Jan. 5, 1960 L. POST 2,919,747

PNEUMATIC CUSHION

Filed Aug. 23, 1957 2 Sheets-Sheet 1

Fig. 1.

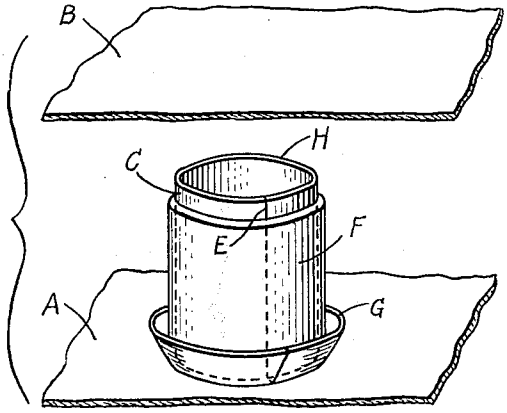


Fig. 2.

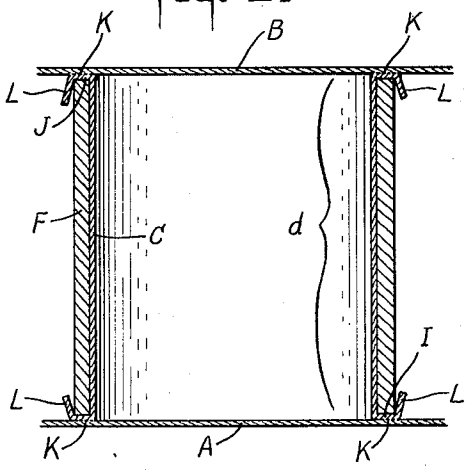


Fig. 3.

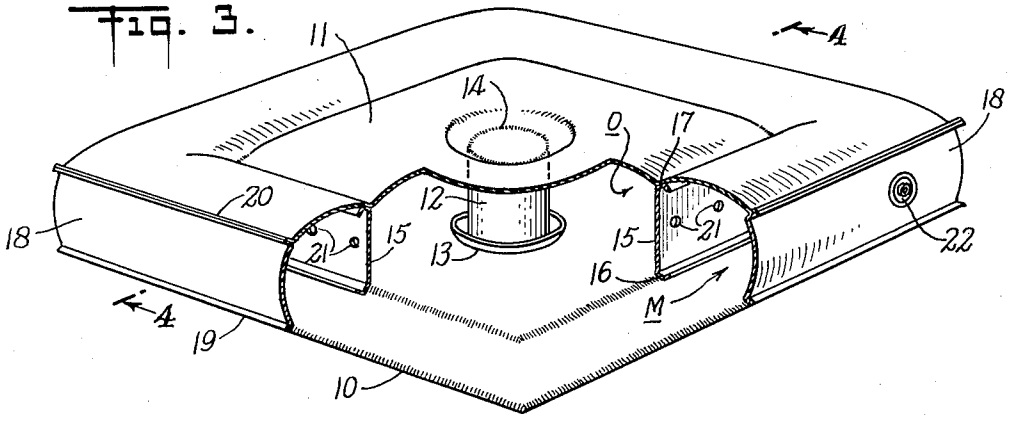
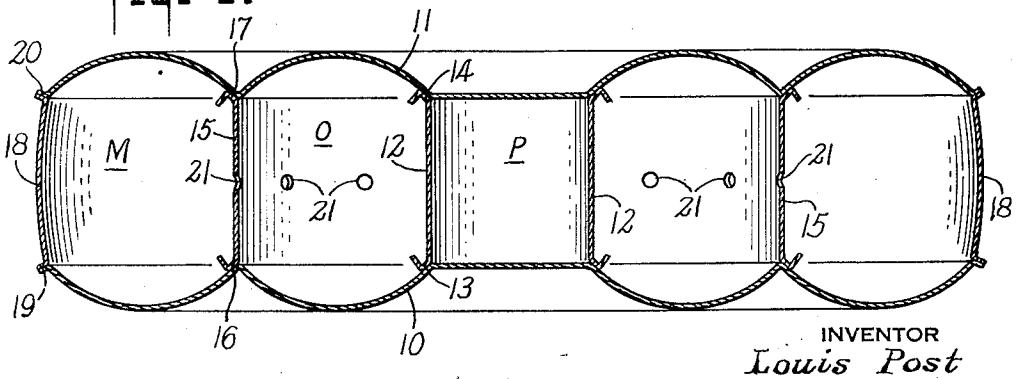


Fig. 4.



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PNEUMATIC CUSHION

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Fig. 5.

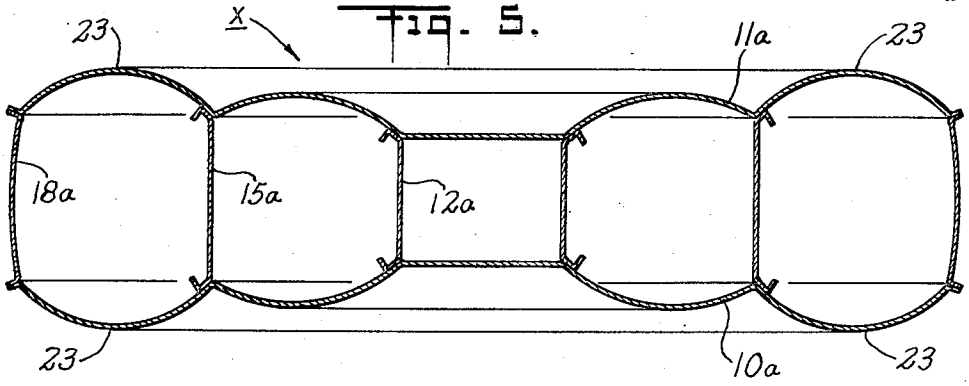


Fig. 6.

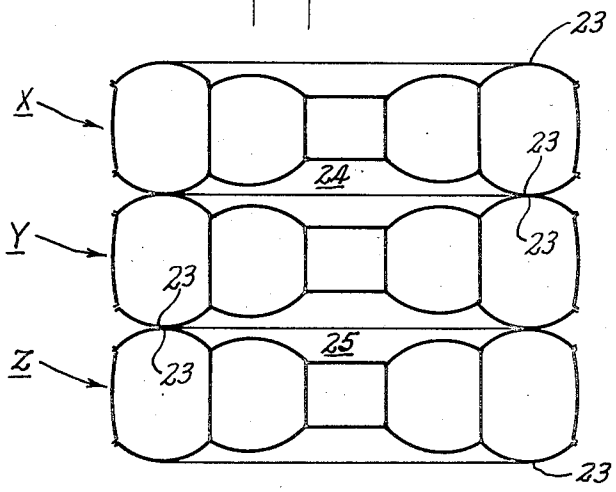


Fig. 7.

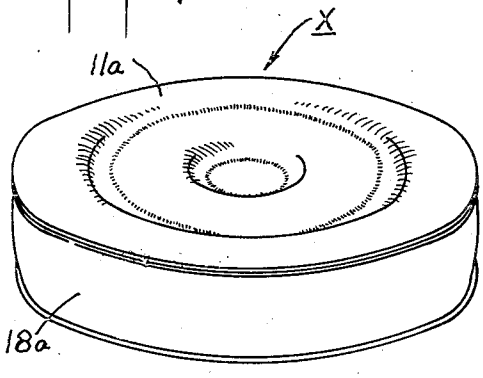
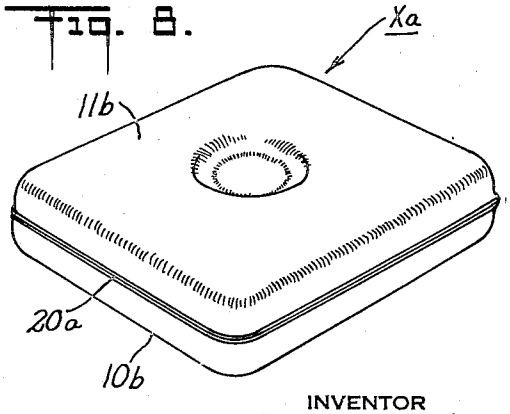


Fig. 8.



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PNEUMATIC CUSHION

Louis Post, Bronx, N.Y.

Application August 23, 1957, Serial No. 679,953

5 Claims. (Cl. 155—178)

This invention relates to pneumatically inflatable objects and more particularly to pneumatically inflatable seat cushions, and still more particularly to pneumatically inflatable hassocks.

Known to me is the provision of pneumatic cushions, mattresses and like air filled products, in which an envelope is formed which may be inflated to secure the resiliency of cushions filled with horsehair, Kapok, sponge rubber or the like. In these assemblies, predetermined contour is achieved with only limited success, particularly by reason of variability in inflation and distensibility of the enveloping sheeting, resulting in instability of the inflated articles.

Also known to me is the provision of pneumatic devices such as mattresses and cushions in which a multiplicity of cells are outlined by partitioning members, to restrain the interchange of the fluid medium from one location to another as a deterrent to deformation and consequent instability of support caused by application of the weight of the body at localized portions. Such devices have failed consistently to assume the desired predetermined outline or have involved costly manufacturing constructions, thereby discouraging the use of the highly desirable pneumatic expedient.

In accordance with my invention, it is an object thereof to provide pneumatic devices in the form of cushions, pillows, mattresses and the like made of sheeting impermeable to the passage of air, characterized by high stability of outline owing to the utilization of the planar expansion restricting properties of pneumatically distended sheeting, particularly when such distended sheeting is employed to outline partitioning walls formed between upper and lower supporting sheeting.

Still more particularly, it is an object of my invention to provide pneumatic devices in the form of cushions, pillows, mattresses, hassocks, the shape or outline of which are predetermined, which retain stability in the inflated condition, despite non-central weight application, and which may be assembled from sheet material by simple jigs, thereby to make the manufacture of such devices commercially feasible.

Still more particularly, it is an object of my invention to provide pneumatic cushions employing a relationship of the upper and lower supporting surfaces to cell-defining partition sheeting to utilize the resiliency of the sheeting along its length and width to control the stability and contour of the desired cushion or like pneumatic device, of sheeting sealable by heat, thereby making the provision of such devices commercially practical.

Still more particularly, it is an object of this invention to provide a pneumatic mattress or like cushioning assembly in which sheeting defining the outer enveloping layers of said mattress forms, in addition, the sealing end walls of inner air cells defined by partition sheeting, the pneumatically distended cells serving to limit distortion in the said outer envelope, to the end that great stability of contour is maintained, despite non-central applications of pressure to said enveloping surface.

A further object of my invention is to provide pneumatic cushions in which dished surfaces of continuous outline may be achieved whereby a plurality of such cushions may be cohesively stacked by utilizing the reduced pressure or suction cup principle to form a demountable hassock.

Still a further object of my invention is to provide a cushion which may be pressure adhered to a wide variety of surfaces, thereby substantially reducing the danger of slippage.

To attain these objects and such further objects as may appear herein or be hereinafter pointed out, I make reference to the accompanying drawing, forming a part hereof in which—

Figure 1 is an exploded perspective view of the initial steps for joining segments of the assembly in accordance with my invention;

Figure 2 is a sectional view of the parts assembled during the heat sealing step;

Figure 3 is a perspective view, partly broken away, of a cushion made in accordance with my invention;

Figure 4 is a magnified section taken on the line 4—4 of Figure 3;

Figure 5 is a transverse sectional view of an inflated cushion in accordance with another embodiment of my invention;

Figure 6 exemplifies a hassock made from a plurality of cushions shown in Figure 5;

Figure 7 is a perspective view of the cushion shown in Figure 5;

Figure 8 is a perspective view of a cushion made in accordance with another embodiment of my invention.

In summary, my invention is predicated upon the provision of a pneumatic device in which the continuous sheeting forming the upper and lower supporting surfaces, with or without peripheral confining gussets, are restrained as to outline and contour predeterminedly by partitioning sheeting of ring shaped outline, the edges of which partitions are heat sealed to the upper and lower sheeting and, more specifically, by a rolled edge heat seal, thereby to divide the pneumatic space between the upper and lower sheeting into chambers which, when inflated, are restrained from expansion in the plane of the sheeting by the limiting distensibility of the said sheeting, as well as by the restraining influence of the rolled edge seal joining the partitioning ring to the upper and lower sheet members.

I now make reference to the accompanying drawings wherein there is shown the manner of joining an upper and lower supporting sheeting to a partitioning ring in accordance with my invention.

As a preliminary matter, it is to be pointed out that the preferred material which I employ is an air impermeable sheeting which is heat sealable with or without solvent activation. Heat sealable sheeting known to me and useful in the relationship comprises balloon type thin, pliable vinyl plastic sheeting, understood by me to be made from polymerized vinyl compounds having limited distensibility. Other heat sealable sheeting, such as polyethylene plastics, may suggest themselves, particularly those which may be joined by induction or electronic heating.

A description will now be made of what I will hereinafter refer to as a "rolled edge heat seal." In such construction, a sheet A, which may be referred to as the bottom sheet, may be joined to sheet B, which I will refer to as the top sheet, by a ring shaped partitioning member C. Preliminarily, the ring C, of predetermined dimensions, is made by forming a continuous length of the desired sheet whose width d is to determine the spacing of the sheets A and B. The sheet C may be made

ring shaped by taking the terminal ends of a strip and heat sealing the same to form the seam E.

With such cylindrical or ring shaped sheeting provided, I nest the same within a ring shaped jig F which may constitute one electrode of a heat sealing assembly. Thereupon the edges G and H are rolled, to provide the rolled edges I and J, respectively.

With this initial mounting of the ring shaped member C, sheets A and B may be brought into contact with the rolled edges I and J and the edge heat seals K effected by known means.

Some degree of trimming of the flap L may be resorted to, if desired. This may be effected economically where the jig includes simultaneous trimming and heat sealing.

The flexibility of the sheeting now permits the assembled sheets A and B, with the ring shaped partition member C, to be drawn from the tubular jig F. One or more concentric partitioning members may be thereby effected, to hold the sheets A and B united to the partitioning rings.

For convenience of reference, the seal effected by me will be herein referred to as a "rolled edge heat seal," this term being intended to cover the heat seal effected by rolling and edge of the ring of the partition sheeting in contact with the flat inner surface of either the upper or lower sheet of a pneumatic cushioning assembly.

While I have described a ring C made of continuous sheeting, joined at the terminal ends thereof by a heat seal E, it will be understood that for purposes hereinafter described, the ring shaped partitioning sheeting may be perforated with diffusing apertures and the juncture corresponding to the ends E may be an overlapping of the terminal ends of the sheeting.

With the procedural method for forming the rolled edge heat seal thus described, I now refer to one form of pneumatic cushion in accordance with my invention wherein a continuous flat section 10 of the heat sealable sheeting forming a continuous bottom sheet is paired with a continuous top sheet 11, the said sheets being of a similar shape. With this pattern provided, I affix a ring 12 at the axial portion and roll edge heat seal the rims 13 and 14 to the lower and upper sheets 10 and 11, respectively. Concentric with the ring 12, I may form a secondary ring 15, roll edge heat sealing the rims 16 and 17 to the lower and upper sheeting 10 and 11. Enclosure of the peripheral edges of the blanks of the upper and lower supporting sheets 10 and 11 may be completed by the ring or gusset 18 with rolled edge heat seals 19 and 20 about the peripheries of each of the lower and upper sheets 10 and 11.

I may, by the construction described, leave the ring 12 unaltered, in which event the rolled edge heat seals 13 and 14 entrap a quantity of air, permanently to give the ring the cylindrical configuration.

It will be understood, however, that I may, for purposes of economy in packaging the cushion, form the ring 12 with air diffusing apertures at spaced, predetermined intervals. Such apertures 21 are illustrated in conjunction with the ring 15. Thus, it will be observed that in the structure of Figure 3 the chamber O between the partitions 12 and 15 has been brought into air interchange connection with the chamber M defined by the partition ring 15 and the partition or gusset 18. Where the ring 12 is perforated, it will likewise be understood that the chamber P will be brought into air interchange connection with the partition O, the speed of air interchange under pressure being in proportion to the size and number of the perforations provided.

In the construction shown in Figures 3 and 4, suitable valve inflating means 22 known in the trade may be supplied, it being understood that in the case of non-interchange partitions, a plurality of such inflating valves may be desirable.

The construction thus far described will provide a

pneumatic cushion which, when inflated, will result in the bottom and top sheets 10 and 11 outlining a predetermined contour as the anchoring of the sheets by the rolled edge heat seals 13 and 14, 16 and 17 will be stabilized under the confining stress along the surfaces of the partition sheeting 12 and 15. The restraining influence along the circumference of the rings 12 and 15 is augmented by the continuous concentric rolled edge seals.

While I have illustrated in Figures 3 and 4 a pneumatic cushion in which the rings 12, 15 and the gusset 18 are of equal depth, I may, for purposes to be hereinafter described, provide a cushion in which the concentric partitioning rings are of graduated depth. Such an assembly is shown in Figures 5 and 7 wherein the partition rings 12*a*, 15*a* and the gusset 18*a* progressively increase in width from the center to the periphery. This provides both upper and lower portions of the cushion with dished surfaces 10*a* and 11*a*. A plurality of such cushions, X, Y and Z, may be stacked as shown in Figure 6. When inflated cushions are so stacked and compressed, the rims 23 thereof, constituting the highest peripheral point, will be in contact with each other. Compression will serve to drive some of the air from the chambers 24 and 25 outlined by the dished surfaces, forming a partial vacuum and thereby adhering the stack of cushions against displacement. There is thus formed a light weight hassock. Similarly, the dished surfaces 10*a* and 11*a* may be utilized to hold a single cushion upon a smooth surface.

While I have illustrated and described in connection with Figures 5, 6 and 7 a circularly shaped cushion and concentric ring shaped partition members having closure gussets, it will be understood that the periphery may be formed by sealing the upper and lower sheets to each other. Such a construction is shown in Figure 8 in which the cushion X*a* may have the bottom sheet 10*b* and the upper sheet 11*b* joined at the periphery by a seal 20*a*, in a measure furnishing the pressure holding and other benefits of my invention, without the employment of a gusset peripheral wall.

Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is:

1. A stable pneumatic cushion or the like of heat sealable sheeting comprising substantially congruent top and bottom sheet members, a gusset rolled edge heat sealed to the marginal edges of said members, and a tubular member having its opposed edge rolled edges heat sealed to each of said sheet members centrally of said marginal edges, to form a cell therewith, the axis of the tubular member being normal to the top and bottom sheet members.

2. An inflatable stable pneumatic cushion or the like of heat sealable sheeting comprising substantially congruent top and bottom sheet members, a gusset rolled edge heat sealed to the marginal edges of said members, and at least one tubular member having substantially longitudinally indistensible walls, the opposed edges of said tubular member being rolled edge heat sealed to each of said sheet members centrally of said marginal edges to form a cell therewith, said walls defining said tubular member being of a dimension to limit the outward expansion of said top and bottom sheet members, thereby reducing the tendency of said cushion to roll.

3. An inflatable cushion in accordance with claim 2 wherein said tube member is of a dimension to shape the surface of said sheet members in the inflated condition of said cushion.

4. A cushion in accordance with claim 2 wherein said tube member is of a dimension to shape the surface of said sheet members to define, in the inflated condition of said cushion, dished surfaces on said upper and lower members whereby said cushion may be adhered to an object by compressing said cushion against said object,

thereby forming a partial vacuum within an area defined by one said surface and said object.

5. An inflatable stable pneumatic cushion or the like of heat sealable sheeting comprising substantially congruent top and bottom sheet members having the marginal edges thereof heat sealed, and at least one tubular member having substantially longitudinally indistensible walls, the opposed edges of said tubular member being rolled edge heat sealed to each of said sheet members substantially centrally of said marginal edges to form a cell with said top and bottom sheet members, said walls defining said tubular member being of a dimension to limit the outward expansion of said top and bottom sheet members, thereby reducing the tendency of said cushion to roll.

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