

July 10, 1962

L. G. MARCUS
INFLATABLE MATTRESS

3,042,941

Filed Jan. 20, 1959

2 Sheets-Sheet 1

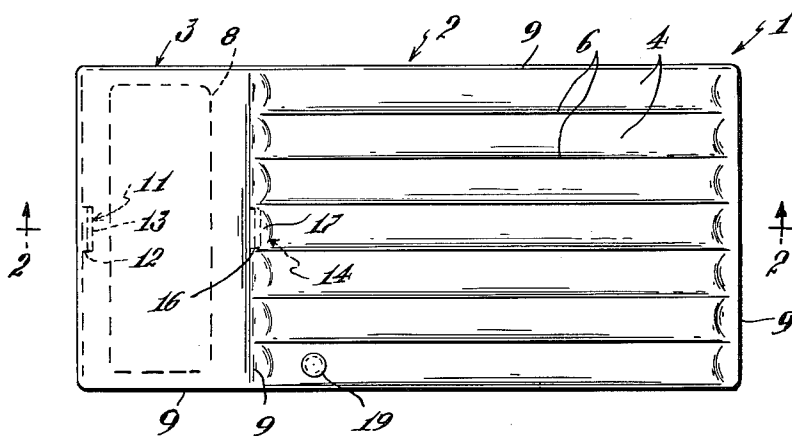


Fig. 1

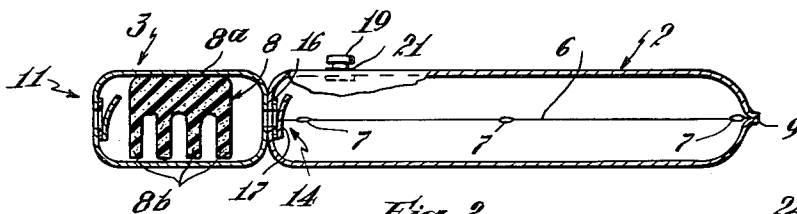


Fig. 2

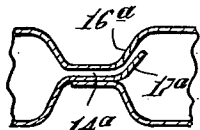


Fig. 3

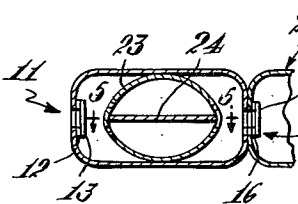


Fig. 4

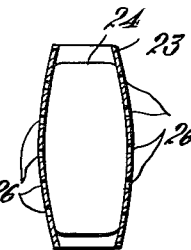


Fig. 5

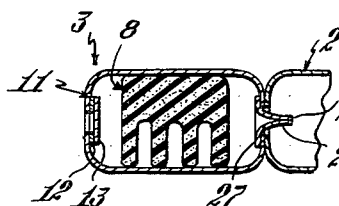


Fig. 6

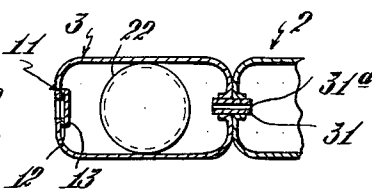


Fig. 7

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2 Sheets-Sheet 2

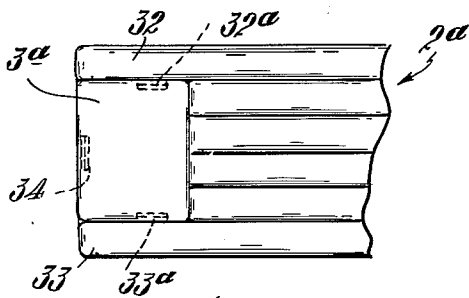


Fig. 8

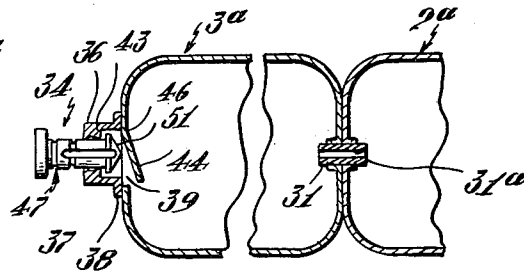


Fig. 9

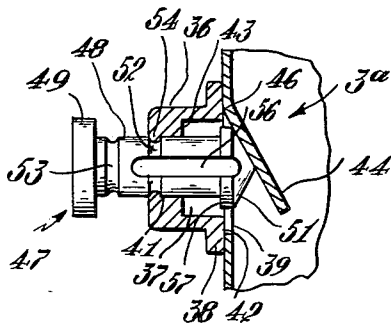


Fig. 10

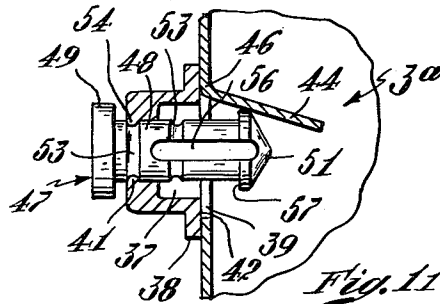


Fig. 11

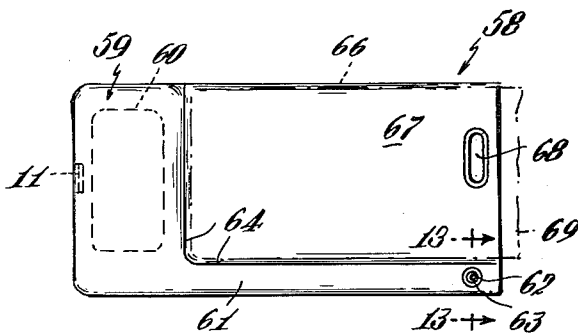


Fig. 12

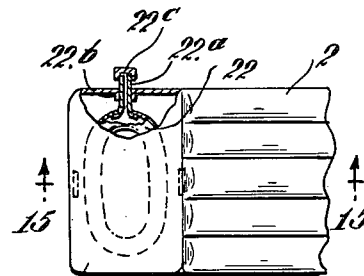


Fig. 14

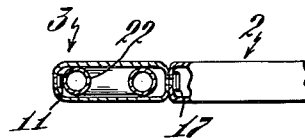


Fig. 15

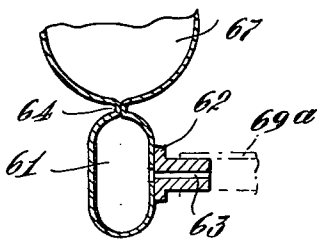


Fig. 13

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INFLATABLE MATTRESS

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3 Claims. (Cl. 5—348)

This invention concerns inflatable articles and relates more particularly to inflatable mattresses having self-contained pump-inflating means.

Objects of this invention are to provide an inflatable article which has integral, pump-inflating means, which may be quickly and conveniently inflated, which will not have uncomfortable lumps therein caused by said integral pump means, which may be quickly and conveniently deflated, which may be conveniently folded into a package suitable for carrying, which may be compactly and inexpensively constructed, and which may be reliable over a long period of use.

In brief summary, the invention comprises an inflatable article having a main compartment and a second compartment so attached as to provide contiguous cushioning surfaces when both compartments are distended, means for resiliently distending the second compartment, an inlet valve for the second compartment, and means for controlling fluid flow between the compartments whereby the main compartment may be inflated by successive compression and distension of the second compartment.

In a particular embodiment of this invention, the fluid control means comprises a restricted fluid passage between the pillow and main compartments whereby, when the pillow compartment is compressed, fluid flows into the main compartment therethrough, and when the pillow compartment is distended, replacing fluid content is drawn into said compartment through the inlet valve before a substantial amount of fluid returns through the restricted passage from the main compartment, and whereby, when the mattress is inflated to the desired pressure, sufficient fluid may return through the passage from the main compartment to equalize the pressure in the two compartments.

The inlet valve may comprise an opening in the pillow compartment wall having a valve seat concentric therewith at either end, a valve means cooperable with the inner valve seat for sealing the opening when pillow pressure exceeds external pressure, said valve automatically opening when external pressure exceeds pillow pressure, and a valve member having a portion adapted to cooperate with the outer valve seat for sealing the opening, said member being movable within the valve opening between an outer position permitting operation of said automatic valve means in open position, and an inner position sealing said opening whereby, when the valve member is in outer position, the main compartment may be inflated by repeated compression and distension of the pillow compartment, whereby, when the valve member is in inner position, the mattress may be sealed in inflated position, and whereby, when the valve member is in middle position, the mattress may be deflated.

Other objects and advantages and detail of construction will appear in the following description which refers to the drawings in which—

FIG. 1 is a plan view of the particular embodiment of the mattress of this invention;

FIG. 2 is a section view along line 2—2 of FIG. 1;

FIG. 3 is a partial section view, similar to FIG. 2, showing another embodiment of this invention;

FIG. 4 is a partial section view, similar to FIG. 2 showing another embodiment of this invention;

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FIG. 5 is a section view along line 5—5 of FIG. 4;

FIG. 6 is a partial section view, similar to FIG. 2, showing another embodiment of this invention;

FIG. 7 is a partial section view, similar to FIG. 2, showing another embodiment of this invention;

FIG. 8 is a partial plan view, to smaller scale, similar to FIG. 1, showing another embodiment of this invention;

FIG. 9 is an enlarged partial section view, similar to FIG. 2, showing another embodiment of this invention;

FIG. 10 is a partial section view, similar to FIG. 9, showing the valve of FIG. 9 in another position;

FIG. 11 is a partial section view, similar to FIG. 9, showing the valve of FIG. 9 in a third position;

FIG. 12 is a plan view, to smaller scale, of another embodiment of this invention;

FIG. 13 is a partial enlarged section view along the line 13—13 of FIG. 12;

FIG. 14 is a partial plan view, also to smaller scale, similar to FIG. 1, showing another embodiment of this invention; and

FIG. 15 is a partial section view along the line 15—15 of FIG. 14.

Referring to the drawings, 1, in FIG. 1 indicates one embodiment of the inflatable mattress of this invention which comprises a main compartment 2 and a pillow compartment 3. The main compartment 2 is substantially separated into cells 4 by the seams 6, the cells, however, being interconnected by the ports 7, to provide a quilted effect as is conventional in devices of this type. The pillow compartment, however, is preferably not quilted. The compartments are formed of non-porous, flexible material such as rubber or plastic having seams 6 and 9 formed by vulcanizing, heat-sealing or adhesives as desired.

The pillow compartment is provided with a self-distending body 8, of sponge rubber as shown in FIG. 2, which is of a volume, shape and resilience on the one hand to normally hold the pillow compartment fully distended without, however, filling the compartment volume and, on the other hand, to provide the pillow compartment with the degree of resiliency normally desired in a pillow. Said resiliency will most often be slightly stiffer than the resilience of the mattress main compartment as fully inflated. For example, the sponge body 8 may have a flat cushioning surface 8a and legs 8b for fully distending the pillow compartment without occupying its full volume and for providing the compartment with pillow resilience.

As shown in FIGS. 1 to 4, 6 and 7, the pillow compartment 2 is provided with an inlet valve 11 comprising a valve seat 12 attached to the inner pillow compartment wall, and a valve flap 13 hinged along a portion of its margin to said valve seat. The flap 13 is stiffly resilient so that when fluid pressure within the pillow compartment exceeds the fluid pressure surrounding the compartment, the valve flap 13 will cooperate with the valve seat 12 to close the valve 11. However, when the fluid pressure within the pillow compartment is less than the surrounding pressure, the flap 13 will bend inwardly to open the valve to permit equalization of the pillow and surrounding pressures.

A similar outlet valve 14, as shown in FIGS. 1, 2 and 4, is provided between the pillow and main compartments, this valve comprising a valve seat 16, attached to the inner main compartment wall, and a valve flap 17 hinged along a portion of its margin to the seat 16. This flap 17 is also stiffly resilient so that, when fluid pressure within the main compartment exceeds pillow compartment pressure, the flap will cooperate with the seat 16 to close the valve 14. However, when pillow pressure exceeds the fluid pressure within the main compartment, the flap 17 will bend inwardly into the main compartment to open the valve 14 to permit equalization of the

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pillow and main compartment pressures. FIG. 3 shows a similar valve 14a wherein the valve flap 17a is provided integral with the mattress wall and cooperates with a surface 16a in the main compartment wall for closing the valve.

The main compartment is provided with a normally closed relief port 18 having a cover 19 which snap-fits onto the port nozzle 21.

The mattress of this invention, as shown in FIGS. 1 and 2, may be inflated by successive compression and distension of the pillow compartment as will be shown below. Stepping onto the pillow compartment 2 will compress the pillow, and therefore the self-distending body 8, and will so increase fluid pressure therein that the valve 14 will automatically open permitting a sufficient portion of fluid content of the pillow compartment to be pumped into the main compartment. Then stepping off the pillow compartment permits distension of the pillow compartment by the self-distending body 8. During distension of the pillow compartment, fluid pressure therein will be less than the fluid pressure in the main compartment and in the surrounding atmosphere so that the valve 14 will automatically close and the valve 11 will automatically open. When the compartment is fully distended, the procedure may be repeated, the pillow compartment, each time, forcing more fluid into the main compartment while being compressed, and replacing that fluid from the atmosphere while being distended. In this way, the main compartment may be inflated to any desired pressure.

It will be seen that the mattress of this invention utilizes the pillow compartment itself as the bellows diaphragm for the integral pump means provided for inflating the mattress and therefore provides a bellows chamber of substantial volume whereby the mattress may be quickly and conveniently inflated. Further, the pillow compartment is self-distending having no force resisting said distension other than normal atmospheric pressure bearing upon the exterior surfaces thereof, and, therefore, will be rapidly distended for the next pumping compression step. This results in a more compact and inexpensive mattress construction while providing a faster, more convenient and reliable inflating device which will not be separated and lost. It will also be noted that this economy and efficiency is achieved while providing a mattress of greater comfort than has before been provided, the means utilized for extending the pillow compartment being of such a shape and resilience to also provide a comfortable pillow effect.

When desired, the mattress of this invention, as shown in FIGS. 1 to 6, may be deflated by removing the cover 19 from the nozzle 21. The mattress may then be rolled or folded into a convenient package, the self-distending body being compressed or not as desired.

The embodiment of this invention illustrated in FIGS. 14 and 15 utilizes an inflatable tube 22 as the self-distending body for distending the pillow compartment 2. Such a tube is preferably provided in a toroidal configuration for holding the pillow compartment fully distended while trapping a substantial volume of air in the center of the tube for evacuation into the main compartment 3. The tube may be inserted into the pillow compartment in a permanently inflated condition, but is preferably provided with a nozzle 22a which extends through the pillow compartment wall whereby the tube may be mouth-inflated to the desired volume and resilience. The nozzle should be sealed to the wall as at 22b and should be provided with a removable sealing cap 22c. The tube of this embodiment of the invention may be deflated whereby the mattress may be rolled into a package convenient for carrying. Alternatively the tube 22 may be replaced by a tube of other configuration.

FIGS. 4 and 5 illustrate another embodiment of the mattress of this invention. A resilient tube 23 is deformed into oval shape by insertion therein of a rela-

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tively stiff plate 24 and disposed within the pillow compartment 2 so as to hold the compartment normally distended. This embodiment leaves a considerable fluid volume within the pillow compartment available for evacuation into the main compartment upon each pumping compression. The tube may be of a suitably resilient plastic or rubber material and may be provided with apertures 26 to facilitate fluid flow therethrough. It should be understood that the walls of the pillow compartment itself may be made resilient for normally holding the pillow compartment distended.

Alternative types of inlet valves or means for controlling the fluid flow between the pillow and main compartments may also be provided. A fishtail valve 27, as shown in FIG. 6, comprises a flattened nozzle having opposite sides thereof, 28 and 29, normally biased together. When pillow pressure exceeds main compartment pressure, the force exerted on the valve by said pressure tends to spread the sides 28 and 29 apart, therefore, permitting fluid flow between the compartments. However, when main compartment pressure exceeds pillow pressure, the pressures on the valve tend to compress the nozzle sides 28 and 29 together, preventing the flow of fluid between the compartments.

A very desirable means for controlling fluid flow between the two compartments is illustrated in FIG. 7. The fluid control means comprises a tubular body 31 having a restricted passage 31a extending between the two compartments which provides an opening of substantially smaller size than the opening in the inlet valve 11. Alternatively, that tubular constriction may be made by joining the two sides of the mattress material so as to form a flat tube. When the pillow compartment is compressed, fluid will flow through the passage 31a into the main compartment exactly as described above. However, when the pillow compartment is distended, since the inlet valve opening is substantially greater than the opening in the passage 31a, the pillow compartment will be refilled through the valve 11, from the atmosphere before a substantial amount of fluid has returned from the main compartment through the passage 31a. In this embodiment, moreover, when the mattress is inflated to the desired pressure and pumping is halted, sufficient fluid will gradually return to the pillow compartment from the main compartment to equalize the pressure in the two compartments.

It may be desirable to provide a mattress having a single inlet valve and having two or more fluid control means between the pillow compartment 3a and main compartment 2a as shown in FIG. 8. In that case, the main compartment may be provided with extensions 32 and 33 alongside the pillow compartment to receive the fluid control means. The fluid control means can comprise one-way fluid flow control valves similar to valves 11 and 14, one valve 32a permitting fluid flow only from the pillow compartment to the main compartment during inflating of the mattress, and the other valve 33a permitting fluid flow only from the main compartment to the pillow compartment. In this embodiment, the fluid control means permits inflation of the mattress to a predetermined pressure and then permits return of fluid from the main compartment to the pillow compartment to inflate the pillow compartment. The arrangement of fluid control valves also sets a limit on the pressure to which the mattress may be inflated, thereby preventing over-inflation and inadvertent inflation.

A novel and particularly desirable type of inlet valve 34 for the mattress of this invention is illustrated in FIGS. 9 to 11. The valve includes a valve body 36, preferably of stiffly, resilient material, having an axial passage 37 therethrough. The body is provided with a mounting flange 38 which may be attached for example with adhesive, to the outer pillow compartment wall in registry with an opening 39 therein. The body is further pro-

vided with an outer valve seat 41 and an inner valve seat 42 at either end of the passage 37, and is provided with a stop shoulder 43. The opening 39 may be formed by slitting the pillow compartment material almost entirely around the periphery of a circle, thereby providing the opening 39, the valve flap 44 and leaving a hinged portion 46 for connecting the flap to the pillow compartment wall.

The valve 34 further includes a valve member 47 comprising a cylindrical body portion 48 adapted to slide within the passage 37 in the valve body, a flange portion 49 adapted to be gripped by hand for sliding the valve member in the passage 37, and an inner butt portion 51 adapted to bear upon the valve flap 44. The valve member 47 is peripherally grooved transversely of its longitudinal axis at 52 and 53 to snap-fit with the edge 54 of the passage 37. The valve member is also longitudinally grooved, as at 56, to a depth greater than the depth of the groove 52, the groove extending through the butt portion 51 and the peripheral groove 52.

This novel valve, when used in the inflatable mattress of this invention in conjunction with fluid control means comprising the restricted passage 31a, as shown in FIG. 9, functions as follows: When the valve member is in outer position, as shown in FIG. 9, the face 57 of the butt portion 51 abuts the stop shoulder 43, retaining the valve member within the passage 37. In this position of the valve member, the valve flap 44 cooperates with the valve seat surface 42 to function like the valve 11 described above, thereby permitting inflation of the main compartment by successive compression and distension of the pillow compartment. In this position, the grooves 56 permit entry of fluid through the valve passage 37. When the mattress has been fully inflated, the valve member may be moved to its inner position, shown in FIG. 11, where the groove 53 snap-fits with the passage edge 54 having the valve seat surface 41 to seal the mattress in inflated position. When, however, the valve member is moved to middle position, shown at FIG. 10, the passage edge 54 snap-fits in the groove 52 holding the valve member in said middle position. In that position, the butt portion 51 of the valve member prevents seating of the valve flap 44 on the seat 42 and thereby permits fluid evacuation from the mattress and pillow compartments through the grooves 56.

It will be noted that the valve provided by this invention is of particularly inexpensive construction—particularly of inexpensive assembly with the mattress pillow compartment—and that it obviates the outlet valve 13 required in other embodiments of this invention.

In another aspect, the invention may comprise a pump device 58, for use in inflating an inflatable mattress of conventional type, which is adaptable for use as a pillow in conjunction with said mattress—the device being also provided with a receptacle and carrying handles for transporting an inflatable mattress in convenient manner. As shown in FIGS. 12 and 13, the device 58 comprises a compartment 59, similar to the compartment 3 shown in FIG. 1, having a self-distending body 60 disposed therein for normally holding the compartment distended. The compartment preferably has an elongate extension 61 whose purpose will be explained below. The compartment is provided with an inlet valve 11, as described above, and with the nozzle 62 having the restricted fluid flow passage 63, the nozzle being located near the remote end of the extension 61. The seams 64, defining the compartment 59 and the extension thereof, in conjunction with the seam 66, define the bag receptacle 67. This bag is apertured on either side, as at 68,

to provide carrying handles for the pump device of this invention.

The bag 67 may be used to receive and carry an inflatable mattress of conventional type, for example a mouth-inflatable air mattress. When it is desired that the mattress, as indicated here by the lines 69, be inflated, the pump device 58, as shown in FIG. 13, may be connected to the nozzle 69a provided on the mattress. The mattress may then be inflated by successive compression and distension of the pillow pump device precisely as described above. When the mattress has been inflated to the desired pressure, it may be left attached to the pillow pump 58 so that the fluid may return through the passage 63 to equalize the pressure in the pillow and in the mattress. In use, the mattress may be placed over the flattened bag portion 67 of the pump device so that the pillow compartment 59 may be held in the proper position relative to the mattress by the normal weight of a person reclining on the mattress. The extension 61 permits this position of the pillow relative to the mattress without disconnecting the pump and mattress.

It should be understood that although particular embodiments of the inflated article of this invention have been shown by way of illustration that this invention includes all modifications and equivalents which are within the scope of the appended claims.

I claim:

1. An inflatable mattress comprising an airtight covering forming a main compartment and an auxiliary compartment, the covering for said main and auxiliary compartments being of uniform flexible material extending over said compartments, said main and auxiliary compartments being formed by said covering in horizontally adjacent positions so that both said compartments can lie directly on the ground, an inlet valve to the auxiliary compartment, a passage between said compartments including means for controlling air flow between the compartments, and additional resilient means disposed within the covering of the auxiliary compartment for distending said compartment and causing air to be drawn into the compartment by distension of the auxiliary compartment, said covering forming the enclosure for said auxiliary compartment, so that expansion of said auxiliary compartment is unopposed by air pressure in the main compartment, said resilient means extending between and engaging the top and bottom of the auxiliary compartment and being flexible vertically so as to yield when said auxiliary compartment covering is compressed between the user's foot and the ground directly; whereby any compression of the covering of the auxiliary compartment by pressure of the user's foot causes air to be pumped into the main compartment without compression of the main compartment by the user's foot such as to oppose pumping of air therein.

2. The mattress according to claim 1 wherein said additional resilient means comprises a tube.

3. The mattress according to claim 2 wherein said tube is elongate and open ended to prevent the development of air pressure therein.

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