

[54] **MEANS FOR INCREASING THE AIR PRESSURE WITHIN SELF-INFLATED HOLLOW BODIES FOR USE AS CUSHIONS AND FOR LIKE PURPOSES**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 76,734, Sept. 30, 1970, Pat. No. 3,643,268.

[52] U.S. Cl. 5/348 R, 9/314, 206/6

[51] Int. Cl. A47c 27/08

[58] Field of Search..... 5/348, 348 R, 349, 350, 5/338, 328, 314; 206/6; 297/DIG. 2, DIG. 8, 456

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Attorney, Agent, or Firm—William A. Smith, Jr.

[57] **ABSTRACT**

A hollow, airtight, box-like inflated body adapted to

serve as an air filled cushion, pillow, mattress or the like and comprising flexible, air-impervious top and bottom portions of substantially the same size and configuraton with a flexible air-impervious member extending between said top and bottom portions with the top and bottom edges thereof connected in airtight relation to the marginal edges of said top and bottom portions, respectively and of a height sufficient to form an air-filled body of the desired height, is provided with a relatively stiff member or members extending along a portion of the length of said air-impervious member with the upper and lower edges thereof connected to the adjacent edges of said top and bottom portions, respectively, and which relatively stiff member or members is or are provided with air inlet and an outlet valves of the desired construction in communication with the interior of said box-like body, movement of said stiff member or members from a horizontal position to a vertical position sucking air into said box-like body through said air inlet valve to inflate the box-like body, and continued movement of said stiff member or members from vertical to a horizontal position creating a pumping action causing an increase of the air pressure within said hollow box-like inflated body, means being provided for retaining said stiff member or members in horizontal position when the air pressure within said box-like body has been increased to the desired degree. The interior of the box-like inflated body may be provided with a plurality of parallel side-by-side open-ended tube-like structures of semi-circular or circular transverse cross section.

8 Claims, 11 Drawing Figures

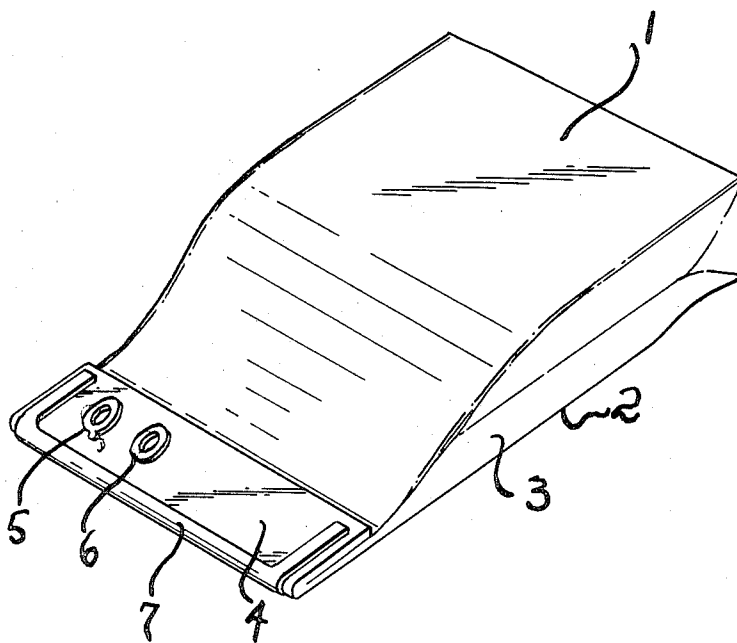


Fig. 1

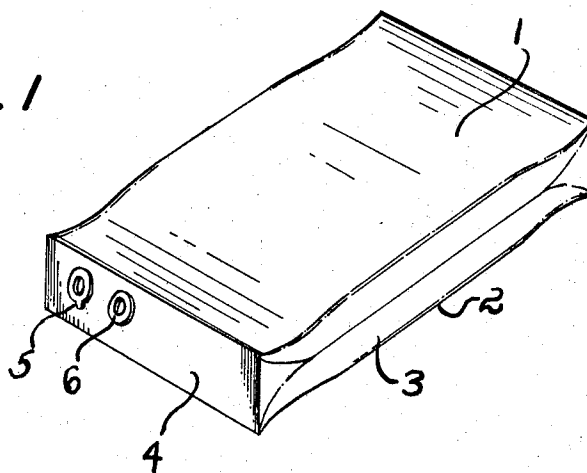


Fig. 2

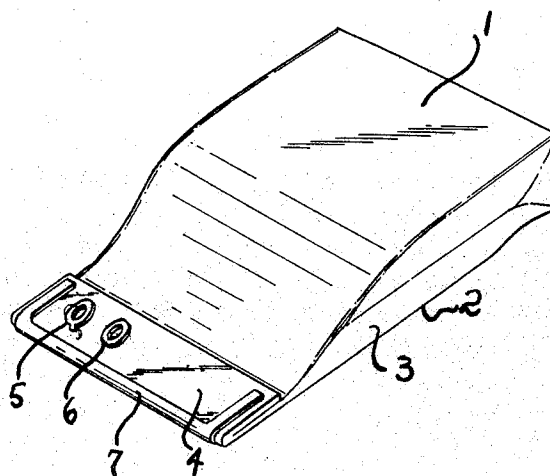


Fig. 3

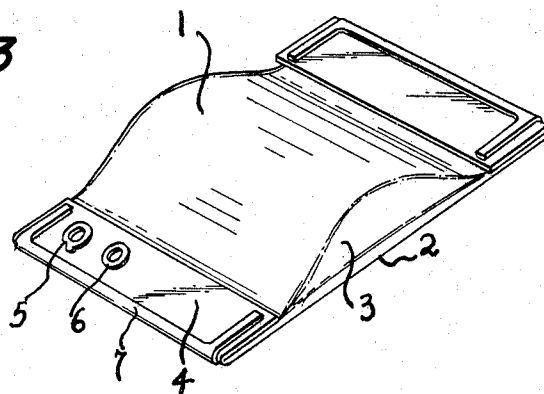


Fig. 4

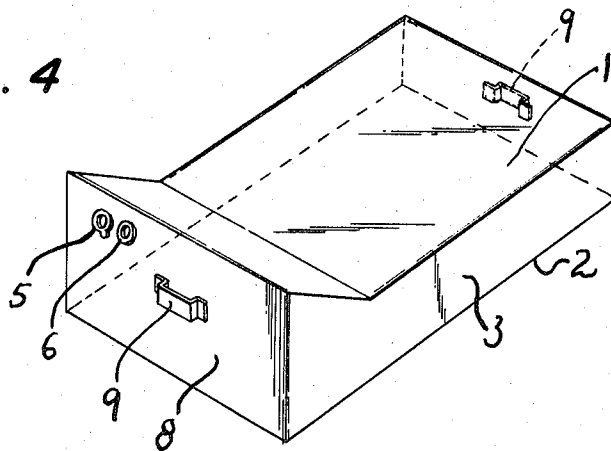


Fig. 5

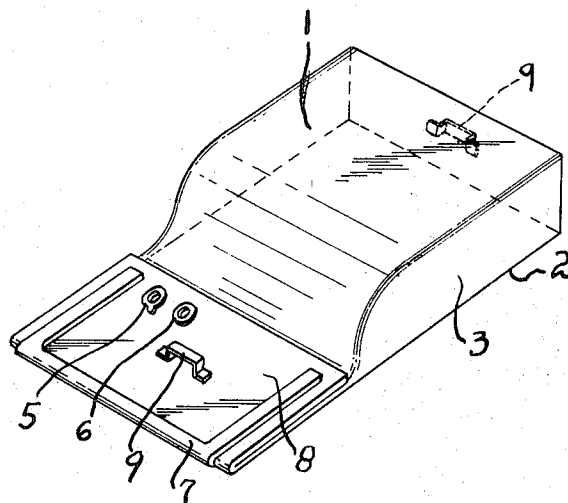


Fig. 6

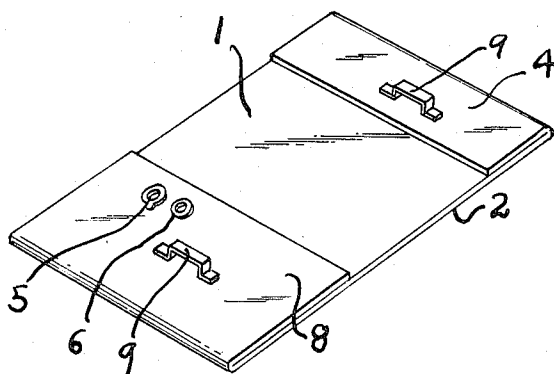


Fig. 7

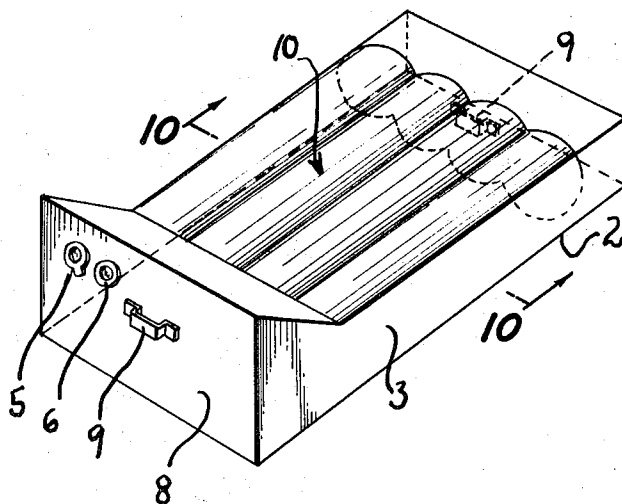


Fig. 8

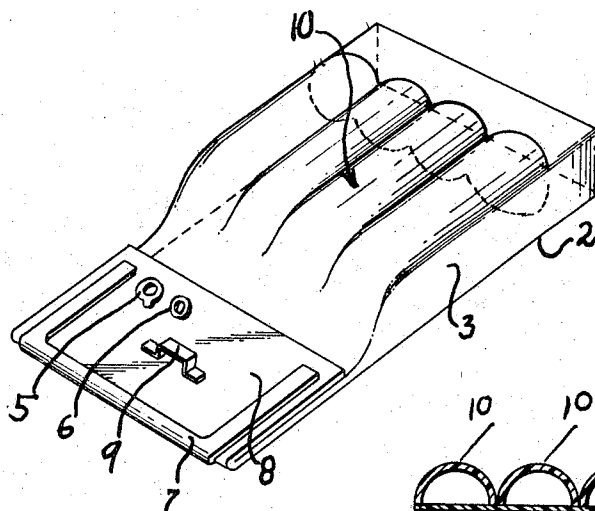


Fig. 9

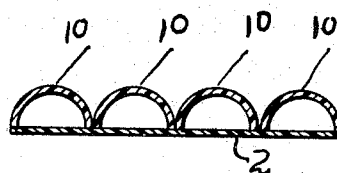
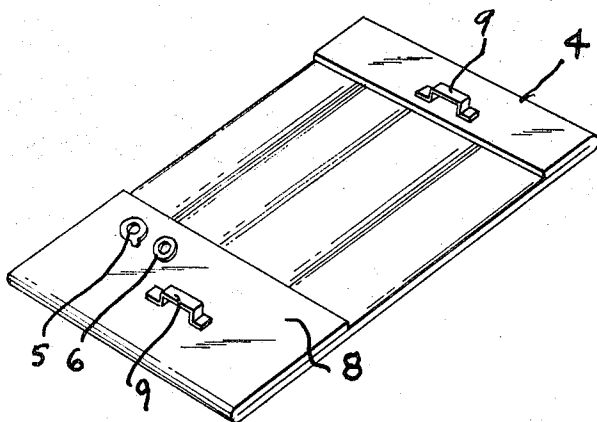


Fig. 10

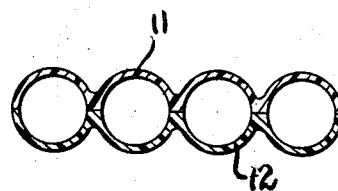


Fig. 11

MEANS FOR INCREASING THE AIR PRESSURE WITHIN SELF-INFLATED HOLLOW BODIES FOR USE AS CUSHIONS AND FOR LIKE PURPOSES

PRIOR APPLICATION

This application is a continuation-in-part of my application Ser. No. 76,734 filed Sept. 30, 1970 and entitled "Self-Inflated Hollow Bodies For Use as Cushions and for Like Purposes" which has now matured into U.S. Pat. No. 3,643,268 of Feb. 22, 1972.

THE OBJECTS OF THE INVENTION

It is an object of my present invention to provide by my improved method and means, a self-inflatable hollow, box-like, air-impervious body of square, rectangular, circular, elliptical, or polygonal configuration in plan, and which may be similar in construction and operation to the several forms of my invention disclosed and claimed in my said application Ser. No. 76,734, filed Sept. 30, 1970, and in which one or more of the stiff members which extend between the edges of the top and bottom portions of the hollow body may be moved manually after the self-inflation of the hollow body has been effected and the air inlet valve has been closed to maintain the air pressure within said hollow body, from a substantially vertical position to a substantially horizontal position to force the volume of air in said hollow body adjacent said stiff member into the main supporting portion of the hollow body to increase the air pressure within said portion and to change the shape thereof, following which said stiff member is clamped or otherwise retained in said horizontal position.

It is a further object of my present invention to provide by my improved method and means, a self-inflatable hollow, box-like body of the type referred to above, which instead of being provided with a single air inlet and outlet valve, is provided with a second valve in the form of a one-way check valve which permits air to be drawn therethrough and into the hollow body but prevents air from being exhausted therethrough. Instead of employing a separate check valve in addition to the air inlet and outlet valve, I may employ a combined air inlet, air outlet and one-way check valve in which that part of the valve which normally functions as a one-way check valve may be manually operated to render it inoperative to perform its normal one-way function and to permit the air from within the hollow body to escape therethrough as the hollow body is collapsed or deflated. Regardless of whether a separate check valve is employed in addition to the air inlet and outlet valve, or whether a combined air inlet, air outlet and one-way check valve is employed, the arrangement permits one or more of the stiff members to be moved repeatedly from the vertical to the horizontal position to effect what might be termed a "pumping" action to increase the air pressure within the hollow body to the desired degree. This "pumping" action is effected when the air inlet valve has been closed and the separate one-way check valve performs its normal function of permitting air to be drawn into the hollow body but prevents air being exhausted therefrom. When the single combined air inlet, air outlet and one-way check valve is employed, said combined valve structure will admit air into the hollow body through the air inlet valve portion and through the one-way check valve

portion and into the hollow body and the closed outlet valve portion and one-way check valve portion will retain the air therein and will permit the "pumping" action referred to above. After the "pumping" action has been repeated and the desired air pressure has been built up within the hollow, box-like body, the said stiff portion by which the repeated "pumping" action has been effected, may be permitted to remain in its normal vertical position or may be moved to a horizontal position to further increase the air pressure within the supporting portion of the hollow body and be clamped or otherwise retained in its substantially horizontal position.

It is a further object of my present invention to provide within the hollow, box-like body a series of resilient, flexible, and air-impervious tube-like members extending in longitudinal, closely adjacent relation to each other and of circular or semi-circular transverse cross section, and which tube-like members are open at both ends thereof and are inflated during the act of inflating the hollow, box-like body, which tube-like members when inflated force the top portion of the hollow body into a series of longitudinally-extending ridges or corrugations constituting the top supporting surface of the body in instances where tubes of semi-circular transverse cross section are employed, and constituting the top and bottom surfaces of the cushion, pillow, mattress or the like when tubes of circular transverse cross section are employed. Instead of providing a series of separate tube-like members within the hollow, box-like body, it is within the scope of the present invention to form the tube-like members by connecting the top and bottom portions together by spaced, longitudinally-extending seams of stitching or adhesive material and bulging the material of the top and bottom portions upwardly and downwardly, respectively, between said seams to form a series of ridges or corrugations open at their ends and in communication with a hollow, enclosed, airtight chamber at each end of the tube-like ridges or corrugations, the construction being such that when the stiff member or members at the end or ends of the enclosed chambers at each end of each tube-like surfaces thus formed are self inflated when said stiff member or members are moved from a vertical to a horizontal position to self-inflate said tube-like members to provide the desired ridged or corrugated top and bottom surfaces of the cushion, pillow, mattress or the like.

It is a still further object of my present invention to provide self-inflatable, hollow bodies admirably suited for use as cushions, pillows, mattresses or like articles, which bodies are relatively cheap and easy to manufacture, which may be moved manually or automatically with a minimum of effort from a normal, collapsed and/or folded condition to a self-inflated condition, to provide a method and means whereby the air pressure within said hollow, box-like bodies may be increased to the desired degree, and to provide such a cushion, pillow, mattress or like article of manufacture which is highly efficient and practical in the purposes for which designed.

THE PRIOR ART

Searches were made through the pertinent prior art by competent searcher prior to the filing of the present application, and no references were located relating to the same or substantially the same method and/or

means presented herein which would appear to negate the novelty, in a patentable sense of the method and means presented herein for increasing the air pressure to the desired degree within a hollow, box-like cushion, pillow, mattress or the like, regardless of whether the method and means are employed in connection with self-inflated or otherwise inflated articles of the type specified herein. The only prior art with which applicant and/or his attorneys are aware are those patents called to applicant's attention during the prosecution of applicant's prior application Ser. No. 76,734, filed Sept. 30, 1970, now U.S. Pat. No. 3,643,268, dated Feb. 22, 1972, of which the present application is a continuation-in-part, which references were not considered sufficiently pertinent by the Examiner to anticipate the claims of the said prior application, which claims were allowed as filed.

THE ACCOMPANYING DRAWINGS

In the accompanying drawings wherein for the purpose of illustration I have shown several preferred embodiments of the present invention:

FIGS. 1 and 2 are perspective views illustrating one form of the present invention in which a single stiff member is provided at one end of a hollow, box-like air-inflated body, these Figures showing the provision of an air inlet and outlet valve for the admission and exhaust of air to and from the interior of said hollow, box-like body, and also the provision of a separate one-way check valve which permits air to be drawn into said hollow, box-like body but prevents the escape of air therefrom,

FIG. 2 showing the substantially horizontal position of the stiff member at one end of said body after it has performed its function of increasing the air pressure within the hollow body and changing the shape thereof, and is clamped in said horizontal position;

FIG. 3 is a perspective view similar to the showing of FIG. 2 and illustrating the clamped position of a stiff member at each end of the hollow, box-like body;

FIGS. 4 and 5 are perspective views illustrating a modified form of the present invention wherein the height of the stiff member at one end of the hollow body has been increased in excess of the height of the interconnecting member between the marginal edges of the top and bottom portions, with the height of those portions of said interconnecting member adjacent the ends of the stiff member of increased height also being increased to provide an airtight, hollow body, FIG. 5 showing said stiff member of increased height when in its clamped horizontal position after it has performed its intended function;

FIG. 6 is a perspective view showing the form of the present invention illustrated in FIGS. 4 and 5 when the hollow, box-like body is in its collapsed, deflated, inoperative condition with the stiff members at the ends thereof overlying adjacent portions of the top portion of said body when said body is ready to be folded longitudinally for storage or shipping purposes;

FIGS. 7 and 8 are perspective views of a modified form of the present invention shown in FIGS. 4 and 5 and showing the provision of a series of longitudinally-extending, open-ended, closely adjacent tubes of semi-cylindrical transverse cross section disposed within the hollow, box-like body, each of which tubes has its longitudinally-extending edges adhesively secured to the flat bottom portion of said body, and which tubes

are inflated when the hollow, box-like body which contains them is inflated, inflation of said tubes causing the top, supporting surface of said body to be expanded into a series of ridges or corrugations, each of said tubes terminating in spaced relation with respect to the end portions of the said body and being in communication with each other to equalize the pressure existing therein;

FIG. 9 is a perspective view showing the form of the present invention illustrated in FIGS. 7 and 8 when the hollow, box-like body has been collapsed and deflated, and when the stiff members at the ends thereof are overlying the top portion of said body when said body and the tubes therein are ready to be folded longitudinally for storing or shipping purposes;

FIG. 10 is a transverse sectional view on the line 10-10 of FIG. 7; and

FIG. 11 is a transverse sectional view of a form of tubes which may be placed within the hollow body in the same manner as the semi-cylindrical tubes of FIGS. 7, 8 and 9, but differing therefrom in that the tubes illustrated in FIG. 11 are of circular transverse cross section which may be regular one piece tubes, or which may be formed by adhesively securing the longitudinally-extending edges of the superimposed tube sections of semi-circular transverse cross section one above the other.

DETAILED DESCRIPTION OF THE APPARATUS

Referring more in detail to the construction of the self-inflatable hollow body illustrated in FIGS. 1 and 2 of the accompanying drawings, the top portion 1 and bottom portion 2 are composed of relatively strong, flexible, air-impervious sheet material, and are of the same relative size and configuration. Said top and bottom portions are interconnected in airtight relation along their marginal edges by a member 3 of relatively strong, flexible, air-impervious material preferably of bellows-like construction, which member is of a sufficient height to form a hollow, box-like body of the desired height when said body has been inflated to serve as a cushion, pillow, mattress or the like. In the form of the present invention shown in FIGS. 1 and 2 the portion of the interconnecting member 3 at one end of the hollow, box-like body is stiffened or a separate stiff member 4 is provided which has the upper and lower edges thereof attached to the adjacent edges of the top and bottom portions 1 and 2 respectively, which stiffened or stiff member 4 has mounted thereon and passing therethrough and through the adjacent end portion of the interconnecting member 3, an air inlet and air outlet valve 5 which, when open permits air to be drawn into the hollow, box-like body and when closed retains the air within said hollow body until it is again opened to permit air to escape therethrough when said hollow body is being collapsed or deflated.

In all forms of the invention shown in FIGS. 1 through 9 of the accompanying drawings I have shown a separate, independent one-way check valve 6 which passes through the stiff member 4 and through the adjacent end portion of the interconnecting member 3, which valve 6 functions without manual manipulation to permit air to be drawn into the hollow body but prevents air from escaping therefrom, but it is to be understood that this showing of two separate and independent valves 5 and 6 is for illustrative purposes only, and that the air inlet, air outlet and one-way check valve

may be incorporated in a single valve structure in which the one-way check valve operation may be rendered ineffective by manual manipulation to permit the air within the hollow, box-like body to pass outwardly through the single combined valve structure when said body is being collapsed or deflated. It is also to be understood that a stiffened portion or a stiff member may be provided at both ends of the hollow, box-like body as clearly shown in FIG. 3, in which construction it is only necessary to provide valves 5 and 6 or the above mentioned single combined valve structure in one of the said stiffened or stiff members 4.

As a means for retaining the stiffened or stiff member or members 4 in the position shown in FIGS. 2, 3, 5 and 8 of the accompanying drawings, in instances where such retention is desired and after said member has performed its intended function as a means for increasing the air pressure within the hollow body, means are provided for such retention. One form of clamp which has been found to be suitable for this purpose is made from a piece of relatively strong metal cut in the shape of the letter "H" which is bent over to form a U-shaped clamp 7 in which the end portions thereof are disposed in parallel, spaced relation and are separated or spaced apart a distance slightly less than the combined thickness of bottom portion 2 and the thickness of stiff member 4, so that when said clamp 7 is applied as shown in FIGS. 2, 3, 5 and 8, said stiff portion 4 is retained in fixed, parallel relation with respect to the underlying portions of top and bottom portions 1 and 2 of the hollow, box-like body due to the resilient action of said clamp. It will be obvious that other forms of clamps or suitable retaining means may be employed for this purpose.

In the form of the invention shown in FIGS. 4, 5 and 6 of the accompanying drawings, I have shown a construction in which the stiff member 4 of the form of the invention shown in FIGS. 1 and 2 has been increased in height in excess of the height of the remaining portion of the interconnecting member 3 constituting the sides and end portions of the hollow, box-like body, that portion of said interconnecting member 3 adjacent the ends of said member 4 of increased height being correspondingly increased in height. The stiff member of increased height designated in FIGS. 4 through 7 of the accompanying drawings by the reference numeral 8 serves effectively as a means for increasing the air pressure within the hollow, box-like body when said member 8 is operated in accordance with the method presented in the present application and to be described hereinafter. In this form of the present invention, and in any of the other forms thereof, especially when the hollow, box-like body is of relatively large size, handles 9 may be provided which may be grasped by the operator when the end members are being pulled apart during the procedure of self-inflating the hollow, box-like body.

In the form of the invention shown in FIGS. 7, 8 and 9, I form within the hollow, box-like body a series of resilient, flexible and air-impervious tube-like members 10 extending in longitudinal, closely-adjacent relation to each other and of semi-circular transverse cross section, which tube members are open at their ends and are inflated during the act of inflating the hollow, box-like body, which tube-like members when inflated, force the upper portion 1 of the hollow, box-like body into a series of longitudinally-extending ridges or corru-

gations constituting the upper supporting surface of the body. The said tube-like members 10 may be formed in the manner best shown in FIG. 10 of the accompanying drawings wherein the said members are of semi-circular transverse cross section and have their longitudinally-extending edges adhesively secured to the bottom portion 2 of the hollow, box-like body. When said tube-like members 10 are inflated, they not only form a series of longitudinally-extending ridges along the top portion 1 of the body but also tend to form a similar series of ridges or corrugations along the bottom portion 2 as indicated in dotted lines in FIGS. 7 and 8 of the accompanying drawings, which ridges or corrugations along the bottom portion are flattened out when the body is placed on a flat surface and a load is applied to the top surface of the body. If desired, the series of longitudinal tubes may be formed from regular tubes of circular transverse cross section, or may be formed as shown in FIG. 11 of the accompanying drawings, wherein said tube-like members are formed by superimposing two sections 11 and 12 of semi-circular transverse cross section one upon the other and adhesively securing the longitudinal edges of said sections. It is within the concept and scope of the present invention to provide a self-inflated cushion, pillow, mattress and the like devoid of the top and bottom portions 1 and 2 described and shown in the drawings of this application, and composed of two sheets of relatively strong, flexible and air-impervious material provided with a longitudinally-extending series of spaced, parallel seams formed by stitching or formed by strips of adhesive and by bulging the material between said seams to form a series of ridges open at their ends and in communication with a hollow, enclosed, airtight chamber at each end of the said tube-like ridges or corrugations, this construction including a stiff member such as members 4 or 8 on one of said hollow airtight chambers, which members 4 or 8 are provided with an air inlet and air outlet valve, with a separate and independent one-way check valve, or with a combined single valve structure of the type described above. FIG. 9 of the accompanying drawing shows such a construction consisting of a series of tubes or tube-like members, when collapsed or deflated and in condition for storage or shipping.

DETAILED DESCRIPTION OF THE METHOD

Referring to the method for increasing the air pressure within a hollow, box-like body which has been inflated by a pump or other source of air pressure, or is of self-inflatable construction, and which comprises a top portion 1, a bottom portion 2, an interconnecting portion 3, and a stiff member 4 or 8 which is provided with an air inlet and outlet valve 5, it is only necessary to move the stiff member 4 or 8 from a vertical position to a horizontal position to increase the air pressure within the body by forcing the air adjacent said stiff member 4 or 8 into the remaining portion of the hollow, box-like body, following which said member 4 or 8 is clamped or otherwise retained in the position shown in FIGS. 1, 2, 3, 5 and 8 of the accompanying drawings, in FIG. 3 of which drawings there is shown a construction provided with two stiff members 4 both of which have performed their intended purpose and are clamped in a horizontal position. In situations in which it is desired to effect a "pumping" action by repeating the movement of stiff member 4 or 8, a sepa-

rate independent one-way check valve 6 is provided in addition to valve 5, which upon the repeated movements of said stiff member 4 or 8 permits air to be drawn into said hollow, box-like body but prevents air from escaping therefrom. As stated above, a single, combined air inlet, air outlet and one-way check valve in which the said check valve may be manually manipulated to permit air to pass therethrough from the interior of said body when the same is being collapsed or deflated, may be substituted for the two independent valves 5 and 6. After the "pumping" action effected by repeated movements of the stiff member 4 or 8 has been completed, said members may be left at their vertical positions, or if still greater air pressure is required within the hollow, box-like body, may be moved to horizontal position and clamped or otherwise retained therein.

When carrying out the method of the present invention as applied to the forms of the inflated bodies described and illustrated in FIGS. 7 through 11 and described in detail above, or as applied to the form of the invention wherein the top or the top and bottom portions consist of preformed tubes or tube-like members made from sections of semi-circular or circular transverse cross section, the method of operation to increase the air pressure within said tubes or tube-like members, whether disposed within said body or constituting the desired longitudinally ridged or corrugated top and/or bottom portions without being enclosed within the hollow, box-like body, is the same as that described above, i.e., the stiff portion is moved once from its vertical position to its horizontal position and then clamped or otherwise retained in said horizontal position, or when a greater degree of air pressure is desired within the tubes or tube-like members, the "pumping" action is accomplished, following which said stiff member may be left in its vertical position or may be clamped or otherwise retained in its horizontal position.

It is to be understood that various changes may be made in the steps of the method and the construction and operation of the hollow, box-like bodies of the various types illustrated and described and referred to herein, without departing from the spirit of the present invention which is directed broadly to a method and means for increasing the air pressure within an air inflated cushion, pillow, mattress or the like, or without departing from the scope of the subjoined claims, keeping in mind that the present invention is not restricted to instances in which the hollow, box-like body is self-inflated but is equally applicable to instances where such a body has been previously inflated by a pump or other source of air pressure, and that said invention is applicable to the manufacture and operation of cushions, pillows, mattresses and the like where the flat top portion 1 and bottom portion 2 or the top portion 1 only is omitted and said top or top and bottom portions are formed from a series of longitudinally-extending, closely-adjacent tubes or tube-like members. It is also within the concept and scope of the present invention that the hollow, air-impervious, box-like body may be placed within and/or covered with fabric of any desired color or design, or may of itself be made of air-impervious, flexible, relatively strong material of any desired color or design in cases where an ornamental or decorative effect is desired.

Having thus described my invention, I claim:

1. A hollow, airtight, box-like, inflated body adapted to serve as an air filled cushion, pillow, mattress or the like comprising flexible, air-impervious top and bottom portions of substantially the same size and configuration, a flexible air-impervious member extending between said top and bottom portions with the top and bottom edges thereof connected in airtight relation to the marginal edges of said top and bottom portions, respectively, and of a height sufficient to form an air filled body of the desired height; a stiff member extending along a portion of the length of said air-impervious member and having its upper and lower edges connected to the adjacent edges of said top and bottom portions, respectively, said stiff member when said top and bottom portions are in juxtaposed positions being disposed in substantially parallel relation to the planes of said top and bottom portions and when moved to a position at right angles to said planes causing said top portion to be moved from its juxtaposed position with respect to said bottom portion to a position in parallel, spaced relation to said bottom portion to form the air-inflated, hollow body defined by said top and bottom portions and said air-impervious member; a valve-controlled air inlet and air outlet in communication with the interior of said hollow body which when open permits air to be sucked into said hollow body and when closed retains the air therein, movement of said stiff member from its position at right angles to the plane of said bottom portion to a position substantially parallel to said plane after said hollow body has been inflated and the air outlet valve has been closed, forcing the air within said hollow body adjacent said stiff member into the remaining portion of said body to increase the air pressure therein; and means for retaining said stiff member in its position overlying and substantially parallel to the plane of said top portion.

2. A hollow, airtight, box-like air-inflated body as defined in claim 1 wherein the height of said stiff member is greater than the height of said air-impervious member, and the height of said air-impervious member adjacent the ends of said stiff member is increased in accordance with the increased height of the said stiff member to form a completely enclosed airtight hollow body.

3. A hollow airtight, box-like, air-inflated body as defined in claim 1 wherein a one-way check valve is provided in addition to the valve-controlled air inlet and air outlet, which one-way valve permits air to be drawn into the hollow, box-like air filled body after the air outlet is closed and the body has been initially inflated to permit said stiff member to be moved repeatedly from its right angle position with respect to the plane of said bottom portion to a position in overlying parallel relation to the plane of said top and bottom portions to create a pumping action to increase the air pressure within the hollow, air-inflated body to the desired degree.

4. A hollow, airtight, box-like air-inflated body as defined in claim 3 in which means are provided for retaining said stiff member in its position in overlying parallel relation to the plane of said top and bottom portion upon completion of the pumping action effected thereby after the air pressure within the hollow body has been increased to the desired degree.

5. A hollow airtight, box-like air-inflated body as defined in claim 3 wherein the air inlet, air outlet and one-way check valve are combined in a single valve struc-

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ture in which the one-way check valve may be manually manipulated to render its one-way function inoperative to permit the escape of air therethrough when the hollow body is being collapsed or deflated.

6. A hollow airtight, box-like air-inflated body as defined in claim 1 having within said hollow body a series of flexible, expansible, longitudinally-extending, closely-adjacent open-ended tube-like members in communication at their ends with each other and with the air pressure within said inflated hollow body and inflated and expanded by said air pressure therein to form along the surface of said top portion a series of longitudinally-extending ridges or corrugations.

7. A hollow, airtight, box-like air-inflated body as defined in claim 6, wherein said series of tube-like members are formed by a plurality of longitudinally extend-

ing members of semi-circular transverse cross section having their longitudinal edge portions adhesively connected throughout the length thereof and in closely arranged position to the bottom portion of said box-like body.

8. A hollow, airtight box-like air-inflated body as defined in claim 6, wherein said series of tube-like members is formed by a plurality of longitudinally extending members each of semi-circular transverse cross section arranged in inverted, superimposed relation and having their longitudinal abutting edge portions adhesively connected throughout the length thereof to form a series of tube-like members of circular transverse cross section.

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