

July 6, 1937.

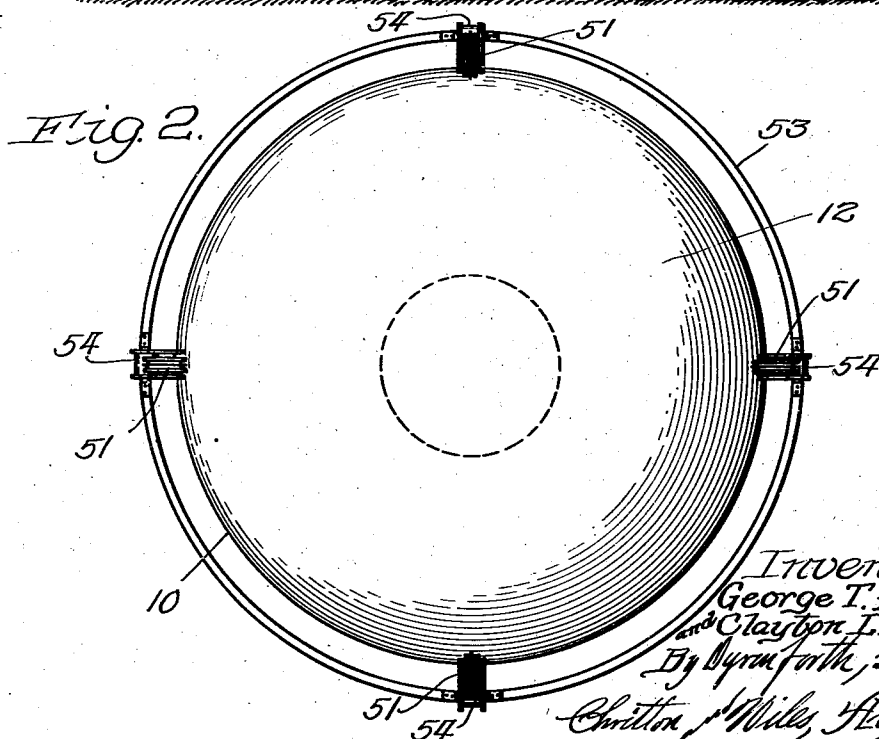
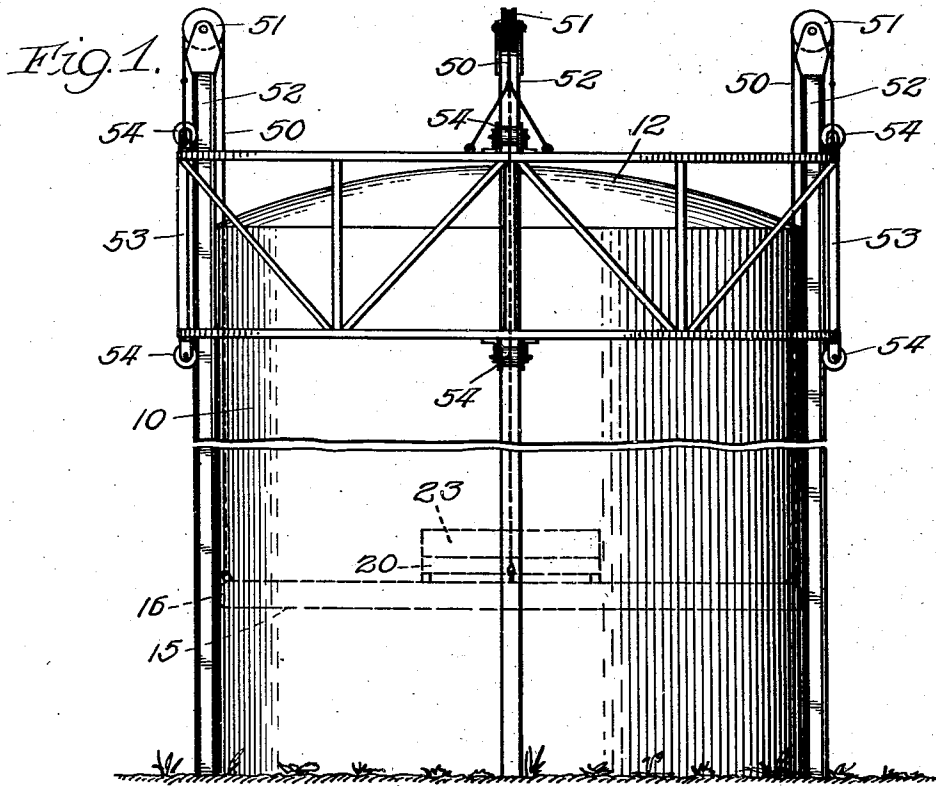
G. T. HORTON ET AL

2,085,752

CONTAINER

Filed May 18, 1935

4 Sheets-Sheet 1



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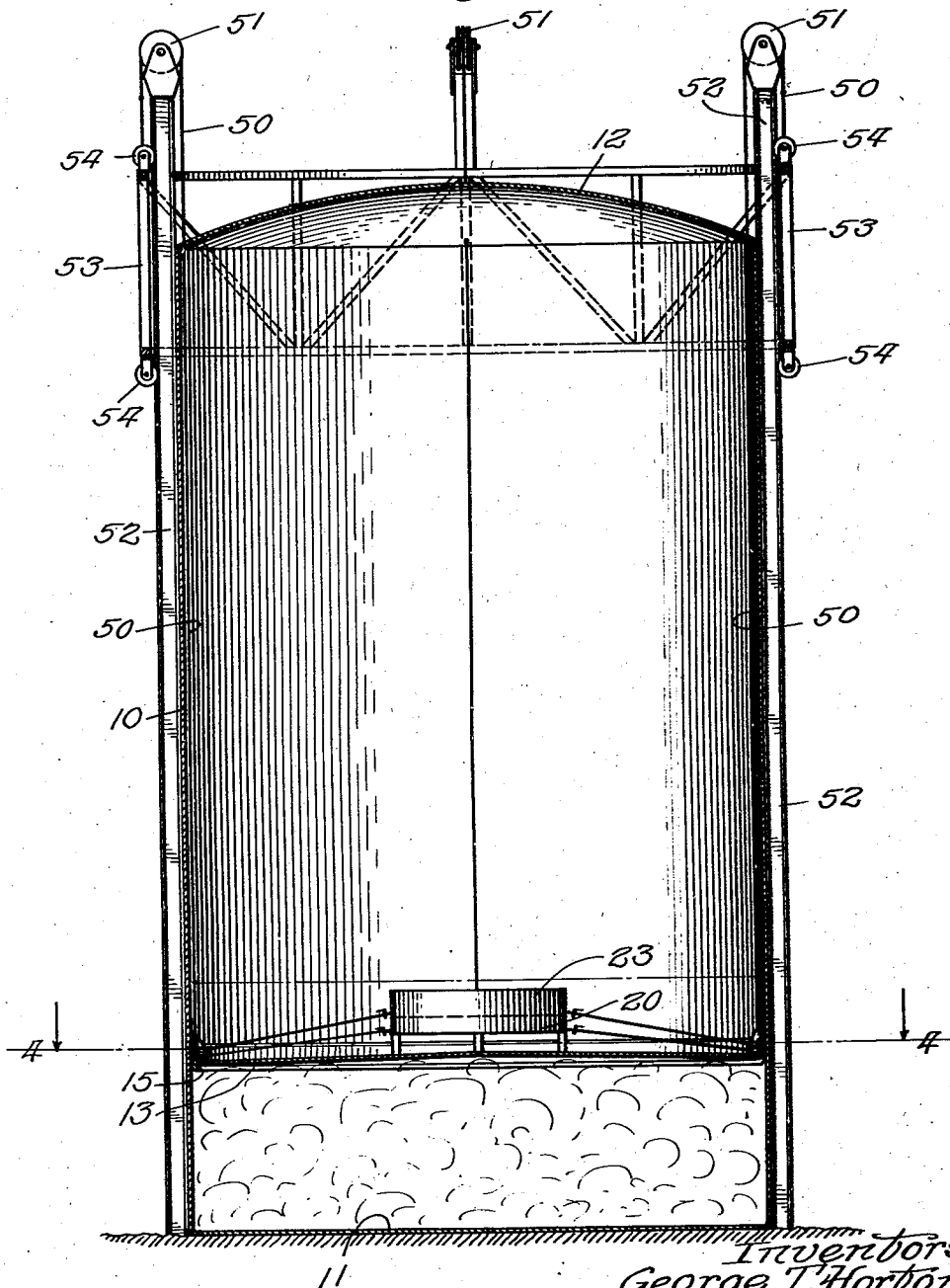
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CONTAINER

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4 Sheets-Sheet 2

Fig. 3.



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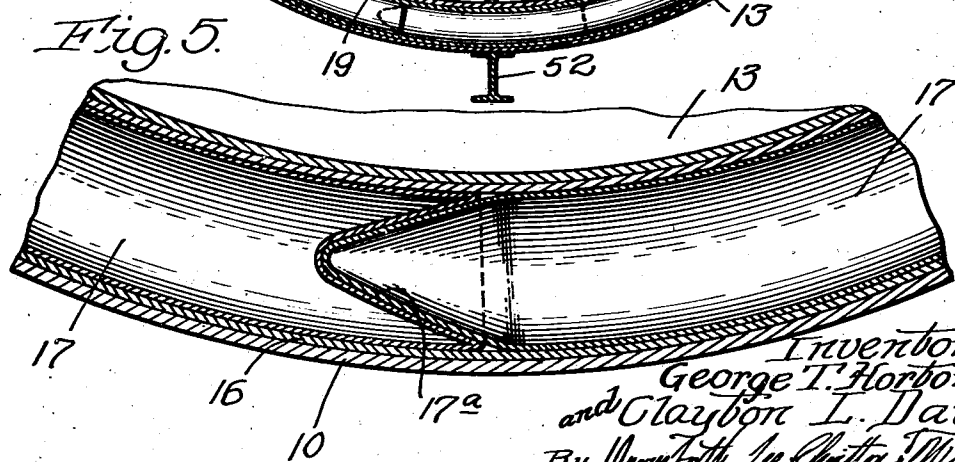
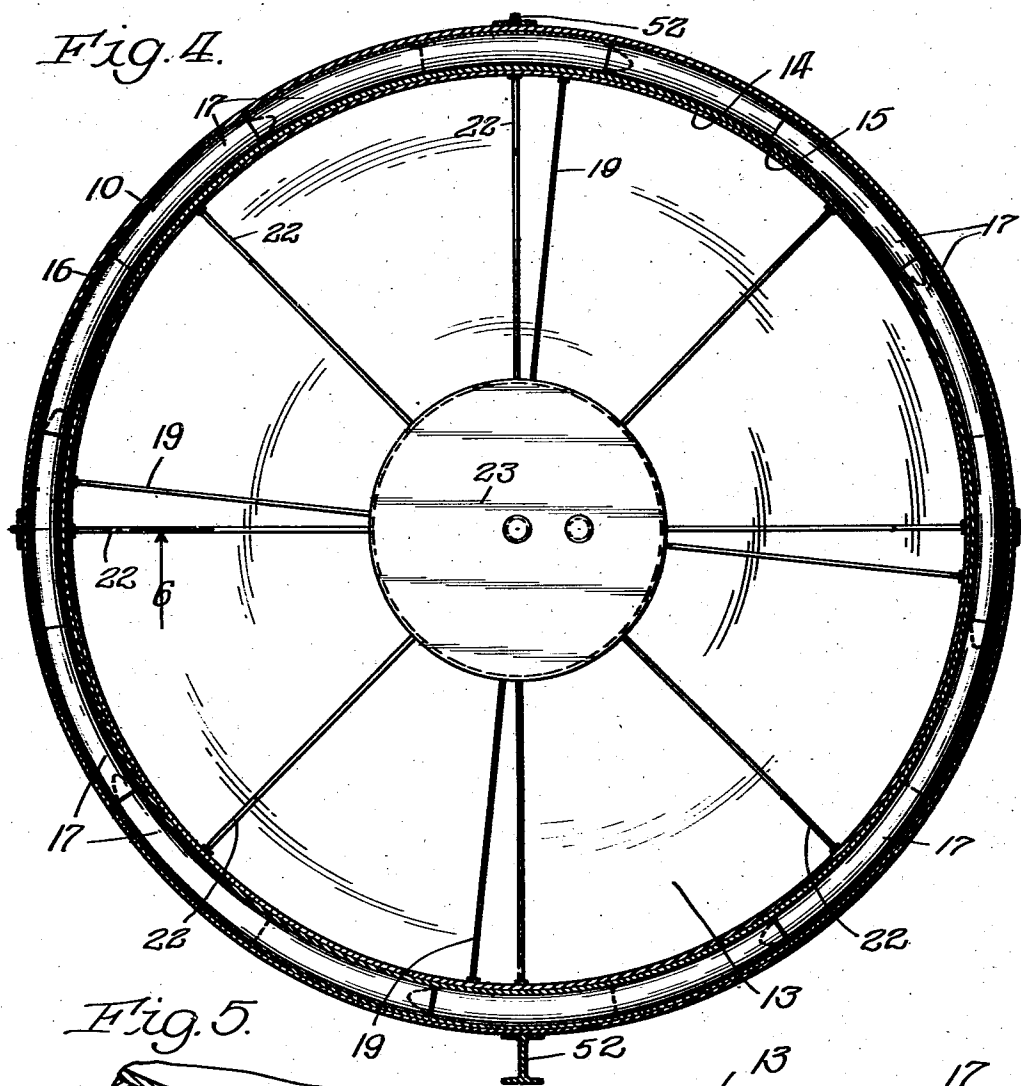
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**CONTAINER**

**Filed May 18, 1935**

**4 Sheets-Sheet 3**



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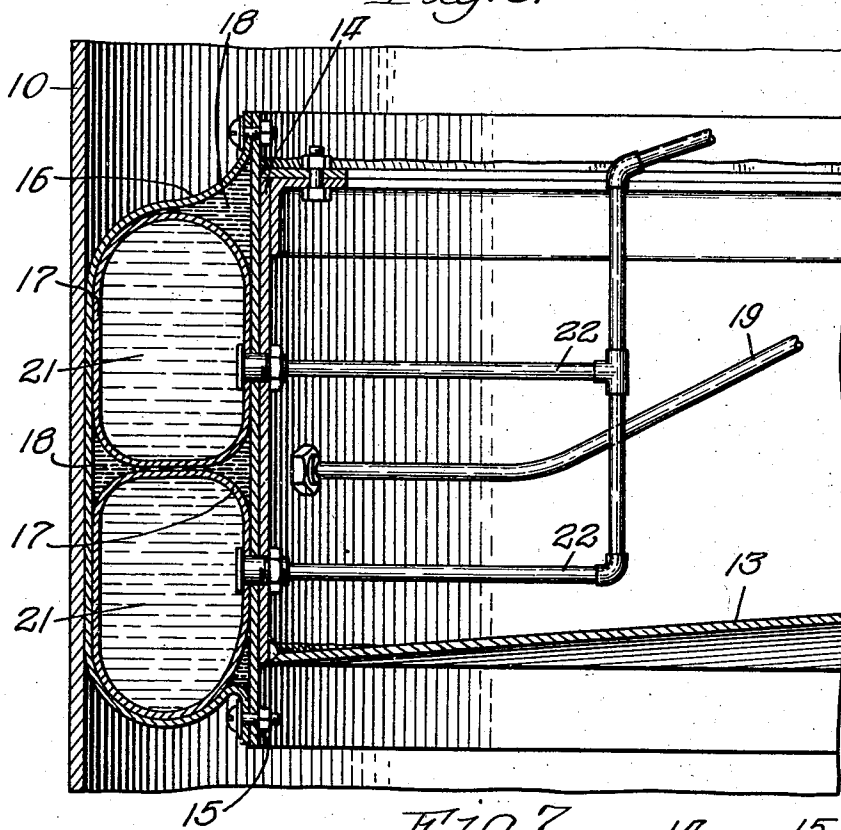
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CONTAINER

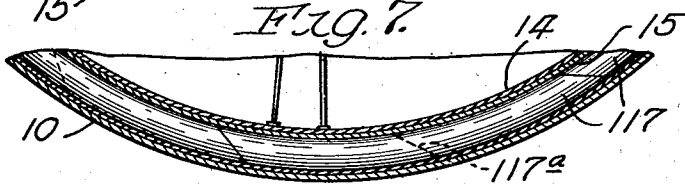
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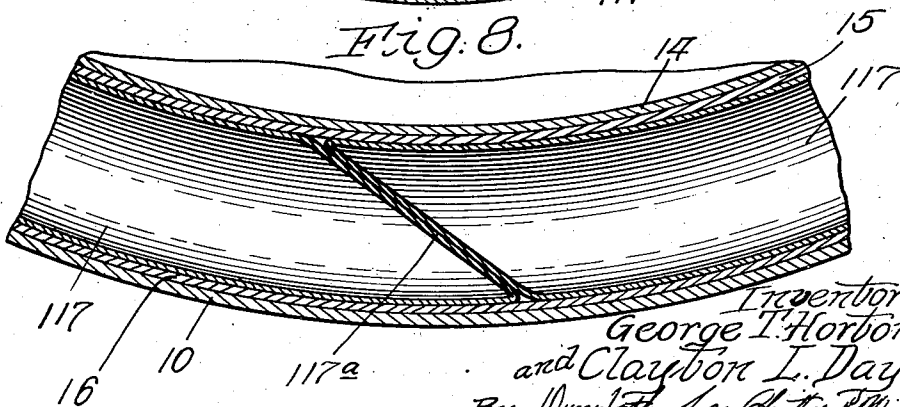
*Fig. 6.*



*Fig. 7.*



*Fig. 8.*



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## UNITED STATES PATENT OFFICE

2,085,752

## CONTAINER

George T. Horton, Chicago, Ill., and Clayton L. Day, New York, N. Y., assignors to Chicago Bridge & Iron Company, Chicago, Ill., a corporation of Illinois

Application May 18, 1935, Serial No. 22,276

5 Claims. (Cl. 220—26)

This invention relates to improvements in containers and, more especially, a cylindrical container adapted for storing liquids or gases, of the type having a vertically movable piston, roof, or deck. Such roof may be buoyed up entirely or partially by the liquid or gas under it and, consequently, may be referred to as a floating roof.

A feature of our invention is improved means for sealing the space between the periphery or edge of the roof and the cylindrical shell.

A feature of our invention is improved means for counterweighting the vertically movable roof.

Other features and advantages of our invention will appear more fully as we proceed with our specification.

In that form of device embodying the features of our invention shown in the accompanying drawings—

Figure 1 is a view in side elevation; Fig. 2 is a top plan view; Fig. 3 is a vertical sectional view; Fig. 4 is a view taken as indicated by the line 4 of Fig. 3; Fig. 5 is an enlarged fragmentary horizontal sectional view showing the elongated casings forming a part of the seal; Fig. 6 is a view taken as indicated by the line 6 of Fig. 4; Fig. 7 is a fragmentary view similar to Fig. 4, showing a modification; and Fig. 8 is a view similar to Fig. 5 showing the modification.

We shall first describe the sealing means. In general, this includes a strip of flexible material on the outer edge of the roof forming a peripheral pocket. This material may resemble, for example, the material frequently used for brake shoe lining on motor cars. This material is preferably as liquid tight as possible and should be strong enough to withstand wear as far as possible as it rubs against the shell wall. The inside of the shell wall should also be as smooth as possible, and to this end, the edges of the sheets forming the cylindrical shell are preferably butt welded.

Inside of the pocket, we provide one or more elongated flexible casings suitably filled, expanded or inflated by liquid or gas. We have here shown two such casings filled with liquid, one above the other, to increase the effectiveness of the seal as the roof passes unevennesses in its vertical movement. As here shown, each casing is made up of sixteen sections with adjacent ends telescoped or overlapped, and each casing, as here shown, is circular in cross-section.

Inside of the pocket and outside of the casings, we preferably provide fluid under pressure, here shown as oil.

The pressure in the casings may be, for example, from one to two pounds per square inch and the pressure outside of the casings and inside of the pocket, from one-quarter to one pound per square inch.

The pressure in the casings and the pressure of the liquid outside of the casings and inside of the pocket serve to maintain the latter yieldingly distended and in contact with the shell to seal the space between the roof and the shell.

As shown in the drawings, the cylindrical shell is indicated by 10 and provided with a suitable bottom 11 and dome top 12. 13 indicates the floating roof or piston, the same being provided with an upstanding peripheral rim 14. Attached to the outside of the rim 14 is a vertical sheet 15 carrying the strip of flexible material 16 on its outer side which forms a peripheral pocket. Means, to be hereinafter described, is provided for yieldingly distending this pocket into contact with the shell 10.

Inside of the pocket 16 we provide two elongated flexible casings, one above the other. As here shown, each of these casings is made up of sixteen sections 17, 17, with adjacent ends telescoped, as indicated by 17<sup>a</sup>. Each casing is suitably circular in cross-section, but in normal use is somewhat flattened as the edge of the roof approaches the shell, as shown in Fig. 6.

Inside of the pocket 16 and outside of the casings 17, 17 we have here shown a relatively heavy oil or lubricant 18 maintained under a pressure of from one-quarter to one pound per square inch. This oil is supplied through suitable pipes 19 from a lower tank 20 which is at the necessary height to maintain the desired pressure.

The casings 17, 17, that is, all sections of said casings, are filled with a relatively light oil 21 maintained at a pressure of from, for example, one to two pounds per square inch. This oil is supplied through suitable pipes 22 from the upper tank 23, which is at the necessary height to maintain the oil under the desired pressure.

In Figs. 7 and 8, we have shown the elongated casings made up of sections 117, 117, corresponding to the sections 17, 17, except that the ends instead of being telescoped are slanted so that they overlap, as indicated by 117<sup>a</sup>.

We shall now describe the means for counterweighting the roof. In general, this includes a plurality of cables, preferably three or more, all attached to a single counterweight. With this construction, employing a single counterweight, tendency for the roof to tip or slant is lessened or eliminated. If one side rises more

than the others, the cable or cables on that side become slack so that the counterweight does not pull on them.

We have here shown the single counterweight 6 as comprising a ring surrounding the shell and so mounted on vertical guides or slides to maintain the same always in a horizontal position in its vertical movement.

The counterweight may be as heavy as desired.

10 The roof may be fully or partially counterweighted or counterbalanced. In storing gases, it is preferably unbalanced to a sufficient extent to maintain the stored gas at the desired pressure.

The roof is counterbalanced by a plurality of 15 cables 50 (here shown as four) passing over sheaves 51 carried on the upper ends of vertical posts 52 mounted on the outside of the shell. Suitable holes are provided in the dome roof 12 for the cables 50 to pass through.

20 Outside of the shell is provided a single counterweight in the shape of a frame forming a ring surrounding the tank. This framework ring is indicated, in general, by 53. The vertical members 52 form vertical guides or slides for the 25 ring, the latter being provided at the top and bottom with flanged rollers 54, 54 operating on the slides. The rollers are separated enough vertically to give a long bearing so that the counterweight ring 53 is always maintained in a horizontal position in its vertical movement.

30 While we have shown and described certain embodiments of our invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from 35 the spirit and scope of the invention as disclosed in the appended claims, in which it is our intention to claim all novelty in our invention as broadly as permissible, in view of the prior art.

40 What we claim as new, and desire to secure by Letters Patent, is:

1. A container, including; a cylindrical shell; 45 a vertically movable roof in the shell; and sealing means, including, a distendable pocket surrounding the roof and means inside of the pocket for yieldingly distending the same into contact

with the shell, said means including an elongated casing in the pocket, with means for expanding the same, and fluid under pressure in the pocket and surrounding the casing.

2. A container, including; a cylindrical shell; 5 a vertically movable roof in the shell; and sealing means, including, a distendable pocket surrounding the roof and means inside of the pocket for yieldingly distending the same into contact 10 with the shell, said means including two elongated casings, one above the other, in the pocket, with means for expanding the same, and fluid under pressure in the pocket and surrounding the casings.

3. A container, including; a cylindrical shell; 15 a vertically movable roof in the shell; and sealing means, including, a distendable pocket surrounding the roof and means inside of the pocket for yieldingly distending the same into contact 20 with the shell, said means including two elongated sectional casings, one above the other, in the pocket, with means for introducing fluid under pressure into said casings to expand the same, and fluid under pressure in the pocket and 25 surrounding the casings, the pressure inside the casings being greater than the pressure in the pocket and outside of said casings.

4. A container, including; a cylindrical shell, 30 a vertically movable roof in the shell, and sealing means, including, a distendable pocket surrounding the roof and attached thereto and means inside the pocket for yieldingly distending the same into contact with the shell, said means including an elongated casing in the pocket 35 and means for expanding said casing.

5. A container, including; a cylindrical shell, 40 a vertically movable roof in the shell, and sealing means, including, a distendable pocket surrounding the roof and attached thereto and means inside the pocket for yieldingly distending the same into contact with the shell, said means including two elongated casings, one above 45 the other, in the pocket, and means for expanding said casings.

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