

Sept. 30, 1958

S. L. FRIEDLANDER

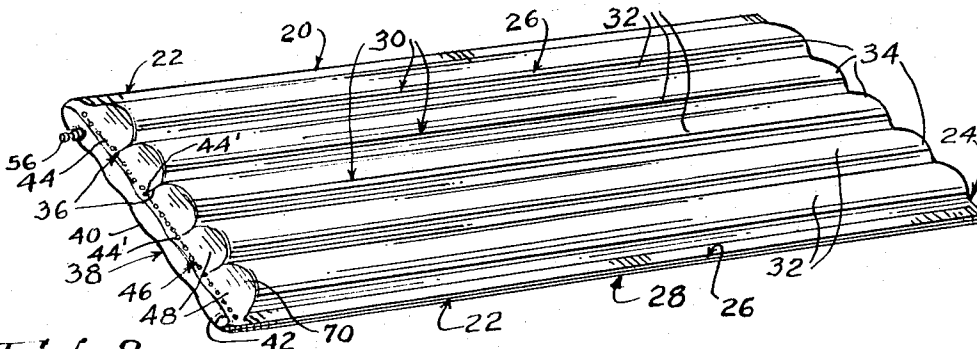
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INFLATABLE MATTRESS

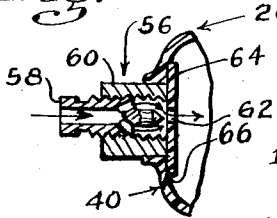
Filed May 4, 1956

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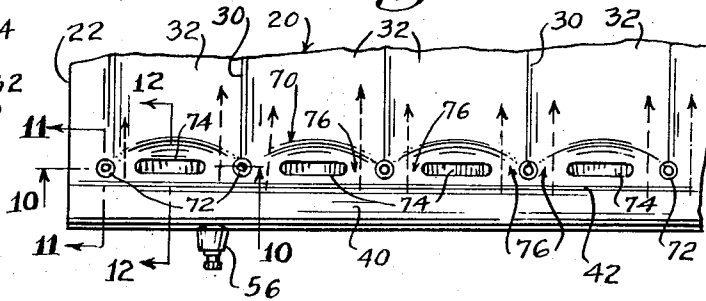
*Fig. 1.*



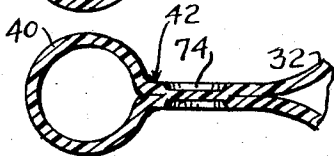
*Fig. 8.*



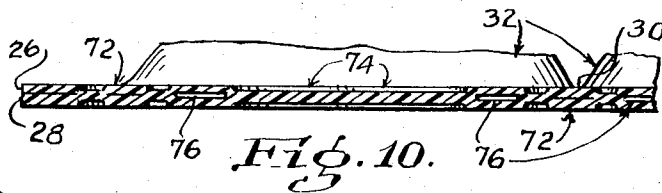
*Fig. 9.*



*Fig. 11.*



*Fig. 12.*



*Fig. 10.*

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Fig. 3.

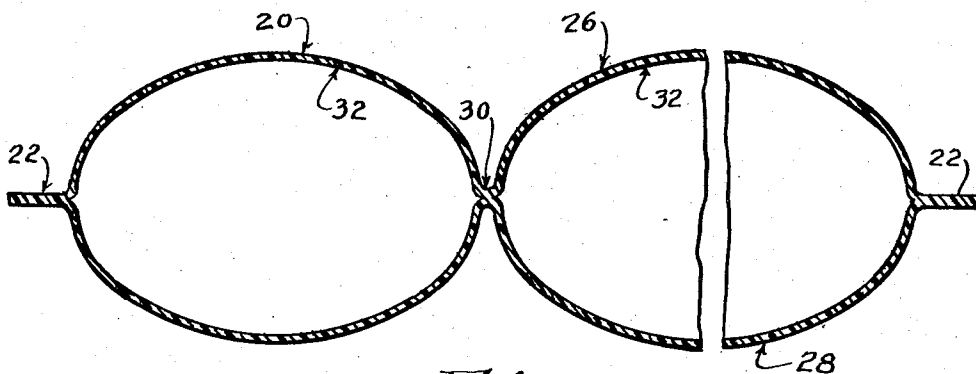


Fig. 2.

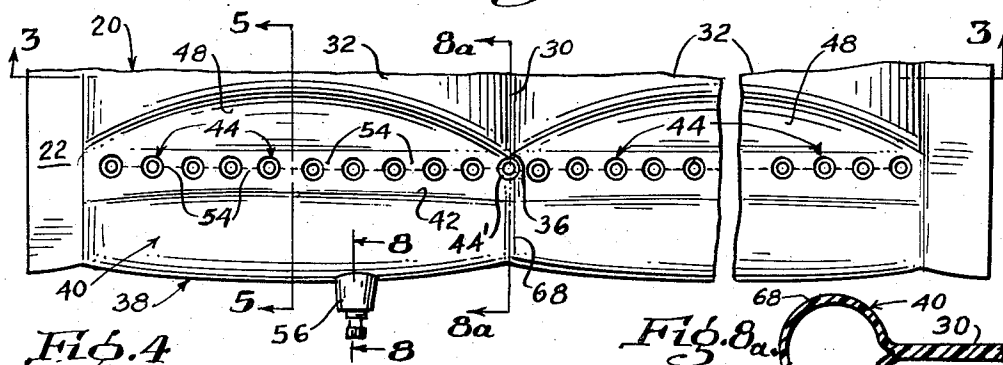


Fig. 4.

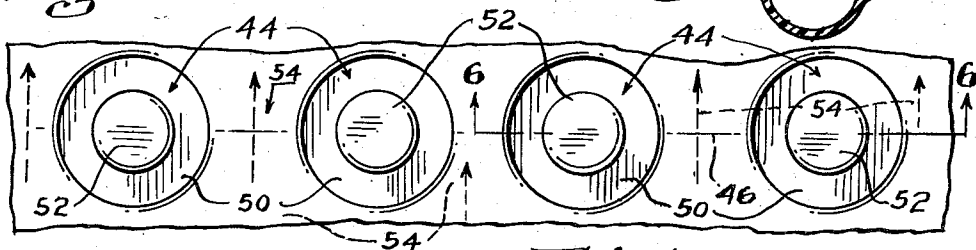


Fig. 5.

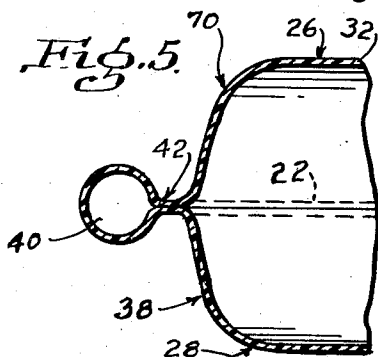


Fig. 6.

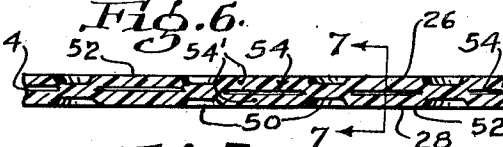
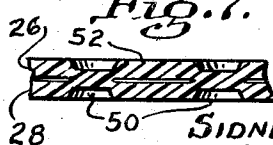


Fig. 7.



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## INFLATABLE MATTRESS

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Application May 4, 1956, Serial No. 582,807

6 Claims. (Cl. 5—349)

This application relates to a novel inflatable mattress, particularly adaptable for use as a float or raft in water and especially in swimming pools.

Inflatable mattresses used to support the human body are well known. Mattresses of this type have been used for rest and sleeping purposes, wherein the mattress is placed on the ground or some other support. A growing use and popularity for such mattresses has developed in the field of water sports and recreation, wherein the inflated mattress is placed on the surface of the water, e. g. in a swimming pool, to act as a raft or support for the human body.

Inflatable mattresses of the above type have in the past been made of various types of resilient or stretchable material, and have been fabricated in various ways. A common form of prior art mattress of this nature is sealed along a series of parallel longitudinal lines to form a number of individual parallel longitudinal tubes which are inflated with air. In one form of such prior art mattress, the above noted lines of sealing extend from one end of the mattress and terminate short of the other end of the mattress forming a sort of passage or manifold across said other end of the mattress in communication with the open end of each of said parallel longitudinal tubes of the mattress. Thus, air introduced into said manifold through a valve in the mattress, passes from such manifold into each of said parallel tubes to inflate the mattress.

In the construction of the prior art inflatable mattresses, e. g. of the type described above, difficulty has been encountered in distributing the air uniformly to each of the longitudinal parallel tubes. Thus, while the air will pass readily into the longitudinal tubes nearest the air valve, as inflation progresses constrictions develop in the air passage or manifold across the end of the mattress, particularly in the vicinity adjacent the ends of the sealed lines or borders between the parallel tubes. This tends to hinder distribution of air to those longitudinal tubes of the mattress remote from the air valve.

Further, and of particular significance, in construction of such prior art mattresses wherein air passes from the distributing manifold across the end of the tube, directly into the relatively wide open ends of these tubes, considerable stress is developed particularly at the ends of said sealed borders adjacent that end of the mattress in which the transverse air distributing manifold is located. In view of the development of such points of stress following inflation of the mattress, the rather rough usage to which these mattresses are often put causes rupture of the mattress at these places of maximum stress and failure of the mattress by air leakage therefrom.

A particular object of the invention is the provision of an inflatable air mattress wherein the stress developed particularly at the ends of the sealed borders between the adjacent parallel tubes forming the mattress, as well as at other points, is relieved or materially reduced.

Another object of the invention is to devise an inflatable air mattress which inflates readily and uniformly.

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A still further object is to provide a relatively durable, easily inflatable, efficient, and inexpensive air mattress.

These and other objects are accomplished according to the invention by providing an inflatable mattress having a structure including a plurality of sealed areas in the air opening at the adjacent ends of each of the parallel tubes of the mattress, forming a plurality of relatively small passages for introduction of air into each of said tubes. I have found that such a structure greatly reduces the stress at the sealed area at the ends of the sealed elongated borders between each of the parallel tubes, which sealed areas are located adjacent the air inlet to said tubes. Further, it has also been found that the provision of said plurality of sealed areas provides a transverse tube or air manifold at one end of the mattress for distributing the air from the valve to each of the parallel tubes, said transverse tube having a substantially uniform cross section throughout its length with substantially no constricted sections, whereby air flows evenly from said transverse tube into each of the longitudinal parallel tubes, to uniformly distribute the air to all parts of the mattress during the process of inflation.

Briefly, the air mattress of the invention comprises a transverse channel or air passage along one end of the mattress, the inner boundary of said channel being formed by a series of sealed areas in alignment with and spaced from each other, and a series of parallel longitudinal channels or tubes extending from said transverse channel to the opposite end of the mattress. The longitudinal channels are sealed from each other along parallel lines extending substantially from said inner boundary of the transverse channel, to the opposite end of the mattress. The transverse air passage communicates with each of the adjacent open ends of the longitudinal channels through a plurality, for example a substantial number, of relatively small spaces or air passages provided between the series of sealed areas forming the inner boundary of said transverse channel. An air valve is provided in the end of the mattress and communicating with the interior of the transverse channel or air passage.

The invention will be more clearly understood from the following description of certain preferred embodiments, taken in connection with the accompanying drawings, wherein:

Fig. 1 is a perspective view of the mattress inflated;

Fig. 2 is an enlarged broken plan view of the end of the mattress in which the air valve is located;

Fig. 3 is a broken vertical section taken on line 3—3 of Fig. 2;

Fig. 4 is an enlarged plan view of a portion of the sealed areas formed at one end of each of the longitudinal channels;

Fig. 5 is an enlarged partial section at the end of the mattress, taken on line 5—5 of Fig. 2;

Fig. 6 is a partial section showing the sealed areas, taken on line 6—6 of Fig. 5.

Fig. 7 is a partial section of the mattress taken on line 7—7 of Fig. 6;

Fig. 8 is a section through the air valve in the mattress, taken on line 8—8 of Fig. 2;

Fig. 8a is a partial section taken on line 8a—8a of Fig. 2;

Fig. 9 is a broken plan view of one end of a modification of the mattress of Fig. 1;

Fig. 10 is an enlarged vertical section of a portion of the mattress of Fig. 9, taken on line 10—10 of Fig. 9;

Fig. 11 is an enlarged section taken on line 11—11 of Fig. 9; and

Fig. 12 is a similar enlarged section taken on line 12—12 of Fig. 9.

Referring particularly to Fig. 1 of the drawing, the

inflatable mattress of the invention is in the form of an enclosed resilient envelope 20, preferably of rectangular or square shape, said envelope being preferably composed of a heat sealable thermoplastic material such as vinyl or polyethylene plastic. I have found that the most desirable heat sealable material is a vinyl plastic such as vinyl chloride or a copolymer of vinyl chloride and vinyl acetate plasticized with dioctyl phthalate. These vinyl plastics are sufficiently elastic to permit easy inflation of the mattress, yet are sufficiently strong in thin sheet form when fabricated into a mattress according to the invention, to resist rupture under normal conditions of use. However, I may use materials other than heat sealable thermoplastics, for example, rubber, but in this case vulcanization is necessary to provide sealing together of the various parts of the envelope, whereas when employing the above noted preferred thermoplastics, this can be accomplished by simple heat sealing methods such as dielectric heat sealing.

The opposite sides 26 and 28 of envelope 20 are sealed along both the outer longitudinal edges 22 of the envelope and along one end 24 thereof. The opposite sides 26 and 28 of the envelope are further sealed together, e. g. by dielectric heat sealing, along a plurality or series of spaced parallel longitudinal lines 30, to form a series of parallel longitudinal channels or tubes 32 sealed at one end 34 thereof adjacent the sealed end 24 of the envelope. It will be noted that the parallel sealing lines 30 extend from the end 24 of the envelope and terminate at a point 36 a relatively short distance from the other end 38 of the envelope. When inflated the longitudinal tubes 32 generally assume an elliptical cross section as seen in Fig. 3, although such cross section can be essentially circular if the tubes 32 are more fully inflated.

The end 38 of the envelope is in the form of a tube or channel 40 extending transversely of the parallel sealing lines 30 and of the longitudinal tubes 32 of the envelope. The inner peripheral edge 42 of the transverse tube 40, which crosses the ends 36 of the parallel sealing lines 30, is sealed at a relatively large number of spaced areas 44 along a line 46 across the envelope normal to the parallel channels 32 at the adjacent inner ends 48 thereof, and parallel to the inner edge 42 of transverse tube 40. It will be noted that the sealed areas 44 are in the form of so-called buttons formed by heat sealing a circular peripheral area 50, the inner central portion 52 within area 50 being left unsealed. This is one convenient way of providing the aligned spaced sealed areas 44. The ends 36 of the border lines 30 between parallel tubes 32, are also sealed by means of the buttons 44', similar to sealed areas or button 44, said buttons 44' serving to reinforce the ends 36 of the border lines 30.

The sealed areas 44 and 44' provide a series of relatively narrow spaces 54 between said adjacent sealed areas. There are a number of said spaces 54 providing communication between the interior of transverse tube 40 and the end 48 of each of the longitudinal tubes 32. Thus, spaces 54 constitute a plurality of small conduits through which air introduced into the transverse tube 40 enters each of the longitudinal tubes 32 for inflating them. An air valve 56 is connected to the transverse tube 40. Such valve can be of any conventional type to permit inflation of the mattress. The valve shown in of the screw type, having a stem 58 (see Fig. 8) which screws into a sleeve 60 and into contact with a valve seat 62 to prevent escape of air from the mattress after the mattress has been inflated. When the stem is unscrewed so as to unseat the valve, air can be introduced by pumping or any other suitable means, into the envelope 20. The valve 56 is fastened to the transverse tube 40 by means of an apertured plastic piece 64 which can be cemented or heat-sealed to the inner wall of tube 40 as at 66.

It will be noted that when the envelope 20 forming

the air mattress is inflated, the transverse tube 40, which distributes the air to each of the longitudinal tubes or channels 32, maintains its full cross section throughout the length of the tube, and there are no constrictions formed therein, especially at those sections 68 of the tube 40 (see Figs. 2 and 8a), which are on a line with the sealed boundaries 30 between each of the longitudinal tubes 32. Hence, it will be seen that air introduced into tube 40 via air valve 56, will pass uniformly throughout the length of transverse tube 40 and through narrow spaces or conduits 54 substantially simultaneously into all of the longitudinal tubes 32 to uniformly inflate these tubes. On the other hand, as noted above, constrictions 100 are formed in the end portion 102 of the prior art mattress shown in Figs. 13 and 14, causing the air to be trapped say only in the first couple of tubes 32a and 32b, closely adjacent the valve, requiring such air to be forced through end portion 102 into the other longitudinal tubes 32c to 32e, e. g. by manually pressing against said first couple of tubes, rendering easy inflation of such mattress difficult.

The inflatable air mattress of the invention can be inflated by any suitable pump means, as for example the pump of my copending application, Serial No. 582,693, filed of even date herewith, now Patent No. 2,812,525, granted November 12, 1957. It will be noted that the valve of my inflatable mattress need not be an expensive type check valve, and may be a simple screw type valve such as shown at 56, because of the low back pressure encountered during inflation of the mattress, due in substantial measure to the small air spaces 54 provided by the plurality of sealed areas 44 and 44'. Hence, such spaces or conduits 54 in this connection also function as check valves, the plastic walls 54' (see Fig. 6) of the envelope enclosing said spaces tending to cling together to prevent reverse passage of air out of the tubes 32 and into the transverse tube 40 during inflation of said parallel tube 32.

Further, of particular importance in accordance with the invention structure, the provision of a series of sealed areas 44 and 44', providing the plurality of small conduits 54 through which the air passes from the transverse tube 40 into each of the longitudinal tubes 32, furnishes a distribution of air throughout the envelope 20 so as to materially relieve or reduce the stress forces at the sealed areas 44' at the ends 36 of the boundary lines 30 between the parallel tubes 32, without providing new areas or points of stress. This greatly alleviates the tendency toward rupture heretofore experienced with prior art air mattresses, at such end points 36, as illustrated in the prior art air mattress of Figs. 13 and 14, wherein a substantial stress is developed at the intersection 95 between the sealed areas 90 at the ends of the sealing lines 88, and the inflated walls of parallel tubes 32a to 32e. In my mattress there are essentially no points or areas under an undue stress, the contour of the mattress at the opposite ends of parallel tubes 32, formed by inflation of the mattress, being gently rounded, as indicated at 70 in Fig. 5, with inflated transverse tube 40 also presenting a gently rounded curvature as seen in Figs. 5 and 8a.

There is shown in Figs. 9 to 12 a modification of the inflatable mattress of Figs. 1 to 8a. The modification shown in Fig. 9 provides for sealing of the inner edge 42 of the transverse tube 40, by a series of aligned circular buttons 72 similar to sealing buttons 44, and elongated sealing areas 74 arranged in alternate succession. Each elongated sealing area 74 is disposed centrally at the entrance to a longitudinal tube 32, as seen in Fig. 9, and a pair of circular sealing areas 72 are disposed adjacent said areas 74, at the ends of and in alignment with the parallel sealing lines 30 between tubes 32. By this arrangement of the sealing areas 72 and 74 there are formed a pair of relatively narrow inlets or conduits 76 between the transverse tube 40 and each of the elongated longitudinal tubes 32. This arrangement produces results

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similar to those realized employing the sealing areas 44 and 44' as seen in Fig. 2. It will be noted that the elongated sealing area 74 may be shortened and additional smaller sealing areas 72 provided adjacent the end of each of the parallel tubes 32, thus providing more than two spaces or conduits 76 from transverse tube 40 into each of said tubes 32.

From the foregoing, it is seen that the invention provides an inflatable mattress in which the pronounced stress heretofore encountered at the sealed ends of the borders between the parallel tubes of the mattress is substantially reduced. Further, my inflatable air mattress is designed to eliminate restrictions to air passage during the process of inflation and hence can be readily and uniformly inflated without manipulation of the mattress to force the air into all of the portions thereof. Moreover, the construction of my inflatable mattress presents gently rounded curved surfaces of relatively large radius when inflated, and hence minimizes strain at these surfaces, whereas the structure of the prior art mattresses often presents sharply changing surface contours of relatively small radius, resulting in increased stress and tendency toward rupture at these surfaces. Finally, my mattress construction permits the fabrication of stronger air mattresses with the use of flexible plastic sheet materials as thin as, or thinner than, those heretofore employed, thus enabling the production of inexpensive air mattresses giving good use.

While I have described a particular embodiment of my invention for the purpose of illustration, it should be understood that various modifications and adaptations thereof may be made within the spirit of the invention as set forth in the appended claims.

#### I claim:

1. An inflatable mattress which comprises an enclosed resilient envelope, opposite sides of said envelope being sealed together along a plurality of spaced parallel longitudinal lines, to form a plurality of parallel longitudinal channels in said envelope, an end portion of said envelope being sealed at spaced areas disposed along a line across said envelope normal to said lines and channels at adjacent ends thereof, forming a transverse tube extending along one end of said envelope integral therewith and normal to said channels, a first group of said sealed areas being disposed at said ends of each of said lines and additional sealed areas being disposed intermediate the ends of all of said lines and spaced from said first group of sealed areas, said tube thereby communicating with each of said channels at one end thereof through a plurality of constricted spaces formed between said sealed areas, and an air valve in said tube facilitating the inflation and deflation of the mattress.

2. An inflatable mattress as defined in claim 1, wherein said envelope is composed of a heat sealable thermoplastic material.

3. An inflatable mattress as defined in claim 2, wherein said thermoplastic material is a vinyl resin.

4. An inflatable mattress which comprises an enclosed

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resilient envelope, opposite sides of said envelope being sealed together along a plurality of spaced parallel longitudinal lines extending from one end of said envelope and terminating a relatively short distance from the opposite end of said envelope, forming a plurality of parallel longitudinal channels in said envelope, each of said channels being sealed off from the adjacent channels along its adjacent parallel borders defined by said parallel longitudinal sealing lines, said envelope when inflated forming a series of parallel longitudinal tubes of essentially elliptical cross section integrally connected together, the end portion of said envelope between said opposite end of the envelope and the adjacent ends of said parallel longitudinal sealing lines being sealed at spaced areas along a line across said envelope normal to said lines and channels at adjacent ends thereof, forming a transverse tube extending along one end of said envelope integral therewith and normal to said channels, a first group of said sealed areas being disposed at said ends of each of said lines and additional sealed areas being disposed intermediate the ends of all of said lines and spaced from said first group of sealed areas, said tube thereby communicating with each of said channels at one end thereof through a plurality of constricted spaces formed between said sealed areas, and an air valve in said tube facilitating the inflation and deflation of the mattress.

5. An inflatable mattress as defined in claim 4, wherein said envelope is composed of a heat sealable thermoplastic material, and wherein said spaced sealed areas are in the form of essentially round buttons.

6. An inflatable mattress which comprises a transverse channel formed in said mattress along one end thereof, the inner boundary of said channel being formed by a series of sealed areas in alignment with and spaced from each other, and a series of parallel longitudinal channels extending from said transverse channel to the opposite end of said mattress, said longitudinal channels being sealed from each other along parallel lines extending from said transverse channel to said opposite end of said mattress, a plurality of said series of sealed areas being positioned at the adjacent ends of each of said longitudinal channels in spaced relation relative to each other and relative to said lines, said transverse channel thereby communicating with each of the adjacent ends of said longitudinal channels through a plurality of constricted spaces formed between said plurality of sealed areas and lines, and an air valve at one end of said mattress communicating with said transverse channel facilitating the inflation and deflation of the mattress.

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