

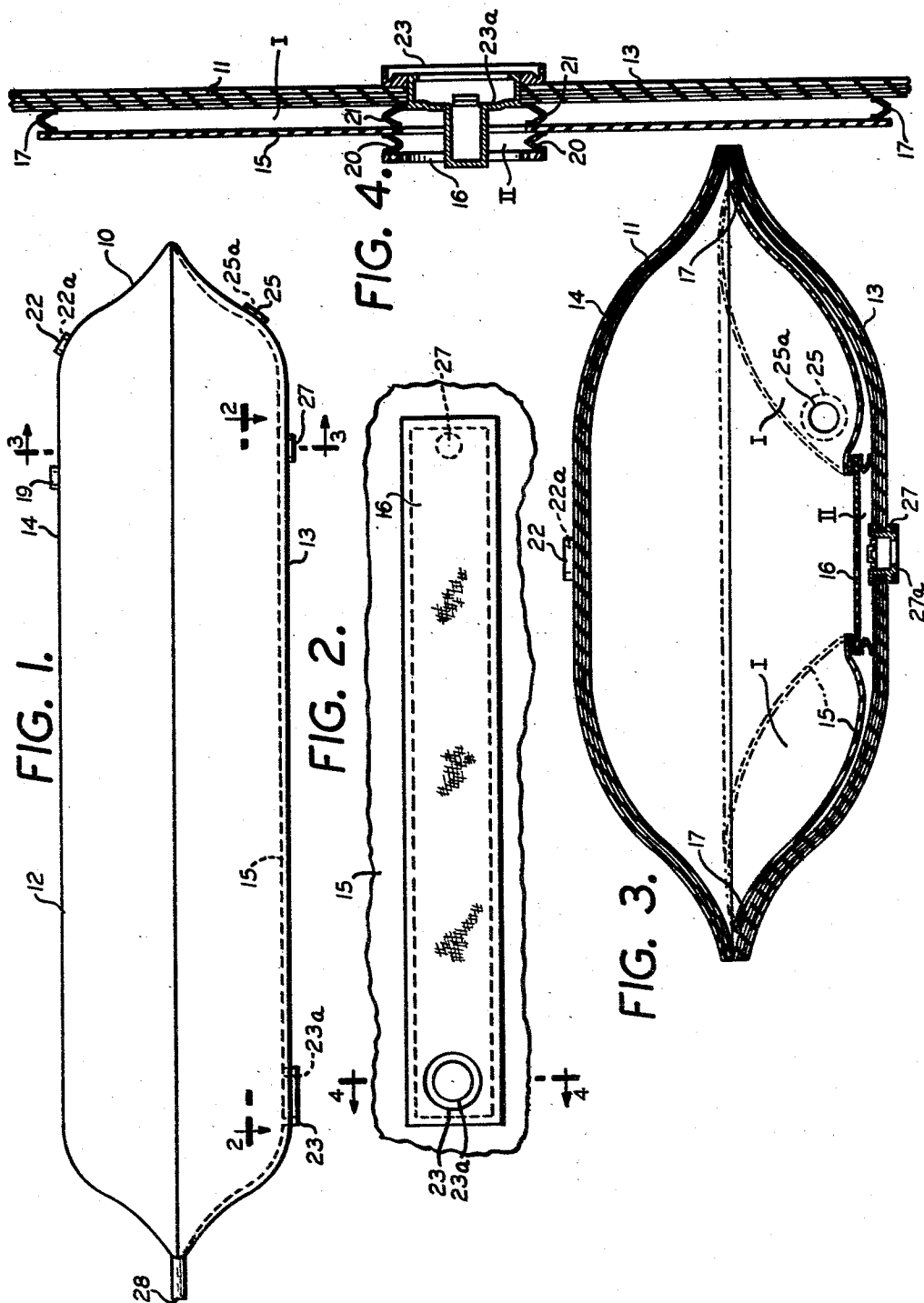
Feb. 23, 1965

R. E. PIERSON

3,170,600

COLLAPSIBLE CONTAINER

Filed Dec. 4, 1962



1

3,170,600

COLLAPSIBLE CONTAINER

Robert E. Pierson, East Greenwich, R.I., assignor to
United States Rubber Company, New York, N.Y.,
a corporation of New Jersey
Filed Dec. 4, 1962, Ser. No. 242,177
1 Claim. (Cl. 222-94)

This invention relates to collapsible containers formed of relatively flexible material and, more, particularly, to such containers having substantially cylindrical body portions.

Such a container was disclosed in Cunningham Patent No. 2,930,423. The container therein described may be formed from a single sheet of coated cord fabric merely by forming a tube and closing off both ends by flat clamps. When such a container is pressurized, the cross-section of the central portion approaches a circular form. When the container is empty, this central part collapses into a doubly covered rectangle.

Containers constructed according to the disclosure of the aforementioned patent are admirably suited for the storage of gas and liquids, as well as for their transportation. However, such a container has not heretofore been adapted to the storage of pulverulent materials, such as dry powdered cement, mortar, flour or powdered plastic, because of the difficulty of emptying the materials therefrom. Accordingly, this invention concerns an improvement to the above-mentioned Cunningham container, and my principal object is to improve such a container so that it will be well suited to the storage and transportation of pulverulent material and will facilitate the emptying of such material in an expeditious manner.

This fundamental object is accomplished by providing the container with a bladder layer having an air-permeable fabric center section which is adapted to aerate pulverulent material in contact therewith so that such material can be easily emptied from the container.

The bladder layer comprises a rectangular sheet of coated cord fabric attached about its periphery to the lower wall of the container, thus to form a chamber therewith. The air-permeable fabric center section is itself attached about its periphery to the lower wall of the container, thereby to form a second chamber.

There are means to fill the container. The container has an opening in the upper wall thereof for introducing gas under pressure into the container. There is a second opening through both the lower wall of the container and the center section of the bladder layer for emptying the container. A third opening is provided in the lower wall of the container for introducing gas under pressure into the first chamber formed by the rectangular sheet of coated cord fabric, thus to force pulverulent material in contact with the bladder layer onto the center section thereof. A fourth opening is provided through the lower wall of the container for introducing gas under pressure into the chamber formed underneath the center section, thereby to aerate pulverulent material on the center section and assist the same out of the emptying opening.

For a better understanding of these and other characteristics and advantages of the present invention, reference should be had to the following description of the accompanying drawings relating to an embodiment thereof, wherein,

FIG. 1 is a cross-sectional view taken longitudinally through a container of the type disclosed in the aforementioned Patent No. 2,930,423;

FIG. 2 is a partial view taken along line 2-2 of FIG. 1 and showing the air-permeable fabric center section of the bladder layer;

FIG. 3 is a transverse cross-sectional view through the

2

container of FIG. 1 taken on line 3-3 thereof, the phantom line portion showing the bladder layer in the inflated position; and

FIG. 4 is a cross-sectional view taken on line 4-4 of FIG. 2.

Referring to the drawings, there is shown a collapsible container 10 of the type disclosed in Patent No. 2,930,423. Container 10 is formed of a number of layers 11 of relatively flexible fabric material, as, for example, coated cord fabric, in the manner disclosed in the patent. Container 10 has a substantially cylindrical body portion 12, which by the nature of its construction is comprised of a lower wall 13 and an upper wall 14.

As shown in the drawings, container 10 is provided with a bladder layer 15, which is preferably formed of rubberized cord fabric and is generally of the same size as the lower wall 13 of the container.

Positioned in the center of bladder layer 15 is an air-permeable fabric strip 16, forming the center section thereof. The fabric of strip 16 preferably takes the form of any low permeability woven fabric material and can be made of cotton or other suitable fibers. The permeability of the fabric should be such that under low pressures, e.g., approximately one-half to five pounds per square inch, it is possible to pass from two to twelve cubic feet of air per minute through each square foot area.

Bladder layer 15 is attached about its periphery to the inner surface of lower wall 13 of the container in an airtight manner. This is accomplished by using rubber fabric hinges 17, as shown in FIGS. 3 and 4.

Fabric strip 16 is also attached about its periphery to lower wall 13 of the container in an airtight manner. This is also accomplished by the use of rubber fabric hinges 20 and 21, as shown in FIGS. 3 and 4. Specifically, air-permeable fabric strip 16 itself is attached about its periphery to the rubberized cord fabric of bladder layer 15 by rubber-fabric hinges 20; and the rubberized cord fabric of bladder layer 15 is attached to lower wall 13 of the container by hinges 21.

By this construction there is formed an airtight chamber I, which extends circumferentially around the lower wall 13 of the container, being bounded by the rubberized cord fabric of bladder layer 15 on the top, lower wall 13 of the container on the bottom, and by rubber fabric hinges 17 and 21 on the sides. The method of attachment also forms a second chamber II, as shown in FIGS. 3 and 4. Chamber II is impermeable on its bottom surface, being bounded there by lower wall 13 of the container, but is air-permeable on its upper surface, since the same is formed by fabric strip 16.

The collapsible container thus equipped is provided with a number of openings and fittings therein for proper operation. There is a filling fitting 19, which may be positioned on the upper wall 14 of the container. There is also a general pressurizing air inlet 22a inserted in opening 22 in the upper wall 14 of the container. Air or other gas under pressure is introduced into the container through opening 22 to make the container rigid prior to the emptying operation.

A second opening 23 is positioned in the lower wall 13 of the container. A fitting 23a is provided in opening 23 and extends through both the outer wall and the air-permeable fabric strip 16. Fitting 23a provides a means of egress for the lading and alternatively, may also serve as the filling means in the absence of fitting 19.

A third opening 25 is also provided in lower wall 13 of the container and includes an air inlet 25a. Air or other gas under pressure introduced into chamber I of container 10 through opening 25 inflates bladder layer 15 in the manner indicated by the phantom lines in FIG.

3

As chamber I is extended outwardly, pulverulent material in contact with the rubberized cord fabric of bladder layer 15 is pushed onto the air-permeable fabric strip 16.

Initially, a fourth opening 27 is provided in lower wall of the container spaced from the other openings therein and is equipped with a suitable air inlet 27a. Air or other gas under pressure is introduced through opening 27 into chamber II underneath fabric strip 16, thus aerate and fluidize the lading in contact therewith. It should be understood that opening 27 extends only through lower wall 13 of the container, and, although it is positioned beneath fabric strip 16, as is opening 23 (see FIG. 1), it does not extend through fabric strip 16 as does opening 23.

In one operation container 10 is emptied of a lading of pulverulent material as follows:

The container is first inflated with air or other gas under pressure through opening 22 in upper wall 14 thereof to a pressure approximating one-half to one pound per square inch. This makes container 10 rigid. Fitting 21 is then opened, thus to provide a means of egress for the lading.

Air or other gas under pressure is then introduced through inlet 27a into chamber II in an amount sufficient to pass approximately two to twelve cubic feet of air per minute per square foot through fabric strip 16.

As the air passes through fabric strip 16, it aerates and fluidizes pulverulent material in contact therewith. The lading exits through fitting 23a, additional air or other gas under pressure is forced into chamber I through fitting 25a, thus to cause bladder layer 15 to be extended in the manner shown by the phantom lines in FIG. 3. As extended, bladder layer 15 urges the lading inwardward fabric strip 16. As this additional material is forced onto the air-permeable fabric strip, it is aerated. The air or other gas passing therethrough, thus causes the material to flow readily through fitting 23a and out of the container.

An opening 28 may also be provided at the end of the container, as shown in FIG. 1, to serve as an alternate means of emptying the container. When the container is placed on a sloping surface and aerated as above described, it may be preferable to use opening 28 as the means of egress for the lading, rather than opening 23.

While the invention has been shown and described as a separately-prepared bladder layer in a container, it should be readily understood that the additional layer could also be made as an integral part of lower wall 13, if lower wall 13 of the container were to consist of two or more plies of rubberized cord fabric as is conventional, a parting material, e.g., paper, talc, etc., could be placed during lay-up between those rubberized cord fabric plies which would ultimately serve as lower wall 13 of the container and the ply which would serve as bladder layer

4

15. The air-permeable fabric strip 16 could then be properly positioned parallel to the longitudinal axis of the cylindrical body portion of the container, and would be attached to the lower wall 13 thereof in the manner shown in FIG. 4, i.e., by the use of rubber-fabric hinges 20 and 21. In this manner container 10 could be equipped with the bladder layer of the instant invention, and yet would be of no heavier construction than ordinary containers, inasmuch as the bladder layer 15 would also constitute part of the load-bearing lower wall when deflated.

Having thus described my invention, what I claim and declare to protect by Letters Patent is:

A collapsible container adapted for the storage of pulverulent material, said container being formed of relatively flexible material, comprising:

a substantially cylindrical body portion having upper and lower walls closed at their ends to form a container;

means to fill said container;

a bladder layer comprising a rectangular sheet of coated cord fabric attached about its periphery to said lower wall of said container thereby to form a first chamber,

said sheet being generally coterminous with said lower wall of said container,

said sheet having an air-permeable fabric center section disposed parallel to the axis of said cylindrical body portion,

said center section being attached about its periphery to said lower wall of said container thereby to form a second chamber;

a first opening in said upper wall of said container for introducing gas under pressure into said container;

a second opening through said lower wall of said container and said center section of said bladder layer for emptying said container;

a third opening through said lower wall of said container spaced from said second opening for introducing gas under pressure into said first chamber to force pulverulent material in contact with said bladder layer onto said center section thereof; and

a fourth opening through said lower wall of said container spaced from said second and third openings for introducing gas under pressure into said second chamber to aerate pulverulent material on said center section.

References Cited in the file of this patent

UNITED STATES PATENTS

2,930,423 Cunningham Mar. 29, 1960

FOREIGN PATENTS

624,286 Canada July 25, 1961