

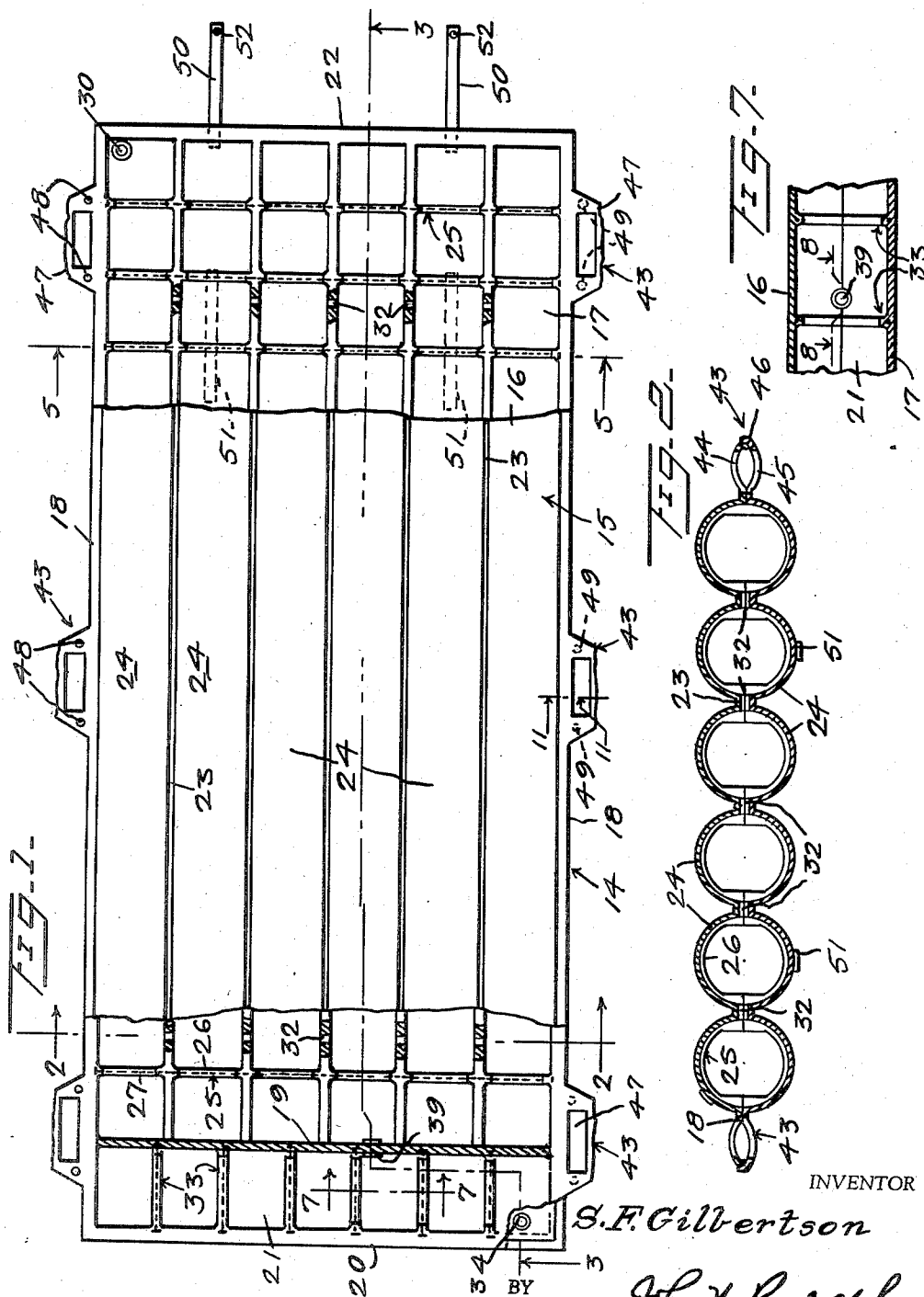
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S. F. GILBERTSON
SELF-INFLATING MATTRESS

2,886,834

Filed May 24, 1957

2 Sheets-Sheet 1



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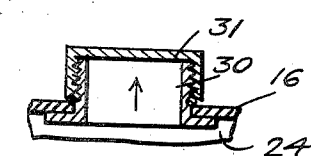
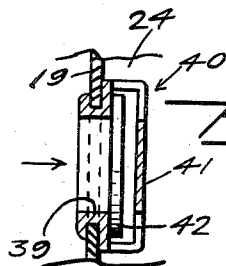
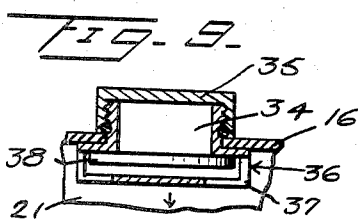
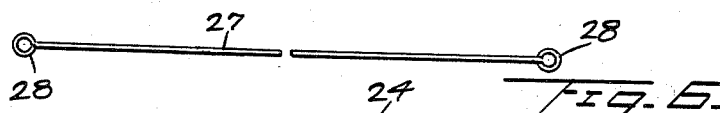
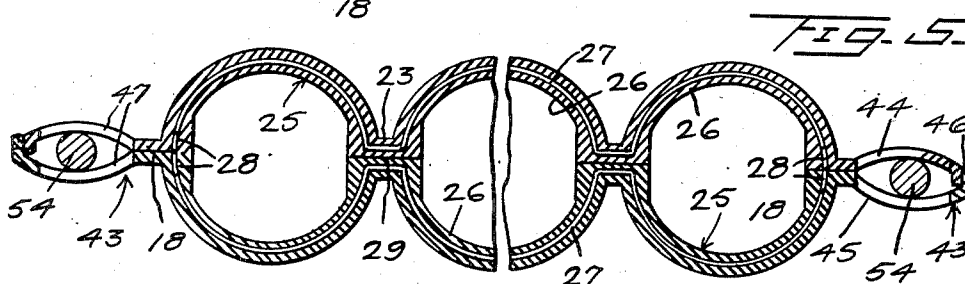
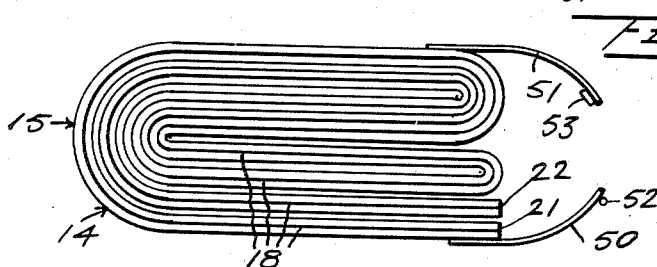
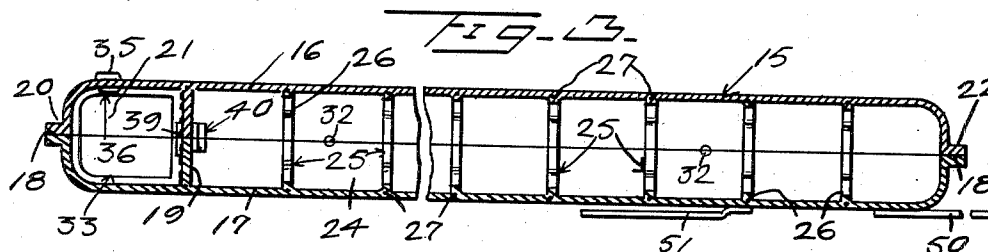


FIG. 10.

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SELF-INFLATING MATTRESS

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5 Claims. (Cl. 5—348)

This invention relates to a novel self-inflating air mattress including stiffening means for urging the mattress into a distended condition for creating a partial vacuum therein to cause air to be drawn into the mattress and trapped therein whereby the mattress will then be maintained inflated, by the air contained therein, when a load is placed upon the mattress tending to distort the stiffening means thereof.

Another object of the invention is to provide a self-inflating mattress including one inflatable chamber forming a part of the mattress which is capable of functioning as a pump by being intermittently compressed for inflating the remainder of the mattress.

A further object of the invention is to provide a self-inflating mattress from which the air can be readily released and which can be readily compressed for exhausting the air therefrom to enable the mattress to be flattened and compactly folded.

Another object of the invention is to provide an air mattress capable of being inflated to produce a positive air pressure therein to enable use of the mattress as a stretcher.

A further object of the invention is to provide an air mattress having handles adapted to be grasped for supporting the mattress as a stretcher or for receiving poles between which the mattress may be supported.

A further object of the invention is to provide a mattress which is so constructed that a number of corresponding mattresses may be connected together in side-by-side relation to form a pneumatic mattress of any desired width.

Various other objects and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

Figure 1 is a fragmentary top plan view, partly in horizontal section, of the self-inflating air mattress;

Figure 2 is a cross sectional view through the mattress, taken substantially along a plane as indicated by the line 2—2 of Figure 1, and on an enlarged scale;

Figure 3 is an enlarged fragmentary longitudinal sectional view of the mattress, taken substantially along the line 3—3 of Figure 1;

Figure 4 is an elevational view showing the mattress completely deflated, collapsed and folded;

Figure 5 is an enlarged fragmentary cross sectional view of the mattress, taken substantially along a plane as indicated by the line 5—5 of Figure 1;

Figure 6 is a fragmentary plan view of a part of the stiffening structure;

Figure 7 is an enlarged fragmentary transverse sectional view, taken substantially along a plane as indicated by the line 7—7 of Figure 1;

Figure 8 is an enlarged fragmentary sectional view, taken substantially along a plane as indicated by the line 8—8 of Figure 7;

Figure 9 is an enlarged fragmentary vertical sectional view through the air inlet at one end of the mattress;

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Figure 10 is a similar view of the air inlet at the opposite end of the mattress and

Figure 11 is an enlarged fragmentary transverse sectional view, taken substantially along a plane as indicated by the line 11—11 of Figure 1.

Referring more specifically to the drawings, the self-inflating mattress in its entirety is designated generally 14 and includes an elongated sack or bag, designated generally 15, formed of a flexible material which is impervious to air, such as a rubberized fabric, and which includes a top half 16 and a bottom half 17. The marginal edge portions of the sack halves 16 and 17 are secured together in abutting engagement in any suitable manner to form a continuous airtight joint 18. The sack 15 is elongated, as clearly illustrated in Figure 1, and near one end thereof is provided with a transverse partition wall 19 which is likewise formed of a flexible material impervious to air and which combines with the end portion 20 of the sack, located adjacent said partition 19, to form a transversely extending chamber 21 at one end of the mattress 14. Between the transverse partition 19 and the other sack end 22, the sack halves 16 and 17 are bonded together along laterally spaced apart lines to form the longitudinally extending seams 23 which divide the mattress sack, between the partition 19 and sack end 22, into a plurality of transversely spaced longitudinally extending tubular portions 24.

The mattress 14 includes a resilient readily deformable frame composed of longitudinally spaced transversely extending ribs 25 which extend around the individual tubes 24 and through the seams 23, and each of which ribs includes an upper half lining the upper halves of the tubes 24, formed by the upper sack section 16, and a lower half lining the lower halves of the tubes, formed by the lower sack section 17. The ribs 25 form the resilient deformable frame of the mattress portion disposed between the partition 19 and mattress end 22. Said ribs or ribbing 25 may include resilient strips 25 of properly shaped hair felt or of stiff fabric, vulcanized or otherwise secured to the sack halves 16 and 17, or the rib members 26 may constitute rubber or plastic molding vulcanized to the sack sections 16 and 17. If a rubberized or plastic molding is employed, such molding is preferably reinforced by spring wires 27, each of which extends from end-to-end of a molding 26 or from side-to-side of the mattress 14, and the ends of the spring wires 27 terminate in eyes 28, embedded in the side edge portions of the mattress 14. The eyes 28 are provided so that the wires 27 will present no sharp points which could puncture the mattress. As seen in Figure 5, the ribbing 25 extends through the seams 23, so that the ribbing of the different tubes 24, disposed in the same transverse plane, is joined by the portions 29 thereof which extend transversely through the seams 23.

At one corner of the mattress end 22, the upper sack section 16 is provided with a port 30 which opens into one of the tubes 24 from the atmosphere. The port 30, as best seen in Figure 10, preferably comprises an outwardly extending externally threaded nipple which is adapted to be closed and sealed by a threaded cap 31, as will hereinafter be more fully described. As seen in Figure 1, communicating ports or passages 32 are formed in each of the seams 23 near each of the ends thereof to permit air to pass laterally from one to another of the tubes 24.

The transversely extending chamber 21 is provided with ribs 33 which are disposed crosswise thereof and which correspond in construction with the ribs or ribbing 25, except that each rib 33 is only of a length substantially equal to the length of a portion of a rib 25 which engages a single tube 24. The upper sack section 16 at one corner of the mattress end 20 is provided with a port 34

which communicates with the atmosphere and with the chamber 21. As seen in Figure 9, the port 34, like the port 30, comprises an outwardly extending externally threaded nipple which is adapted to be closed and sealed by a threaded cap 35. The port 34 also has an inwardly opening one-way valve 36, comprising a cage 37 which is secured to the inner end of the nipple 34 and disposed in the chamber 21, and a disc valve 38 which is loosely confined by said cage and which is adapted to seat against the inner end of the nipple to prevent air escaping outwardly through the nipple 34. The partition 19 is provided with a port 39 forming a communicating passage between the chamber 21 and one of the tubes 24. As best seen in Figure 8, the port 39 comprises a ferrule which extends through and is secured in the wall 19 and which has a one-way valve 40 mounted on the side thereof which is disposed in the tube 24. The valve 40 corresponds structurally to the valve 36 and includes a cage 41 secured to the ferrule 39 and a disc valve 42 which is confined by said cage and which is of a size to close said ferrule opening to prevent air passing from the tube 24 into the chamber 21 but for permitting air to pass from the chamber 21 into the tube.

Portions of the sealed joints 18 at the side edges of the mattress 14 are provided with integral extensions forming handles 43. Each handle 43 includes an upper ply 44 and a lower ply 45, which plies form integral extensions of the sack sections 16 and 17, respectively. The plies 44 and 45 have their outer edges overlapped and suitably secured together as seen at 46 in Figure 5 and are unsecured between said joints 46 and the joints 18. The plies 44 and 45 have corresponding openings 47 through which the fingers can be inserted for grasping the handles 43. Each side of the mattress 14 is provided with a plurality, preferably three or four handles 43. Additionally, the handles 43 at one side of the mattress are each provided with snap fastener sections 48, located on the upper sides of said handles 43, and the handles 43 at the opposite side of the mattress 14 are provided with snap fastener sections 49 on the undersides of said last mentioned handles. The snap fastener sections 48 may constitute female sections and the snap fastener sections 49 male sections, so that a plurality of mattresses 14 can be connected together in side-by-side relation by attaching male fastener sections 49 of one mattress to female fastener sections 48 of another mattress.

A pair of nonelastic tapes or straps 50 have corresponding ends secured to the underside of the mattress end 22, and said tapes 50 extend outwardly from said mattress end. Similar tapes or straps 51 are secured to the underside 17 of the mattress, near to but spaced somewhat from the mattress end 22. The straps 51 extend from their secured ends in a direction away from the straps 50. The straps 51 are disposed in longitudinal alignment with the straps 50 and are provided adjacent their free ends with snap fastener sections 53 for engagement with snap fastener sections 52 of the straps 50, as will hereinafter be described. Any other suitable means may be provided in lieu of the fastener sections 52 and 53 for connecting the straps 51 to the straps 50.

Assuming that the mattress 14 with the closure caps 31 and 35 applied, is extended from the folded position of the mattress as seen in Figure 4, the resilient deformable ribbing 25 will tend to urge the tubes 24 to distended positions as seen in Figures 1, 2, 3 and 5 and the ribbing 33 will also tend to urge the mattress portion forming the chamber 21 to a distended position as seen in Figure 3. This will produce a partial vacuum or suction within the mattress. By removing the cap 31, air will enter the mattress through the port 30 and will pass through the lateral ports 32 for filling the tubes 24 to substantially atmospheric pressure or so that only a slight negative pressure will exist in said tubes. The cap 31 can then be replaced and the mattress portion as defined by the tubes 24 is then ready for use and will constitute an inflated

mattress when a load is placed thereon, as the load will then be supported by the air within the mattress, since the ribbing 25 is only of sufficient strength to distend the tubes when no load is supported thereon.

Again assuming that the mattress 14 is flat and extended, by removing the cap 35, rather than the cap 31, air will enter through the port 34 past the inwardly opening valve 36 and will also pass the one-way valve 40 so that the tubes 24 and chamber 21 will all be filled to nearly atmospheric pressure. Whereas the cap 31 had to be replaced to prevent escape of air from the port 30 when a load was placed on the tubes 24, it is not necessary to replace the cap 35 as the valve 36 will prevent the escape of air to the atmosphere through the port 34. When a load is placed on the mattress 14 the air contained within the inflated mattress will support the load, so that in either manner as aforescribed the mattress is self-inflating.

The chamber 21 in combination with the valves 36 and 40 provides a self-contained mattress pump which can be utilized for increasing the air pressure in the tubes 24. With the cap 35 removed, this is accomplished by compressing and flattening the chamber 21 so that the air therein will be forced past the valve 40 into the tubes 24. Pressure is then released on the chamber portion 21 and as said chamber portion is distended by its ribbing 33, air will be drawn into the chamber 21 from the atmosphere past the valve 36, the one-way valve 40 preventing air returning from the tubes 24 to the chamber 21. By repeating this operation of intermittently compressing the portion of the mattress defining the chamber 21, the portion of the mattress formed by the tubes 24 can be inflated until a substantial positive pressure exists therein. With the mattress thus inflated, it can be utilized as a stretcher and can be supported by grasping the handles 43, or poles 54 can be inserted through the handles 43, between the plies 44 and 45, with a pole 54 extending through the handles 43 at each side of the mattress, and the poles 54 can be supported beyond the ends of the mattress, in stretcher-carrying fashion.

To exhaust the air from the mattress so that the mattress can be folded as seen in Figure 4 for storage or transportation, the cap 35 is applied and the cap 31 is removed. The mattress portion defining the chamber 21 is then flattened to exhaust the air therefrom into the tubes 24. The cap 35 and valve 40 prevents any air from re-entering the chamber 21. The mattress is then folded crosswise in half while applying pressure thereto and is twice more folded in half and compressed until all of the air is exhausted from the mattress through the port 30 and so that the folded mattress will appear as seen in Figure 4. The straps 50 and 51 are then connected by the fasteners 52, 53 for retaining the collapsed mattress folded. The cap 31 is replaced after all air has been exhausted from the mattress to prevent any air re-entering the flattened mattress. The ribbings 25 and 33 are sufficiently deformable so that they can be flattened with the tubes 24 and with the mattress portion defining the chamber 21, respectively.

Various modifications and changes are contemplated and may be resorted to, without departing from the function or scope of the invention as hereinafter defined by the appended claims.

I claim as my invention:

1. A self-inflating mattress of the character described comprising an elongated relatively wide sack formed of a material impervious to air having a port communicating with the interior of the mattress sack and opening to the atmosphere, said sack being sealed from the atmosphere except for said port, said sack including opposite sides, a deformable frame contained within the sack comprising separate resilient deformable ribs secured to each of said sides internally of the sack and urging said opposite sides away from one another to a distended condition of the sack from a deflated condition thereof in

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which the sack is longitudinally and laterally extended and flattened, and a removable closure for closing and sealing said port for maintaining the mattress inflated and distended or deflated, said closure being removable from the port, when the mattress is deflated, to permit the deformable ribs to displace the sack sides away from one another to distend the sack and create a partial vacuum therein for filling the sack with air automatically to substantially atmospheric pressure, said closure being replaceable to prevent escape of air from the sack when the frame is deformed by a load being placed on the distended mattress.

2. A mattress as in claim 1, said mattress being provided with an internal partition wall connected to opposite sides of the sack and forming a restricted chamber separated from said first mentioned mattress chamber, deformable resilient ribbing contained in said restricted chamber urging the mattress portion defining said restricted chamber to a distended condition, a port provided with a one-way valve connecting said restricted chamber to the first mentioned chamber and permitting a passage of air from the restricted chamber into the first mentioned chamber but preventing passage of air there-through into the restricted chamber, said mattress having a second port opening from the atmosphere into said restricted chamber, a one-way valve permitting the passage of air through said second port to the restricted chamber from the atmosphere and preventing escape of air through said second port, said mattress portion defining said restricted chamber being intermittently compressible for exhausting the air therefrom through the first mentioned valve controlled port into said first mentioned chamber whereby said mattress portion and said one-way valves combine to form a self-contained pump for inflating the first mentioned mattress chamber.

3. A mattress as in claim 1, a plurality of handles projecting outwardly from each longitudinal side edge of the mattress and forming extensions of the opposite sides of the sack and adapted to be manually engaged for supporting the inflated mattress for use as a stretcher, said handles each being formed of plies having separated portions between which carrying poles are adapted to be passed, the aligned handles at each side of the mattress each being adapted to be engaged by the same pole.

4. A mattress as in claim 1, a plurality of handles projecting outwardly from each longitudinal side edge of the mattress and forming extensions of the opposite sides

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of the sack and adapted to be manually engaged for supporting the inflated mattress for use as a stretcher, and snap fastener means carried by said handles for connecting a plurality of the mattresses together in side-by-side relation.

5. An air mattress comprising a sack formed of a material impervious to air and defining an air chamber, said sack being provided with an internal partition wall forming a restricted separate air chamber disposed externally of said first mentioned air chamber, deformable resilient means contained in said restricted air chamber for urging the mattress portion defining said restricted chamber to a distended condition, said mattress portion having a port provided with a one-way inwardly opening valve permitting the passage of air to said restricted chamber from the atmosphere and preventing escape of air through said port, said partition being provided with a port connecting said restricted air chamber and the first mentioned air chamber and provided with a one-way valve permitting passage of air from the restricted air chamber into the first mentioned air chamber but preventing the passage of air therethrough into the restricted air chamber, said mattress portion defining said restricted chamber constituting a part of the air mattress and an air pump whereby an intermittent compressing of said mattress portion will exhaust the air therefrom through the partition port for inflating the first mentioned air chamber, and means for releasing the air from said first mentioned air chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

1,282,980	Takach	Oct. 29, 1918
1,640,618	Sampson	Aug. 30, 1927
1,663,268	Foley et al.	Mar. 20, 1928
1,673,636	Perry	June 12, 1928
1,681,130	Panalle et al.	Aug. 14, 1928
2,028,060	Gilbert	Jan. 14, 1936
2,068,134	Houghton	Jan. 19, 1937
2,372,218	Manson et al.	Mar. 27, 1945
2,682,670	Crump	July 6, 1954

FOREIGN PATENTS

494,496	Belgium	July 1, 1950
522,691	Germany	Apr. 13, 1931
657,558	Great Britain	Sept. 19, 1951