

[54] VARIABLE TENSION FLUID MATTRESS

[57]

ABSTRACT

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[58] Field of Search **5/348 R, 348 WB, 349, 350,
5/348; 297/DIG. 8, DIG. 2**

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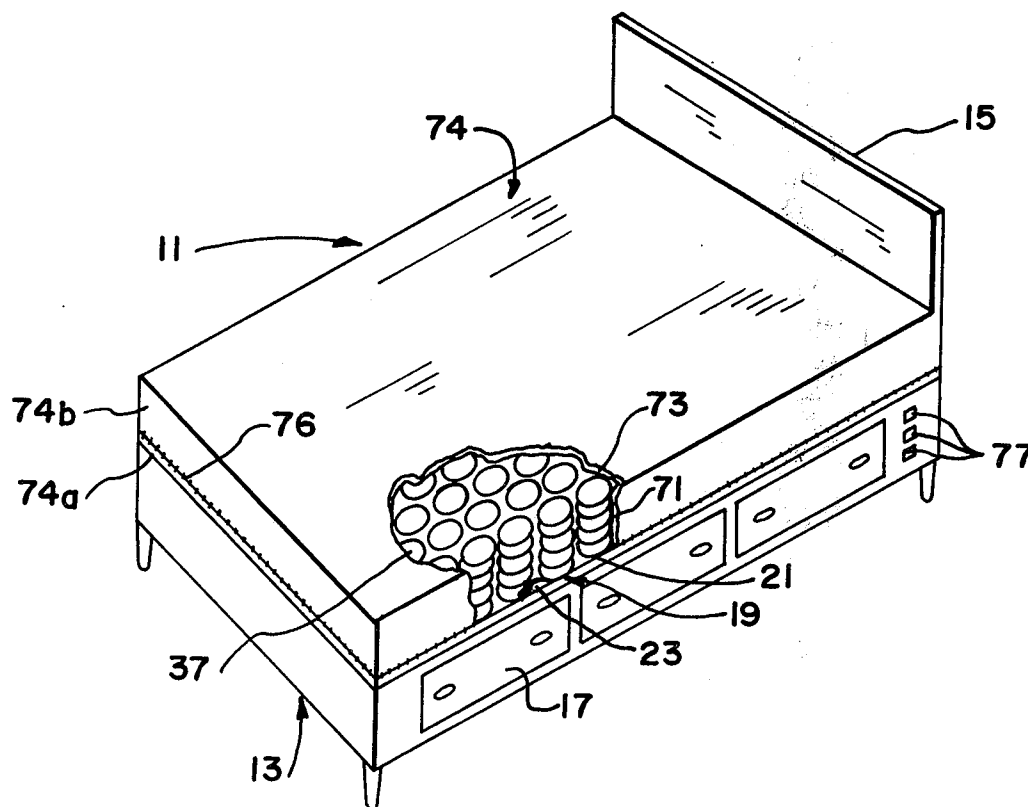
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A mattress for support of the human body in which the body engaging surface includes a large number of individual inflatable pads. The pads, forming either the entire mattress or an individual zone thereof are interconnected to a single fluid chamber providing a predetermined fluid pressure. In a mattress divided into zones, means are provided so that pressure in various zones may differ from each other. Moreover, the pressure in any zone or of the entire mattress may be varied at the user's will, such that the hardness or softness of the mattress is adjustable. The individual inflatable pads include a bellows like flexible tube having a flattened closed end at the top and secured to a rigid base at the bottom through which fluid may be supplied to the pad. A restrainer, such as a chain, may be affixed within the pad to limit its elongation under pressure.

4 Claims, 3 Drawing Figures



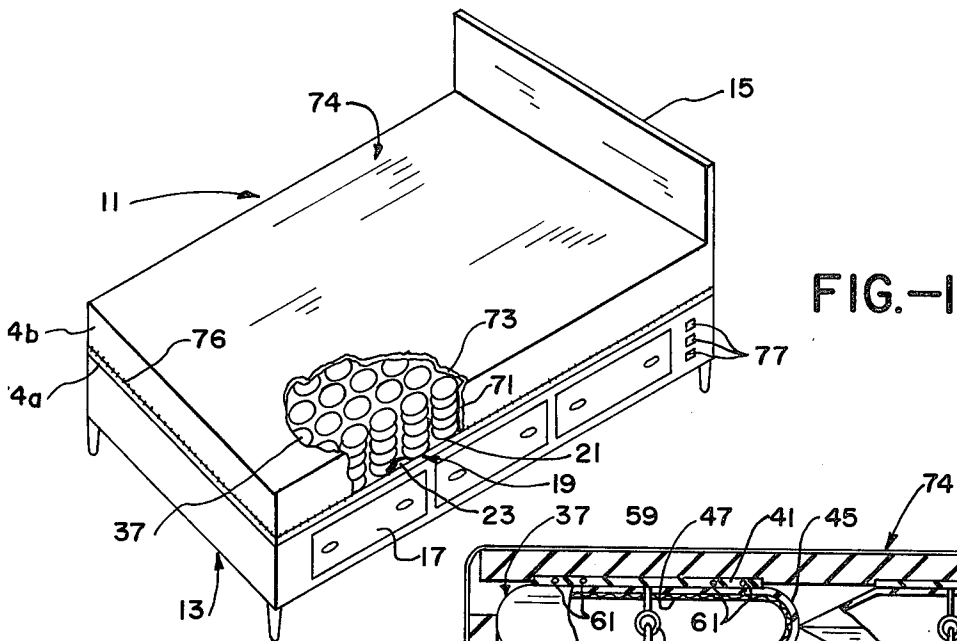


FIG.-1

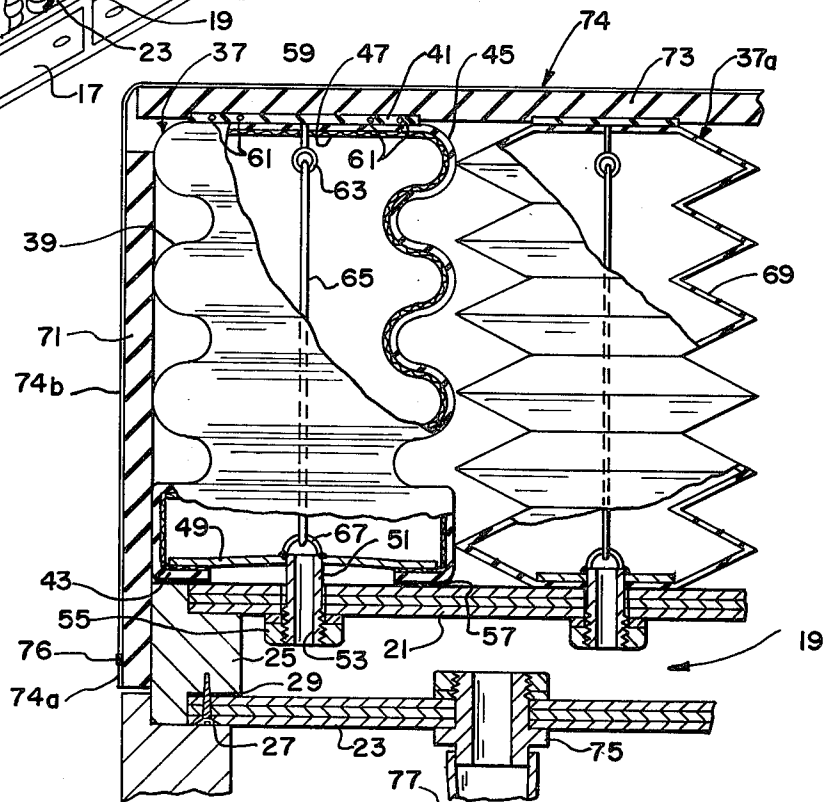
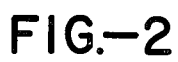
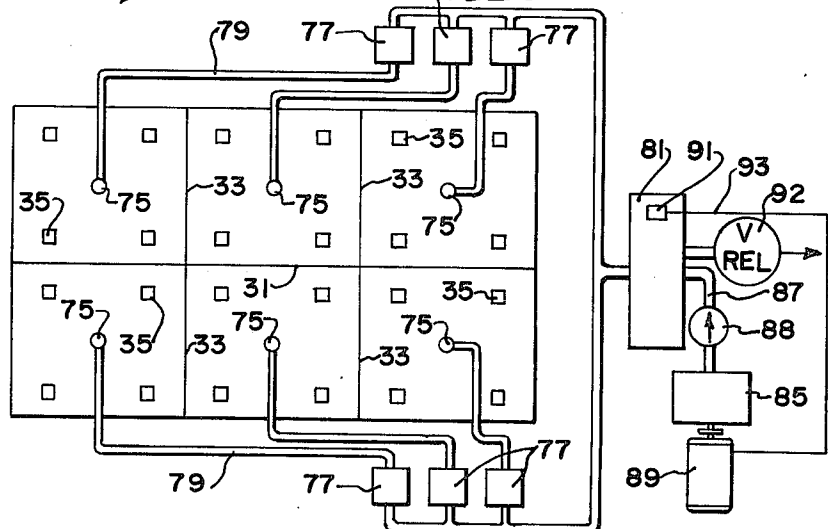


FIG.-3



VARIABLE TENSION FLUID MATTRESS

BACKGROUND OF THE INVENTION

Fluid mattresses of the prior art, that is, both the air and water mattresses, have generally included either a single chamber or a plurality of totally isolated chambers. Neither arrangement provides an ideal solution. With respect to the single chamber movement at any part of the surface of the mattress is quickly transferred to the remaining surface of the mattress. With respect to the isolated compartments, the individual compartments are not able to interadjust to accommodate the weight distribution of the body on the mattress itself. Moreover, the fluid mattresses of the past have relied entirely on the strength of the compartment.

SUMMARY OF THE INVENTION AND OBJECTS

The invention is incorporated in a mattress including a rigid walled chamber forming a base upon which a plurality of pressure expandable pads are secured. The interior of each pad is in communication with the chamber to which may be applied a fluid such as air, water or oil under pressure. The individual expandable pads may have means to limit their expansion regardless of the pressure.

It is, therefore, an object of this invention to provide a new and improved type of mattress.

It is a further object of this invention to provide an improved fluid mattress in which the pressure throughout the mattress or at various zones can be quickly and easily varied at will.

It is still another object of this invention to provide a mattress having the above features and further in which the level of the mattress does not increase beyond a predetermined limit despite increased pressure therein.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a perspective view of a mattress in accordance with the invention, as installed on a bed;

FIG. 2 is a detail view taken along the line 2—2 of FIG. 1 and showing two alternative constructions of expandable pads in accordance with the invention; and

FIG. 3 is a schematic diagram showing the interconnection of the air chambers of the mattress in accordance with the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, there is shown partially broken away a fluid mattress 11 in accordance with the invention disposed on a bed frame 13 having a headboard 15. The bed frame 13, rather than carrying the usual box springs, may include a series of drawers 17 since the box springs are unnecessary when utilizing the mattress in accordance with the invention.

Also, as shown in FIG. 1 but in more detail in FIG. 2, the mattress includes a fluid chamber 19 defined by upper and lower walls 21 and 23 which may be formed of plywood and a peripheral wall 25. The upper wall 21 may be permanently secured to the peripheral wall 25 by an adhesive or the like but the lower wall 23 is preferably connected by means of screws 27 in conjunction with a fluid tight membrane such as rubber stripping 29.

As shown schematically in FIG. 3 the fluid chamber 19 may be compartmentalized by a longitudinal divider

31 such as may be used in a double occupancy bed. If desired, the chamber may be further compartmentalized by cross dividers 33 to provide individual zones of the fluid chamber for each occupant. In addition, the upper and lower walls 21 and 23 of the chamber may be connected together by short blocks 35 spaced throughout in order to minimize any swelling under pressure. Rather than being formed of wood as shown, the walls 21, 23 and 25, as well as the blocks 35 and dividers 31 and 33 may be formed of a plastic material.

On the top wall 21 is secured a plurality of pressure expandable pads 37 or, as alternatively shown in FIG. 2, 37a.

Referring particularly to the pads 37 they include a generally bellows shaped tube 39 having a closed end 41 and an open end 43. The tube is preferably formed of a flexible material such, for instance, as a rubber 45 molded over a nylon material 47. The pad is clamped to the top wall 21 by means of a disc 49 secured to a hollow stem 51 having a threaded end 53. The stem 51 is passed through an opening in the upper wall 21 and secured the pad thereon by means of a nut 55. If desired the pad 37 can be further secured to the top wall 21 by means of an adhesive 57.

A reinforcing member 59 may be secured to the top of the pad 37. The member 59 may be in the form of a thick rubber disc and may further include a coil of wire 61 molded therein. Also secured at the end 41 is a hook or eye 63 which cooperates with a restraining member such as the chain 65, the other end of which is attached to a loop 67 formed on the tube 51. The chain 65 may be replaced by any suitable elongation limiting means such as a cord or a flexible wire serving merely to limit the upward expansion of the pad 37 regardless of the internal pressure.

The alternative pad 37a, shown in FIG. 2, is also in the form of a bellows like tube but includes side walls 69 formed of a plastic material.

As shown best in FIG. 1 a plurality or field of the pads 37 are mounted on the fluid chamber wall 21 forming the surface of the bed. A molded ring 71 of latex or foam rubber, for instance, surrounds the field of pads and supports them to form a firm edge. A foam pad 73 overlies the top of the pads 39 providing a smooth top surface of the mattress. A cover 74 formed of a ticking includes a stationary portion 74a and a removeable portion 74b connected together by a zipper 76. The stationary portion 74a is secured to the peripheral wall 25 in any convenient manner such as stapling.

As shown schematically in FIG. 3 each division of the fluid chamber 19 includes a fluid inlet 75, shown also in FIG. 2. Each fluid inlet 75 is connected to a variable pressure regulator 77 through a fluid line 79. The regulator 77 may include a calibrated pressure dial. Also pressure gauges may be included. In the particular example shown three such regulators 77 are associated with each side of the mattress and may be physically mounted beneath the mattress itself, as shown in FIG. 1. All of the regulators 77 are connected to a storage tank 81 by means of a conduit 83 and the storage tank is, in turn, connected to a fluid pump 85 through a conduit 87 having a check valve 88. The fluid pump 85 is activated by a motor 89 which is, in turn, switched on and off in response to an electrical signal from a pressure sensitive switch 91 through a line 93. An alternative to the pump 85 and motor 89 is a manually actuated pump used to create a surplus of fluid in the tank

81. The tank 81 and, if desired, the various compartments of the chamber 19 are fitted with pressure relief valves 92. In the event the fluid used is a liquid, further means must be provided to direct the output of the relief valves 92 to a safe and convenient location.

In practical application the pressure sensitive switch is set to a pressure somewhat greater than the highest pressure to be anticipated by any of the regulators 77. The motor 89, and the pump 85 then serve to maintain pressure in the tank 81 at a sufficiently high level. Pressure may be applied to any portion of the chamber 19 through the selected regulator 77 to make that particular portion as firm or as soft as desired by the occupant. Fluid in any particular portion of the chamber 19 is supplied to the pads 39 through the hollow stems 51. The internal diameter of the stems 51 is selected such as to somewhat restrict passage of fluid therethrough and thereby prevent rapid collapse and rise of the pads 39. On the other hand, the openings are selected sufficiently large so as to avoid whistling or other noise during the passage of fluid. The particular dimension of the opening in the tube 51 will be dependent upon the particular fluid used and the pressure under which the system will operate. It should be recognized, however, that very little fluid need be moved to vary the pressure in the individual pads 39 since their length is limited by the chain 65. Consequently, the only fluid to be moved is that required to increase or decrease the amount of pressure.

As an alternative to the automatic pressure regulators, two sets of manually operable valves could be employed. The valves of one set are employed in place of the regulators 77 and permits selective application of

fluid from the pressurized tank 81 to various portions of the chamber 19. The other set of valves are relief valves connected to each portion of the chamber 19. Thus by opening a valve of the first set, pressure in a selected portion of the chamber is increased while opening a valve of the second set, pressure will be lowered.

I claim:

1. A fluid mattress comprising a flat rigid upper wall, a rigid lower wall and a rigid peripheral wall, said walls being joined together in fluid tight relationship to form a fluid chamber, a field of pressure expandable pads secured to said top wall, each of said pads comprising a bellows shaped tube having a closed upper end and an open lower end, and means within the bellows shaped tube for limiting the expansion thereof, the interior of each of said pressure expandable pads being in fluid communication with said fluid chamber, and means for applying fluid under pressure to said chamber.

2. A fluid mattress as defined in claim 1 wherein said means for applying fluid under pressure to said chamber includes means for applying said fluid at selectively variable pressure.

3. A fluid mattress as defined in claim 1, together with divider means located within said rigid walls for dividing said fluid chamber into compartments and means for applying fluid under selectively variable pressure to each of said compartments.

4. A fluid mattress as defined in claim 1, together with a cover disposed about said pressure expandable pads and removeably secured to said peripheral wall.

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