Nov. 25, 1969 W. P. SCHOENING 3,480,059

COLLAPSIBLE RECEPTACLE FOR LARGE QUANTITIES

Filed Oct. 19, 1967 2 Sheets-Sheet 1

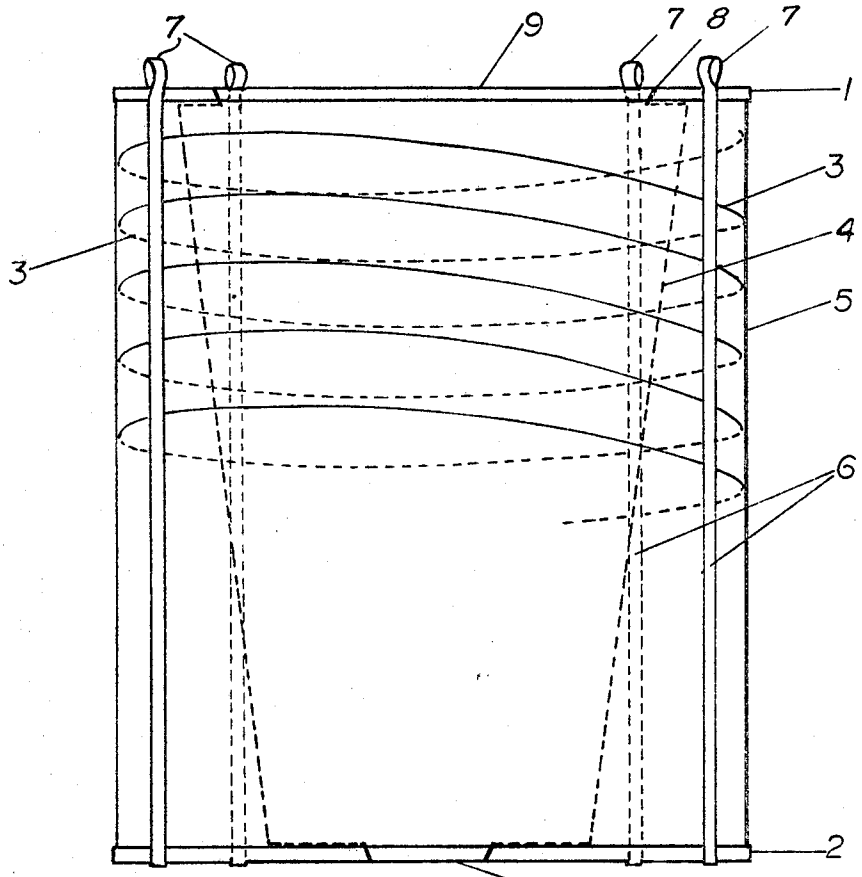

FIG. 1

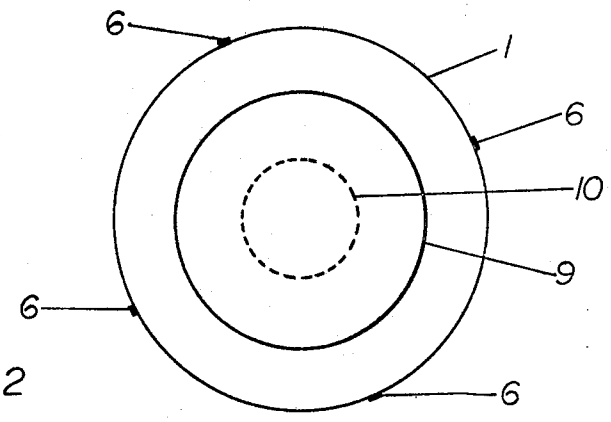

FIG. 2

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COLLAPSIBLE RECEPTACLE FOR LARGE QUANTITIES

Filed Oct. 19, 1967 2 Sheets-Sheet 2

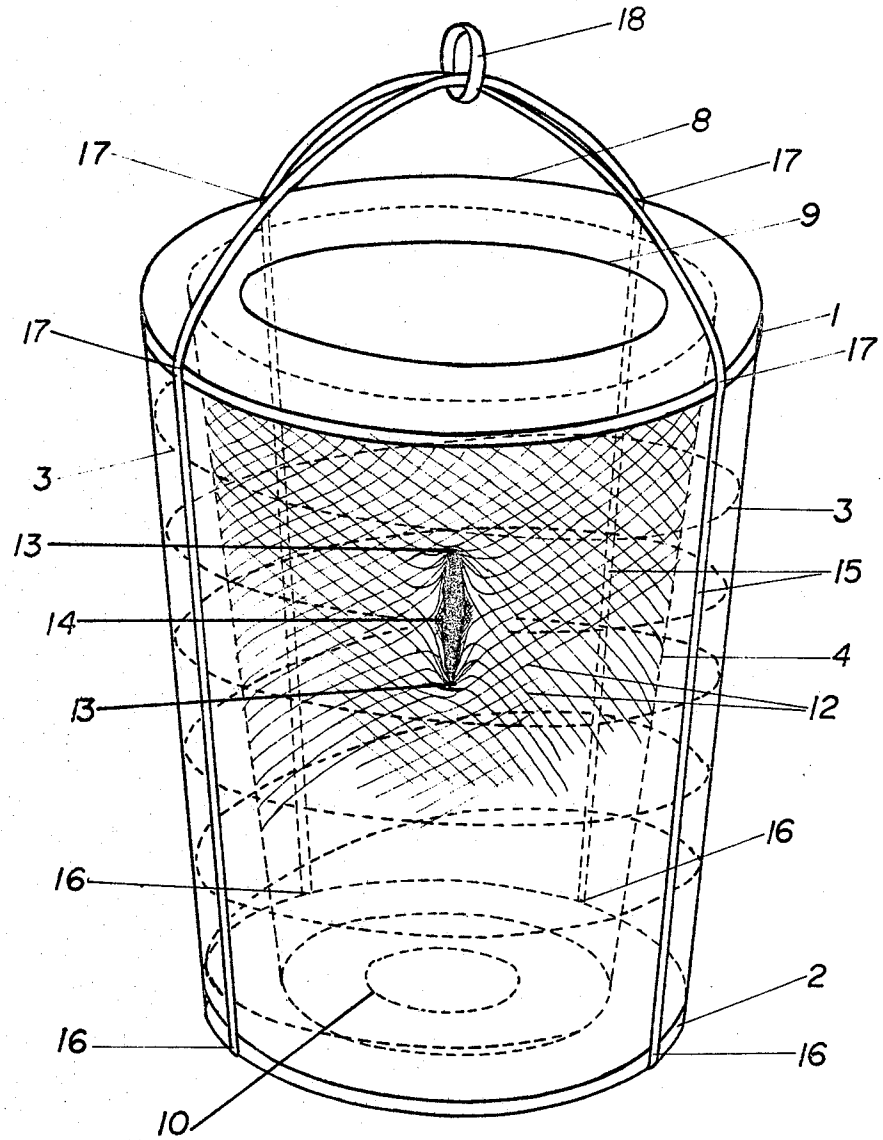

FIG. 3

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COLLAPSIBLE RECEPTACLE FOR LARGE QUANTITIES

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U.S. Cl. 150—48 5 Claims

ABSTRACT OF THE DISCLOSURE

A collapsible receptacle for quantities of 60–10,000 gallons, characterized by having the load distributed between stiff upper and lower plates by means of flexible connecting and distributing means; and a flexible liner helically reinforced, which has a vertical dimension longer than the means connecting upper and lower plates.

This invention relates to receptacles, and more particularly to a receptacle for conveniently transporting bulk quantities of solid and liquid materials. In particular, it is intended for convenient mechanized handling of quantities substantially exceeding the dimensions of the conventional barrels or drums, and yet being substantially less than the quantities used in carloads or truckloads.

Heretofore, various types of receptacles have been used. The type here presented has been found particularly convenient and does possess advantages over all the prior art known to the applicant.

An object of this invention is a strong receptacle for shipping quantities intermediate between drums and truckloads, and which can be collapsed for easy return to the shipper for re-use.

Another object is a flexible receptacle in which top and bottom are rigid, and are connected by means of flexible means such as cables, ropes, belts or ribbons which are shorter in length than the flexible liner itself.

Another object is a container in which the weight distribution of a solid load is carried at the top as much as at the bottom.

Another object is a package having a spiral tube reinforced collapsible inner liner.

Further objects will become apparent as the following detailed description proceeds.

When handling by crane is intended, I prefer to have the flexible connecting means continue beyond the upper plate, to firmly connect, or even form a part of hoisting loops such as rings adapted to receive the hook of a hoisting crane or the like.

In accordance with my invention, I employ a receptacle characterized by two hard solid and weight-carrying plates, at top and bottom, the top plate carrying about half of the load, said load being transferred to it by flexible connecting means such as ropes, cables, bands or belts. The total weight of the package can be lifted either from the top plate with a crane or from the bottom plate with a lift truck. Between these plates there is a flexible confining means such as a cylinder with the sides reinforced with a spiral—made for example of steel or of plastic—and inside this there may be a detachable bag or formable receptacle for example of plastic which may be detached and removed. In order to keep the liner free from excessive stresses, it is in the vertical dimension longer than the flexible connecting and load distributing means. Likewise the outer skin has its vertical dimension longer than the said flexible connecting means between the rigid plates.

The invention is further illustrated by the drawings, and by the example.

Referring to the drawings, FIG. 1 is a side view; FIG. 2, a top view, and FIG. 3, a perspective view of the receptacle. In FIG. 1, 2 and 1 are plates of rigid material, either one being capable of carrying the entire weight of the package at maximum loading; plate 2 has a discharge port 10; and plate 1 has a loading port 9 formed in the plate 1 with its circumference at 8. Plate 1 can be lifted up by means of hoisting devices secured at the loops 7. These loops 7 may be directly connected with ropes of high strength 6 so that the plate 2 and port 10, which support the entire weight of the package can be lifted up by these loops 7 without damage, the entire weight resting on these loops, and the ropes 6, as well as on the bottom plate.

The side cover 5 is reinforced by means of a helical reinforcement made either of a metal band or of a very strong plastic band or rope 3.

The preferred capacity of this container is in the range 100–5,000 gallons, although such containers can be made in dimensions as low as a 60-gallon capacity, or as large as 10,000-gallon capacity.

Example I

In preparing a container for the purposes indicated above and of the construction substantially as shown in the drawing, I employed a bottom plate having a diameter of 5 feet, the said bottom plate being made of reinforced polyester glass laminate in 10-ply, 180 weave glass reinforcement, the bonding agent being a silane type finish, the resin component being a polyester. The top plate was made of the same material. The diameter of the bottom port for discharge was 1 foot, of the top port for filling, 3½ feet. The connecting and weight supporting ropes were ½" polypropylene in 6' length. The spiral reinforcement was ⅛" diameter spring steel round. The outer liner was made of a polyvinyl chloride weave reinforced laminate known as "Plastilap," made by the Griffolyn Company, and the inner liner was made of reinforced plastic film laminate, comprising 2 mil polypropylene film sandwiched together by means of a poly-acrylate adhesive and having disposed therein non-woven 200 denier nylon fibers with ⅜" spacing—3 parallel layers of 200 denier polyester fibers, one of these layers being substantially parallel with the longitudinal axis of the container, and the two others in approximately a 45° angle therewith. The height of the inner liner 4 when filled was 6' 1".

This container was found particularly suitable for shipping plastic granules from the raw material manufacturer to an extrusion plant, and could handle 1300 lbs. of polyethylene granules per trip. The volume when full was 320 gallons, the volume collapsed for return was 30 gallons.

While reference has been made to one particular use, it is apparent that this shipping container is particularly valuable because of the load distribution arrangement which permits economy in tare weight because of maximal utilization of material strength; and also because of the effective protection against lateral impact provided by the combination of hard end pieces and helical springy reinforcement of the lateral containment.

The charge and discharge openings or ports at the top and bottom plates are adapted and dimensioned with a view to the particular material and mode of operation intended. Thus, when a liquid is to be handled relatively small valved openings are suitable, while very large openings are needed for handling larger chunks, such as chunks of ore, potatoes or grapefruit.

The outer skin of the containers of this invention is preferably made from a plastic film laminate, reinforced with fibers arranged in non-woven layers leaving the fibers capable of bunching together to prevent the propa-

gation of tears. This is further illustrated in the following example:

EXAMPLE 2

A container of the dimensions of Example 1 was built using top and bottom plates of 1" plywood, the helical reinforcement **3** of 1/16" spring steel coiled so as to provide a distance of 3" between coils in the fully extended state, and the outer skin made of a 4 ply polypropylene film laminate, in which the laminae were held together by a glue made of buna rubber plasticized with 10% of a rosin ester such as "Staybelite," a product made commercially by the Hercules Powder Co. of Wilmington, Dela. and the three spaces between the films containing each 2 layers of superimposed (non woven) layers of 300 denier nylon fibers **12** and spaced ½" apart and parallel within each layer, the fibers in one layer forming a 30 to 150° angle with the fibers in the other layer between the same films. Only one of these three double layers of fibers is shown in FIG. 3, for the sake of clarity.

With this, or equivalent arrangement permitting the motion of the fibers within their respective layers, the fibers will bunch together as at **13**, FIG. 3 in response to stresses or tears, so as to seal off and stop the propagation of any tear as at **14**, FIG. 3.

The flexible connecting means used in this example were two polypropylene ropes **15** the ends of which were fixed at the points **16** of bottom plate **2** and the middle part of which were bent at portions **17** of top plate **1** and thru a steel ring **18** which was thus made an integral part of the support system, as well as a convenient point of attachment for a crane hook or other similar lifting means. The bends of the ropes at **17** results in a force component directed downward at that point when the receptacle is lifted from the ring, and thus effects the load distribution on both plates.

I regard this construction as having 4 ropes as flexible connecting means between plates **1** and **2**, because these plates are for all practical purposes connected by 4 ropes in this construction. The circumstance that the 4 ropes are connected on top two and two and thus could be viewed as 2 ropes, is here viewed as irrelevant to the construction between the plates.

The invention is not limited to the particular materials used—e.g. instead of reinforced glass laminate I may use metal or organic wood tops and bottoms; instead of the

"Plastilap" I may use, for example, a fiber reinforced film of extrudable plastics or a neoprene impregnated weave, or the equivalent; instead of the polypropylene rope, I may use a rope of flexible connecting means of other material having sufficient strength to support any weight which reasonably could be expected to result from the filling of the container with the particular dimensions at hand.

Having thus disclosed my invention, I claim:

1. A container having a capacity from 60 to 10,000 gallons, said container being collapsible, comprising rigid top and bottom plates connected by at least 3 flexible connecting means, the said top and bottom plates having ports for charge and discharge of material, the said container having a detachable liner, and an outer skin, said outer skin being reinforced with a helical reinforcing member and having its vertical dimension longer than the said flexible connecting means between the said rigid plates.

2. As claim **1**, the capacity of said container being from 100 to 5000 gallons.

3. As claim **1**, the said flexible connecting means being firmly united with a hoisting loop.

4. As claim **1**, the said outer skin being made of a fiber reinforced plastic film laminate.

5. As claim **1**, the said outer skin being made of a plastic film laminate reinforced with fibers arranged in non-woven layers leaving the fibers capable of bunching together to prevent the propagation of tears.

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