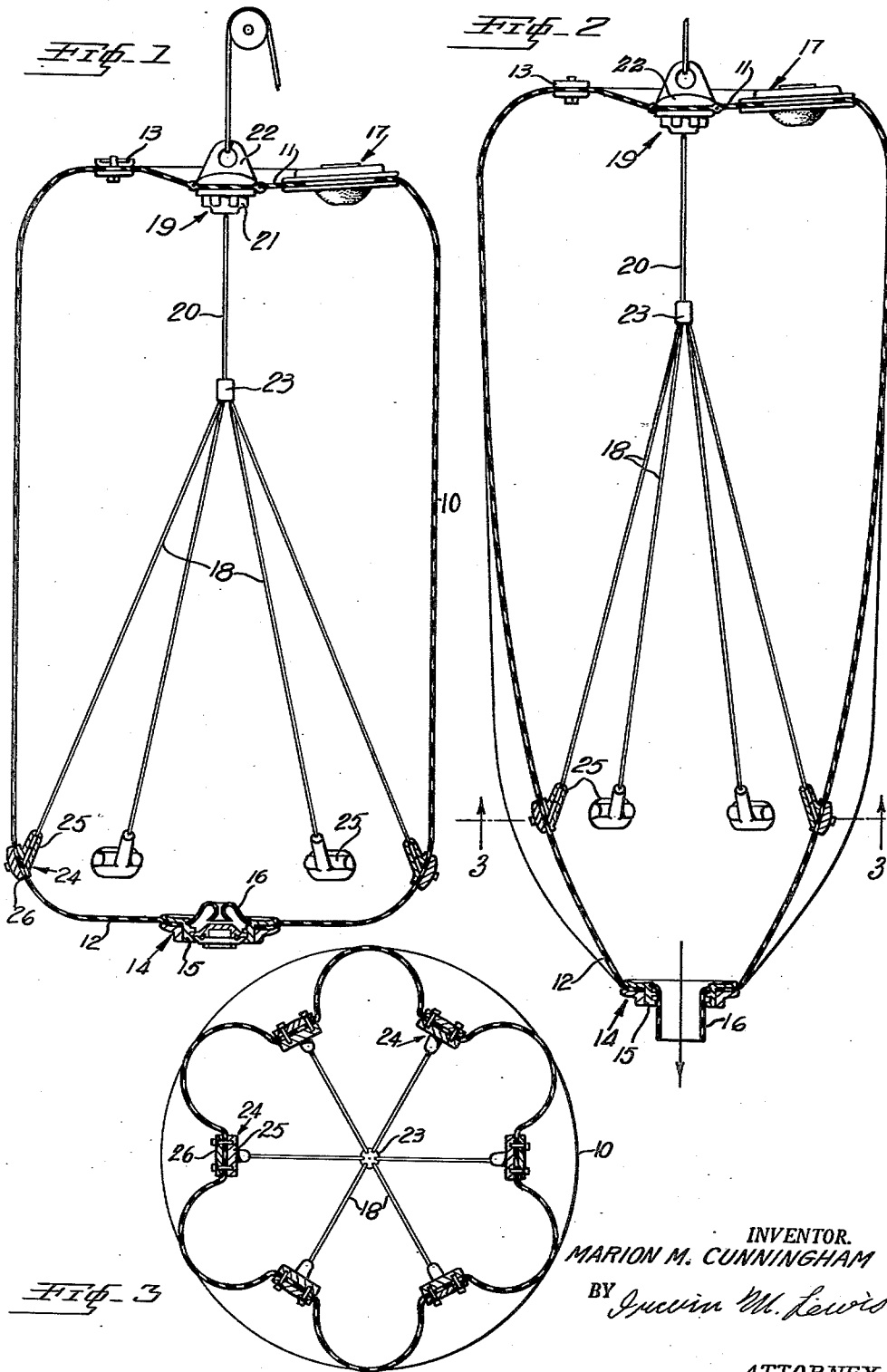


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M. M. CUNNINGHAM
COLLAPSIBLE CONTAINER

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COLLAPSIBLE CONTAINER

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1 Claim. (Cl. 150—5)

This invention relates to a collapsible container of the general type shown in my U. S. Patent Nos. 2,672,902 and 2,612,924.

In particular the invention relates to the arrangement of the internal cables used in such containers to prevent elongation of the container during lifting and to carry the load during lifting.

The primary object of the invention is to provide a novel arrangement of the cables so that when the container is suspended from one end and an emptying opening in the other end is opened permitting the contents of the container to flow out, or thereby reducing its resistance, the lower end of the container will assume a fluted, funnel shape due to the weight of the material thereby insuring complete emptying of the container.

The advantages of this invention will become apparent from the following description when read in conjunction with the accompanying drawings wherein:

Fig. 1 is a sectional view of the collapsible container of the present invention showing the container filled and pressurized with gas to render the container rigid;

Fig. 2 is a sectional view similar to that of Fig. 1 but showing how the lower end of the suspended container takes a fluted funnel shape by reason of the cable arrangement when the closure for the emptying opening in the lower end is removed to permit the contents of the container to flow out therethrough; and

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 2.

Referring to the drawings, and in particular to Fig. 1, the container of the present invention, when filled and expanded, is of generally cylindrical shape. The cylindrical body portion 10 and the end or head portions 11 and 12 are conveniently formed of plies of rubberized cord fabric, either textile or wire cord fabric, in the manner described in my U. S. Patent Nos. 2,612,924 and 2,672,902, though it will be appreciated that other gas impervious flexible materials such as some types of sheet plastics may be used.

The end portion 11 is provided with an inflating fitting 13 which includes a check valve through which the container may be pressurized with gas to render it rigid after it is filled with powdered or granular material.

The end portion 12 is provided with a central fitting 14 providing an opening into the container which can be closed by a closure plug 15. Fitting 14 is provided with a sleeve valve 16, which, when the container is filled, is tucked into the opening provided by the fitting 14 and covered by the closure plug 15. The sleeve valve 16 is normally provided with a tie string (not shown) by which it may be tied off to provide a secondary closure. During filling or emptying, the sleeve valve 16 may be conveniently attached to a filling spout or emptying pipe, as the case may be. The container may be upended and filled or emptied through the fitting 15, or as shown in the drawings, a separate fitting 17 may be provided in the end 11 through which the container may be filled.

The container is provided with a plurality of substan-

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tially inextensible cables 18 of metal or other suitable material which serve to limit the length of the container during lifting and to carry a portion of the load. In accordance with the invention, the lower ends of the cables 18 are secured to the container at spaced points substantially at the corner portion of the container formed between the end portion 12 of the container and the cylindrical body portion 10.

The cables 18 may be connected directly to the fitting 19 or may be connected thereto by means of a connecting cable 20, as shown in the drawings by means of a connector block 23 in which the ends of the cables are anchored, as by swedging. The fitting 19 includes an inner member 21 in which the connecting cable 20 is anchored, and an outer member 22, providing a lifting eye, which is bolted through the end 11 to the inner member 21. The lower ends of the cables 18 are connected to the container wall by means of connector blocks 24 each of which includes an inner member 25 in which the end of the cable is anchored, as by swedging, and an outer plate 26 which is bolted through the wall of the container to the inner member 25.

When the container is filled with the granular powdered material and pressurized with gas to render the container substantially rigid as shown in Fig. 1, the load in the container when the container is lifted from the fitting 19 is carried by the cables 18 and the lower end 12 of the container with the result that there is substantially no elongation of the cylindrical wall 10 or the end 11. The tendency of the lower ends of the cables 18 to move inwardly under the force imposed thereon during lifting is effectively resisted by the gas pressure and/or the pressure of the filling material acting outwardly on the cylindrical wall portion of the container. Sagging of the bottom end portion 12 is also resisted by the pressure acting outwardly against the cylindrical wall portion 10.

When the closure plug 15 of the fitting 14 is removed and the sleeve valve 16 withdrawn and opened as shown in Fig. 2 so that the filling material runs out, the pressure acting on the cylindrical wall portion 10 is gradually reduced with the result that the end portion 12 sags and the ends of the cables 18 are pulled inwardly by the weight of the filling material acting on the lower end 12 so that the lower end of the container assumes a fluted funnel shaped as shown in Figs. 2 and 3. This distorting of the lower end of the container to a fluted funnel shape assures that there are no pockets in which the filling material might be trapped and thereby insures complete emptying of the container.

For very heavy loads it may be found desirable to connect the upper ends of the cables 18 directly to the fitting 19, or at least make the connecting cable 20 very short so that the angle that the cables 18 make with the side of the container 10 is decreased. This will result in a smaller component of the force acting inwardly at the lower end or head 12. For lighter loads, the connecting cable 20 may be made longer so that the angle that the cables 18 makes with the side of the container 10 is increased. This results in a larger component of the force at the lower ends of the cables 18 in a direction to pull the container wall 10 inwardly, thereby insuring that the lower end of the container is properly distorted to a fluted funnel shape under the lighter load. For most loads, the cable arrangement as described will function satisfactorily if the point of connection of the upper ends of the cables 18 and the connecting cable 20 falls within the upper one-third of the height of the container.

From the above description it can be seen that there is provided a novel cable arrangement for a collapsible container which will serve to distort the lower end of the container to a fluted funnel shape during emptying thereby insuring complete emptying of the container.

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While a preferred form of the invention has been shown and described, it is to be understood that this is for the purpose of illustration only and that modifications could be made therein without departing from the spirit and scope of the invention.

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

A collapsible container having when expanded a generally cylindrical body portion and end portions of a flexible, gas impervious, material, a fitting secured to the center of one of said end portions from which the container can be suspended, a fitting secured to the center of the other of said end portions providing an opening through which filling material may pass, a plurality of

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flexible relatively inextensible cables in said container, means securing said cables at one end to said fitting of said one end portion and means securing said cables at the other end to spaced points of the wall of said container substantially at the corner thereof formed by the cylindrical body portion and said other of said end portions.

References Cited in the file of this patent

UNITED STATES PATENTS

1,554,316	Winship	Sept. 22, 1925
2,287,824	Pihl et al.	June 30, 1942