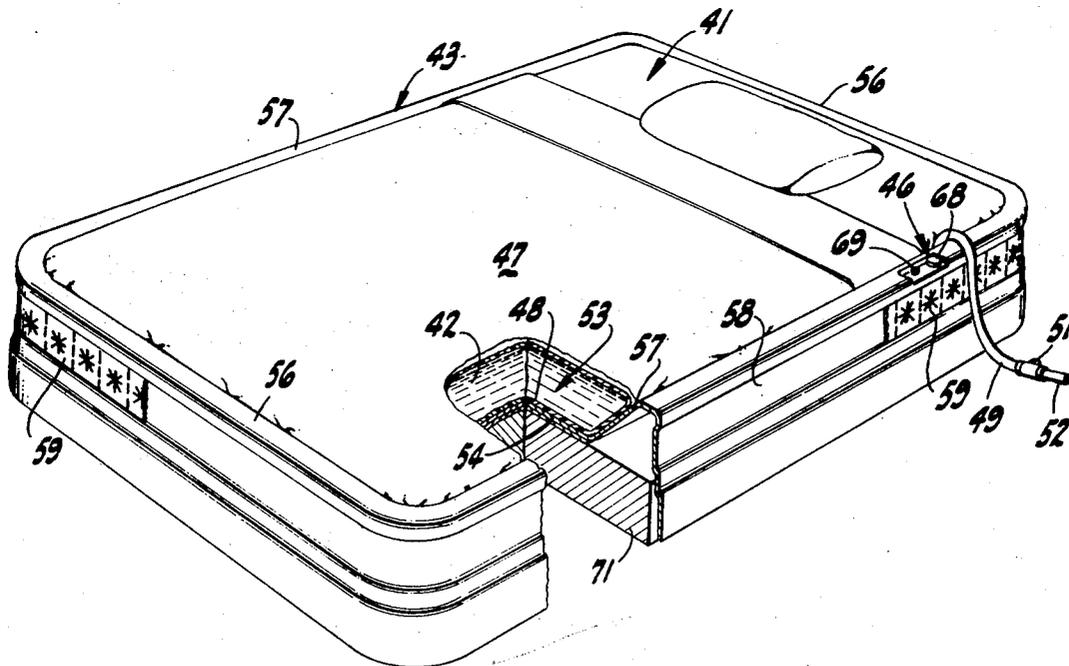
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A61h 9/00
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220/85—88

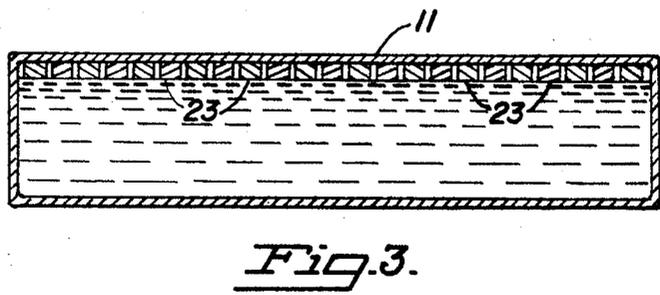
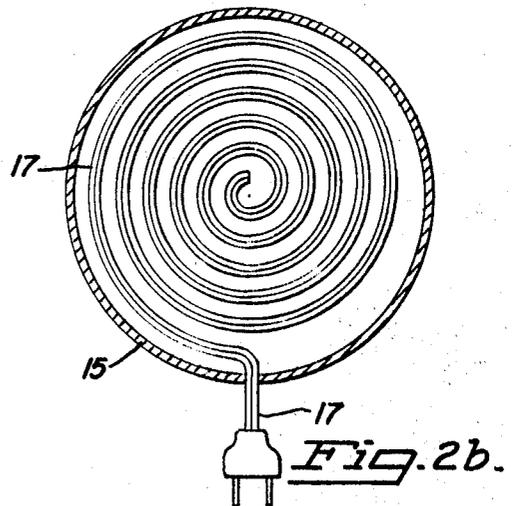
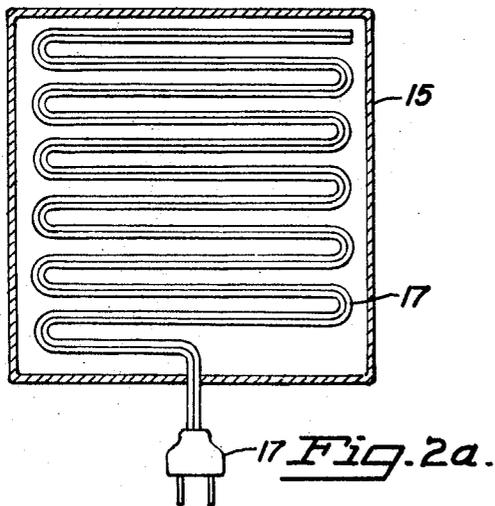
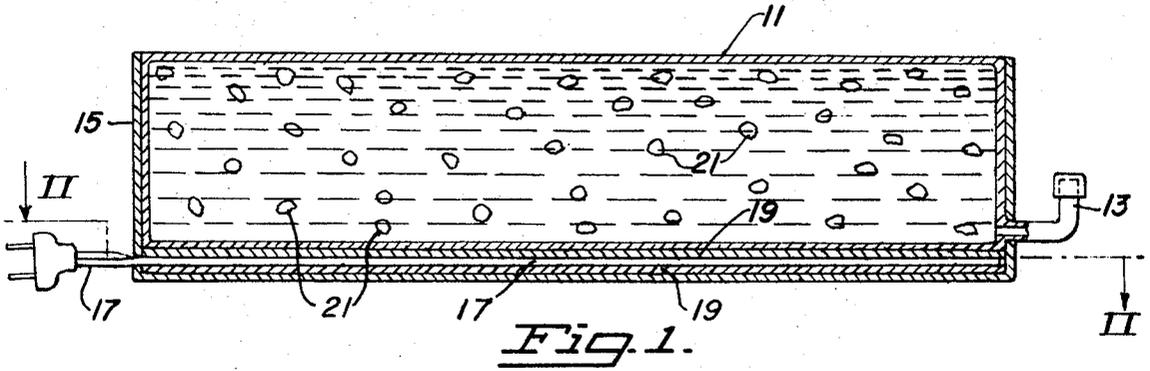
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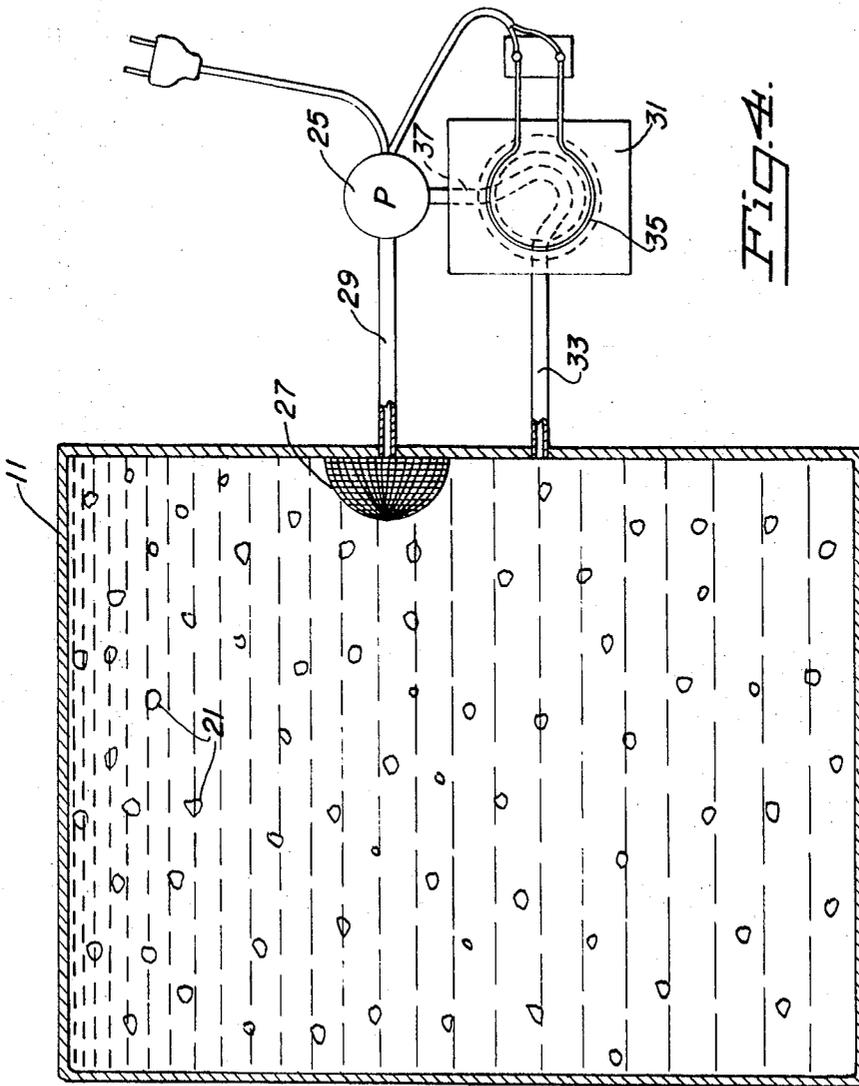
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ABSTRACT: An article of furniture comprising a flexible bladder which is substantially filled with a liquid. A supporting framework is provided for holding the liquid filled bladder in such manner that a body resting upon the bladder is floatably supported by the liquid. Heating means is provided for maintaining a temperature of the liquid at a temperature on the order of the Temperature of the human body. In some embodiments, solid particles, such as styrofoam, are disposed in the bladder to dampen shock waves in the liquid and to provide additional support for a body resting upon the bladder.





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FIG-5

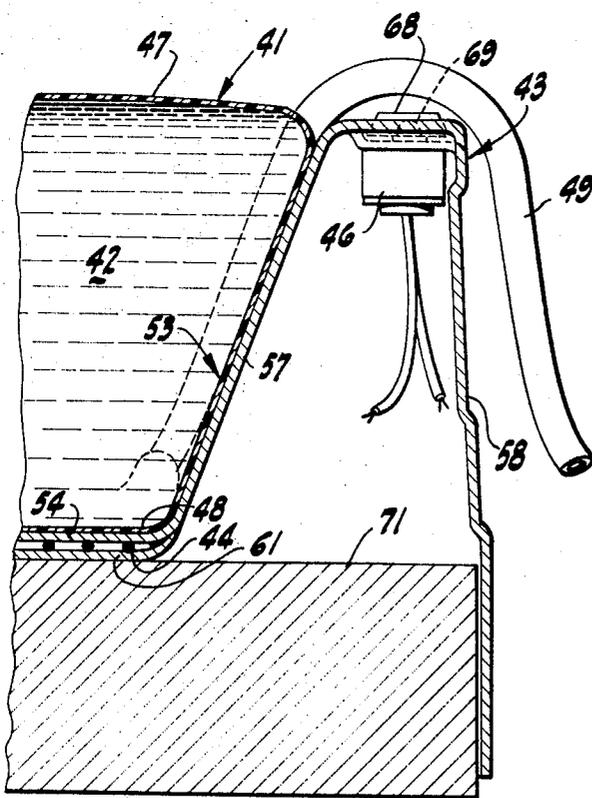
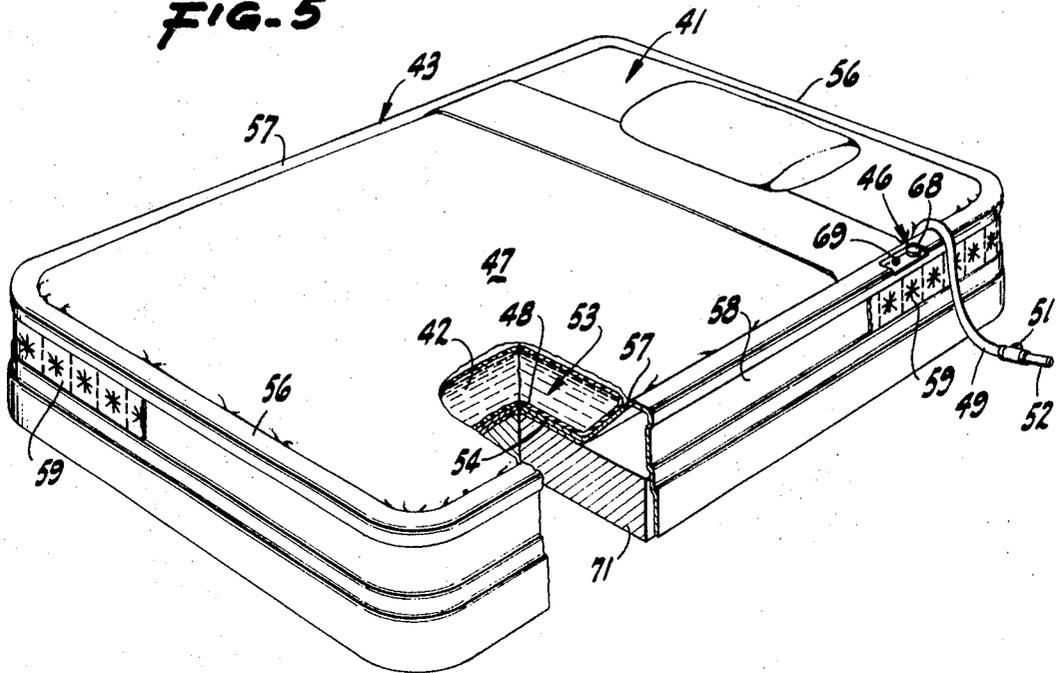


FIG-6

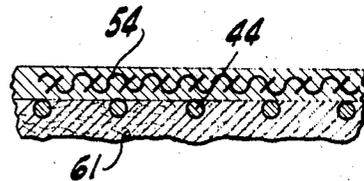


FIG-7

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LIQUID SUPPORT FOR HUMAN BODIES

Cross-REFERENCE TO RELATED APPLICATIONS

This application is a continuation-in-part of copending application Ser. No. 793,687, filed Jan. 24, 1969 now abandoned.

BACKGROUND OF THE INVENTION OF THE INVENTION

Furniture produced today, regardless of its design, is sold primarily on the merits of its appearance, rather than its function, and tradition dictates how it should look and how it should be used.

Most objects of furniture upon which people are expected to sit or recline are rather hard and uncomfortable. Although people often believe that certain chairs, sofas, beds, etc. are comfortable, there are no such articles presently available which do not force the person to stand and walk around, change position, or roll over after some period of time due to the fact that even the most comfortable furniture is hard upon the muscles of the body and tends to restrict blood circulation.

As an example, most chairs have shapes governed by a single design. This is due to the fact that wood was the first material utilized in furniture production and its grain patterns allow easy fastening of pieces to one another at predetermined angles. This design limitation has been carried over into today's designs which utilize materials which are entirely free of the restrictions imposed by wood.

These concepts force people to "mold" their own shape to that of the piece of furniture they are using and to try to relax even though it may be uncomfortable. When people sit or recline on any object, they usually spend several moments attaining a relatively comfortable position and then must become engrossed in thought or conversation to be able to forget the discomfort they still suffer.

A very good example of this concept is found in watching a small child who is forced to remain on a chair. Since his attention span is rather short, thereby making it difficult to become engrossed in something for any length of time, he soon begins to fidget. This occurs, first because he is restless, and second because he is uncomfortable and unable to dismiss the discomfort from his conscious awareness.

SUMMARY AND OBJECTS OF THE INVENTION

The instant invention embodies a new concept in furniture by providing a yieldable support material which absorbs or damps shocks while supporting a membranelike flexible material upon which a person may sit, recline, etc. The flexible material allows the person using the furniture to be supported by the yieldable material with equal force throughout the entire area of contact. Utilizing a liquid, as the yieldable material, the person experiences many of the same sensations experienced while floating in water. The single notably absent sensation is that of getting wet, because of the presence of membranelike material.

Articles of furniture manufactured in accordance with the teachings of this invention are truly three-dimensional articles which depart from the conventional designs which have long attempted to fit two basically flat planes—that of the body and that of the furniture—together, in attempting to make a person comfortable. The body contour support is "alive" in that it tends to surround the user rather than to reshape him; in a sense, the support is "worn," rather than used.

Although similar supports utilizing liquids have been known in the past, all have been subject to deficiencies. One important deficiency almost universally present in similar articles has been the inherent quality of water and similar fluids to be "springy" or, in other words, to transmit a shock force through the liquid very rapidly. This creates discomfort since pressing upon one portion of the flexible envelope immediately causes the force to be felt to all other portions of its surface in the form of a shock wave.

In this invention however, it has been found that proper selection of materials within the envelope cause a force exerted on it to be passed through the materials in a gentle rolling or dampened manner which, when experienced, is rather soothing and comfortable.

Another deficiency in similar supports is that the article produces a clammy feeling in the user, even when the envelope is covered with several layers of cloth or other material.

It has now been discovered that heating of the material in the envelope to a temperature near that of human body temperature obviates this problem entirely.

An article of furniture embodying the principles of this invention provides the user with full support, softness, warmth, and total relaxation such that any feeling of tension or being ill at ease rapidly disappears. Further, it has been found that persons sleeping on an article embodying these principles experience a very deep sleep with no tossing and/or turning because there is no uneven exertion of supporting force on the body and no restriction of blood circulation.

It is, in general, an object of the present invention to provide a new and improved liquid support for the human body.

Another object of the invention is to provide a support of the above character which can accommodate a plurality of adult humans in sitting and reclining positions.

Another object of the invention is to provide a support of the above character which includes means for dampening shock waves in the liquid so that on body is not disturbed by the movements of another of the support.

Additional objects and features of the invention will be apparent from the following description in which the presently preferred embodiments are set forth in detail in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic, sectional illustration of the invention, showing the structural relationships of the various elements thereof.

FIG. 2a illustrates one embodiment of the invention, as viewed along line II-II in FIG. 1.

FIG. 2b illustrates another embodiment of the invention, as viewed along line II-II in FIG. 1.

FIG. 3 is a schematic illustration of an embodiment of the invention which includes small blocks of a material such as styrofoam floating upon the surface of the liquid.

FIG. 4 is a schematic illustration of an embodiment of the invention which includes means for continuously recirculating and heating the liquid.

FIG. 5 is a perspective view, partially broken, of one embodiment of a bed incorporating the present invention.

FIG. 6 is an enlarged sectional view of a portion of the bed illustrated in FIG. 5.

FIG. 7 is an enlarged cross-sectional view of a portion of the supporting framework of the bed shown in FIG. 5, illustrating the mounting of a heating element.

FIG. 8 is a top plan view of the embodiment shown in FIG. 5, with the liquid filled bladder removed to illustrate the mounting of a heating element for heating the liquid in the bladder. In this figure, the thermostat for controlling the temperature of the liquid is shown schematically.

FIG. 9 is a perspective view of another embodiment of a bed incorporating the present invention which is particularly suitable for use in hospitals.

FIG. 10 is a perspective view of one embodiment of a sofa incorporating a present invention.

FIG. 11 is a cross-sectional view taken along line II-II in FIG. 10.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Now referring to the drawing in detail, there is shown an envelope or bag 11, greatly exaggerated in thickness, which may be of vinyl, rubber, or any other sealable, nonporous or water-proof substance. A fluid, such as water, is inserted in the bag

through a passage 13 so as to pressurize the interior of the bag. The pressure in the bag, and thus the firmness or softness of the article of furniture, may be controlled by the amount of fluid put into it.

The bag is situated within a container 15 which determines the shape of the article as the bag becomes inflated. As shown in FIGS. 2a and 2b, the container may be of any desired shape and size and may, in fact, be the walls of a room or of a sunken conversation pit. The container may be a nylon reinforced vinyl band of any shape which acts as a girdle for the bag and need not extend under the bag.

A heating device, such as a radiant heating cable 17, is situated within the container and is utilized to heat the bag and fluid to a temperature between 85° and 105° F.—approximately the temperature of the human body. This heating obviates the cold, clammy feeling normally inherent in fluid filled envelopes.

As illustrated in FIG. 1, a lightweight strip of aluminum 19, such as foil, may be placed above and below the cable 17 to protect the surface of the bag 11 and container 15. If desired, suitable insulation, etc. could be provided and the cable could be placed within the bag rather than outside of it.

In many cases, it is desirable to cushion or dampen the shock waves which travel through the fluid when pressure is exerted on the bag—such as when a person sits or steps on it. A suitable material may either replace or be placed in the fluid so as to provide this effect. For example, a liquid with a high viscosity rating, a grease, a gelatin, or other material may be placed in the bag.

As shown in FIGS. 1 and 4, one preferred method of producing the dampening effect is to place a suitable solid material 21 in suspension in the fluid within the bag. It has been found that ground or shredded styrofoam at a volume ratio of about 1 to 3 to water produces satisfactory results. As an alternative, the styrofoam may be replaced by starch or other material which will stay in suspension in the fluid.

In FIG. 3, an alternate embodiment of the invention is shown wherein small blocks 23 of a material such as styrofoam float upon the entire surface of the fluid. In the view shown, the spacing between the blocks has been greatly exaggerated; in reality, the blocks actually rub against each other and their reaction with the fluid provides independent support for all parts of a body positioned on the bag.

Referring now to FIG. 4, there is once again shown a bag 11 containing water and the particles 21.

A pump 25 draws the water in the bag through a strainer 27, to keep the styrofoam from entering the pump, and a hose 29, and then passes it to a heater 31. After being heated, the water passes through a second hose 33 and returns to the envelope.

Any suitable heat transfer means, of which cable 17 and heater 31 are good examples, may be utilized to heat the water so long as it is capable of maintaining the temperature of the water within the envelope at a temperature close to normal body temperature, but at least within the range of 85°—105° F.

As illustrated, the heater 31 may comprise a plaster block in which is embedded an electrically actuated heating coil 35 and water tubing 37. Proper numerical selection and placement of the turns of the coil and tube in the block will produce the desired heating.

Use of the furniture as a chair, sofa, bed, etc. is, of course, dependent only upon the desires of the user and the position he desires to maintain since, when on the article, he is effectively floating in water and he is "in" the article rather than "on" it. As previously stated, the bag may completely fill a room or may be confined by specially constructed walls or the walls of a sunken conversation pit. The envelope may also be covered with any suitable material so that it blends into its surroundings and creates a slight "breathing barrier" between a person on the article and the envelope itself.

FIGS. 5—8 illustrate a presently preferred embodiment of a bed incorporating the invention which is particularly suitable for home use. This bed includes a flexible bladder 41, a

volume of liquid 42 enclosed within the flexible bladder, a rigid framework 43 supporting the liquid filled bladder, a heating element 44 for heating the liquid within the bladder, and a thermostat 46 for maintaining the liquid at a predetermined temperature.

The bladder 41 is fabricated of a substantially inelastic material such as vinyl plastic. Throughout this application the term "inelastic" is used to denote a material which is flexible but does not stretch when it is deformed or flexed. In a preferred embodiment all seams in the bladder are ultrasonically welded to provide a liquid-tight enclosure. This bladder has substantially planar top and bottom walls 47 and 48, respectively, which are maintained in a spaced apart relationship by the liquid within the bladder. The top wall 47 is adapted for receiving a human body and maintaining the body separated from the liquid, and the wall 48 rests upon a supporting surface provided by the framework 43.

Means is provided for filling and draining the bladder. This means includes a flexible tubing 49 connected at one end in fluid communication with the interior of the bladder 41. At the other end, the tubing is provided with a fitting 51 for connection to a conventional water hose, as illustrated at 52. The fitting 51 includes a conventional valve for controlling the communication with the interior of the bladder. When not in use, the tubing 49 can be tucked out of sight between the bladder and the framework 43.

The liquid 42 can be any liquid of high viscosity, such as water. The volume of the liquid is preferably slightly less than the capacity of the bladder so that the bladder is substantially filled, but not placed in tension, by the liquid. In a king size bed, for example, the bladder might contain on the order of 200 gallons of water. When the bladder is substantially filled with liquid, there is preferably no air in the bladder.

The framework 43 defines a cavity 53 in which the water filled bladder is disposed. This cavity is open at the top and is defined by a rectangular bottom wall 54 and end and sidewalls 56 and 57, respectively, extending upward from the ends and sides of a rectangular bottom wall. In the preferred embodiment, the cavity 53 has a volume substantially equal to the volume of liquid in the bladder 41. Thus, the bottom wall 48 of the bladder rests upon the upper surface of the rectangular bottom wall 56, and the top wall 47 of the bladder is substantially level with the upper portions of the walls 56, 57. A person resting upon the top wall 47 is supported by the buoyant effect of the liquid within the bladder. In the presently preferred embodiment, the framework 43 is fabricated in the form of a shell molded of a rigid thermoplastic material such as an acrylic or ABS plastic. The end and sidewalls of the shell include inclined inner portions which engage the bladder between its top and bottom walls, a horizontal portion generally level with the top wall of the bladder, and a generally vertical outer portion which is formed to include a recessed area 58 adapted for receiving a decorative band of material. The band 59 can be changed to match the decor of the room in which the room is located.

The heating element 44 comprises an electrical heating element of the resistance type. This heating element is mounted on the bottom surface of the rectangular bottom wall 54 of the framework shell and is held in place by means of a layer of fiberglass 61 which is sprayed over the bottom surface of the wall 54. In addition to holding the heating element in place, the fiberglass serves as an insulator, directing the heat from the element toward the liquid in the bladder. Being enclosed between the plastic wall 54 and the fiberglass layer 61, the heating element 44 will remain electrically insulated from the liquid 42 even if a leak should develop in the bladder 41. If desired, the layer of fiberglass can be replaced with a sheet of plastic similar to the material of which the framework shell is fabricated. This sheet is conveniently secured to the framework shell by riveting. With the heating element enclosed between the bottom wall and the plastic sheet, the body of liquid in the bladder 41 draws the heat upward from the heating element. Alternatively, the heating element can be

placed inside the bladder or it can be placed on top of the bladder in a form similar to an electric blanket.

The thermostat 46 is mounted in a recess 62 which is provided in the top portion of one of the sidewalls 57. It is connected to the heating element 44 by means of insulated conductors 63 and is adapted for connection to a conventional source of alternating current through a line cord 64. A temperature sensing bulb 66 is mounted on the framework 43 proximate the bladder 41 and connected to the thermostat as indicated 67. The thermostat is a conventional unit which includes a dial 68 for adjusting the temperature of the liquid and a lamp 69 for indicating when the heating element is energized.

The bed shown in FIGS. 5—8 is supported by a generally rectangular block 71 upon which the rectangular bottom wall 54 and fiberglass layer 61 rest. In the preferred embodiment, this block is fabricated of a light weight material such as urathane or styrene. If desired, other base structures can be utilized with this bed. However, it is desirable that such structures provide direct support for a substantial portion of the area of the bottom wall 54.

FIG. 9 illustrates a bed incorporating the present invention which is particularly suitable for use in institutions such as hospitals. Except for its shape, this bed is generally similar to the king size bed illustrated in FIGS. 5—8. This bed, however, is mounted upon a conventional hospital bed framework 72, with the rectangular bottom wall 54 resting directly upon this framework. This bed also differs from that shown in FIGS. 5—8 in that a drain opening 73 is provided in at least one of the sidewalls 57 to prevent an invalid patient from being drowned should a leak develop in the bladder 41. In this embodiment, the heating element 44 is again sealed between the bottom wall 54 and the layer of fiberglass insulation. Thus, even if leakage should occur and liquid should drain through the opening 73, there is no danger of the patient being electrocuted by the heating element.

FIG. 10 illustrates a sofa embodying the present invention which is suitable for supporting a plurality of persons. This sofa includes a generally square bladder 76 mounted in a framework 77.

The bladder 76 is filled with a liquid 78 such as water to provide buoyant support for persons resting upon the sofa. In addition, a plurality of solid particles 79 of a material such as styrofoam are enclosed within the bladder. These particles serve to dampen shock waves in the liquid 78 so that one person is not disturbed by the movements of another on the sofa. Also, these particles provide additional support for the persons on the sofa.

The framework 77 is fabricated of wood. It includes a large square member 81 upon which the bladder 76 rests. The member 81 rests upon supported upon a base structure 82. The frame also includes an inner sidewall 83, and outer sidewall 84, and a horizontal deck 86 extending between the tops of the sidewalls. The sidewalls and deck extend around the periphery of the bladder 76, with the inner wall 83 providing lateral support for the bladder. The outer sidewall and deck are padded and covered with a decorative upholstery material 87. In the preferred embodiment, the framework is formed in two sections to facilitate moving. These two sections are joined together along a vertical plane intermediate and parallel to two of the oppositely disposed sidewalls.

The sofa also includes a heating element 88 and thermostat 89 for maintaining the temperature of the liquid 78 at a desired level. This heating element and thermostat are similar to those described hereinbefore. The heating element 88 is mounted on top of the horizontal frame member 81, and separated from the bladder 76 by a layer of thermally conductive material 91 such as aluminum foil. The thermostat 89 is mounted in a control panel 92 which is mounted in the deck 86. A reading light 93 is also mounted on the control panel 91, and, if desired, other controls, such as sound system controls, can be mounted on the panel.

Hereinbefore the invention has been described with specific reference to beds and sofas of the type which are adapted for supporting the entire weight of a body resting thereon. However, it should be noted that the invention is also applicable to conventional seating pieces wherein the users feet typically rest upon the floor or other supporting surface so that only a portion of his body weight is supported by the piece. Such pieces includes couches, lounges, divans, love seats, chairs, and the like.

It is apparent from the foregoing that a new and improved article of furniture has been provided. This article is relatively inexpensive to produce, yet provides a degree of comfort not heretofore available in any article of furniture. While only the presently preferred embodiment have been described herein, as will be apparent to those familiar with the art, certain changes and modifications can be made without departing from the scope of the invention as defined by the following claims.

I claim:

1. In a support of the sofa type for floatably supporting a plurality of adult human bodies, a bladder formed of a flexible substantially inelastic material, said bladder having an upper wall of sufficient size for receiving a plurality of adult human bodies in sitting and reclining positions, a body of liquid enclosed within and filling said bladder so there is substantially no air in said bladder, a rigid framework providing lateral support for the body of liquid in said bladder, whereby said body of liquid and said upper wall are adapted for floatably supporting the adult human bodies on the upper surface of said wall in such manner that said wall accommodates the contours of said bodies without contacting the bottom wall of said bladder, and means for heating the body of liquid in said bladder.

2. A support of the sofa type as claim 1 together with particles of solid matter disposed within said bladder, said particles serving to provide additional support for said bodies and to dampen shock waves in said liquid to minimize the disturbances to one body by the movements of another on the support.

3. In a support of the sofa type for floatably supporting a plurality of adult human bodies, a bladder formed of a flexible substantially inelastic material, said bladder having an upper wall of sufficient size for receiving a plurality of adult human bodies in sitting and reclining positions, a body of liquid enclosed within and filling said bladder so there is substantially no air in said bladder, a rigid framework providing lateral support for the body of liquid in said bladder, whereby said body of liquid and said upper wall are adapted for floatably supporting the adult human bodies on the upper surface of said wall in such manner that said wall accommodates the contours of said bodies without contacting the bottom wall of said bladder.

4. In a support for floatably supporting a plurality of adult human bodies:

a bladder of flexible substantially inelastic material defining a single closed chamber, said bladder having an upper wall of sufficient size to support a plurality of adult human bodies;

a body of liquid enclosed within and filling said bladder so there is substantially no air therein;

a rigid circumscribing framework, separable from said bladder exteriorly engaging the sides of said bladder and preventing lateral distortion thereof;

means supporting the bottom of said bladder to confine the same within said framework;

the height of said bladder being sufficient that an adult human body on said upper wall causes the same to conform to all lower surface portions of the body to floatably support the same a substantial distance above the bottom of said bladder.

5. In a support for floatably supporting a plurality of adult human bodies:

a bladder of flexible substantially inelastic material defining a single closed chamber, said bladder having an upper wall of sufficient size to support a plurality of adult human bodies;

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a body of liquid enclosed within and filling said bladder so there is substantially no air therein;
a rigid circumscribing frame work, separable from said bladder exteriorly engaging the sides of said bladder and preventing lateral distortion thereof;
means supporting the bottom said bladder to confine the same within said framework;
the height of said bladder being sufficient that an adult

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human body on said upper wall causes the same to conform to all lower surface portions of the body to floatingly support the same a substantial distance above the bottom of said bladder; and
heating means for maintaining said body of liquid at a desired temperature.

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