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(54) **HEAVY-DUTY SHIPPING CONTAINER FOR FLOWABLE BULK MATERIALS.**

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Description

The invention relates to a heavy-duty shipping container for flowable bulk materials according to the leading part of claim 1.

Flowable bulk materials include liquids, dry powders or granular substances, semi-solid materials such as grease, pastes or adhesives and highly viscous fluids.

A heavy duty shipping container of this kind is known from CA—A—703 631. The container is stackable. The outer sleeve is of one-layer construction and has a square cross-section. The container is used for heavy articles or metal parts but is not suitable for containing bulk fluids in volumes exceeding 500 litres. The inner sleeve is described as being formed in two semi-circular halves joined by gummed tape. The inner sleeve has the same height as the outer sleeve. The weight of a superimposed container shall be transmitted at least partially by the inner sleeve on the bottom support means. However, the inner sleeve impresses the bottom support means and moves down by the extent of impression with the result, that all of the stacking load will be borne by the outer sleeve alone.

GB—A—997081 shows a container consisting of an outer sleeve of polygonal cross-section and an inner sleeve of the same cross-sectional shape. Both sleeves consist of corrugated paperboard. The inner sleeve includes an inwardly projecting substantially continuous reinforcing rib integrally formed in the inner sleeve midway of its height. However the reinforcing rib cannot prevent the outer sleeve from bulging outwardly if a plurality of containers are stacked one above another, because when loaded by a superimposed container the inner sleeve tends to buckle or fold inwardly and therefore becomes shortened. Indeed the upper wall and the lower wall of the horizontal rib are spaced from one another in the unloaded condition and upon vertical loading this spacing at least partly becomes reduced. Therefore, the vertical load will be borne by the outer sleeve alone and the tendency of bulging outwardly cannot be prevented.

Various types of containers and container materials have been designed for the transport of flowable bulk materials. Single wall (double face) corrugated fibreboard boxes, for example, have been used as inexpensive, disposable containers for light-duty applications. Such fibreboard containers, where necessary, are waxed or provided with a plastic liner bag. As the volume and weight of the contained material increases, however, the pressure of the material within the container causes bulging of the sides of the container. This makes the container difficult to stack with other similar containers. Furthermore, the bulging of the sides of the container significantly reduces the inherently limited column strength of single wall containers making this type of container unsuitable for stacking or heavy-duty application.

The term fibreboard is a general term applied to paperboard utilized in container manufacture. Paperboard refers to a wide variety of materials most commonly made from wood pulp or paper stock. Containerboard refers to the paperboard components—liner and corrugating material—from which corrugated fibreboard is manufactured. Thus, the term fibreboard, as used in the packaging industry and in the present specification and claims, is intended to refer to a structure of paperboard material composed of various combined layers of containerboard in sheet and fluted form to add rigidity to the finished product. Fibreboard is generally more rigid than other types of paperboard, allowing it to be fabricated into larger sized boxes that hold their shape and have substantial weight bearing capability.

Double or triple wall corrugated fibreboard, when made into shipping containers, provides many distinct advantages for the packaging and transport of heavy loads. Double wall corrugated fibreboard comprises two corrugated sheets interposed between three flat facing or spaced liner sheets. In triple wall corrugated fibreboard, three corrugated sheets are interposed between four spaced facing or liner sheets. Triple wall corrugated fibreboard, in particular, compares favorably with wood in rigidity and strength and, as well, in cost, and provides cushioning quality not found in wooden containers. In addition, triple wall corrugated fibreboard, relative to other fibreboard materials, advantageously provides great column strength. The column strength of triple wall corrugated fibreboard containers permits stacking, one on top of the other, of containers containing heavy loads without excessive buckling or complete collapse of the vertical walls. Triple wall corrugated fibreboard also has great resistance against tearing.

Fibreboard shipping containers employing an outer multi-sided tubular member and a similarly configured inner reinforcement to strengthen the overall container have been disclosed. See, for example, U.S. Patent Nos. 3,159,326; 3,261,533; 3,873,017; 3,937,392; 4,013,168 and 4,418,861.

Therefore, the aim of this invention is to provide a heavy duty shipping container which avoids the deficiencies mentioned above. The container shall be designed to at least reduce the tendency of bulging outwardly when loaded by one or more superimposed similar containers.

This problem is solved by a container comprising the features of claim 1.

The invention leads to the advantage, that upon loading a container vertically both sleeves can transmit the load and therefore, the load share of the outer sleeve becomes reduced whereby the bulging tendency is eliminated. By making the outer sleeve also of a multi-wall corrugated fibreboard the allowable share of load of the outer sleeve is further increased. Because the container according to the invention can be folded flat when not in use an increased utilization of cubic storage space is provided.

In one embodiment the bottom support means comprises a bottom pad mounted atop bottom flaps of the outer sleeve. In another embodiment, the bottom support means comprises the bottom flaps alone.

The drawing shows preferred embodiments of the invention.

Figure 1 is a schematic perspective view of a shipping container, partly broken away;

Figure 2 is a top view of a shipping container, with the top cap removed;

Figure 3 is an enlarged view of the encircled detail of Figure 2;

Figure 4 is a section of a portion of the top edges of the sleeves and of a side and the bottom of the shipping container of Figure 1;

Figure 5 is a top plan view illustrating a blank, prior to false scoring, from which an inner sleeve of the shipping container may be formed;

Figure 6 is a top plan view of a blank from which an outer sleeve of the shipping containers may be formed;

Figure 7 is a sectional view taken along line 7—7 of Figure 6;

Figure 8 a perspective view showing on end flaps of and outer sleeve of the shipping containers;

Figure 9 is an exploded schematic view, in perspective, illustrating a shipping assembly;

Figure 10 is a partial sectional view which illustrates the relative heights of the top edges of the assembled inner and outer sleeves in the preloaded initial position;

Figure 11 is a section of a portion of the side and bottom of the container, similar to Figure 4, after the inner sleeve has been loaded and has reached the equilibrium position;

Figure 12 is a section, similar to Figure 11, in which the bottom pad has been omitted; and

Figure 13 is a bottom view of the container of Figure 1.

The shipping container 10 is constructed with a right circular cylindrical inner sleeve 12 of a multi-wall corrugated fibreboard substantially coaxially received within an outer sleeve 14 of a multi-wall corrugated fibreboard which has a polygonal cross section as best shown in Figures 1, 2 and 3.

The inner sleeve 12 is a multi-wall corrugated fibreboard which may consist of a double wall corrugated fibreboard for certain applications. The inner sleeve 12 is preferably composed of triple wall corrugated fibreboard as is illustrated by Figure 4. Corrugated fibreboard, particularly heavy grades such as double and triple wall corrugated fibreboard, when used for inner sleeve construction, dramatically increases the stacking strength of the overall container as compared to a solid fibre and single wall inner sleeves.

The inner sleeve 12 is formed from a flat sheet 11 of triple wall corrugated fibreboard. The flat sheet 11, as shown in Figure 5, is formed with two major score lines 13, 17, provided preferably at diametrically opposite locations on the assembled inner sleeve 12, to allow the inner sleeve to be shipped, when empty, in a knocked down flat condition, with a uniform folded shape. The flat sheet 11 is circularly shaped in a bending apparatus, such as a sheet metal roller or a modified four bar slitter, by subjecting the corrugated sheet to a prebreaking process. The prebreaking process comprises passing the corrugated sheet through a curved path having a radius of curvature which causes the random formation of multiple scores, so-called false scores 75, running in the direction of the corrugations, on the smaller radius of the curved sheet. The randomly spaced false scores 75, which in the case of a triple wall corrugated fibreboard occur variously, approximately from 2.5 cm (1″) to 15 cm (6″) apart, help facilitate the formation of a nearly perfect cylindrical shape of the inner sleeve 12, when the inner sleeve is placed within the outer polygonal sleeve, and filled with a liquid or flowable solid substance. Besides providing these random scores, the prebreaking process also stretches the outer facing of the corrugated fibreboard sheet, and compresses the inner facing to the extent that when assembled into a sleeve, and secured by a glue joint, the sleeve, although it can be folded flat, maintains a circular cylindrical shape when erected. The end portions of the sheet, which comprises the circular inner sleeve, are overlapped and adhesively combined in a lap joint. The outer circumferential facing of the inner sleeve is not substantially creased or scored but remains substantially smooth.

The randomly-spaced false scores 75 of the corrugated fibreboard sheet, when assembled into a sleeve configuration, extend generally parallel to the longitudinal axis of inner sleeve 12. As used herein, it should be understood that the terminology "false scores" does not comprise score lines of the type which are formed with a scoring tool but are the type of scores known in the fibreboard industry as "false scores" which result from the application of prebreaking stress to sheetstock materials. As best shown in the enlarged detail view provided in Figure 3, the false scores only crease the innermost (on the small diameter side of the sleeve) facing of the inner sleeve 12 of triple wall fibreboard. In comparison, the mechanical scores 13, 17 formed to allow folding of the inner sleeve blank crease the innermost facing and, as well, the intermediate facings and flutes of the triple wall fibreboard comprising the inner sleeve 12. It is critical that the described false scores be used to obtain the circular configuration of the inner sleeve as, for example, use of a multiplicity of numerous mechanical score lines would debilitate the strength of the inner sleeve.

Outer sleeve 14 comprises a tubular member having an octagonal cross section. The outer sleeve 14 is formed from a substantially rectangular sheet 16 of corrugated fibreboard, shown in Figure 6. The rectangular sheet 16 is die cut and scored for folding, by techniques well understood in the art, and includes a plurality of substantially rectangular sidewall panels 18, 20, 22, 24, 26, 28, 30 and 32, foldably connected to each other along lateral score lines 34, 36, 38, 40, 42, 44, 46 and a sealing flange 48 foldably connected to wall panel 32 via a lateral score line 50. Bottom flaps 52, 54, 56, 58, 60, 62, 64, 66 are formed at one of the opposite edges of the respective wall panels and are foldable along score lines 51, 53, 55, 57, 59, 61, 63, 65 which are formed on the bottom flap approximately 0.3 cm (1/8") from the bottom edge 68 of the wall panels. The wall panels are preferably formed from triple wall corrugated fibreboard which, as shown in Figure 7, include three corrugated sheets 70, 72, 74. The ridges of the corrugated sheets are adhesively secured to liner sheets 76, 78, 80 and 82. The bottom flaps are preferably formed of single wall corrugated fibreboard, as shown in Figure 8, which is integral to the triple wall side wall panels. The end panels may be formed on a triple wall combiner machine as part of the combiner process in a manner well-known to those skilled in the corrugated fibreboard container industry.

The rectangular sheet 16 is bent along the lateral fold lines into the form of an octagon, when viewed in cross section. The sealing flange 48 overlaps the exposed face of liner 76 and is adhesively secured thereto, in a known manner, to form outer sleeve 14. The bottom flaps are then sequentially folded inwardly of the outer sleeve 14 so that adjacent flaps overlie each other. The use of bottom flaps on the outer sleeve adds to the structural integrity of the container. The bottom flaps can be omitted and a lower end cap, similar to the upper end cap, employed with less favorable results. Alternatively, both a bottom end cap and bottom end flaps can be utilized. The inner sleeve does not have end flaps, i.e. is flapless.

In the post-loaded condition, the lower edge 23 of the inner sleeve 12 extends below the inner face 27 of the central portion of the bottom pad 98 and bottom flaps as shown in Figure 11. This feature is particularly advantageous insofar as it minimizes the possibility of damage to an enclosed flexible bag could slip under the bottom edge 23 should the inner sleeve 12 be vertically upset in transit. In an absence of the bottom pad, as shown in Figure 12, the inner sleeve 12 will form an impression in the bottom flaps.

If the inner sleeve is not initially positioned higher than the outer sleeve, but initially arranged at the same height, the application of pressure to the inner sleeve, due to bulk loading or stacking of a similar container atop the container, or both, will nevertheless cause the inner sleeve to depress or crush the bottom pad and inner sleeve will displace downwardly into the bottom pad. As a result, all of the stacking load will necessarily, and undesirably, then be borne by the outer sleeve thereby deflating the advantages of utilizing an inner sleeve capable of accommodating significant stacking loads.

In operation, a plastic retainer, normally a flexible plastic bag, will be inserted into the inner sleeve to contain the flowable bulk materials. It has been found that filling of the bag with the bulk materials, in itself, will result in some depression of the bottom pad and the resultant downward movement of the inner sleeve. However, the initial distance of the upper edge of the inner sleeve above the upper edge of the outer sleeve is predetermined so that the post-loaded equilibrium position, in which both of the upper edges are in the same horizontal plane, is preferably not reached until a load, having a weight of at least 204 kg (450 pounds) is placed atop the inner and outer sleeve, for example, by stacking a similarly loaded container thereon. It should be noted that the degree to which the bottom pad 98 and the bottom flaps 52—66 depress when a load is placed on top of the inner sleeve 12 will vary to a small degree based on the paper weights and flute configuration of the corrugated containerboard being utilized, but those skilled in the art of paperboard container manufacture should have no difficulty making those adjustments necessary to achieve optimal performance of this container.

Although the outer sleeve 14 is shown as octagonal in cross section, it will be appreciated that any polygonal cross section may be utilized.

The container 10 is preferably closed at its top by a removable end cap 90, which has a cross section similar to that of the outer sleeve and, thus, in the illustrated embodiment has an octagonal configuration. End cap 90 has downwardly extending peripheral side flanges 92 which extend outside and are engageable with the ends of the outer sleeve below the upper edge of the outer sleeve 14. The end cap 90 is preferably may be formed from single wall corrugated fibreboard. The end cap 90 distributes the stacking loads to the inner and outer sleeves.

Figure 9 illustrates a shipping assembly. A separate pallet 96 of conventional construction is employed beneath the shipping container to facilitate movement of the containers by a fork lift or hand lift truck.

A plastic liner bag 100 is preferably provided within the inner sleeve 12 to leak-proof the container. The liner bag 100 precludes the flow of the contained materials between the interstices that may exist in between the end flaps and at the bottom pad. A suitable liner bag 100 can be made from a flexible plastic film material, such as polyethylene extruded film or the like.

The bottom flaps do not extend across the entire bottom of the container as shown in Figure 12. The bottom pad 98, therefore, protects the plastic liner bag 100 from abrasive contact with the pallet as well as potential nail head or splinters protruding from the pallet, and assists in the retention of the bag within the inner sleeve.

In certain applications, a compressible top pad 102 with a circular cross section is provided as a filler to fill any head space or void area that may exist or occur, for example, due to incomplete filling, settling, or contraction of the contained material, between the liner bag 100 and the end cap 90. The top pad 102 is particularly suited for applications in which a liquid is contained as it prevents, or at least helps to reduce, the harmful sloshing or surging of the liquid which tends to occur during transit motion. However, the compressibility of the top pad 102 still allows expansion of the liquid, thereby releasing some of the hydrostatic or hydraulic pressures which would otherwise be exerted against the sidewalls and bottom of the container. The top pad 102 is preferably composed of triple wall corrugated fibreboard or polyether foam. The periphery of the top pad bears against the inner surface of the inner sleeve 12.

Steel strapping 84 is employed to hold the shipping containers to the pallet 96. In order to avoid damage to the end cap 90, inverted U-shaped steel strapping braces 86 are mounted across the end cap 90 intermediate of both the upper surface and side flanges 92 of the end cap and the strapping 84. Each strapping brace 86 consists of a flattened central elongated plate and depending legs designed to overlie the top surface and flanges 92, respectively, of the end cap. The braces 86 are provided with a greater width than the strapping 84 in order to more evenly distribute the strap forces over the shipping container. The surface of the strapping brace 86 is preferably beaded in order to inhibit slippage between the strapping and the brace. When the strapping braces 86 are tightened down by the strapping 84, the inner sleeve 12 is positively seated against the bottom pad 98 to further stabilize the contained load. The end flaps are held in place by the weight of the contained materials pressing down on the bottom pad and, in conjunction with the pressure of the strapping, provide a strengthening or resistance to lateral deflection at the bottom of the outer sleeve 14, which is the area that is most vulnerable to buckling or deflection. The strapping forces are generally not of sufficient magnitude to cause the inner sleeve to displace and crush into the bottom pad to the equilibrium position.

A bottom spout fitment 88, as is known in the bag industry, may be provided. The fitment 88 extends through cutouts formed in the outer sleeve and the inner sleeve. The fitment 88 is connected to the liner bag to allow gravity evacuation of the material contained within the liner bag 100. The fitment extends through apertures formed through the walls of the inner and outer sleeves.

Actual containers, built as described above, have been subjected to drop tests, vibration tests and high humidity compression tests with markedly successful test results, as described below.

Example I

A shipping container was constructed according to the invention. The outer sleeve was formed of a triple wall corrugated fibreboard. The outer sleeve had an octagonal cross section and was approximately 100 cm (40″) across and 110 cm (44″) high. The inner sleeve was also formed from triple wall corrugated fibreboard material bent into a circular cylindrical shape with random scores. Single wall bottom end flaps were employed. An octagonal-shaped bottom pad formed from corrugated fibreboard and a top end cap of single wall, fluted fibreboard was utilized to close the ends of the outer sleeve. A plastic liner bag, filled with 760 litres (220 gallons) of water, was inserted into the container. A top pad composed of a triple wall corrugated fibreboard having an octagonal shape was placed on top of the liner bag to substantially fill the void between the liner bag and the top end cap. Three 19 mm×0.5 mm (3/4″×0.02″) steel strappings were used to attach the container to a 2-way entry wooden pallet 112 cm×112 cm (44″×44″). Two straps were placed in the same direction and one strap was placed crosswise over the other two. Each strap was mounted on a 13 cm (5″) wide brace of sheet metal with 8 cm (3″) long legs.

The container was tested using a trailer on flat car to simulate handling, vertical linear motion, loose-load-rotary motion vibration and rail switching. The liquid was retained within the liner bag without leakage throughout the entire test procedure.

(A) Handling drop test

In the drop test, the container was raised 15 cm (6″) off of a concrete floor by means of a fork lift and dropped on edge. The test was repeated on the opposite edge. No leakage occurred.

(B) Vertical linear motion vibration tests

The container was subjected to vertical linear motion vibration by placing it on the table of a vertical linear motion vibration tester having a table displacement of 2.5 cm (1″). The low and medium vibration emported in vertical linear vibration testing simulates truck transit conditions and determines whether destructive resonance of the container will occur. The container was horizontally restrained. The container was placed on the table and subjected to 260 cpm for 40 minutes. The container was then placed on an higher vibration machine, again restrained in the horizontal direction, and subjected to 40 minutes of vertical linear vibration at the following frequencies and displacements:

Test (minutes)	Frequency (hertz)	Displacement	
		(mm)	(inches)
10	13	3.0	0.12
10	21.8	1.8	0.07
10	33.3	1.3	0.05
10	36.3	0.5	0.02

No leakage occurred throughout the vertical linear motion vibration testing.

(C) Loose load-rotary motion vibration test

The container was also placed on a rotary motion vibration machine with a table displacement of 2.5 cm (1″). The rotary vibration test simulates the side-to-side motion which commonly occurs in rail transport or piggy back shipments. The container was vibrated for twenty minutes at a frequency of 235 rpm. It was then rotated ninety degrees and vibrated for another twenty minutes at 235 rpm. No leakage occurred.

(D) Rail switching-incline impact test

The container was placed on the dolly of an incline-impact machine for impact against a bulkhead to simulate train car bumping. A second container (also filled) was placed behind the first container. The container was subjected to one impact of 6.5 km/h (4 mph) and two impacts of 10 km/h (6 mph). No leakage occurred.

Example II

A shipping container was constructed as set forth in Example I for testing after being subjected to adverse humidity conditions. A plastic liner bag was filled with 834 litres (220 gallons) of water and inserted into the container.

The container was conditioned for 72 hours at 33°C (90°F) and a relative humidity of 90%. After 72 hours the conditioned container was compression tested to simulate container stacking. A load was applied by a top platen travelling downwardly at a speed of 1.2 cm (0.5″) per minute until the container failed. Failure did not occur until a load of 3800 kg (8600 lbs) was reached.

Example III

A container constructed as in Example I was conditioned for 72 hours at 24°C (73°F) and a relative humidity of 50%. A plastic liner bag was filled with 834 litres (220 gallons) of water and inserted into the container. A load was applied as set forth in Example II. Failure of the container did not occur until a load of 8100 kg (18,000 pounds) was reached.

It is a particular feature of the container according to the invention that the inner sleeve 12 may be filled with a bulk flowable material without bulging. This is due to the circular cross section of the inner sleeve 12, which transmits the pressure from the flowable load, purely into hoop stress in the walls of the inner sleeve 12, inherently resisting any bulging of those walls.

The criticality of the initially assembled, relative heights of the circular inner and polygonal outer sleeves is demonstrated by the following example.

Example IV

An inner circular sleeve was assembled within an octogonal outer sleeve. The height of the inner circular sleeve was equal to the height of the octagonal outer sleeve when assembled. It was observed, after strapping and stacking these containers for approximately one week, that the top edge of the outer sleeve compressed 3 mm (1/8″) or more, until a part of the load weight rested upon the inner sleeve and when load was transferred to the inner sleeve, it deformed the bottom pad until the top edge of the outer sleeve ceased to compress and the inner sleeve ceased bearing weight.

Accordingly, in accordance with the invention, the upper edge of the inner sleeve projects above the top edge of the outer sleeve so that when strapped and stacked, the inner sleeve will deform and compress the bottom pad and flaps to the maximum amount possible, reaching a height equilibrium of the inner and outer sleeves. Both the inner and outer sleeves then bear weight and allow the containers to be stacked with less danger of collapsing.

Testing, as shown in Example V, has demonstrated the relative deformation of a triple wall corrugated fibreboard bottom pad and single wall flaps.

Example V

Three containers, each having different capacities, were filled and used as the bottom containers in a three-high stack test for a period of three weeks. Each of the different capacity containers were made so that the inner sleeve projected above the top edge of the outer sleeve by 8 mm, 11 mm and 14 mm (5/16″, 7/16″, 9/16″). The results of the test showed that a container with an inner sleeve height 8 mm (5/16″) over the top edge of the outer sleeve achieved equilibrium when the bottom pad and flaps deformed the maximum amount. Using this test data, it was determined that the inner sleeve height is initially higher than the outer sleeve in the assembled condition by 7.9 mm (0.3125″) but is less than the outer sleeve unassembled height by 15.9 mm (0.625″).

An example of this relationship is shown in a size analysis of an 834 litres (220 gallons) container (all dimensions are in mm, the imperial units being stated in brackets).

	mm	(inches)
Outer sleeve inside unassembled height	1117.6	(44.0)
Caliper of bottom pad	14.3	(0.5625)
Caliper of flap×2 (4.8×2)	9.5	(0.3750)
Height of inner sleeve	1101.7	(43.3750)
Initial projection of inner over outer sleeve	7.9	(0.3125)
Height of unassembled outer sleeve	1117.6	(44.0)
Height of inner sleeve	1101.7	(43.3750)
Relationship of inner to outer height	15.9	(0.6250)

The outer sleeve 14, due to its construction from a double wall or triple wall corrugated fibreboard, is adapted to resist endwise crushing loads, permitting a number of such fully loaded containers to be stacked one upon the other.

The enhanced capability of the heavy-duty shipping container to accommodate and withstand static and cyclic loads is attributable to a structure which utilizes a circular multi-wall fibreboard inner sleeve and an outer multi-wall fibreboard container against which the inner sleeve bears and in which both the circular and polygonal sleeves support part of the stacking load. Constructions utilizing solid fibre or single wall (double face) corrugated fibreboard inner or outer sleeves are not suited to use as heavy-duty shipping containers and are outside of the scope of the invention.

The term "heavy duty" is used herein to define containers designed to accommodate bulk flowable materials in volumes of at least 208 litres (55 gallons) and weights of 204 kg (450 pounds) and greater. The term "stackable" as used herein refers to heavy-duty containers capable of supporting like containers containing heavy-duty bulk flowable materials of equal volume and weights without bulging or failure of the lowermost container.

The shipping container design described herein, when utilized in conjunction with a plastic liner bag, is suitable for liquids and dry, flowable products in volumes of 208 litres (55 gallons) up to 1440 litres (380 gallons) liquid measure. Liquids and suspensions which weigh as much as 1.5 kg per litre (12.5 lbs per gallon) and flowable dry solids which weigh as much as 1.8 kg/cm^3 (115 lbs per cubic foot) can be effectively contained in fibreboard containers of this design in those volumes.

Claims

1. A heavy-duty shipping container (10) for flowable bulk materials comprising a polygonal outer sleeve (14) vertically extending between a bottom edge (68) and a top edge (25), providing a plurality of sidewall panels (18—32), a right cylindrical inner sleeve (12), coaxially mounted in the outer sleeve (14), vertically extending between a bottom edge (23) and a top edge (21), bearing centrally along each one of the side wall panels (18—32) and consisting of a multi-wall corrugated fibreboard, and bottom support means (52—66; 98), mounted within the outer sleeve (14) and underlying the bottom edge (23) of the inner sleeve (12), characterized in that the outer sleeve (14) consists of a multi-wall corrugated fibreboard, that the inner sleeve (12) projects upwardly beyond the top edge (25) of the outer sleeve (14) by an extent not exceeding the thickness of the bottom support means (52—66; 98), that the inner sleeve (12) has an inner circumferential facing with a multiplicity of false scores (75) extending vertically along the inner sleeve and that the bottom support means (52—66; 98) are compressible by an amount substantially equal to the extent of projection of the inner sleeve (12) such that upon stacking a similar container (10) thereabove, the inner sleeve (12) can move downwardly to a position in which the top edges (21, 25) of the inner and outer sleeves (12, 14) are in the same horizontal plane.

2. A heavy-duty shipping container according to claim 1, characterized in that the bottom support means (52—66; 98) comprises a bottom pad (98) having a polygonal cross section complementary to the cross section of the outer sleeve (14), said bottom pad (98) having peripheral edges being of such size as to be contiguous to the sidewall panels (18—32).

3. A heavy-duty shipping container according to claim 2, characterized in that the bottom pad (98) comprises corrugated fibreboard.

4. A heavy-duty shipping container according to claim 2, characterized in that the bottom pad (98) comprises triple wall corrugated fibreboard.

5. A heavy-duty shipping container according to one of the claims 1 to 4, characterized in that the inner sleeve (12) is flapless.

6. A heavy-duty shipping container according to one of the claims 1 to 5, characterized in that a bottom flap (52—66) is attached to each of the sidewall panels (18—32) along a foldline (51—65) along the bottom edge (68) of the outer sleeve (14), the bottom flaps (52—66) at least partly forming the bottom supporting means (52—66; 98).

7. A heavy-duty shipping container according to one of the claims 1 to 6, characterized in that the extent by which the inner sleeve (12) projects beyond top edge (25) of the outer sleeve (14) not exceeds the thickness of the bottom pad (98).

8. A heavy-duty shipping container according to claims 6 or 7, characterized in that the bottom flap (52—66) comprises single wall corrugated fibreboard.

9. A heavy-duty shipping container according to one of the claims 1 to 8, characterized in that each of the inner and outer sleeves (12, 14) comprises corrugated fibreboard having flutings which extend vertically and the bottom pad (98) comprises flutings which extend normal relative to the flutings of the inner and outer sleeves (12, 14).

10. A heavy-duty shipping container according to one of the claims 2 to 9, characterized in that in loaded condition the bottom pad (98) includes a central portion and peripheral portion which is vertically depressed relative to the central portion, the bottom edge (23) of the inner sleeve (12) being mounted on the peripheral portion intermediate the central portion and the side wall panels (18—32) of the outer sleeve (14).

11. A heavy-duty shipping container according to one of the claims 1 to 10, characterized in that the inner sleeve (12) comprises a triple wall corrugated fibreboard.

12. A heavy-duty shipping container according to claim 11, characterized in that the facing of the inner sleeve (12) comprising the plurality of false scores (75) has been produced by passing the sheet of triple wall corrugated fibreboard through a curved path so as to impart a curvature to the currugated sheet to cause randomly spaced formation of the multiple false scores (75).

13. A heavy-duty shipping container according to one of the claims 1 to 12, characterized in that the outer sleeve (14) has an octagonal cross section.

14. A heavy-duty shipping container according to one of the claims 1 to 13, characterized in that the outer sleeve (14) comprises triple wall corrugated fibreboard.

15. A heavy-duty shipping container according to one of the claims 1 to 14, characterized in that the false scores (75) extend parallel to the corrugations of the inner sleeve (12).

16. A heavy-duty shipping container according to one of the claims 1 to 15, characterized in that the false scores (75) of the inner sleeve (12) are spaced from 25 mm to 150 mm apart.

17. A heavy-duty shipping container according to one of the claims 1 to 16, characterized in that the bottom support means (52—66; 98) comprises a bottom pad (98) mounted on bottom flaps (52—66) intermediate the bottom flaps (52—66) and the lower edge (23) of inner sleeve (12).

18. A heavy-duty shipping container according to one of the claims 2 to 17, characterized in that the bottom pad (98) has a peripheral edge mounted against the side wall panels (18—32) of the outer sleeve (14).

19. A heavy-duty shipping container according to one of the claims 1 to 18, characterized in that bag means (100) are provided for containing the flowable materials mounted within and substantially filling the inner sleeve (12).

20. A heavy-duty shipping container according to claim 19, characterized in that an end cap (90) is mounted on the top edges (21, 25) of the outer sleeve (14) and inner sleeve (12), and a top pad (102) having a circular cross section is mounted within the inner sleeve (12) intermediate the bag means (100) and the end cap (90), and that the top pad (102) has a circular periphery in engagement with the inner sleeve (12).

21. A heavy-duty shipping container according to claim 20, characterized in that the top pad (102) comprises a triple wall corrugated fibreboard panel.

22. A heavy-duty shipping container according to claim 20 or 21, characterized in that the top pad (102) comprises a compressible polyether foam panel.

23. A heavy-duty shipping container according to one of the claims 20 to 22, characterized in that the end cap (90) has a cross section similar to the cross section of the outer sleeve (14), the end cap (90) having peripheral side flanges (92) which overlie the side wall panels (18—32) of the outer sleeve (14) and that a plurality of inverted U-shaped braces (86) are mounted to the end cap (90), each brace (86) including a central portion overlying the end cap (90) intermediate the flanges (92) thereof and depending legs overlying opposite flanges (92) of the end cap (90), and that strap means (84) are provided, overlying the braces (86) for holding the container (10) on a pallet (96).

Patentansprüche

1. Schwerfrachtbehälter (10) für fließfähige Materialien, mit einer polygonalen Außenhülle (14), die sich zwischen einem Bodenrand (68) und einem Oberrand (25) vertikal erstreckt und eine Merhzahl Seitenwandabschnitte (18—32) aufweist, einer kreiszylindrischen Innenhülle (12) die in der Außenhülle (14) koaxial angebracht ist und sich vertikal zwischen einem Bodenrand (23) und einem Oberrand (21) erstreckt, mittig längs jeder der Seitenwandabschnitte (18—32) angedrückt ist und aus mehrwandigem Wellfaserstoff besteht, und mit Bodenstützmitteln (52—66; 98), die in der Außenhülle (14) angebracht sind und den Bodenrand (23) der Innenhülle (12) untergreifen, dadurch gekennzeichnet, daß die Außenhülle (14) aus mehrwandigem Wellfaserstoff besteht, daß die Innenhülle (12) über den Oberrand (25) der Außenhülle um einen Betrag nach oben vorsteht, der die Dicke der Bodenstützmittel (52—66; 98) nicht übersteigt, daß die Innenhülle (12) eine innere Umfangsfläche mit einer Vielzahl Scheinrillen (75) aufweist, die sich längs der Innenhülle vertikal erstrecken und daß die Bodenstützmittel (52—66; 98) um einen Betrag zusammendrückbar sind, der im wesentlichen gleich dem Betrag ist, um den die Innenhülle (12) vorsteht, sodaß beim Übereinanderstapeln eines ähnlichen Behälters (10) die Innenhülle (12) in eine Stellung abwärtsbewegbar ist, in welcher die Oberränder (21, 25) der Innen- und Außenhüllen (12, 14) in derselben Horizontalebene liegen.

2. Schwerfrachtbehälter nach Anspruch 1, dadurch gekennzeichnet, daß die Bodenstützmittel (52—66; 98) ein Bodenpolster (98) aufweisen, das einem dem Querschnitt der Außenhülle (14) komplementären polygonalen Querschnitt hat, wobei das Bodenpolster (98) Umfangsränder solcher Größe aufweist, daß sie an den Seitenwandabschnitten (18—32) anstoßen.

3. Schwerfrachtbehälter nach Anspruch 2, dadurch gekennzeichnet, daß das Bodenpolster (98) aus Wellfasermaterial besteht.

4. Schwerfrachtbehälter nach Anspruch 2, dadurch gekennzeichnet, daß das Bodenpolster (98) aus dreiwandigem Wellfasermaterial besteht.

5. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Innenhülle (12) laschenfrei ausgebildet ist.

6. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß eine Bodenlasche (52—66) an jedem der Seitenwandabschnitte (18—32) längs einer Faltlinie (51—65) längs des Bodenrandes (68) der Außenhülle (14) angebracht ist, wobei die Bodenlaschen (52—66) mindestens zum Teil die Bodenstützmittel (52—66; 98) bilden.

7. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 6, dadurch gekennzeichnet, daß der Betrag, um den die Innenhülle (12) über den Oberrand (25) der Außenhülle (14) vorsteht die Dicke des Bodenpolsters (98) nicht übersteigt.

8. Schwerfrachtbehälter nach Anspruch 6 oder 7, dadurch gekennzeichnet, daß die Bodenlasche (52—66) aus einwandigem Wellfaserstoff besteht.

9. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 8, dadurch gekennzeichnet, daß jede der Innen- und Außenhüllen (12, 14) Wellfa-

serstoffe aufweist, die vertikale Riefen besitzen und das Bodenpolster (98) Riefen aufweist, die sich rechtwinklig mit Bezug auf die Riefen der Innen- und Außenhüllen (12, 14) erstrecken.

10. Schwerfrachtbehälter nach einem der Ansprüche 2 bis 9, dadurch gekennzeichnet, daß das Bodenpolster (98) im Ladezustand einen Mittelabschnitt und einen Umfangsabschnitt aufweist, welcher letzterer bezüglich des Mittelabschnittes invertikaler Richtung eingedrückt ist, wobei der Bodenrand (23) der Innenhülle (12) auf dem Umfangsabschnitt zwischen dem Mittelabschnitt und den Seitenwandabschnitten (18—32) der Außenhülle (14) angebracht ist.

11. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß die Innenhülle (12) aus dreiwandigem Wellfaserstoff besteht.

12. Schwerfrachtbehälter nach Anspruch 11, dadurch gekennzeichnet, daß die Fläche der Innenhülle (12), die die Vielzahl an Scheinrillen (75) aufweist, dadurch hergestellt ist, daß die dreiwandige Wellfaserstoffplatte auf einer gekrümmten Bahn so bewegt wird, daß der Wellplatte einen Krümmung gegeben wird, um in zufälligem Abstand die Vielzahl an Scheinrillen (75) entstehen zu lassen.

13. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, daß die Außenhülle (14) einen achteckigen Querschnitt hat.

14. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 13, dadurch gekennzeichnet, daß die Außenhülle (14) aus dreiwandigem Wellfaserstoff besteht.

15. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 14, dadurch gekennzeichnet, daß die Scheinrillen (75) sich parallel zu den Wellen der Innenhülle (12) erstrecken.

16. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 15, dadurch gekennzeichnet, daß die Scheinrillen (75) der Innenhülle (12) zwischen 25 mm und 150 mm beabstandet sind.

17. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 16, dadurch gekennzeichnet, daß die Bodenstützmittel (52—66; 98) ein Bodenpolster (98) aufweisen, das auf Bodenlaschen (52—66) zwischen den Bodenlaschen (52—66) und dem unteren Rand (23) der Innenhülle (12) befestigt ist.

18. Schwerfrachtbehälter nach einem der Ansprüche 2 bis 17, dadurch gekennzeichnet, daß das Bodenpolster (98) einen Umfangsrand aufweist, der gegen die Seitenwandabschnitte (18—32) der Außenhülle (14) anstößt.

19. Schwerfrachtbehälter nach einem der Ansprüche 1 bis 18, dadurch gekennzeichnet, daß ein Sack oder Säcke (100) für die fließfähigen Materialien vorgesehen sind, die in der Innenhülle (12) eingebracht sind und diese im wesentlichen füllen.

20. Schwerfrachtbehälter nach Anspruch 19, dadurch gekennzeichnet, daß eine Endkappe (90) auf den Oberrändern (21, 25) der Außenhülle (14) und der Innenhülle (12) aufgesetzt ist, und ein Deckpolster (102) mit kreisförmigem Querschnitt in der Innenhülle (12) zwischen dem Sack oder Säcken (100) und der Endkappe (90) eingebaut ist, und daß das Deckpolster (102) einen kreisförmigen Umfang aufweist und mit der Innenhülle (12) in Eingriff steht.

21. Schwerfrachtbehälter nach Anspruch 20, dadurch gekennzeichnet, daß die Deckkappe (102) einen dreiwandigen Wellfaserstoffabschnitt aufweist.

22. Schwerfrachtbehälter nach Anspruch 20 oder 21, dadurch gekennzeichnet, daß das Deckpolster (102) einen kompressiblen Polyetherschaumabschnitt aufweist.

23. Schwerfrachtbehälter nach einem der Ansprüche 20 bis 22, dadurch gekennzeichnet, daß die Endkappe (90) einen Querschnitt ähnlich dem Querschnitt der Außenhülle (14) aufweist, wobei die Endkappe (90) Umfangs-Seitenflansche (92) aufweist, die die Seitenwandabschnitte (18—32) der Außenhülle (14) übergreifen und daß mehrere auf dem Kopf stehende U-förmige Streben (86) auf der Endkappe (90) befestigt sind, wobei jede Strebe (86) einen die Endkappe (90) zwischen deren Flanschen (92) übergreifenden Mittelabschnitt und herabhängende Beine aufweist, die gegenüberliegende Flansche der Endkappe (90) übergreifen, und daß Befestigungsmittel (84) vorgesehen sind, die die Streben (86) übergreifen, um den Behälter (10) auf einer Palette (96) zu halten.

Revendications

1. Conteneur pour chargements lourds (10) de matériaux fluides en vrac, comportant une chemise extérieure polygonale (14) s'étendant verticalement entre le bord inférieur (68) et le bord supérieur (25) et présentant une pluralité de panneaux de paroi latérale (18—32), une chemise interne (12) cylindrique circulaire, montée de manière coaxiale dans la chemise extérieure (14), s'étendant verticalement entre un bord inférieur (23) et un bord supérieur (21), s'appuyant au centre tout au long de chacun desdits panneaux de paroi latérale (18) et consistant en un carton de fibre ondulé multicouches, et des moyens d'appui dans le fond (52—66; 98) qui sont fixés dans la chemise extérieure (14) et qui sous-tendent le bord inférieur (23) de la chemise intérieure (12), caractérisé en ce que la chemise extérieure (14) consiste en un carton de fibre ondulé multicouches, que la chemise intérieure (12) dépasse vers le haut le bord supérieur (25) de la chemise extérieure (14) par une mesure ne dépassant pas l'épaisseur des moyens de support du fond (52—66; 98), que la chemise intérieure (12) possède une face circonférencielle intérieure avec une multitude de fausses rainures (75) s'étendant verticalement le long de la chemise intérieure et que les moyens de support du fond (52—66; 98) sont compressibles à concurrence d'une mesure substantiellement égale à la mesure de la projection de la chemise intérieure (12) de sorte que, lors de l'empilage d'un conteneur semblable (10),

la chemise intérieure (12) peut être poussée vers le bas dans une position dans laquelle les bords supérieurs (21, 25) des chemises intérieure et extérieure (12, 14) se trouvent dans le même plan horizontal.

2. Conteneur pour chargements lourds selon la revendication 1, caractérisé en ce que les moyens de support du fond (52 à 66; 98) comportent un rembourrage de fond (98) ayant une section transversale polygonale complémentaire à la section transversale de la chemise extérieure (14), ledit rembourrage de fond (98) ayant des bords périphériques de dimensions telles à être contigus aux panneaux de paroi latérale (18—32).

3. Conteneur pour chargements lourds selon la revendication 2, caractérisé en ce que le rembourrage de fond (98) comporte du carton de fibre ondulé.

4. Conteneur pour chargements lourds selon la revendication 2, caractérisé en ce que le rembourrage de fond (98) comporte du carton de fibre ondulé à triple paroi.

5. Conteneur pour chargements lourds selon l'une des revendications 1 à 4, caractérisé en ce que la chemise intérieure (12) ne comporte pas de brides.

6. Conteneur pour chargements lourds selon l'une des revendications 1 à 5, caractérisé en ce qu'une bride de fond (52 à 66) est attachée à chacun des panneaux de paroi latérale (18—32) le long d'une ligne de pliure (51—65) le long du bord inférieur (68) de la chemise extérieure (14), les brides de fond (52—66) formant au moins partiellement les moyens de support du fond (52—66; 98).

7. Conteneur pour chargements lourds selon l'une des revendications 1 à 6, caractérisé en ce que la mesure par laquelle la chemise intérieure (12) dépasse le bord supérieur (25) de la chemise extérieure (14) n'est pas supérieure à l'épaisseur du rembourrage du fond (98).

8. Conteneur pour chargements lourds selon les revendications 6 ou 7, caractérisé en ce que la bride de fond (52—66) comporte du carton de fibre ondulé simple.

9. Conteneur pour chargements lourds selon l'une des revendications 1 à 8, caractérisé en ce que chacune des chemises, intérieure et extérieure (12, 14), comporte du carton de fibre ondulé ayant des cannelures qui s'étendent verticalement et que le rembourrage de fond (98) comporte des cannelures qui s'étendent à angle droit par rapport aux cannelures des chemises intérieure et extérieure (12, 14).

10. Conteneur pour chargements lourds selon l'une des revendications 2 à 9, caractérisé en ce que le rembourrage de fond (98), lorsqu'il est chargé, comporte une partie centrale et une partie périphérique qui est comprimée verticalement par rapport à la partie centrale, le bord inférieur (23) de la chemise intérieure (12) étant monté sur la partie périphérique entre la partie centrale et les panneaux de paroi latérale (18—32) de la chemise extérieure (14).

11. Conteneur pour chargements lourds selon l'une des revendications 1 à 10, caractérisé en ce que la chemise intérieure (12) comporte un carton de fibre ondulé à triple paroi.

12. Conteneur pour chargements lourds selon la revendication 11, caractérisé en ce que la face de chemise intérieure (12) comportant une pluralité de fausses rainures (75) a été produite en passant une feuille de carton de fibre ondulé à triple paroi par un passage courbé de manière à donner une courbure à la feuille ondulée et à créer une multitude de fausses rainures (75) espacées au hasard.

13. Conteneur pour chargements lourds selon l'une des revendications 1 à 12, caractérisé en ce que la chemise extérieure (14) a une section transversale octogonale.

14. Conteneur pour chargements lourds selon l'une des revendications 1 à 13, caractérisé en ce que la chemise extérieure (14) comporte du carton de fibre ondulé à triple paroi.

15. Conteneur pour chargements lourds selon l'une des revendications 1 à 14, caractérisé en ce que les fausses rainures (75) s'étendent parallèlement aux ondulations de la chemise intérieure (12).

16. Conteneur pour chargements lourds selon l'une des revendications 1 à 15, caractérisé en ce que les fausses rainures (75) de la chemise intérieure (12) sont espacées de 25 à 150 mm.

17. Conteneur pour chargements lourds selon l'une des revendications 1 à 16, caractérisé en ce que les moyens d'appui du fond (52—66; 98) comportent un rembourrage de fond (98) monté sur des brides de fond (52—66) entre les brides de fond (52—66) et le bord inférieur (23) de la chemise intérieure (12).

18. Conteneur pour chargements lourds selon l'une des revendications 2 à 17, caractérisé en ce que le rembourrage de fond (98) a un bord périphérique qui touche les panneaux de paroi latérale (18—32) de la chemise extérieure (14).

19. Conteneur pour chargements lourds selon l'une des revendications 1 à 18, caractérisé en ce qu'un sac ou des sacs (100) sont prévus pour recevoir les matériaux fluides et sont montés dans la chemise intérieure (12) qu'ils remplissent substantiellement.

20. Conteneur pour chargements lourds selon la revendication 19, caractérisé en ce qu'un couvercle (90) est monté sur les bords supérieurs (21, 25) de la chemise extérieure (14) et de la chemise intérieure (12), et qu'un rembourrage de plafond (102) possède une section transversale circulaire et est monté dans la chemise intérieure (12) entre le sac ou les sacs (100) et le couvercle (90), et que le rembourrage de plafond (102) présente une circonférence circulaire qui est en prise avec la chemise intérieure (12).

21. Conteneur pour chargements lourds selon la revendication 20, caractérisé en ce que le rembourrage de plafond (102) comporte un panneau de carton de fibre ondulé à triple paroi.

22. Conteneur pour chargements lourds selon les revendications 20 ou 21, caractérisé en ce que

le rembourrage de plafond (102) comporte un panneau de mousse de polyether compressible.

23. Conteneur pour chargements lourds selon l'une des revendications 20 à 22, caractérisé en ce que le couvercle (90) possède une section transversale semblable à la section transversale de la chemise extérieure (14), que le couvercle (90) possède des brides latérales sur la périphérie (92) qui chevauchent avec les panneaux de paroi latérale (18—32) de la chemise extérieure (14) et qu'une pluralité de renforts en forme de U (86) montés de manière renversée sur le couvercle (90), chaque renfort présentant une partie médiane superposée au couvercle (90) entre les brides de celui-ci (92) ainsi que des branches pendantes qui sont superposées aux brides opposées du couvercle (90), et que des moyens de fixation (84) sont prévus et sont superposés aux renforts (86) afin de maintenir le conteneur (10) sur une palette (96).

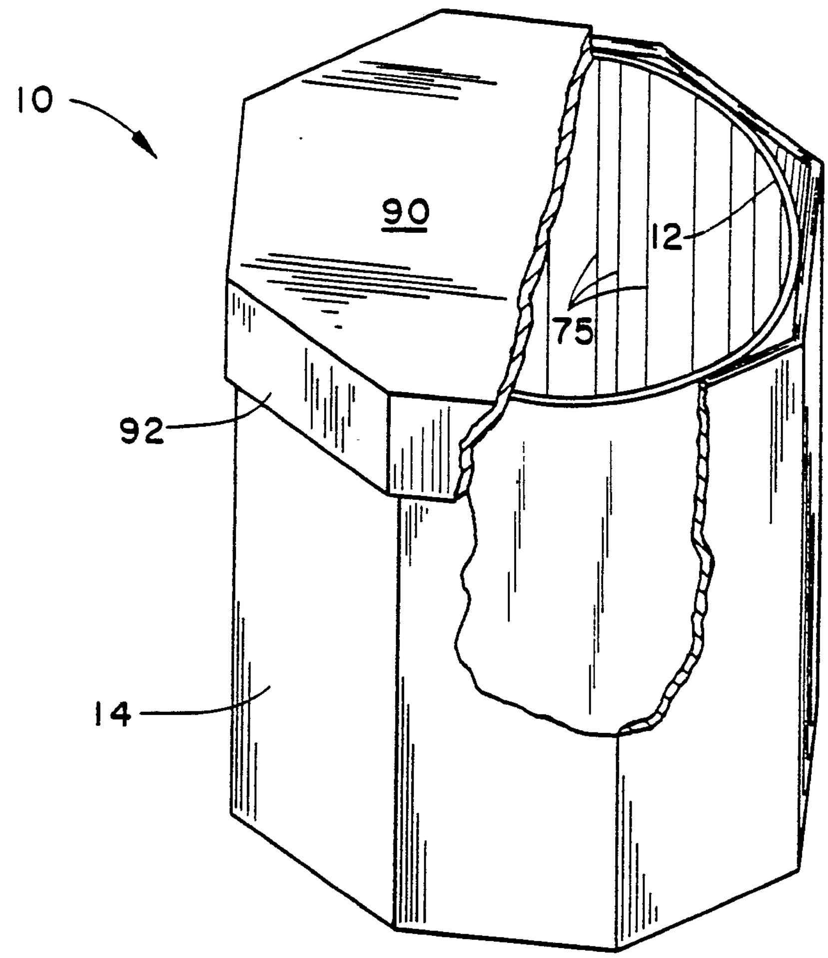

FIG. 1

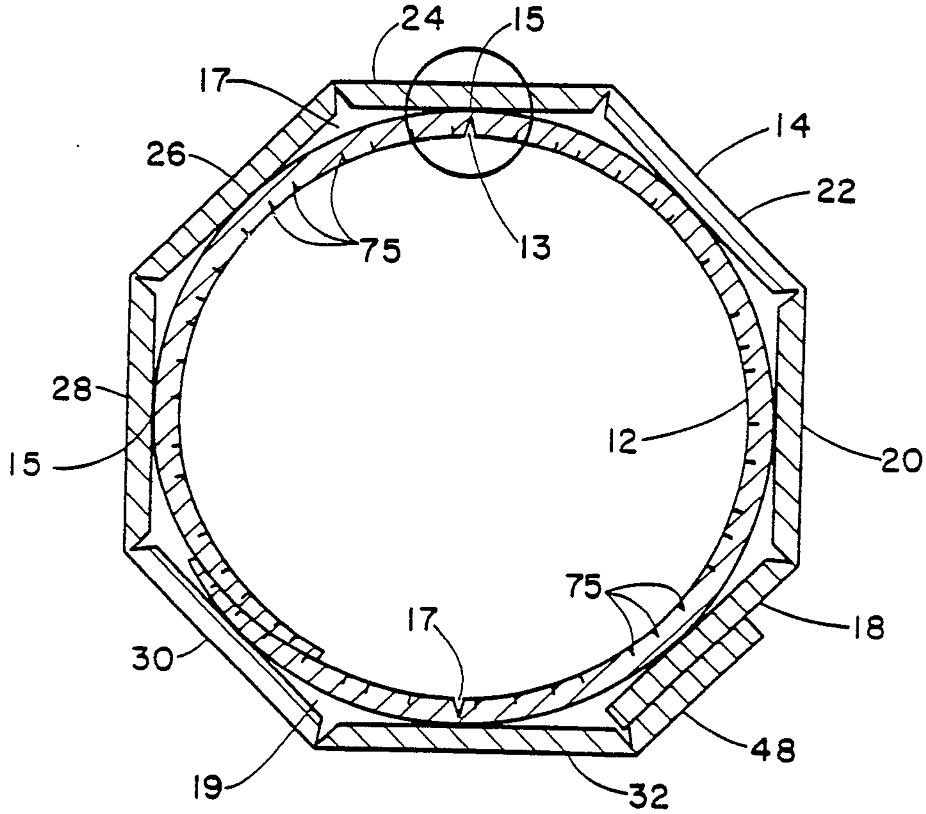
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FIG. 2

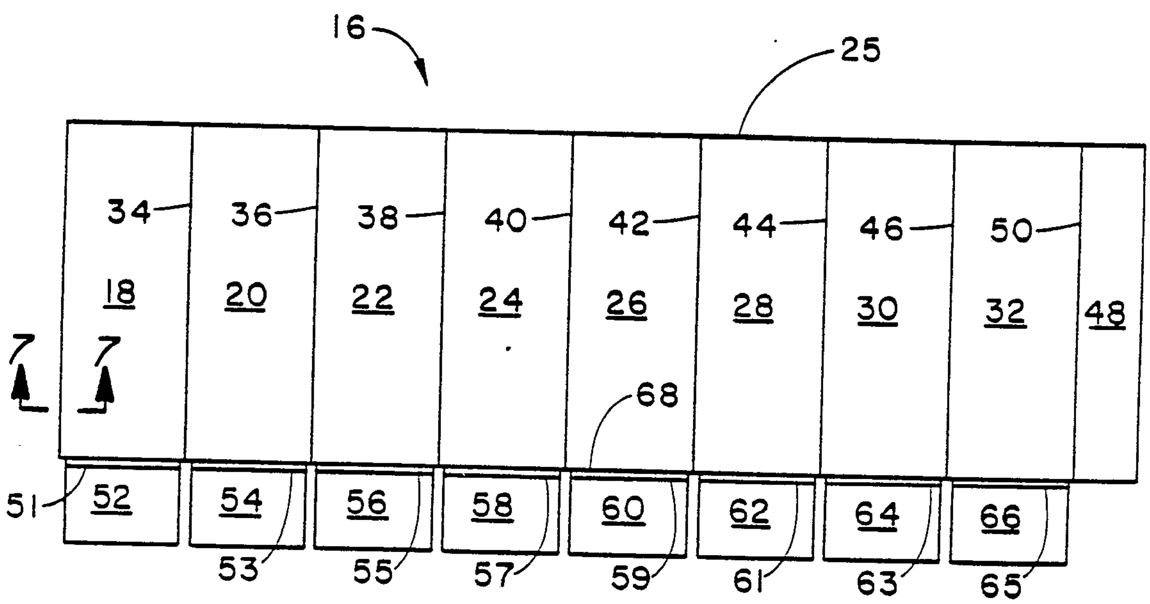
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FIG. 6

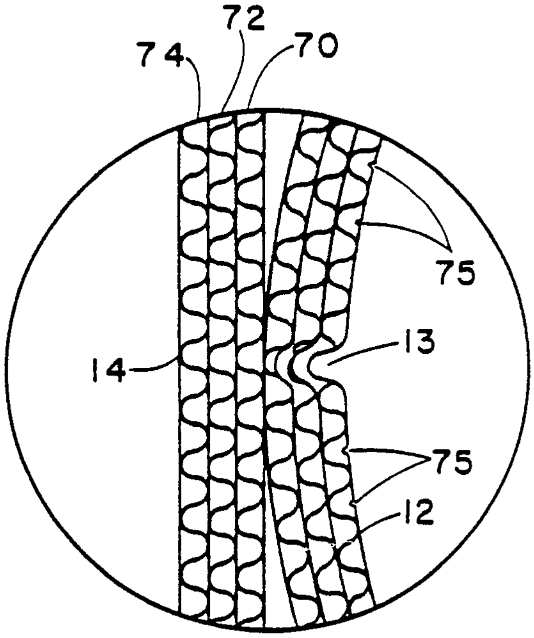

FIG. 3

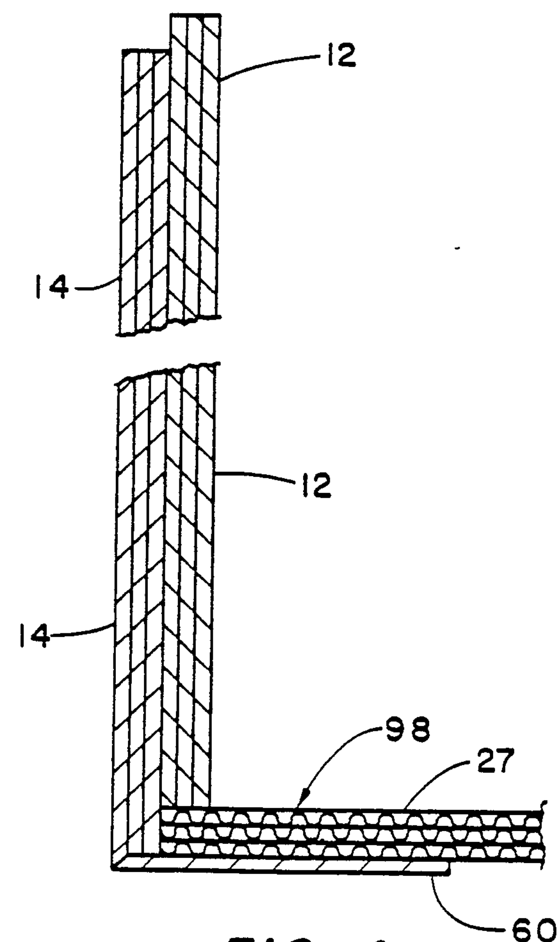

FIG. 4

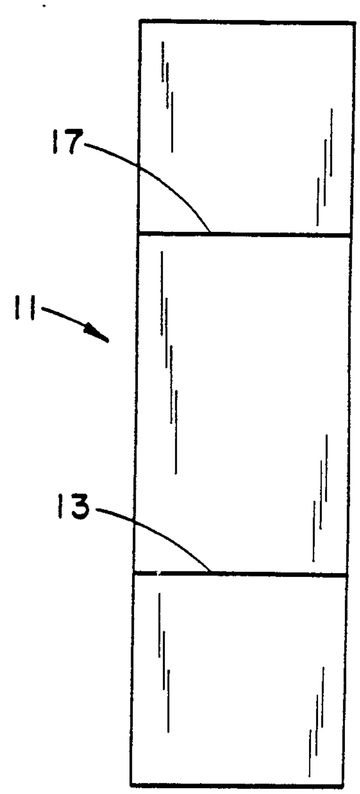

FIG. 5

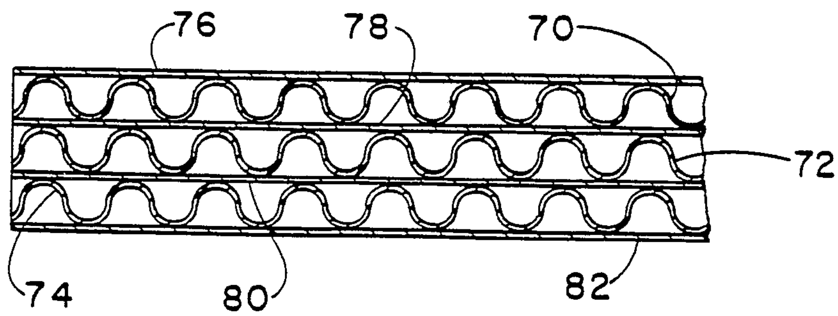

FIG. 7

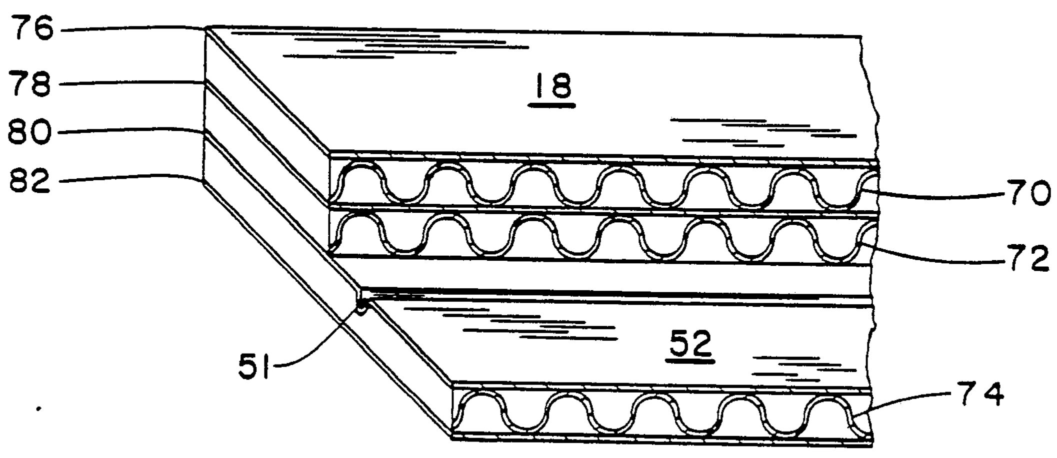

FIG. 8

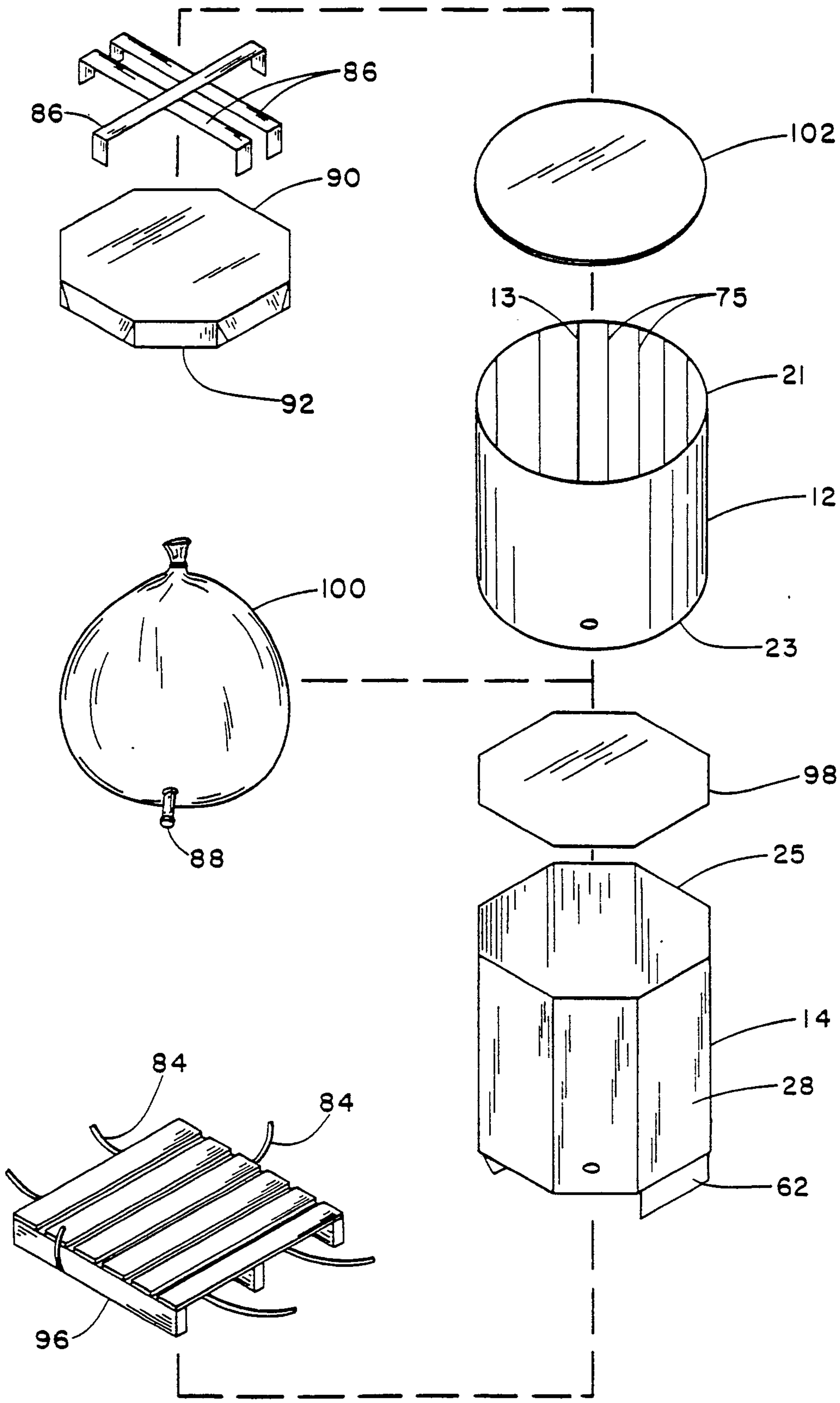

FIG. 9

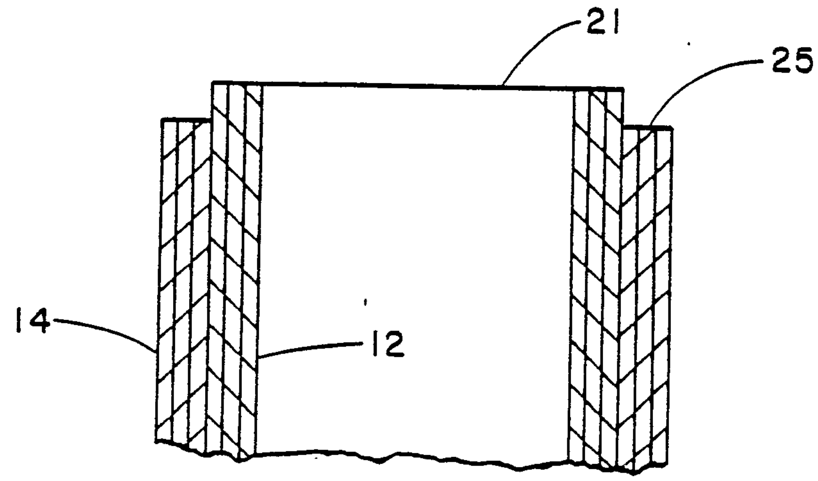

FIG. 10

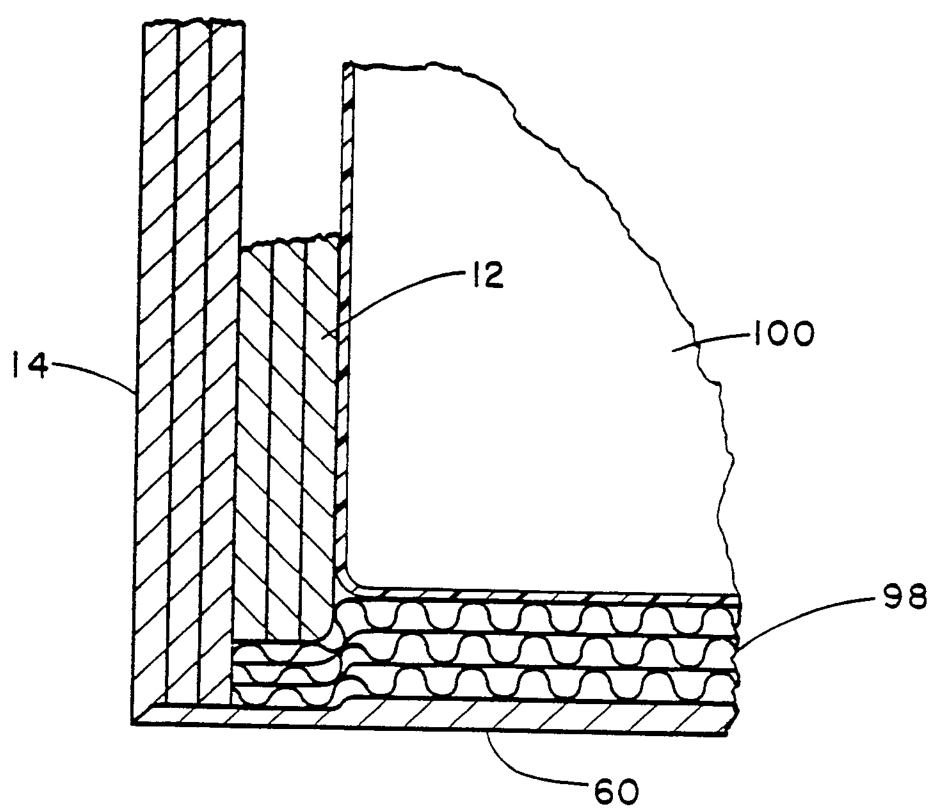

FIG. 11

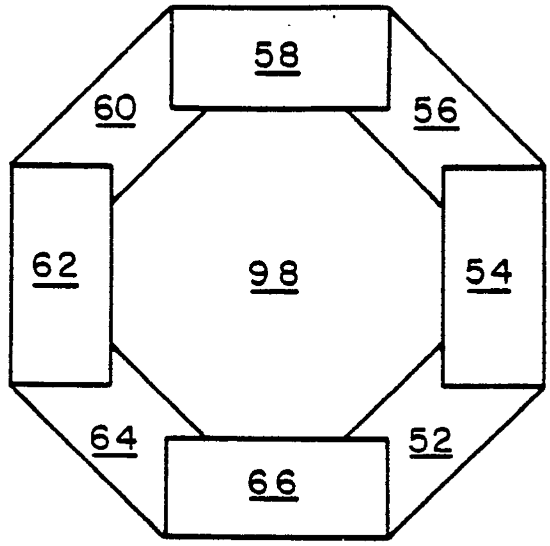

FIG. 13

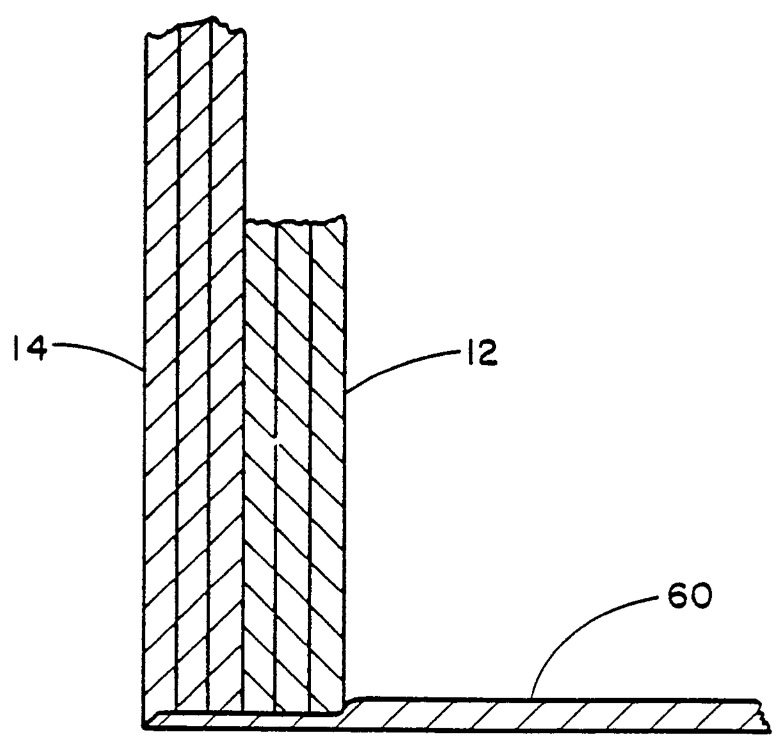

FIG. 12