United States Patent

Tobinick et al.

[15] **3,702,484**

[45] **Nov. 14, 1972**

[54] **LIGHT-WEIGHT, MINIMUM-VOLUME WATER PAD**

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[22] Filed: **Nov. 18, 1971**

[21] Appl. No.: **199,853**

[52] **U.S. Cl.**.....**5/348 WB,** 5/91

[51] **Int. Cl.**.....**A47c 27/08**

[58] **Field of Search**.....5/348, 348 WB, 349, 350, 60, 5/91; 150/1; 229/55, 87 R

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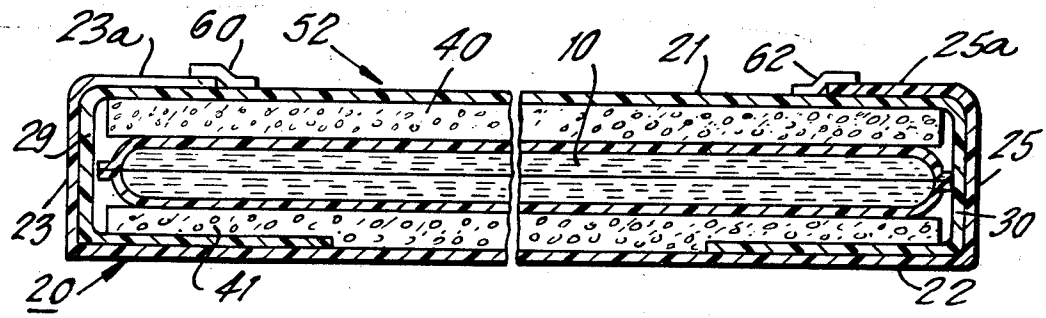
[57] **ABSTRACT**

A low-water volume, low-weight water pad for use as a mattress or seat pad consists of a water-filled container sandwiched between an upper and lower layer of cellular foam sheets with a surrounding water-impervious sheath which is loaded through openings in the top of the sheath. The sheath serves as a flexible frame and tray for containing water which may escape from the water-filled container. The top surface of the sheath contains flaps at either end which extend beyond the opening slits in the top of the sheath. These flaps are enveloped inside of the sheath and around the bottom of the foam layer. When used as a mattress, it may be placed directly on a conventional inner spring. A rigid platform is shown which is placed between water mattress and inner spring to provide a flat surface for support of the water mattress.

18 Claims, 16 Drawing Figures



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SHEET 1 OF 3

FIG. 1

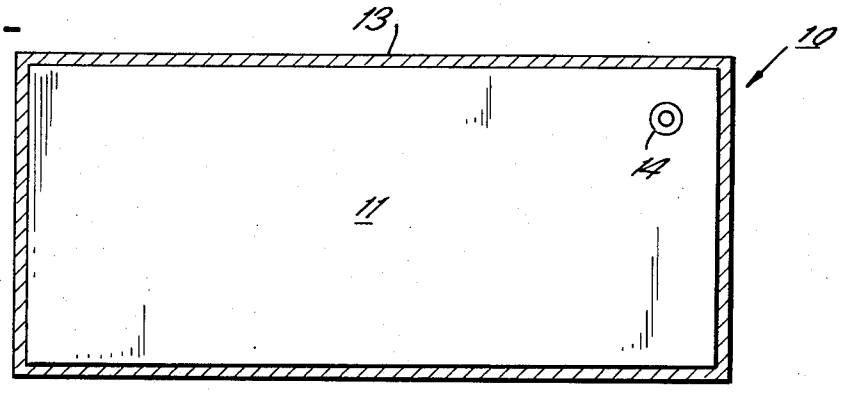


FIG. 2

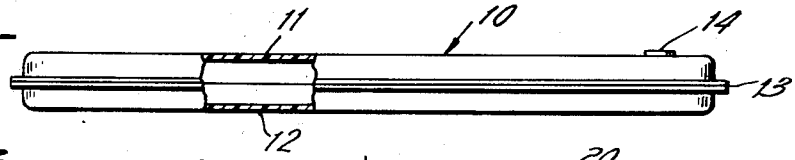


FIG. 3

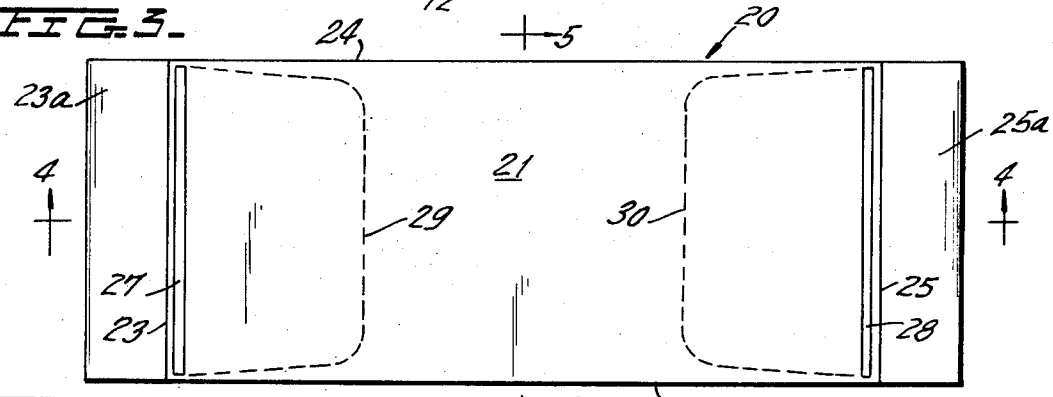
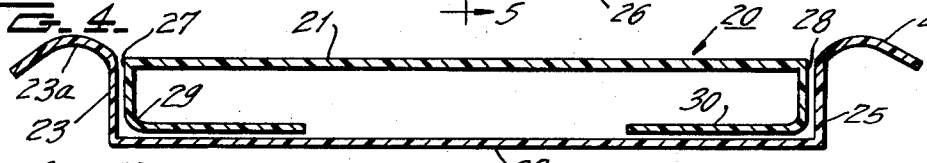


FIG. 4



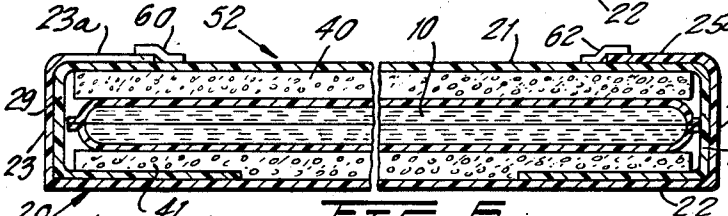


FIG. 6

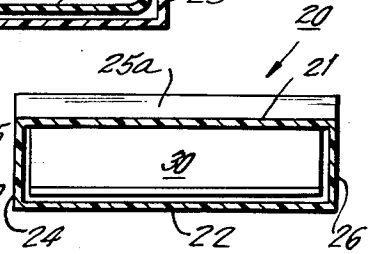


FIG. 5

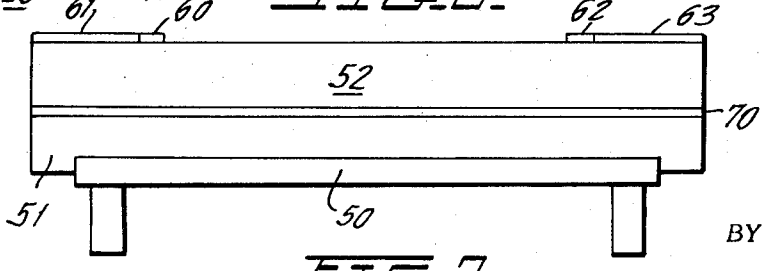


FIG. 7

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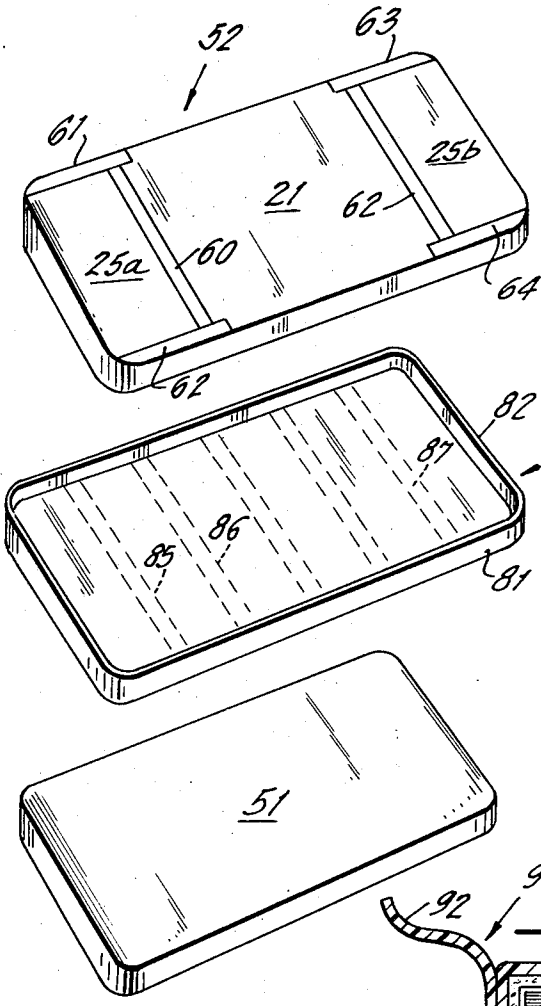


FIG. 8.

FIG. 9.

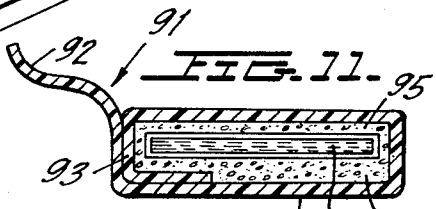
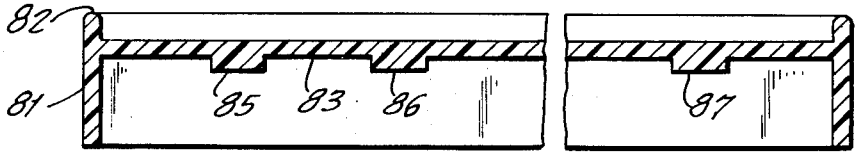


FIG. 11.



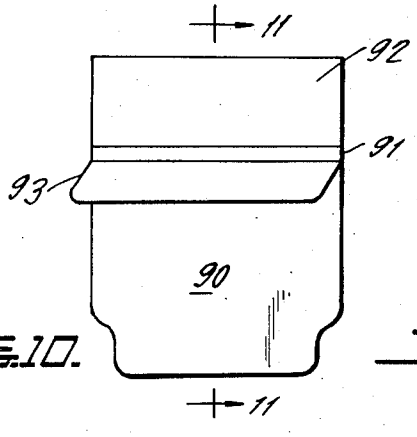


FIG. 10.

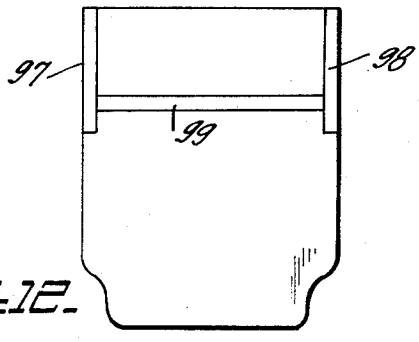


FIG. 12.

FIG. 15

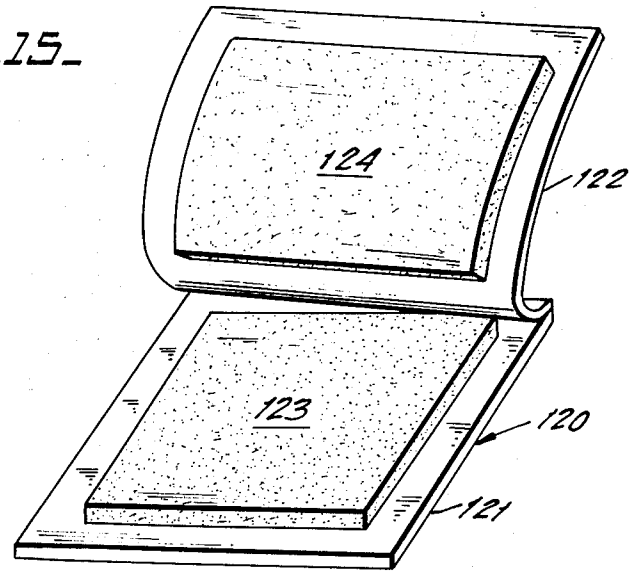


FIG. 13

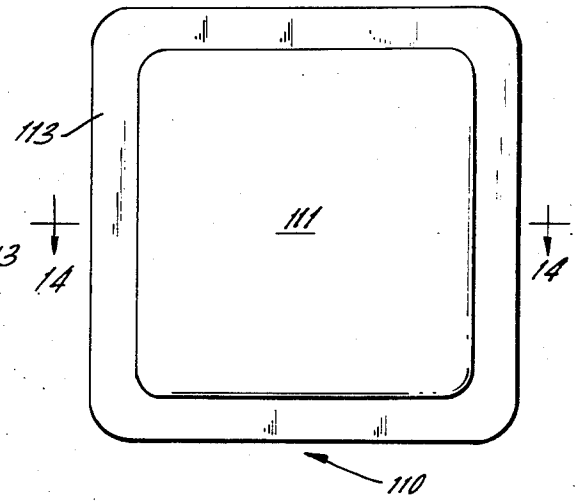


FIG. 14

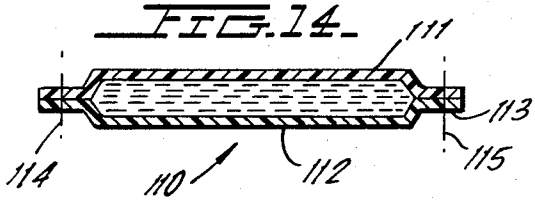
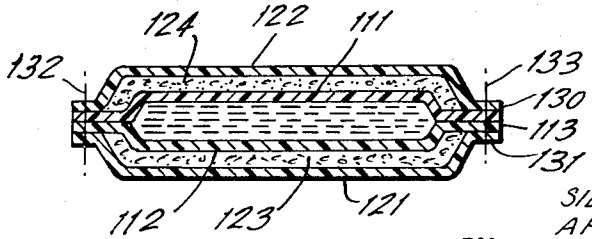


FIG. 16



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LIGHT-WEIGHT, MINIMUM-VOLUME WATER PAD

BACKGROUND OF THE INVENTION

This invention relates to water-filled cushions and mattresses, and more particularly relates to a low-volume water-filled pad which is surrounded by foam layers and is mounted within a fluid-impervious sheath which is flexible, and which serves the purpose of a means for holding the mattress components in position and for collecting any water which may be accidentally discharged from the normally sealed pad.

Water-filled mattresses are generally well known and are commonly constructed of a large vinyl container, frequently rectangular in shape, which is filled with water. The container is then surrounded by a rigid frame which prevents the sagging of the edges of the liquid-filled bag. Conventional water mattresses or beds might contain 200 gallons of water or more, and might weigh 2,000 pounds or more. Consequently, water beds have found limited commercial success since they require specially designed and reinforced flooring for supporting the great weights involved and because of the fear of purchasers of the possible flooding which could occur if the water-filled mattress is punctured. It has been further necessary to provide means for heating the water in a conventional water bed since the mattress will feel extremely cold because of the high thermal conductivity of water.

It has been previously suggested, for example, in U.S. Pat. No. 3,456,270, to reduce the weight and volume of water used for a water bed while still producing the unique comfort and feel of a water bed mattress. Thus, a relatively shallow container of water is disclosed, which may be lined on the top with a layer of foam material. The foam material permits the use of a smaller depth of water for the water bed and also provides thermal insulation so that the user of the mattress will not feel chilled when the water of the water bed is not artificially heated as is the practice in the conventional water bed. The use of this type mattress reduces the weight sufficiently to permit the mattress to be supported on a conventional bed or inner spring mattress. However, these arrangements generally incorporate the conventional frame so that the puncture of the water-filled container could cause flooding and damage due to the escaped water from the container. Thus, the use of such minimum volume arrangements have not, to our knowledge, found great commercial success.

Moreover, when low-water volume mattresses are placed directly on an old bed spring or other yielding or sagging surface, water tends to collect at the bottom of the sagging surface and is not suitably distributed over the mattress surface.

BRIEF SUMMARY OF THE INVENTION

A minimum-volume generally flat water-filled container is placed between two coextensive foam rubber pads and the assembly is, in turn, contained within a a flexible plastic sheath of water-impervious material. The sheath, which may be of the same material as the water-filled container, defines a tray having a height sufficient to contain the entire volume of the water within the container if the container should rupture. The tray shape has a top cover integral therewith, where an elongated opening is provided at one end of the top cover to allow insertion of the foam rubber pads and water container. Note that the water container preferably will be filled with water after it is loaded into the plastic sheath. The plastic sheath then defines a tank for preventing the possible escape of water which might be released into the sheath from the container, due to accidental puncture or rupture of the container. The assemblage is especially adapted to be supported on a conventional bed-type support and can be mounted directly on a conventional inner spring mattress.

The lower foam pad is provided to equalize pressure distribution over the bottom of the water-filled container so as to reduce the possibility of the puncture of the container by irregularities or broken springs, or the like, on the support surface receiving the water-filled mattress assemblage. Preferably, this lower foam pad will have a thickness of about 4 inches for it to serve a proper protective function.

The upper foam pad will have a thickness preferably of about one-half inch, its main purpose being to provide thermal insulation between the body of the user and the liquid-filled container. It has been found that this upper foam pad can be as thick as about 3 inches before there is any substantial masking of the sensation one expects from a water-filled mattress. The surrounding sleeve or sheath then acts both as a safety liner for the mattress and a frame for holding the water mattress components in positive relation to one another, and for holding the mattress assembly in its desired shape.

Flaps may then extend from the upper surface of the sheath and beyond the end sides of the sheath, and over the slits at either end of the sheath through which the sheath is loaded. These flaps are then tucked down into the sheath and around the foam pads in order to complete the mattress-like appearance of the assemblage.

A flat support such as a plywood board or the like is preferably interposed between a yielding support such as a soft or used inner spring and the mattress to prevent collection of water in localized regions due to sagging.

The water-filled pad can be shaped to the form of a conventional bed mattress of any desired size and shape, and further has important application as a seat pad, for example, for a wheelchair.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a conventional water container which may be used in the present invention.

FIG. 2 is a side view partly in cross-section of the container of FIG. 1.

FIG. 3 is a top view of the container or sheath of the present invention.

FIG. 4 is a cross-sectional view of FIG. 3 taken across the section line 4—4 in FIG. 3.

FIG. 5 is a cross-sectional view of FIG. 3 taken across the section line 5—5 in FIG. 3.

FIG. 6 is a cross-sectional view through a water mattress assemblage of the present invention, which includes the container of FIGS. 1 and 2 sandwiched between upper and lower foam layers and disposed within the sheath of FIGS. 3, 4 and 5.

FIG. 7 is a plan view illustrating the assembled mattress of FIG. 6 mounted on a conventional bed.

FIG. 8 is a perspective view of an assembly with a novel platform mounted on a conventional inner spring.

FIG. 9 is a longitudinal cross-sectional view of the platform of FIG. 8.

FIG. 10 is a plan view of a seat cushion made in accordance with the invention.

FIG. 11 is a cross-sectional view of FIG. 10 taken across the section line 11—11 in FIG. 10.

FIG. 12 is a plan view similar to FIG. 10 but with the outer seal connected to the seat body by adhesive strips/

FIG. 13 is a top plan view of a water-filled sack which can be used in a second embodiment of the invention for use as a cushion.

FIG. 14 is a cross-sectional view of FIG. 13 taken across the section line 14—14 in FIG. 13.

FIG. 15 is a perspective view of a cushion outer liner and foam pads therefor glued in position, which liner is to cooperate with the water container of FIGS. 13 and 14.

FIG. 16 is a cross-sectional view of the assembled elements of FIGS. 13, 14 and 15 to define a low-water volume cushion.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIGS. 1 and 2, there is illustrated therein a typical water container 10 which could, for example, consist of an upper sheet 11 and lower sheet 12 which are joined to one another at their periphery by a heat seal 13. A conventional valve 14 is provided in sheet 11 to permit a liquid such as water to be introduced into the interior of the container 10. Note that container 10 is a single empty volume and that there are no internal compartments or webs designed to hold the container in a particular shape.

In a typical embodiment of the invention, where the water mattress is to be mounted on a conventional, but relatively narrow bed, the container 10 may have a width of about 36 inches and a length of about 72 inches. The container 10 is then adapted to receive from about 25 to 30 gallons of water which will inflate the container 10 to a thickness of from 2 to 3 inches. Typically, the container 10, when filled with water, will weigh up to about 270 pounds. This is to be contrasted to the more conventional water bed which may weigh about 2,000 pounds when filled.

Clearly, the mattress could take any desired form or size, other than the narrow rectangle shown.

The sheets 11 and 12 may be of any desired material having the necessary thickness to provide the structural strength necessary for use as a mattress. Good results have been obtained when using a polyvinyl chloride material having a thickness of about 20 mils.

In accordance with the invention, the water container of FIGS. 1 and 2 (shown filled in FIG. 2) is loaded into a sleeve which acts as both a safety liner and frame, where the sleeve is illustrated in FIGS. 3, 4 and 5. Thus, the sleeve 20 may be formed of the same 20 mil vinyl material as is used to form the container 10 and has a top layer 21, a bottom layer 22, and four side regions 23, 24, 25 and 26.

The bottom layer 22 along with the sides 23 to 26 can be fabricated in any desired manner, as by having their adjoining edges heat-sealed to one another, thereby to define a water impervious tray which has sufficient volume to contain at least all of the water which could fill the container 10 of FIGS. 1 and 2. If desired, these edges could be sealed by a suitable, commercially available, vinyl adhesive tape.

The upper layer 21 of sheath 20 may be heat-sealed or otherwise suitably secured to the tops of sides 24 and 26. However, slits 27 and 28 (FIGS. 3 and 4) are left between the opposing ends of layer 21 and the sides 23 and 25. These slits are provided to permit loading of the container 10 and of foam rubber layers into the interior of sheath 20. The ends of the upper layer 20 are further provided with flaps 29 and 30, respectively, which extend beyond sides 23 and 25, which flaps extend downwardly from slits 27 and 28, respectively, and may envelope around the bottom of sheath 20. Side regions 23 and 25 may also have flap portions 23*a* and 25*a* respectively, which are sealed to top layer 21 after the mattress is placed in its desired position and is filled with water.

FIG. 6 illustrates the sheath of FIGS. 3, 4 and 5 after it has been loaded with the container 10 of FIGS. 1 and 2, and with upper and lower foam rubber pads 40 and 41, respectively. The pads 40 and 41 are substantially coextensive with the upper and lower layers 21 and 22 of sheath 20 and may be of a conventional foam rubber.

The upper pad 40 is preferably about one-half inch thick and serves to provide thermal insulation between the user's body and the relatively cold upper surface of container 10. It has been found that pad 40 can have a thickness of up to about 3 inches before it begins to mask the effect of the water-filled container 10 in its action as a water-filled mattress.

The lower pad 41 serves to protect the bottom of container 10 from damage due to sharp springs, or the like, on the surface upon which the water mattress assemblage is subsequently deposited. Thus, the pad 41 may have any desired thickness. A pad having a thickness of about 4 inches for the pad 41 has been found satisfactory.

Each of the flaps 29 and 30 in the sheath 20 may have a length of about 18 inches and are tucked under the lower foam pad 41, as shown in FIG. 6. Thus, the entry regions are generally masked by these flaps and the flaps prevent the accidental displacement of the components from the sheath. While any desired material could be used for the sheath 20, manufacturing techniques are simplified when this sheath is made of the same material as the container 10. Thus, the sheath 20 may be constructed of 20 mil thick vinyl material.

After assembly of the various components 10, 40 and 41 within and before filling the sheath 20, the sheath may be laid atop any conventional bed support. Thus, as shown in FIG. 7, there is a conventional bed frame 50 which has a conventional inner spring mattress 51 thereon. The novel water mattress assembly 52 of FIG. 6 may then be directly deposited on the inner spring 51, and the assemblage can then be filled with water by filling the container 10 through valve 14. If desired, the entire bed may be moved to a conventional hose outlet and the mattress filled at the outlet. The entire bed may then be carried to its location, this being possible in view of the relatively light weight of the assemblage.

Conventionally, however, a fitting will be attached to the nearest water outlet and connected to a hose which is, in turn, connected to valve **14**.

After the container **10** is filled, flaps **23***a* and **25***a* are folded down as shown in FIGS. **6** and **8** and are secured to layer **21** of sheath **20**, thereby to close slits **27** and **28**. Thus, flap **23***a* is secured to layer **21** by tape strip **60** (across the end of the flap **23***a*) and tape strips **61** and **62** (along the edges of the flap **23***a*) as shown in FIGS. **6**, **7** and **8**. Similarly, three tape strips **62**, **63** and **64** are used to secure flap **25***a*. Tape strips **60** to **64** may be conventional vinyl tape strips, well known for the connection of vinyl members to one another.

When using the water-filled pad of the invention as a mattress to be supported by an inner spring which may sag, it has been found that water tends to collect at the lowest points of the sag, and therefore tends to aggravate the sag condition, leading to further local accumulation of water. To prevent this condition, it has been found useful, especially in connection with yielding support surfaces, to provide a fairly rigid, flat reinforcing surface. By way of example, a simple plywood board of about one-eighth inch thickness is shown in FIG. **7**, interposed between assembly **52** and inner spring **51**.

When the arrangement of FIGS. **1** to **7** is used for a hospital bed, it has been found useful to terminate the water-filled container **10** about 20 inches short of the head of the mattress, with only foam pads **40** and **41** filling the head portion of the mattress. This allows the head of the bed to be moved to an inclined position without disturbing fluid distribution in the remainder of the mattress.

FIGS. **8** and **9** illustrate a particularly useful form of flat, rigid support, consisting of a plastic frame **80** which has a downwardly extending rectangular rim **81** which telescopes over a supporting mattress, and which also has an upwardly extending rim **82** which serves to position assembly **52** when laid on top of frame **80**. The central body of frame **80** consists of a main web **83** having a flat upper surface **84** and integral transverse reinforcing ribs such as ribs **85**, **86** and **87**. Typically, frame **80** can be formed of molded polystyrene with web **83** having a thickness of about one-quarter inch and ribs **85** to **87** having a thickness of about three-quarters of an inch. The ribs may be spaced from one another by about 12 inches. Rim **81** may have a height of about 2 inches, while rim **82** may have a height of about 1 inch.

In the above description, the novel invention is described primarily for use as a bed mattress. The novel invention, however, may also be used in connection with seat pads for chairs, and particularly for wheelchairs, and the term mattress as used herein is intended to be synonymous with seat pads or cushions, or indeed, a head rest or pillow. FIGS. **10**, **11** and **12** show a specific embodiment of the invention, for use as a seat cushion.

Referring to FIG. **10**, there is shown an outer sleeve **90**, similar in purpose to sleeve **20** of FIG. **3**, but shaped to fit on the contour of a chair, for example, a wheelchair. Sheath **90** is suitably sealed to define a closed volume with a single entrance slit **91** formed in a side edge thereof. Two flaps **92** and **93** extend from the sides of slit **91**. Sheath **90** is then loaded, as shown in FIG. **11**, through slit **91**, with foam pads **94** and **95**, with a water-filled vinyl container **96** between them. The flap **93** is then tucked under pad **93** and flap **92** is sealed over slit **91** and to the top surface of sheath **90**, as shown in FIG. **12**, by the side adhesive strips **97** and **98** and the transverse adhesive strip **99**.

In use, the cushion of FIGS. **10**, **11** and **12** may be placed on the flat bottom support of a wheelchair, and no interposed rigid plate is needed, as was the case for a bed mattress. Moreover, in view of the short dimensions of the cushion, good results are obtained where the cushion is placed on a yielding bottom support, without a rigid flat base.

FIGS. **13** to **16** show a further embodiment of the invention as applied to a seat pad which has particular application, for example, to wheelchairs, although it has any general seating application.

Referring first to FIGS. **13** and **14**, there is illustrated a water-filled container **110** consisting of two sheets of 20 mil vinyl **111** and **112**, respectively, which may be heat-sealed or otherwise suitably secured around a periphery **113**. A heat seal is schematically illustrated in FIG. **14** at the region of the dotted lines **114–115**.

In accordance with the invention, the water-filled cushion may have some suitably small length and height so that it can be received on a conventional seat and could, for example, be 12 inches by 12 inches, with the peripheral lip **113** having a length of, for example, one-half inch.

Before sealing the two sheets **111** and **112** together, their interior is filled, by way of example, with 1 gallon of water, and the seal is made with air being excluded from the interior of the sealed volume. Alternatively, sheets **111** and **112** can be filled through a conventional valve.

An enclosing sheath for enclosing the water container is then formed, as illustrated in FIG. **15**, of an elongated sheet of 20 mil vinyl **120** formed of two flaps **121** and **122** (which may be separate flaps and which have dimensions slightly larger than those of sheets **111** and **112**). Foam rubber layers **123** and **124** are then cemented to the opposing surfaces of sheets **121** and **122**, respectively, as shown.

Thereafter, the water-filled container of FIGS. **13** and **14** is inserted between foam pads **123** and **124** and, as shown in FIG. **16**, a further heat seal is formed between the opposing outer edges **130** and **131** and the extending lip **113** of the water-filled container **110**. This final heat sealing, schematically shown in FIG. **16** by dotted lines **132** and **133**, secures the assembly together and further forms an additional heat seal preferably spaced from the heat seal at lines **114** and **115** of FIG. **14**, so that a further water seal is formed in the container **110**.

It has been found that this minimum water cushion provides excellent results in connection with patients who are confined to long periods of sitting in wheelchairs, and the like. Thus, even though there is a minimum volume of water used, and even though it is a simple matter to "bottom out" by localized pressure on the pad, it is nevertheless possible to suspend the patient sitting erect in such a manner that pressure is evenly distributed over the buttocks of the patient.

Although this invention has been described with respect to its preferred embodiments, it should be understood that many variations and modifications will

now be obvious to those skilled in the art, and it is preferred, therefore, that the scope of the invention be limited, not by the specific disclosure herein, but only by the appended claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows:

1. A pressure distributing pad having the characteristics of a water-filled mattress and having a minimum water volume and having a relatively low weight; said pad comprising, in combination:
- a generally flat, water-filled and water-impervious container having upper and lower surfaces;
- a compressible, thermally-insulating pad disposed in contact with and being coextensive with said upper surface of said water-impervious container;
- an enclosed sheath of a flexible, water-impervious material enclosing and closely fitting around said water-impervious container and said thermally-insulating pad;
- said enclosed sheath having top and bottom surfaces and side surfaces joining said top and bottom surfaces; said bottom surface and said side surfaces defining a shallow, water-impervious tank for receiving and holding water from said container if water escapes from said container;
- said sheath having at least one elongated opening in its said top surface to permit the loading of said container and said thermally-insulating pad therein.

2. The pad of claim 1 wherein said at least one elongated opening is formed adjacent the junction between said top surface and one of said side surfaces of said sheath.

3. The pad of claim 1 wherein said thermally-insulating pad is formed of a sponge rubber type material, and wherein said container and said sheath are both formed of the same material.

4. The pad of claim 1 which further includes a second thermally-insulating pad in contact with and generally coextensive with the lower surface of said water-impervious container.

5. The pad of claim 1 which further includes a flap extending from at least one of said side surfaces of said sheath, and means for fastening said flap over said at least one elongated opening and to said top surface of said sheath.

6. The pad of claim 2 wherein said top surface of said sheath has a freely extending flap section which extends beyond said elongated opening; said flap section having a length longer than the height of said side section to permit said flap to be inserted into said elongated opening and enveloped around the edges of said container and said thermally-insulating pad which are adjacent said one of said side surfaces of said sheath.

7. The pad of claim 4 wherein said container and said sheath are each formed of a flexible plastic material having a thickness of about 20 mils.

8. The pad of claim 6 which further includes a second flap extending from at least one side surface of said sheath, and means for fastening said second flap over said at least one elongated opening, and to said top surface of said sheath.

9. The pad of claim 7 wherein said thermally-insulating pads are formed of a sponge rubber type material; said thermally insulating pad at said upper surface of said water container has a thickness of from about ½ inch to about 3 inches, thereby to provide thermal insulation; said second pad having a thickness of less than about 4 inches; said water-filled pad having a thickness, when filled, of less than about 3 inches.

10. The pad of claim 8 which further includes a second thermally-insulating pad in contact with and generally coextensive with the lower surface of said water-impervious container.

11. The pad of claim 9 wherein said at least one elongated opening is formed adjacent the junction between said top surface and one of said side surfaces of said sheath and wherein said top surface of said sheath has a freely extending flap section which extends beyond said elongated opening; said flap section having a length longer than the height of said side section to permit said flap to be inserted into said elongated opening and enveloped around the edges of said container and said thermally-insulating pads which are adjacent said one of said side surfaces of said sheath.

12. The pad of claim 10 wherein said thermally-insulating pads are formed of a sponge rubber type material; said thermally insulating pad at said upper surface of said water container has a thickness of from about ½ inch to about 3 inches, thereby to provide thermal insulation; said second pad having a thickness of less than about 4 inches; said water-filled pad having a thickness, when filled, of less than about 3 inches.

13. The pad of claim 11 wherein said sheath has a second elongated opening in the top surface thereof; said second opening being parallel to said one opening and being disposed adjacent a side of said sheath which is opposite to its said one side; and a second flap section, identical to said flap section, extending from said top surface at said second opening.

14. The pad of claim 13 which further includes first and second side flaps extending from opposite sides of said sheath, and means for fastening said first and second side flaps over said at least one elongated opening and said second elongated openings respectively, and means for fastening said first and second side flaps to said top surface of said sheath.

15. In combination, a mattress having the characteristics of a water-filled mattress, and a conventional box spring support therefor; said mattress having a minimum water volume and having a relatively low weight; said mattress comprising, in combination:
- a generally flat, water-filled and water-impervious container having upper and lower surfaces;
- a compressible, thermally-insulating pad disposed in contact with and being coextensive with said upper surface of said water-impervious container;
- an enclosed sheath of a flexible, water-impervious material enclosing and closely fitting around said water-impervious container and said thermally-insulating pad;
- said enclosed sheath having top and bottom surfaces and side surfaces joining said top and bottom surfaces; said bottom surface and said side surfaces defining a shallow, water-impervious tank for receiving and holding water from said container if water escapes from said container.

16. The combination of claim 15 which further includes a flat, and relatively rigid member generally

coextensive with said mattress and being disposed between said mattress and said box spring support.

17. The combination of claim 16 wherein said relatively rigid member includes an annular rim extending downwardly from the periphery thereof and telescoping over said box spring.

18. The combination of claim 17 wherein said relatively rigid member further includes an annular rim extending upwardly from the periphery thereof for receiving portions of the outer periphery of said mattress.

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