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R. L. A. DIT MICHEL NALPAS

3,250,742

CONTAINER HAVING A FLEXIBLE WALL

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2 Sheets-Sheet 1

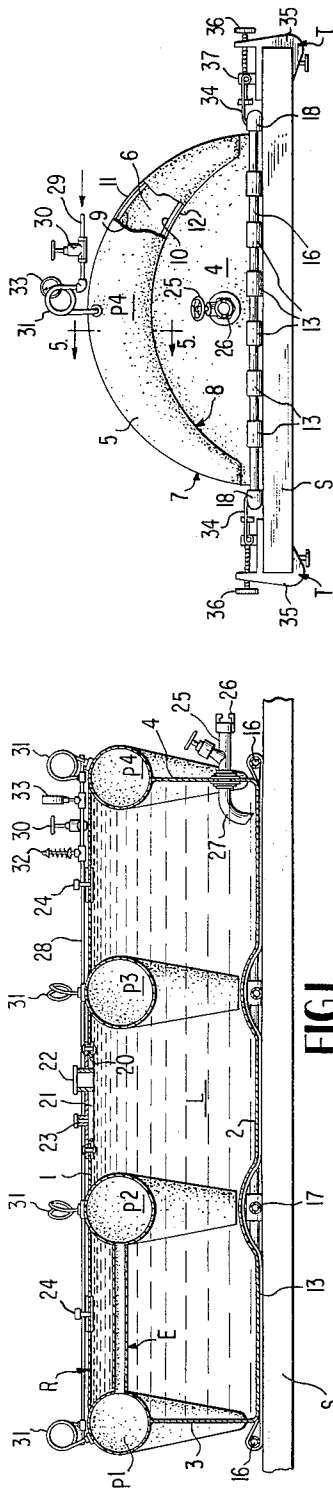


FIG 1

FIG 3

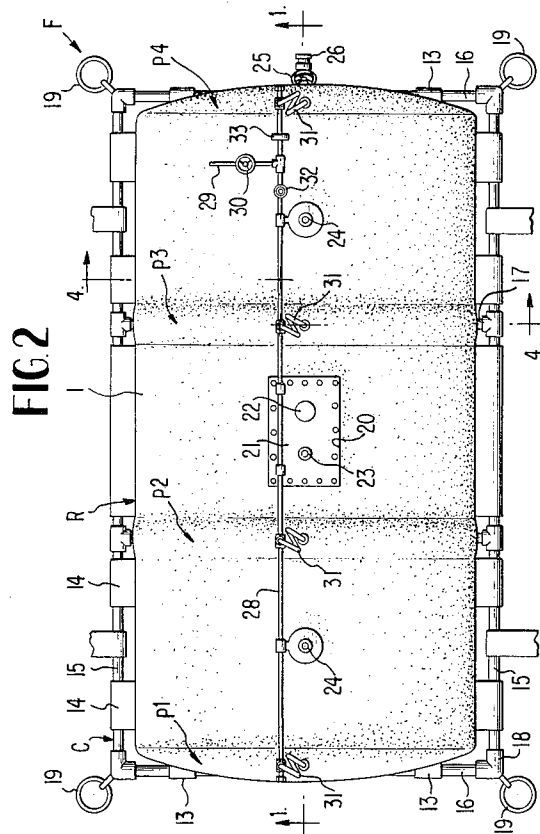
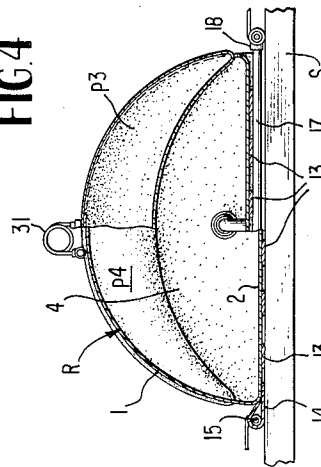


FIG 2

FIG 4



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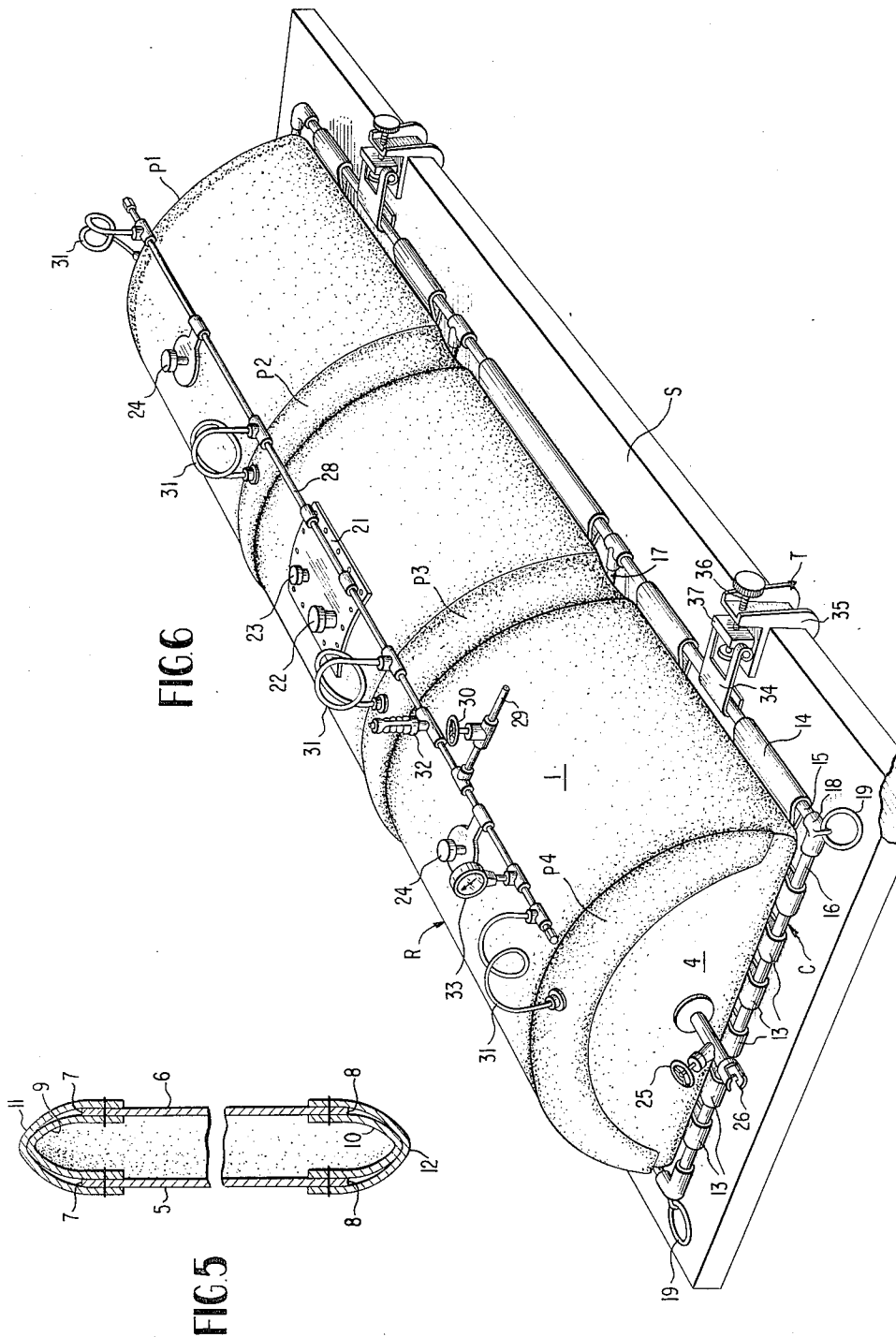
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CONTAINER HAVING A FLEXIBLE WALL

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5 Claims. (Cl. 206-46)

The present invention relates to containers having flexible and fluidtight walls capable of being folded and/or rolled up and intended to store, and more particularly transport, liquid or powdered products.

Experience has shown that although a container having merely a flexible wall can be used without difficulty in a fixed installation, it has serious drawbacks when it is placed on a vehicle and especially a road vehicle since as the wall of the container is not sufficiently held in position, the container is liable to become deformed and in particular to lean over in the lateral or longitudinal direction owing to the mass of the liquid or powdered products contained therein, especially in bends in the roads and during accelerations and decelerations. The fact that the container is thus thrown out of balance could be the cause of serious accidents.

The object of the invention is to remedy these disadvantages in a simple manner without diminishing in any way the possibilities of folding or rolling up the container when empty.

The invention provides a container, having a flexible fluidtight wall which is capable of being folded and/or rolled up, for liquids or powdered products and more particularly for the transportation of said products over land, on rivers or the sea, or in the air. This container comprises inflatable fluidtight compartments, said compartments being secured to the wall of the container and adapted to project into the space defined by said wall when they are inflated so as to stiffen the container not only as a result of their own rigidity consequential to their inflation but also owing to the fact that when the container is full at least portions of the wall are put under tension under the effect of the pressure exerted by said compartments on the incompressible product filling the container.

Owing to the aforementioned feature, excellent rigidity is secured when the container is full and the compartments are inflated and consequently the container has high stability when it is placed on a vehicle subjected to lateral or longitudinal forces while it is still possible to fold and/or roll up the container when empty.

In a preferred embodiment in which the container has an elongated cylindro-prismatic or like shape, at least a certain number of the stiffening compartments have a transverse arcuate shape.

Preferably each compartment has a crescent shape and is formed by the interconnection of two transverse side walls also having identical crescent shapes, the inner and outer edges of said walls having the same radius, which permits cutting the walls from a strip of fluidtight material without waste.

Further features and advantages of the invention will become apparent from the ensuing description with reference to the accompanying drawings to which the invention is in no way limited.

In the drawings:

FIG. 1 is a diagrammatic longitudinal sectional view taken along line 1—1 of FIG. 2 of a container according to the invention;

FIG. 2 is a corresponding plan view thereof;

FIG. 3 is an end elevational view thereof, the container being shown secured to the platform of a vehicle by a supporting frame;

FIG. 4 is a sectional view taken along line 4—4 of FIG. 2;

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FIG. 5 is a diagrammatic sectional view taken along line 5—5 of FIG. 3 on an enlarged scale, of one of the crescent-shaped stiffening compartments, and

FIG. 6 is a perspective view of the container in the direction of arrow F shown in FIG. 2.

In the embodiment shown in the drawings, the body R of the container has a semi-cylindrical shape and a flat base since it comprises a semi-cylindrical upper wall or skin 1, a flat bottom wall or skin 2 and two end walls or skins 3 and 4 which are substantially flat when the container body R is fairly full of product.

The body R comprises a strictly fluidtight and flexible wall, for example consisting of fabric coated with a fluidtight product. The fabric can be a natural textile fabric such as cotton, or of a synthetic material such as a polyamide, superpolyamide or rayon. The fluidtight product can be natural or synthetic rubber or a plastic material such as polyvinyl chloride, a polyester or a superpolyamide.

The container body R is provided according to the invention with a number of stiffening pockets or compartments P¹, P², P³, P⁴, each of which has a crescent shape and is associated with substantially the entire transverse extent of the semi-cylindrical wall 1, the two end compartments P¹ and P⁴ also being associated with the end walls 3 and 4.

These compartments are rendered integral with the wall of the body R by, for example, welding, sticking, stitching and/or clipping so that when these compartments are inflated as shown in the figures they, on the one hand, slightly project from the outer face of the body R and, on the other hand, project much further inwardly of said body, as can be clearly seen in FIGS. 1 and 4.

Consequently, as has been mentioned hereinbefore, if the container body is completely filled with liquid L or other product to be transported or stored, the inflation of these compartments causes pressure to be exerted on this liquid and this pressure, in acting through the medium of the liquid, stretches the wall of the body R and imparts to the assembly the required rigidity.

Each pocket or compartment can be advantageously constituted as shown in FIGS. 3 and 5 by two side walls 5 and 6 which have a crescent shape, their outer and inner edges 7 and 8 being circular and having the same radius of curvature. This permits, as has already been mentioned, cutting these walls without waste from a strip of material which constitutes these compartments and which can be identical or similar to that constituting the wall of the container body R.

These two walls 5 and 6 are preferably united along their edges 7 and 8 by two gussets, namely an outer gusset 9 and an inner gusset 10, secured to these walls by for example welding, sticking or stitching. Preferably, two joint-covering strips 11 and 12 are also provided.

In FIGS. 1, 2 and 4 the constructional details of the compartments have not been shown in order to render the drawing more clear.

The assembly comprising the container body R and the compartments P¹, P², P³, P⁴ bear on longitudinal straps 13 of a rigid securing frame C to which this assembly is secured by lateral transverse ties or straps 14 attached to the assembly. The frame consists of two longitudinal bars 15 and a number of transverse bars, namely end transverse bars 16 and intermediate transverse bars 17, these various elements of the frame being interconnected by sleeves, such as 18. The corner sleeves carry rings or other handling means 19.

The assembly is completed by means for filling and emptying the container body R, safety devices and means for inflating the stiffening compartments.

The container body R comprises at its upper part an inspection man-hole 20 closed by a cover 21 which is

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provided with a filling aperture 22, having a safety valve and an escape vent 23. Other vents are provided at 24.

One of the end walls, for example wall 4, comprises a drain cock 25 having a connection 26 for example of the fire-hose type, and an inner filter 27.

For inflating the compartments P¹-P⁴ there is provided above the container a conduit 28 supplied with compressed air by a pipe 29 through a valve 30. The conduit 28 is connected to each compartment by a flexible pipe 31, for example formed by a few spirals of pipe. A safety valve 32 and pressure gauge 33 are mounted on this conduit 28.

The improved container just described can be used at a fixed station or on a ground, river, sea or air vehicle. It can be attached to a support platform, such as S, by tightening devices T, for example having hooks 34 and 35 adapted to engage round the longitudinal bars 15 of the frame C and round the lateral edges of the platform S, a screw 36 screwed in the hook 35 permitting traction to be exerted on the other hook 34 which is pivoted to a nut 37 threadedly engaged on the screw.

It will be observed that it is possible to interconnect a plurality of flexible containers according to the invention, stiffened by the inflation of their compartments and attached to their frames C, in the manner of a line of barges for transporting on the sea or rivers instead of securing them to the deck or in the hold of a canal boat, cargo-ship or other ship.

Although a specific embodiment of the invention has been described, many modifications and changes may be made therein without departing from the scope of the invention as defined in the appended claims.

The shape of these compartments can be other than the illustrated crescent shape although the latter has shown itself to be particularly effective.

In the illustrated embodiment, the stiffening compartments are independent of one another, but they could be interconnected by solid or tubular spacer elements. In this case these spacer elements are preferably inflatable and their interiors preferably communicate with the compartments they interconnect. Such spacer elements could be arranged as shown at E in FIG. 1. The container could be secured to the frame by further elements, such as longitudinal connecting ties or straps.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. The combination comprising a container having:
 - a flexible skin defining a chamber for carrying bulk material,
 - substantially incompressible bulk material substantially completely filling the chamber,
 - bulk material inlet and outlet means in the skin, means for opening and closing the inlet and outlet means,

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inflated, fluidtight compartment means secured to the skin, projecting into the chamber, and compressively engaging said material,

the skin being under elastically yieldable tension which exceeds that which it would normally have if the compartment means was not inflated and the chamber was filled with bulk material and which is the result of inflation of the compartment means subsequent to the filling of the chamber with the bulk material, which inflation is sufficient to create elastically yieldable forces tending to compress the bulk material whereby the container is stiffened against lateral sway.

2. A combination as recited in claim 1, wherein said compartment means comprises a plurality of compartments, each of which is of crescent shape and consists of two interconnected side walls which extend transversely of the container, have identical crescent shapes, and have interconnected outer and inner edges of identical radius.

3. A combination as recited in claim 1, wherein said compartment means comprises a plurality of compartments which are independent from each other, said combination further including means for inflating said compartments.

4. A combination as recited in claim 1, wherein said compartment means comprises a plurality of compartments, said combination further including tubular and inflatable spacer elements extending between and communicating with said compartments.

5. A combination as recited in claim 1, including a rigid flat anchoring frame, with said skin being anchored to said frame.

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