United States Patent [19]

Penn et al.

[11] **3,778,852**

[45] **Dec. 18, 1973**

[54] **WATER BED**

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[73] Assignee: **Penn International Industries, Inc.,** San Anselmo, Calif.

[22] Filed: **Mar. 29, 1971**

[21] Appl. No.: **128,957**

[52] **U.S. Cl.** ..... **5/348 WB,** 5/60, 128/376

[51] **Int. Cl.** **A67c 27/08**

[58] **Field of Search** ..... 4/177, 177 IW; 5/348, 349, 350, 90, 91, 92, 60; 206/DIG. 30; 150/1; 128/376

[56] **References Cited**

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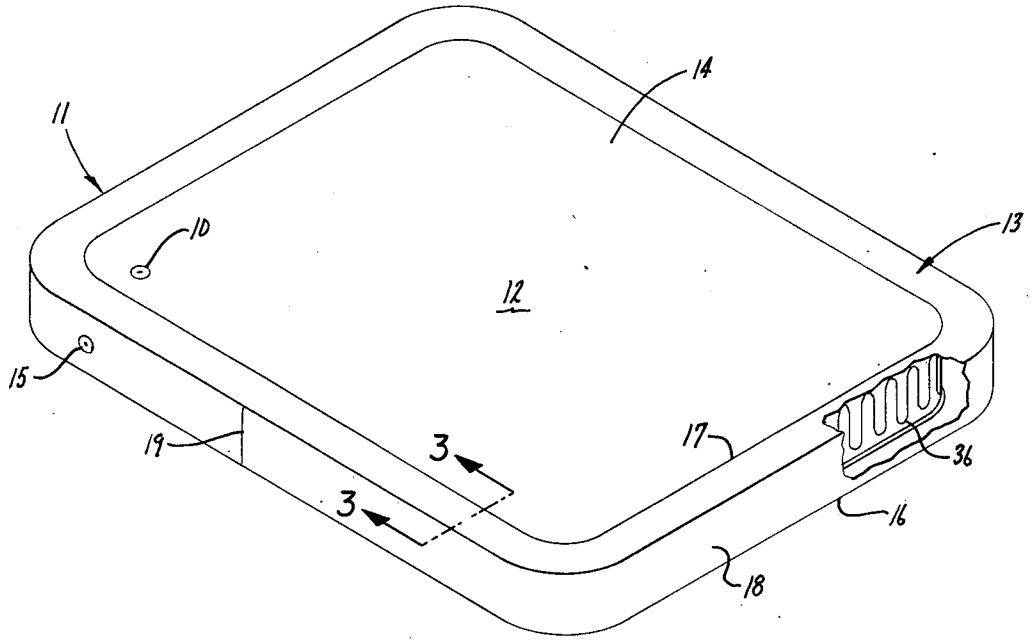
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Assistant Examiner—Andrew M. Calvert
Attorney—Warren, Rubin, Brucker & Chickering

[57] **ABSTRACT**

A water bed including a surrounding pneumatic chamber.

8 Claims, 7 Drawing Figures



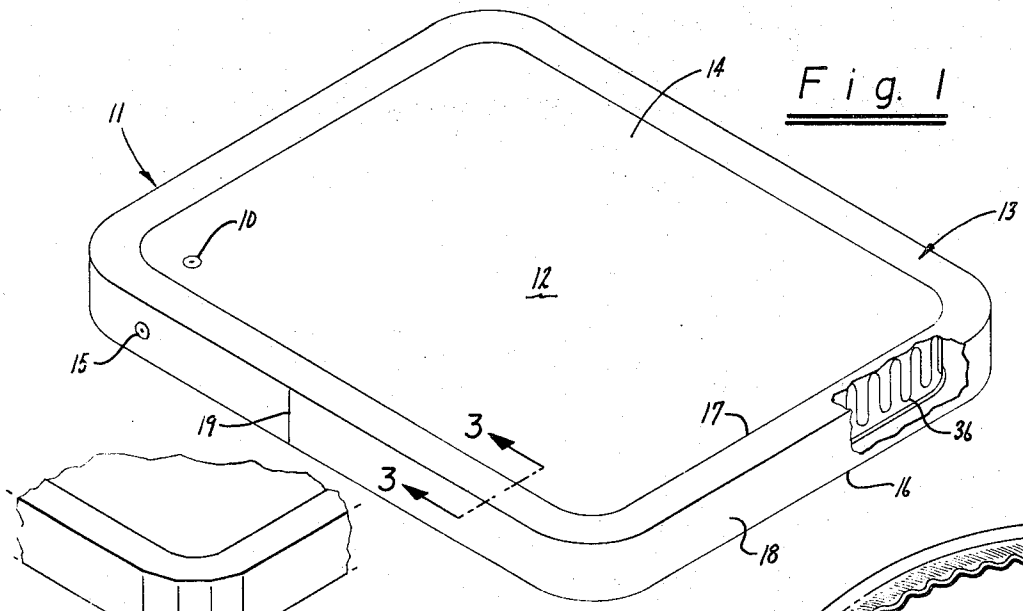


Fig. 1

Fig. 2

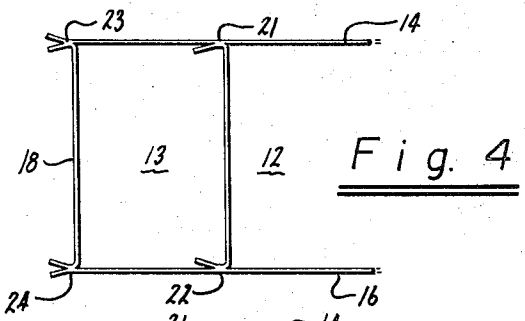


Fig. 4

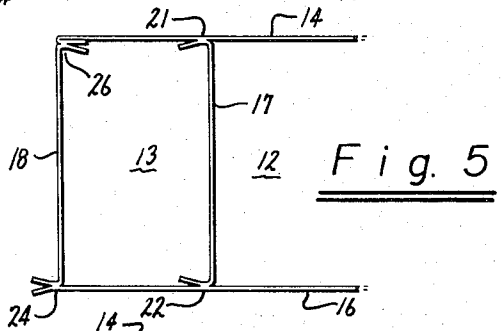


Fig. 5

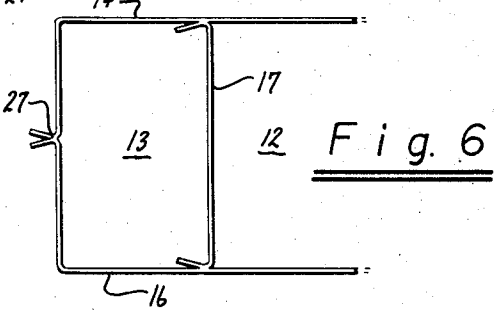


Fig. 6

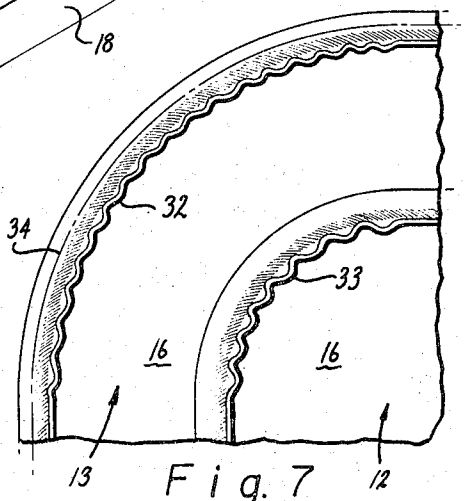


Fig. 7

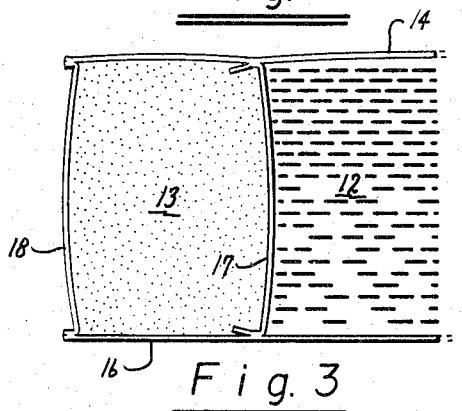


Fig. 3

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WATER BED

The present invention relates to beds and more particularly to water beds. Water beds of the variety which have become recently popular are extremely simple structures comprising primarily a pair of vinyl sheets seamed together to form a bladder which when filled with 200 to 300 gallons of water provides a body supporting structure on which a person can sleep. The most widely accepted advantage of a water bed over conventional mattresses is the manner in which all parts of the body in contact with the bed are supported by the same pressure preventing any undue pressure from being exerted on any specific portion of the body. Water beds also enjoy the advantage of being less expensive than conventional beds and much more easily transported when emptied of water.

While it is possible for a water bag (bladder) to form the entire bed, there are a number of advantages to be gained by surrounding the bag with a frame and it is further recommended by manufacturers of these items to provide a watertight liner material between the frame and the bag. Prior to the present invention, frames have been formed of wood and simply surround the bag with a wood wall 8 to 12 inches high.

The rigid wooden frame serves to assist in supporting the side walls of the water bag and thus decrease the curvature of the bag in an attempt to provide a more nearly level sleeping surface. In addition, the wood frame provides protection for the bag which although generally formed of a tough vinyl material can be punctured.

A liner is formed by attaching a vinyl material to the frame at the upper edge portion thereof. A liner so formed serves primarily to separate the water containing bag from the hard edges of the wood frame and, in addition and possibly more importantly, to provide a safety feature in case of a leak in the water bag. If the water bag should develop a leak, the liner and frame contain the water and prevent any serious property damage posed by 200 or 300 gallons of water.

While a frame and liner have the utility suggested above, they also present certain well recognized disadvantages which the present invention eliminates, as will be described in greater detail below.

One of the outstanding features of a water bed is the ease with which it can be moved or stored when emptied of water. The rigid somewhat heavy structures which form the frame mitigate from this advantage since they are relatively heavy and thus are more like conventional beds so far as storage or moving is concerned. It has also been the experience of those in the field that the wooden frames provide a problem in that while the water bed will obviously adjust to any irregularities in the floor structure on which it is supported, the rigid wooden frame requires an almost perfectly level floor surface for proper performance. Accordingly a rigid frame requires a certain amount of shimming and adjustment which clearly detracts from the self-adjusting feature inherent in the water bag itself. In addition, the hard surface of the frame as well as its associated hardware pose a constant threat to damage to the water bag as well as to persons who may accidentally make physical contact therewith.

From the above it can be appreciated that while a rigid wooden frame provides certain necessary structural sfpport for the water bed bag, it carries with it a

number of undesirable features quite inconsistent with the main component of the water bed itself.

The present invention provides a water bed which does not require a rigid frame and yet enjoys all of the advantages thereof in addition to providing previously unachieved advantages.

The features and advantages of the present invention will be made clear by the following description when taken together with the drawings.

FIG. **1** is an isometric illustration of the present invention in its operable state;

FIG. **2** is an isometric view of a corner of the bed of FIG. **1** showing an alterate embodiment thereof;

FIG. **3** is a sectional view taken along the line **3—3** of FIG. **1**;

FIGS. **4, 5** and **6** show three alternate seam configurations for forming the invention; and

FIG. **7** is an enlarged plan view of a corner of the bed of FIG. **1** illustrating the manner of forming a curved corner.

Referring now to the drawings, a water bed **11** is formed to have a central enclosed water containing portion or mattress **12** (filled through a valve **10**) and a surrounding peripheral enclosed air containing portion or frame **13** (filled through a valve **5**) formed entirely of a flexible plastic material such as vinyl film of approximately 20 thousandths of an inch (mil) thickness. A number of commerically available vinyl films are suitable for forming the structure of the present invention as, for example, the material manufactured by Union Carbide Corporation which is designated by the trademark KRENE.

The water containing chamber **12** and surrounding air chamber **13** are formed by a top sheet **14**, a bottom sheet **16**, an inner side wall forming member **17**, and an outer side wall forming member **18**. The inner side wall forming member **17** is heat sealed along one of its edges to the bottom sheet **16** near, but not at, the edge thereof. It is obvious that the dimensions of a water bed formed in accordance with the teachings of the present invention can vary widely such that any dimensions which are given herein are for purposes of illustration only and are, unless otherwise stated, not to be understood as critical to the invention. Thus for purposes of example, the inner wall **17** may be displaced from the outer edge of the bottom sheet **16** 4 to 6 inches with the upper edge of the inner wall forming member **17** similarly seamed to the upper sheet **14**. The inner wall forming member **17** circumscribes the entire periphery of the top and bottom sheets, forming members and seamed to itself so as to form an endless band. This inner wall **17** serves as a chamber forming member for both the water containing portion **12** and the air containing portion **13**.

Referring to FIGS. **4** and **5**, an outer wall forming member **18** has its upper and lower edges seamed to the upper sheet **14** and the lower sheet **16**, respectively, in precisely the same manner as inner wall forming member **17** but closer to the outer edges of the upper and lower sheets, forming the exterior side wall member. Outer wall **18** is seamed to itself at **19** to form a continuous band as previously described in connection with inner wall forming member **17**. The seams **21** and **22** connecting inner wall forming member **17** to the upper and lower sheets are simple butt seams which are advantageously formed prior to the seams connecting the outer wall forming member **18** in place. The seams **23**

and 24 which join outer wall forming member 18 in place may also be simple butt seams (see FIG. 4) with excess material trimmed away. Simple butt seam 23 can be replaced by an inverted butt seam 26 (see FIG. 5) to form a smoother upper outer edge so as to reduce any possibility of an exposed rough surface. It is necessary to form the inverted butt seam 26 before the simple butt seam 24 due to the necessity of access to the interior of the chamber formed by walls 17 and 18 in order to seam the upper edge of wall 18 to the edge of sheet 14 in the inverted butt configuration.

The embodiments described hereinabove are all of the four piece variety including upper and lower sheets together with an inner wall forming member and an outer wall forming member. It is possible as illustrated in FIG. 6 to eliminate one piece, namely the outer wall forming member 18, by simply joining the edges of the upper and lower forming sheet members 14 and 16 by a butt seam 27. This embodiment has the obvious advantage of eliminating one seam and thus requires less manual labor in its construction.

The machinery and methods for forming butt seams and inverted butt seams for the purposes of joining vinyl material are well known in the art and thus will not be explained in any detail herein.

Because the inner wall forming member 17 and, in the four piece embodiment, the outer wall forming member 18 include flange like portions, consideration must be given to the formation of the corners of the water bed. FIG. 2 illustrates a corner which is turned by straight segments 31. This approach to turning the corner requires sheeting the material at the breaks which can lead to seam leaks.

FIG. 7 illustrates an embodiment of the present invention including corners which are formed by utilizing curved heating electrodes (having for example radii of 3½ inches and 7½ inches) to produce rounded corners which more nearly approximate the contour of present mattresses, thus enabling conventional bedding to be employed. It has been found from experience that by evenly distributing the gathers 32 and 33 which form along the inner edges of the outer and inner wall seams respectively, over the entire curved portion since no material stretching is required, the likelihood of seam leaks is greatly reduced. After the seam is formed, the excess material is eliminated by cutting along the line 34 leaving a sufficiently smooth surface to enable fitted sheets and the like to be utilized in connection with the present invention.

The air chamber 13 can be conveniently inflated through valve 15 by a vacuum cleaner since it is not required that the chambers be placed under extremely high pressure. The pressure which can be achieved by a common household vacuum cleaner is sufficient to give the air chamber the rigidity required to have it serve as an adequate outer frame, completely eliminating the necessity for any rigid plastic or wooden frame now utilized with previously known water beds. When the pressure in chamber 13 is sufficient to support a height of water at the edges of chamber 12 equal to the height of water at the center of chamber 12, the frame formed by air chamber 13 not only tends to flatten the upper surface 14 of the bed but in fact produces a totally flat surface and in so doing far exceeds the performance of known frames. This result is largely due to the convex (as seen from chamber 12) configuration of wall 17 (see FIG. 3) provided by the pressure in chamber 13. The air frame formed by chamber 13 together with the bottom sheet 16 guards against water loss in the event of a puncture in the upper surface of the water bed thus furnishing the same protection as a frame and liner without the attendant cost and disadvantages as discussed hereinabove.

In addition to providing the advantages of a conventional frame, the air frame of the present invention provides advantages not heretofore known in the art. A complete water bed including frame and safety liner can now for the first time be stored in the same space previously required for the bladder alone, completely eliminating the bulk and weight of a rigid outer frame. By replacing a rigid hard-surface outer frame with the air chamber 13 the present invention eliminates those potential personal hazards connected with hard surface furniture.

Because the material of which water beds are formed is pliable, once the contained water is set into motion as by a shift in body weight or by a person entering or exiting, if often persists for a relatively long time which becomes annoying. While much has been done to attempt to reduce this water movement, no practical solution has been achieved prior to the present invention. The air chamber 13 is a single chamber completely surrounding the water chamber 12 and under static conditions the air pressure at any location within chamber 13 is substantially identical. When the water in the chamber 12 is set into motion, however, there are instantaneously inequalities in the pressure within chamber 13 caused by the unequal pressure of the water at different locations along inner wall 17. The desire for equal pressure within chamber 13 sets up counter forces against the moving water in chamber 12 which operate to return the water to its quiet state more quickly than has been experienced with conventional water beds. It is also possible by changing the pressure of the air in chamber 13 to vary the firmness of the sleeping surface without adding or taking water out of chamber 12, which is a much more difficult process than adding or taking air out of chamber 13.

The air chamber 13, in addition to all of the advantages mentioned above, also provides an effective insulation between the water in chamber 12 and the ambient temperature of the air in the room in which the bed resides. This insulating effect cuts down on heat loss and thus decreases the amount of energy required to maintain the water in chamber 12 at the desired temperature. The air side of inner wall forming member 17 provides an advantageous location for heating element 36 for heating the water in chamber 12. The air in chamber 13 minimizes heat loss so that element 36 efficiently maintains the bed at an acceptable temperature and eliminates the need for separate heating devices.

From the foregoing it is made apparent that the present invention provides an outstanding advance in the field of water beds in that many presently known disadvantages are eliminated while many advantages not known heretofore are achieved and thus it is not intended that any minor variations from the teachings herein be considered outside the scope of the present invention except as defined by the following claims.

We claim:

1. A self-framing, self-leveling water bed for supporting a human body, comprising; upper and lower sheets of a flexible, foldable material, an endless, upstanding inner wall of flexible, foldable material secured at its

upper and lower edges to the upper and lower sheets, respectively, adjacent a peripheral edge portion of the sheets, defining with the upper and lower sheets a hollow mattress, the outer peripheral edge portions of said upper and lower sheets permanently secured together radially outwardly of the wall, defining with said wall a hollow, air filled frame peripherally surrounding the mattress in supporting relationship with the outer periphery of the mattress, valve means on the frame for supplying and exhausting air to and from the frame, valve means on the mattress for supplying and exhausting water to and from the mattress, said mattress filled with water, said frame having a height at least as great as the height of the mattress, the pressure of air in said frame being sufficient to deform the wall of said mattress inwardly so that the upstanding wall presents a convex surface to the water in the mattress and a concave surface to the frame and the upper surface of substantially the entire mattress is level, thus presenting a level sleeping surface over substantially the entire upper surface of the mattress, and said air filled frame effectively damps movement of said water in said mattress due to the ability of the concave wall to deform outwardly into the air filled frame upon the occurrence of sudden surges in pressure in the mattress, said air filled frame further presenting a flexible, comfortable structure at the periphery of the mattress to facilitate entering and leaving the bed, said frame and mattress fully collapsible when they are empty of air and water, respectively.

2. A water bed as in claim **1,** wherein the outer peripheral edge portions of said upper and lower sheets are secured directly to one another outwardly of said upstanding wall.

3. A water bed as in claim **1,** wherein an outer upstanding wall of flexible, foldable material is permanently secured at its upper and lower edges to the outer peripheral edge portions of the upper and lower sheets outwardly of said inner wall, securing the outer peripheral edge portions of the upper and lower sheets together.

4. A water bed as in claim **3,** wherein the upper and lower edges of the inner wall are secured to the upper and lower sheets, respectively, by simple butt seams, the lower edge of the outer wall is secured to the lower sheet by a simple butt seam, and the upper edge of the outer wall is secured to the upper sheet by an inverted butt seam.

5. A water bed as in claim **3,** wherein the upper and lower edges of both the inner and outer walls are secured to the upper and lower sheets, respectively, by simple butt seams.

6. A water bed as in claim **2,** wherein the edge portions of said wall and of said sheets are heat sealed, securing them together.

7. A water bed as in claim **1,** wherein heating element means is on said inner wall for heating water in said mattress.

8. A water bed as in claim **1,** wherein said flexible, foldable material comprises a plastic vinyl film.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,778,852 Dated Dec. 18, 1973

Inventor(s) RUSSELL C. PENN; WAYNE P. PENN; THOMAS H. ROUGHLEY

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 67, "sfpport" is corrected to --support--.

Column 2, line 9, the period "(.)" after drawings is changed to a semicolon --(;)--, and the following language is added: --in the drawings:--.

Column 4, line 21, "if" is corrected to --it--.

The last name of one of the co-inventors is corrected from "Roughly" to --Roughley--.

Signed and sealed this 6th day of August 1974.

(SEAL)
Attest:

McCOY M. GIBSON, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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