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A. STRANDBERG ETAL

3,131,832

COLLAPSIBLE CONTAINER AND SUPPORT THEREFOR

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FIG. 1

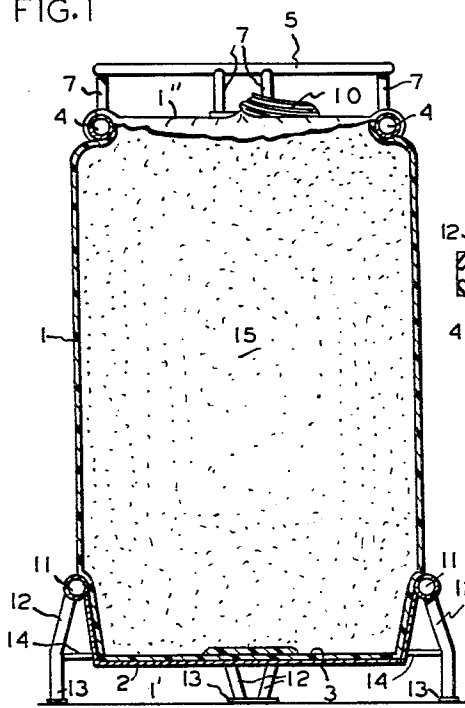


FIG. 2

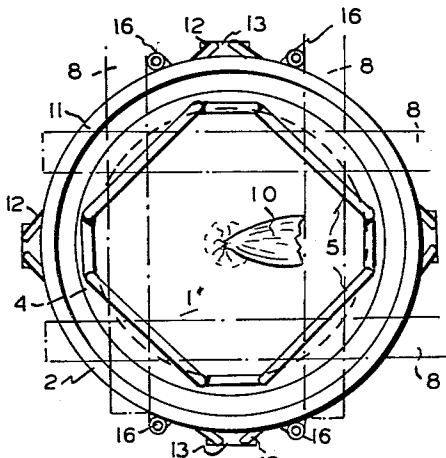


FIG. 3

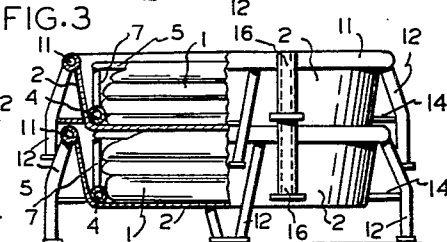


FIG. 4

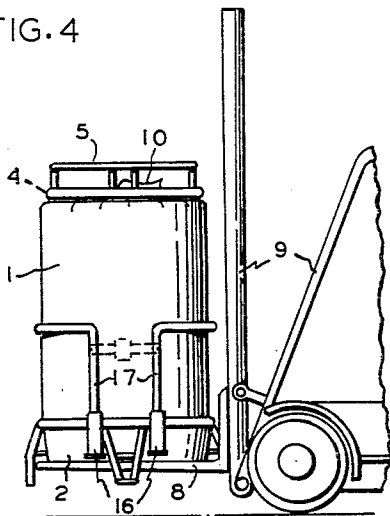
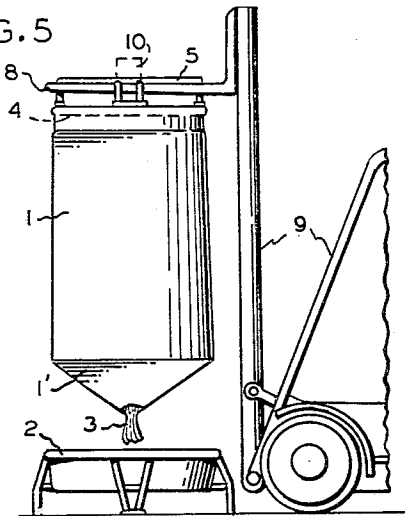


FIG. 5



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3,131,832 COLLAPSIBLE CONTAINER AND SUPPORT THEREFOR

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9 Claims. (Cl. 222-105)

This invention relates to a collapsible container for transporting and storing pulverulent, granular or fluid materials.

Background

Many different types of so-called collapsible bulk containers for handling granular materials have been suggested and put on the market. They generally comprise rectangular, cylindrical or spherical collapsible containers formed of rubber material. Some containers are made with relatively thick walls, and the tare weights as well as the space required for the collapsed containers are rather considerable. Furthermore the containers are relatively expensive to manufacture. Other containers have been made of light-weight material such as various unimpregnated or impregnated fabrics which are surrounded with supporting and protective means of rigid material such as a network of tubes, sheet iron, wood or the like or the walls and/or the bottom of the container are reinforced by girders or the like. The main disadvantages of such containers are that they are complicated and time-consuming to handle when the parts thereof must be collapsed together.

Objects

The main object of the invention is to provide a collapsible container of the beforementioned type which is capable of being handled as a separate, self-supporting unit, i.e. does not require any particular supporting means for keeping erect, and which is simple and inexpensive to manufacture and particularly easy to handle by means of fork-lift trucks. Another object of the invention is to provide a container which, when not in use, e.g. during return transports for instance, requires a minimum of space and is easy to handle. A further object of the invention is to provide a collapsible container having a low weight relative to its effective material-receiving capacity, and in which the outlet spout of the envelope is well protected against damage and unintentional opening during transportation.

Further objects, advantages and characteristic features of the invention will be obvious from the following description in which reference is had to the accompanying drawing of a preferred embodiment of the invention, wherein FIGURE 1 shows a sectional elevation of a filled container according to the invention; FIGURE 2 shows the container according to FIGURE 1 as viewed from above; FIGURE 3 shows—in partial section and at a slightly reduced scale—two containers according to the invention in collapsed condition and piled on top of each other; FIGURE 4 shows at a further reduced scale a container according to the invention during transport and handling by means of a fork-lift truck; and FIGURE 5 shows, likewise at a reduced scale, how the bag-like envelope of the container may be lifted by a fork-lift truck separately for being emptied or filled.

When viewed from neither its broadest nor narrowest sense the present invention may be considered as a collapsible container for the storage and transportation of granular and pulverulent material, comprising in combination:

- (a) a supporting ring,
- (b) a flexible and collapsible side wall member for laterally containing said granular and pulverent material,
- (c) said side wall member being supported adjacent its upper periphery by said supporting ring,

(d) a yoke member,
(e) said yoke member being rigidly connected to said supporting ring and spaced thereabove by rigid spaced apart spacing members,

(f) said flexible and collapsible side wall member having its lower end joined to a funnel-shaped bottom wall section made of flexible collapsible material,

(g) said bottom wall section having a discharging sleeve of flexible material,

(h) said flexible and collapsible side wall member having its upper periphery joined to a top cover member provided with inlet means,

(i) a rigid basin member disposed below said bottom wall section and serving as a support for the above-mentioned components,

(j) said basin member having a substantially flat basin bottom with a diameter at least about as great as the diameter of said supporting ring,

(k) said basin member having basin side walls extending upwardly from the periphery of said flat basin bottom, and

(l) said basin having a plurality of downwardly depending legs exterior to said basin side walls.

(a)

The first important component part of our apparatus is the supporting ring which, as its name suggests, has as its primary function the support of another main component of the apparatus. As shown in the drawings the supporting ring 4 may comprise a generally circular section of strong iron pipe. However the shape is not critical and instead of being round, the ring 4 could be square, rectangular, polygonal, etc. Also, instead of consisting of hollow pipe, the ring 4 could consist of a solid bar having a circular or square cross section.

(b)

The next component of our apparatus is the flexible and collapsible container side wall member for laterally containing the granular and pulverulent material. As shown in the drawings, this is preferably a substantially cylindrical, bag-like envelope 1, made of fabric which is coated or impregnated with plastic or rubber material. Polyethylene or hypalon coated nylon fabrics are quite satisfactory since they are extremely strong and retain flexibility even at very low temperatures. The supporting ring 4 insures that the side wall member will be kept open during filling.

(c)

The flexible and collapsible side wall member 1 is supported adjacent its upper periphery by the aforesaid supporting ring 4. More particularly the fabric 1 may be fitted around the supporting ring 4 and then held securely in place by sewing or by other appropriate types of fastening means (such as glue, rivets, eyelets, fasteners, etc.).

(d)

A yoke member 5 is shown as consisting of a polygonal ring, as for instance an iron ring. Although the yoke member may also be circular, its outer periphery, regardless of shape, is preferably no larger than the peripheral extremities of the supporting ring 4 and preferably somewhat smaller.

The primary function of the yoke ring 5 is to permit the entire container to be lifted and transported by either a hook, hoist, fork-lift truck, or other lifting means. FIGURE 5 shows how the arms 8 of a fork-lift truck can apply lifting force under the yoke member 6.

(e)

The yoke member 5 is rigidly connected to said sup-

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porting ring 4 and spaced thereabove by a plurality of rigid spaced apart spacing members 7. The spacing members are sufficiently long and appropriately spaced so that any appropriate hoisting means can be applied without rubbing against the portion of the side wall member 1 which is attached to the supporting ring 4.

(f) and (g)

The flexible and collapsible side wall member 1 preferably has its lower end joined to a funnel-shaped bottom wall section 1' of flexible collapsible material. The bottom wall section 1' has a discharge sleeve 3 of flexible material which may be closed by tying (or a clamp) or the like. A discharge sleeve of this sort is advantageous in that it minimizes dust problems when discharging the granular material to a storage receptacle.

(h)

The flexible and collapsible side wall member 1 has its upper periphery joined to a top cover member 1" which is in turn provided with inlet means 10. In other words the area within the supporting ring 4 is covered by an envelope portion 1", which at its center merges into an inlet sleeve 10. The envelope portion 1" and the sleeve 10 may be made of the same material as the side wall member 1, or of different material. Sleeve 10 is similar to sleeve 3 in that it may be closed by tying and it is the inlet through which material may be introduced into the container.

Cover member 1" should preferably be well stretched within the supporting ring 4 so that it will bear against the top of the material 15 contained within the envelope 1 and thus assist in preventing the supporting ring 4 from creeping down on the vertical sides of the filled envelope. In said latter case complications may arise in gripping the yoke structure with the fork shanks of the lifting truck, which should be avoided.

(i)

A rigid basin member 2 preferably made of metal, is disposed below the bottom wall section 1' and serves as a support for the aforementioned components (and primarily the bag-like envelope 1). It will be noted that the basin member 2 is entirely separable from the bag-like envelope 1.

(j)

The basin member 2 has a substantially flat basin bottom, and the bottom preferably has a diameter at least about as great as the diameter of the supporting ring 4. The basin bottom is preferably made of a rigid material such as sheet iron. It provides protection for the lower vulnerable end of the container and also assists in permitting the upper flexible portion of the container to be easily changed, stored and transported while retaining its shape permanence.

(k)

The basin member 2 has basin side walls which extend upwardly from the periphery of said flat basin bottom. Preferably the walls diverge outwardly to some extent so that the basin is slightly conical. The height of the walls is preferably great enough so that the upper edge of the basin side wall will be above the upper edge of the yoke member 5 when the container is in an empty and collapsed or folded down condition. In other words, the basin can completely house the rest of the container in its empty and folded down condition. Thus, the entire container, when empty and not in use or when being returned to a material supplier, takes up a minimum of space, while at the same time being easy to handle. The upper portion of the basin side walls preferably merges into a smoothly rounded mouth edge (e.g. in the form of a tube welded to and along the upper edge of the basin side walls).

The diameter of the basin (as defined by the basin

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side walls) is such that both the lower portion of the flexible side wall member 1 and the bottom wall section 1' in their filled state will fill out the basin 2 and be supported by the side walls of the basin (in the manner most clearly shown in FIGURE 1).

With an arrangement as described above, several basins containing folded down envelopes may readily be piled on top of each other.

(l)

The basin preferably has a plurality of downwardly depending legs 12 exterior to the basin side walls. The legs, such as the four sets shown in the drawing, are preferably disposed around the upper circumference of the basin side walls. Each leg may consist of two tube pieces 17 the upper ends of which are welded to the lower side of the mouth edge or tube 11 and the lower ends of which are connected to a foot plate 13. These supporting legs 12 are slightly bent at about the middle of their length and connected to the outside wall of the basin by means of bracing plates 14, whereby the legs, when several basins are piled on top of each other as shown in FIGURE 3, will project downwardly on the outside of the mouth edge 11 of the basin below and thus guide the basins relative to each other. The bracing plates 14 may in turn suitably be arranged at a level slightly above the bottom of the basin 2 so that the basins, when being piled as mentioned, will partly enter into each other. This gives a degree of lateral stability when there is vertical stacking.

The supporting legs 12 preferably have such a height that the fork shanks 8 of a fork-lift truck 9 may easily enter under the basin 2 and lift the same together with the filled envelope 1. In this way the container also becomes convenient to handle in its filled condition.

Another way of preventing the filled envelope 1 from tipping out of the basin 2 when there is careless handling of the filled container is, as indicated in FIGURES 2, 3 and 4, to secure by welding on suitable brackets a number, preferably four, of vertical tubular sockets 16 to the circumference of the basin 2 and to use such sockets 16 for temporarily attaching U-shaped lateral supporting racks 17, the upper portions of which, when viewed from above, are arcuate and cooperate to give the filled envelope 1 additional lateral support at a level above the mouth edge 11 of the basin 2. The U-shaped supporting racks 17 may, of course, be bound together (e.g. with straps) for improved stability. In most cases, however, such additional supporting measures are entirely superfluous, provided certain dimensioning rules are followed.

The container as shown and described may readily be made with such dimensions that its volume capacity amounts to about 35 cubic feet (1 cubic meter) or more. The proportion of height to diameter of the filled container should then be so selected that the height does not exceed twice the diameter and preferably is between 1 to 1.5 times the diameter, because the bag-like envelope may otherwise easily show a tendency to tip out of the basin. Such tendencies may, however, be reduced by tightening straps or chains at some locations between the yoke member 5 and the supporting legs of the basin 2. Such straps or chains may also be used if (e.g. in loading filled containers on a ship) it is desirable to use a hoisting or travelling crane which is coupled to the yoke structure 5 alone, though lifting of the entire container including the basin 2 is generally contemplated.

The Container in Use

When the container is to be filled the cylindrical, bag-like envelope 1 is simply lifted, the funnel-shaped bottom wall section 1' and the discharge sleeve 3 closed both being collapsed on the bottom of the rigid basin member 2 and the filling material 15 introduced through the inlet sleeve 10. The bottom part of the bag-like envelope as well as the funnel-shaped bottom and the spout 3 will be concealed and protected within the basin during storing and handling of the filled container. The inlet sleeve 10

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may suitably also be closed by tying as shown in the drawing.

When emptying the container the bag-like envelope 1 is lifted up from the basin 2 according to FIGURE 5 by means of a fork-lift truck or other suitable hoisting equipment engaging the yoke structure 5. At the discharge site the funnel-shaped wall 1' and the spout 3 are unfolded and then the spout is opened so that the material flows out. During the discharge it is highly advantageous that the funnel-shaped wall has such an angle that all of the material in the container will come out without difficulty (particularly such materials as chalk and other materials which often have a tendency to cake).

For lifting the container from the protective basin a conventional lifting device 9 can be attached to the frame or a fork lift truck whereby the forks 8 can be introduced between the yoke 5 and the supporting ring 4. If the yoke 5 is of square form the forks 8 can be introduced from two directions perpendicular to each other (indicated by dotted lines in FIGURE 2) and if the frame is hexagonal the forks can be introduced from three directions. The capacity of the filled container normally is between 1,000 to 2,000 kgs. The outer diameter of the supporting ring 4 has to be smaller or equal to the smallest inner diameter of the protective basin 2 so that the supporting ring and the folded empty container may be inserted into the protective basin during return transporting.

After emptying the container is introduced in its protective basin as shown in FIGURE 3. The supporting ring 4 and the yoke member 5 have sufficient room in the basin 2 and the flexible container walls 1 are gently folded within the basin. When return shipment of the empty containers takes place, several of the protective basins with the introduced container folded are stacked.

In conclusion, while there has been illustrated and described a preferred embodiment of our invention, it is to be understood that since the various details of construction may obviously be varied considerably without really departing from the basic principles and teachings of this invention, we do not limit ourselves to the precise constructions herein disclosed and the right is specifically reserved to encompass all changes and modifications coming within the scope of the invention as defined in the appended claims. Having thus described our invention, what we claim as new and desire to secure a United States Letters Patent for is:

What is claimed is:

1. A collapsible container and support therefor for the storage and transportation of granular and pulverulent material, comprising in combination:

- (a) a supporting ring,
- (b) a flexible and collapsible side wall member for laterally containing said granular and pulverulent material,

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(c) said side wall member being supported adjacent its upper periphery by said supporting ring,

(d) a yoke member,

(e) said yoke member being rigidly connected to said supporting ring and spaced thereabove by rigid spaced apart spacing members,

(f) said flexible and collapsible side wall member having its lower end joined to a funnel-shaped bottom wall section made of flexible collapsible material,

(g) said bottom wall section having a discharging sleeve of flexible material,

(h) said flexible and collapsible side wall member having its upper periphery joined to a top cover member provided with inlet means,

(i) a rigid basin member disposed below said bottom wall section and serving as a support for the above-mentioned components,

(j) said basin member having a substantially flat basin bottom with a diameter at least about as great as the diameter of said supporting ring,

(k) said basin member having basin side walls extending upwardly from the periphery of said flat basin bottom,

2. A container and support therefor according to claim 1 wherein said side wall member is a substantially cylindrical bag-like envelope.

3. A container and support therefor according to claim 1 wherein said side wall member comprises a plastic coated fabric material.

4. A container and support therefor according to claim 1 wherein said side wall member comprises a rubber coated fabric material.

5. A container and support therefor according to claim 1 wherein said side wall member is nylon impregnated with a resinous material selected from the group consisting of rubber and plastic.

6. A container and support therefor according to claim 1 wherein said basin member is slightly conical.

7. A container and support therefor according to claim 1 wherein the outer periphery of said basin member is provided with a number of vertical socket members and upstanding supporting racks in order to insure greater stability of the container when filled.

8. A container and support therefor according to claim 1 wherein said basin has a plurality of downwardly depending legs exterior to said basin side walls.

9. A container and support therefor according to claim 1 wherein said downwardly depending legs are bent near the middle of their length.

References Cited in the file of this patent

UNITED STATES PATENTS

993,964	Davis	May 30, 1911
3,028,898	Gooding	Apr. 10, 1962