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54 COLLAPSIBLE CONTAINER FOR LIQUID OR DRY GOODS.

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Description

TECHNICAL FIELD

The present invention relates to cargo containers and, more particularly, to expansible containers of such kind as disclosed in NL-A-76 02 555 and set out in the first part of claim 1.

BACKGROUND ART

Liquids are normally transported in bulk and, where the use of a pipe line is impractical, they are conveyed in vehicles, railcars, aircrafts, or ships fitted with rigid tanks. One of the major factors contributing to the expense of transporting liquids in bulk in such specially constructed tankers is that, once having delivered their loads, whether by sea, air, road, or rail, they must usually make the return trip empty.

Therefore, expansible cargo containers capable of carrying alternatively liquid cargo or solid cargo were developed. US-A-3,570,705 discloses such a cargo container which comprises a rigid walled structure within which there is provided a movable platform. A flexible corrugated sleeve is sealingly connected along its periphery to the platform and to a fixed rigid floor wall of the container to form an expansible vessel. The rigid walls support the sleeve against internal pressure from the liquids provided in the vessel and protect it from external damaging influences.

Therefore, supplying liquid in the expansible vessel causes the platform to displace vertically upwards, with the platform retaining substantial horizontality as it is supported by the level liquid. The upwards movement of the platform is limited by inwardly projecting brackets provided at the top of the rigid-walled structure. When the expansible vessel is empty of liquids, the platform is in a retracted position within the walled structure. A solid cargo receiving box-like structure is thus formed.

US-A-2952379 discloses a collapsible container having a vessel adapted to receive solids, semi-solids and liquids. The container comprises a box housing having rigid panels adapted to be swung between a vertical box-like position and an outwardly extending position. The vessel which is mounted within the box housing comprises parallel rigid top and bottom walls and a flexible impermeable liner extending therebetween. The vessel top wall which is adapted to be raised by an external hoist when the panels are in their outwardly extending position is vertically displaceable between a retracted position, where the top wall is adjacent to the bottom wall with the liner collapsed therebetween, and an expanded position. Fasteners are

provided for securing the panels, when in their vertical box-like position, to the vessel top wall, when in its expanded position.

5 DISCLOSURE OF INVENTION

10 It is an aim of the present invention to provide an improved expansible cargo container capable of being expanded by air pressure and of carrying alternatively liquid cargo or solid cargo.

15 In accordance with the present invention, there is provided a cargo container adapted to transport liquids and, alternatively, solid cargo, comprising a box-like housing having rigid side walls and an expansible vessel adapted for receiving and containing the liquids mounted inside the box-like housing. The vessel includes a rigid bottom wall, a rigid top wall extending parallel to the bottom wall, and flexible impermeable side walls extending between the vessel bottom wall and top wall. The top wall is adapted for movement within the box-like housing between a retracted position where the top wall is adjacent to the bottom wall with the vessel side walls collapsed therebetween and an expanded position. Means are provided for maintaining the vessel top wall substantially parallel to the vessel bottom wall when the vessel is vertically displaced. Means are provided to prevent the vessel side walls from penetrating into gaps defined between the vessel top wall and the rigid side walls. The vessel is adapted to receive air therein for raising the vessel top wall to the expanded position. Means are provided for securing the vessel top wall in the expanded position to the box-like housing.

35 In a more specific construction, a sleeve made from a flat sheet material forms the vessel side walls.

40 In a still more specific construction, the rigid side walls of the box housing include panels adapted to be folded down onto the top wall when the expansible vessel is retracted in order to serve as a floor for solid bulk cargo.

45 More specifically, the vessel includes peripheral top flanges mounted on the top wall to sealingly engage the top edges of the flexible walls, and peripheral bottom flanges are provided on the bottom wall of the vessel for sealingly engaging the bottom edges of the flexible walls. The expansible vessel may be provided with a heat exchanger for heating or cooling the contents of the vessel, and a vent may be provided to allow the passage of air or gases but not liquids. A port is also provided for loading and unloading liquids into the expansible vessel.

55 The panels of the rigid side walls can pivot by way of hinge means which are located slightly above an upper surface of the vessel top wall when

retracted. The pivoting panels are adapted to pivot at least between an open upstanding position for allowing the vessel to be expanded and a folded horizontal position in which the panels overlie one and another and the vessel top wall. The panels and the hinges are adapted to provide a continuous plane inner surface to the box housing when the panels are in their upstanding position in order that the vessel side walls can come in continuous contact therewith without any grooves or protrusions thereunder into which the vessel side walls could become wedged under the force exerted by the liquid in the vessel. Also, the pressure could cause the vessel side walls to split open. Similarly, the panels and hinge means are adapted, in the folded position of the panels, to provide a plane continuous upper surface onto which the solid bulk cargo can be carried. This prevents solid cargo from wedging into the hinges and possibly damage the same when the panels are moved towards their upstanding position.

In a particular construction, all four side walls of the box housing include hinged panels, with the height of a pair of opposite panels being sufficient in order to at least join one another, if not overlap each other, when they are folded so as to provide a continuous solid cargo receiving floor. Alternatively, only one or two of these side walls may be provided with hinged panels.

Power cylinders and lever mechanisms may be used to actuate the panels between their open and closed positions.

When hinged panels are provided on the box housing, a rigid pale defines the portion of the box housing located lower than the panels and on which the hinges are secured.

The means for maintaining the top wall in its expanded position can comprise a series of latches having cooperating parts provided on the upper surface of the top wall near the periphery thereof and on the inner upper portions of the rigid side walls of the box housing and, more particularly, of the panels thereof.

In order to prevent the box housing from deforming or yielding under the pressure exerted by the expansible vessel when the platform is being displaced vertically, straps may be provided which extend from the upper free ends of opposite pairs of panels thereby limiting the outwards pivot of the panels to their aforementioned upstanding position.

The vessel side walls may be made of a single sleeve which is made from a straight, flat and uncorrugated sheet of flexible impermeable material.

Limiting means may be provided on the inner upper portions of the panels to limit the upwards movement of the top wall when the vessel is being expanded. These limiting means may further be

integral to the parts of the latches mounted on the panels, whereby, when the top wall reaches the limiting means, it is in position to be connected to the panels by way of the latches.

Arresting floating brackets may be provided along the periphery of the top wall as the means to prevent the sleeve from inserting or wedging into the gaps defined between the top wall and the panels. As the parallelism system might not maintain the vessel top wall completely parallel to the vessel bottom wall, it is possible that the vessel top wall will tilt slightly, thereby accentuating the gaps formed between the vessel top wall and the panels. However, the arresting brackets are adapted to also close off such larger gaps.

The vessel top wall in an expansible vessel can be moved up and down by means of a liquid or by air depending on the construction of the container. In all cases, the liquid or air pressure which act upwards on the vessel top wall to raise it applies at the same time an internal pressure against the four side walls of the sleeve thereby pressing the same against the rigid walls of the box housing. The sleeve thus has to displace upwards while being in contact with the rigid side walls which results in friction. To overcome this friction, more pressure is required which consequently develops more friction, and so on up to a point where the sleeve becomes jammed.

In U.S. Patent No. 3,570,705, the vessel top wall is raised by liquid pressure and the pressure applied against the rigid side walls is much higher than that of air. For example, for a vessel having a 50 inch height, the mean pressure on the vessel side walls will be approximately 10 times higher with water than with air. In order to reduce the friction between the sleeve and the rigid side walls, a corrugated sleeve is used to reduce the contact surfaces between the sleeve and the rigid side walls and therefore the amount of friction. The vessel top wall in this patent is directly supported by the liquid, whereby the horizontality of the vessel top wall is substantially ensured by the liquid which remains level. This allows the vessel top wall to basically remain horizontal during its vertical displacements. On the other hand, the vehicle on which the cargo container is mounted has to be level in order that the vessel top wall remains at right angles to the rigid side walls. Indeed, if the vehicle is slightly angled because of the parking surface, the rigid side walls are also angled with respect to the vertical whereas the vessel top wall remains substantially horizontal as it overlies the liquid which remains level because of the gravity forces providing there is an even distribution of weight and of friction. In such a case, the vessel top wall will most likely jam as it is being displaced vertically within the box housing.

Furthermore, when the vessel top wall is raised by liquid pressure, it is extremely difficult or even impossible to lock and unlock the vessel top wall to the box housing by way of the latches as it is difficult to stop the vessel top wall precisely at a position where the latches can be engaged in view of the incompressibility of the liquid. Moreover, high liquid pressures from a pump during loading of the vessel can cause the container to burst if for one reason or another the pumping of the liquid therein is not stopped on time.

Again, an almost completely horizontal parking surface is required for engaging the latches, which is extremely rare. Indeed, if the parking surface is not level, the vessel top wall which remains horizontal as overlying the liquid will not be aligned with the rigid side walls at identical heights thereof.

The above US-A-3570705 cannot use air to raise or lower the vessel top wall as air pressure which is lower than liquid pressure will allow for various tilts of the vessel top wall which will result in the vessel top wall becoming jammed within the box housing as the sleeve becomes pinged in the gaps which are not blocked by devices such as the present arresting brackets.

In the present invention, a parallelism means is provided in order to ensure that the vessel top wall remains substantially parallel to the vessel bottom wall and thus perpendicular to the rigid side walls even if the parking surface is not level. The arresting brackets are provided to close the gaps. On a level surface, the vessel top wall can be raised or lowered either by way of a liquid or by air pressure. In case of a liquid, a corrugated sleeve is required for the reasons mentioned hereinabove regarding friction forces. On the other hand, air pressure to raise or lower the vessel top wall can be used whatever the orientation of the cargo container. It is noted that since U.S. Patent No. 3,570,705 is not provided with a parallelism system to ensure that the vessel top wall remains parallel to the vessel bottom wall, the vessel top wall cannot be displaced up and down by air pressure. With such a parallelism system and the arresting brackets, the above U.S. Patent could work using air pressure. However, it would remain quite expensive because of the corrugated sleeve which is complicated to make.

If the vessel top wall is to be displaced by air pressure in the present invention, the corrugated sleeve has to be replaced by a sleeve made of a flat sheet material. If such a flat sheet is provided, liquids cannot be used to move the vessel top wall because of the high pressure thereof which develops high friction forces between the sleeve and the rigid side walls, as explained hereinbefore. Therefore, if a parallelism system and arresting brackets are provided, air can be used to displace the

vessel top wall thereby allowing the use of an inexpensive sleeve made of a flat sheet material.

In such a construction, the air pressure required to move the vessel top wall is relatively low in the range of a few inches water column. Because of the compressibility of air, it becomes relatively easy to move the vessel top wall up and down in order to lock and unlock the latches. A pressure blower of say twelve inches water column is sufficient to engage the male and female parts of the latches. The use of air for raising the vessel top wall results in the advantage that the vessel top wall can be fixed to the box housing rigid side walls by way of the locking latches before starting to load the liquid in the vessel. This reduces the pressure on the top straps and therefore prevent bulging of the rigid side walls as the rigidity of the structure formed by the vessel top wall latched to the box rigid side walls can withstand more pressure than the straps alone. The straps are sufficient for maintaining the box housing rigid side walls in a vertical position under air pressure but the lock latches are necessary when the box housing side walls become pressurized by the liquid and especially under the dynamic forces encountered during transportation of the container. Furthermore, if something happens during the ascension of the vessel top wall under liquid pressure, the liquid must be completely emptied from the vessel, for instance, to repair the cargo container. Facilities to empty the vessel of the liquid pumped therein are not always available.

Again, the horizontal stability of the vessel top wall moved by air pressure is very poor and the slightest friction at any point results in the tilting of the vessel top wall. Therefore, using air pressure, a parallelism system and arresting brackets are essential.

In general, sleeves are made of a fabric (canvas) coated on one or two sides with layer or layers of rubber. A green rubber or green sleeve represents uncured rubber which thus do not have any resiliency or strength. A green sleeve can be cut and formed to any desired shape or form. In the ensuing curing process, the green sleeve is located between two rigid surfaces and high pressures and high temperatures are applied at the same time on the two sides of the sleeve for a certain period of time. The process is relatively simple when a flat sheet must be cured as the sheet is passed between two sets of heating rolls. Once the rubber has been cured, it cannot be easily formed or shaped or spliced.

The corrugated sleeve of U.S. Patent No. 3,570,705 necessitates the use of uncured rubber which can only be cured after the formation of the pocket corners. In order to cure a container size and shape sleeve having pocket corners and cor-

rugated pleats, two rigid molds must be fabricated: an inner and an outer mold. For example, for curing a sleeve which is eight foot wide by six feet high and twenty feet long, two molds of 8 feet by 6 feet by 20 feet must be built and a system must be provided to apply equal pressure and temperature throughout the entire sleeve. The molds must take into consideration the pleat noses and pocket corners whereby the process becomes especially complicated.

Indeed, the above US-A-3570705 must use uncured rubber and not a flat sheet because of the necessity of having a pre-pleated corrugated sleeve. Again, such corrugations are necessary to reduce the friction between the sleeve and the rigid side walls since liquid is used as a moving agent. By using corrugations, only the pleat noses are in contact with the rigid walls, hence the friction forces are reduced.

In the present invention, the presence of the parallelism system prevents considerable tiltings of the top vessel wall and therefore the creation of larger gaps which could not be closed by the adjustable arresting brackets and into which the sleeve could thus penetrate. The provision of arresting brackets prevents the sleeve to be pushed into a range of smaller gaps defined between the top vessel wall and the rigid side walls. The parallelism system and the arresting brackets thus allow air to be used for vertically moving the vessel top wall. By using air as a moving agent, the internal pressures applied on the sleeve are reduced, whereby a sleeve made from a flat sheet material can be used instead of a corrugated sheet. Furthermore, as a consequence of using air as the motor force, a latch system as described hereinabove can be used for securing the top vessel wall in its expanded position to the box housing rigid side walls. The above U.S. Patents cannot use such a latch system as liquid is used to raise the vessel top wall in view of the reasons presented hereinbefore.

The advantage of using a flat sheet for manufacturing the sleeve resides in that a standard readily available and inexpensive material which is fabricated and pre-cured by standard existing techniques and methods can be used. Only the splicing or joining of two flat ends is required. This is achieved by pressing the two overlapping ends while applying heat.

The corrugated and pleated sleeve of the above U.S. Patent is complicated and difficult or even impossible to manufacture as it requires large and complicated molds. The molds are very expensive (\$40,000.00). Furthermore, a twenty foot long corrugated sleeve would cost about \$25,000.00 versus \$1,000.00 for a sleeve made from a flat sheet material, as in the present invention. It is

therefore considered that the corrugated system would be uneconomical to use in transportation.

Furthermore, the corrugated sleeve has an uneven thickness and therefore weak spots especially at the corners. There are discontinuities in the material and no technique is known to fabricate a proper corrugated sleeve. During operation, there is a possibility of the corrugated sleeve cracking at the pleats thereof when the sleeve is stretched to its full height. The stretching of the pleats produces compression on the outer surface of the corrugated sleeve and tension on the inside surface thereof. This problem is accentuated by the small thickness of the material. Therefore, there is a quite high danger of the sleeve cracking which would result in liquid leaking outside of the cargo container and the vehicle carrying it.

Improvements and advantages of the present invention are presented hereinbelow.

The present invention provides a cargo container which is fully autonomous, self-sufficient, and portable, requiring only an external receiving floor. The cargo container which can include a full rigid floor for additional rigidity and strength is adapted to be anchored to a vehicle floor.

The lid system which includes the side wall panels of the box housing reduces the weight and cost of the expansible containers because the lid panels are used as structural members as well as rigid walls and as a false floor, thus eliminating duplication of the structural members.

The lid system makes possible an unobstructed original space when the panels are closed or lowered and solid cargo is transported. The space is at a premium when transporting solid cargo.

The lid system allows for the provision on the inside of the panels of various straps and protruding latches which become hidden underneath the panels when they are closed in order not to interfere with the solid cargo.

The lid system eliminates cantilever hanging of the false floor around its periphery and makes the false floor more rigid and stronger. Without these panels, the top wall is used as a false floor supported only centrally and hanging in a cantilever fashion around its periphery.

The lid system with its hinges and overlapping panel arrangement seals the inside of the closed container from the outside and thus reduces penetration of foreign material into the vessel space which can cause damage to the sleeve.

The lid system is assisted by the panel actuator system. Without the actuator system, it can be difficult to open and close the panels.

The expansible container is composed of two separate main parts, i.e. the box housing and the vessel, and consequently each part can be manufactured separately. Furthermore the expansible

vessel can be easily removed for access, inspection, and maintenance.

The peripheral sealing flanges capable of providing a fluid-tight seal of the horizontal surfaces located in different planes, the parallel system preventing the vessel top wall from tilting thereby reducing the necessary gaps or clearances between the top wall and the rigid side walls, and the arresting floating brackets sealing the gaps all render possible the use of a standard, readily available, inexpensive, precured flat sheet material that is fabricated and cured by standard and existing techniques and methods. This eliminates the need for the sleeve to be molded or formed from uncured sheets with a series of corrugations and pleats that can extend in concertina-like fashion and cured thereafter with molds, high pressures and temperatures to form the pocket corners. Also, there is no more need for reinforcing strips and tie belts. Pre-forming of corrugations and pleats requires the use of uncured rubber, complicated molding, and curing technology and equipment. The sleeve must be molded into a pleated position to somehow retain a "memory" that ensures its return to the pleated position after having been stretched. The finished sleeve material usually has uneven thickness. This occurs especially at corners. Unevenness and discontinuity of material increase the possibility of liquid leaks. There is a possibility of cracking at pleat areas when it is stretched to full height. The stretched pleat produces compression on the outer surface of the sleeve and tension on the inside surface. This problem is accentuated by the small thickness of material. The present invention results in considerable savings as such sleeves molded or formed with corrugations and pocket corners are expensive to manufacture.

The parallel system, the arresting floating brackets, and the flat unpleated sleeve make possible a vertical movement of the vessel top wall by air instead of by liquid. The top wall is kept in a parallel, horizontal position, and the sleeve cannot penetrate into the gaps between the top wall and the panels because of the arresting floating brackets. The air pressure necessary to operate the top wall is much lower than the pressure required by liquids. Consequently, there is less friction between the sleeve material and the panels. Lower friction permits the use of a flat unpleated sleeve instead of a precorrugated sleeve. The top wall can be moved to its upper position and locked in place by latches while empty, and only after a strong and rigid all-sides container is created, can the loading of liquid start. The same container can be unloaded of its liquid while the top wall is in its upper position. It is safer and more reliable to move the top wall up and down without liquid inside the

vessel and without high liquid pressure inside the container.

BRIEF DESCRIPTION OF THE DRAWINGS

- 5 Fig. 1 is a top plan view of an expansible cargo container in accordance with the present invention in a folded and closed position thereof;
- 10 Fig. 2 is a cross-sectional side view taken along lines 2-2 of Fig. 1;
- 15 Fig. 3 is a cross-sectional elevation taken along lines 3-3 of Fig. 1;
- 20 Fig. 4 is a top plan view of the expansible cargo container in accordance with the present invention in its expanded and opened position;
- 25 Fig. 5 is a cross-sectional side view taken along lines 5-5 of Fig. 4;
- 30 Fig. 6 is a cross-sectional elevation taken along lines 6-6 of Fig. 4;
- 35 Fig. 7 is a cross-sectional fragmented side view of the cargo container in its expanded position showing the top wall in an intermediate position and further illustrating the system ensuring the horizontality and parallelism of the top wall;
- 40 Fig. 8 is a cross-sectional view taken along lines 8-8 of Fig. 1 of a hinge assembly;
- 45 Fig. 8a is a cross-sectional view taken along lines 8a-8a of Fig. 1 of the hinge assembly;
- 50 Fig. 9 is a top plan view of a latch assembly;
- 55 Fig. 10 is a cross-sectional view taken along lines 10-10 of Fig. 9;
- Fig. 11 is a cross-sectional view taken along lines 11-11 of Fig. 9;
- Fig. 12 is a cross-sectional plan view of a corner of the top peripheral flange;
- Fig. 13 is a cross-sectional view taken along lines 13-13 of Fig. 12;
- Fig. 14 is a cross-sectional view taken along lines 14-14 of Fig. 12;
- Fig. 15 is a cross-sectional view of the bottom peripheral flange;
- Fig. 16 is a side elevation of a panel actuator showing the panel in its opened position and, in broken lines, in its closed position; and
- Fig. 17 is a cross-sectional view taken along lines 17-17 of Fig. 16.

MODES FOR CARRYING OUT THE INVENTION

50 Reference will now be made to the drawings which illustrate a preferred construction of an expansible cargo container C in accordance with the present invention.

55 Figs. 1 and 5, for instance, show an expansible, fluid-tight vessel 1 which includes a rigid base 2 and an upper rigid wall or platform 3. A flexible sleeve 5 which will be further described hereinbelow extends between the platform 3 and the rigid

base 2 to form the side walls of the vessel 1. The platform 3 is movable vertically between its lower position which is relatively close to the base and outer or upper position which is further spaced from the base 2. The platform 3 can be lifted upwards by compressed air supplied by a fan or a blower (not shown) through a vent opening 7. The platform 3 will move downwardly by gravity, and the rate of descent can be controlled by the vent opening 7. The positive pressure inside the vessel 1 during the platform descent presses the sleeve walls 5 against the rigid walls (to be described later), thus creating conditions which allow for proper and gentle folding of the flexible sleeve material 5.

A manhole 4, as shown in Fig. 4, can be provided in the platform 3 for allowing access to the vessel 1.

The sleeve 5 constitutes a continuous flexible wall. In the case of a circular vessel, the wall would be a cylinder, while in the case of a square or rectangular vessel, the sleeve 5 will adopt that configuration. The sleeve 5 is made from a straight, flat, and uncorrugated sheet of flexible material chosen to suit the liquid that it is intended to transport. Thus, if, for example, the vessel 1 is intended to carry oil, the flexible sleeve 5 would be made of oil-resisting rubber. Alternatively, the sleeve 5 can be made of rubber having a flexible reinforcement or of a flexible plastics material. The advantage is that the straight and flat standard sheet material can be used, and consequently, pre-cured rubber can be used requiring splicing only. Thus, the need for expensive and complicated molds and curing equipment for forming a corrugated sleeve is eliminated. The sheets can be produced by standard methods without any modification to existing equipment and procedure.

Spacers or pillars 6 are welded to the base 2 or to the underside of the platform 3 and can be of any cross-section. If the pillars 6 extend from the underside of the platform 3, it becomes easier to clean the bottom of the vessel 1. The pillars 6 are distributed regularly over the central part of the base 2. The top ends of the pillars 6 can be fitted with rubber pads (not shown). The pads eliminate metal-to-metal contact between the platform 3 and the base 2 in the retracted position of the platform 3, and also absorb shocks and minimize vibration of the platform 3 when a vehicle V onto which is mounted the container C is in motion. In the drawings, the vehicle V which is illustrated represents a flat bed. The container C could also be mounted in a semitrailer. The rubber pads thus support the platform 3 on top of pillars 6. The pillars 6 create a dead space between the platform 3 and the base 2 in which the sleeve 5 can fold freely when the platform 3 is in its retracted position. The pillars 6

transfer platform load to the base 2 and further to the floor of the vehicle V. The dead space permits the sleeve 5 to be packed away and folded beneath the platform 3 when the platform 3 is in its retracted position.

As previously mentioned, an air vent 7 is provided in the platform 3 and serves to allow air, vapor, or any gases to pass inwardly and outwardly of the vessel 1.

A liquid opening 8 is provided in the base 2 and serves to allow liquid to be pumped in or out of the vessel 1. By having the liquid opening 8 in the base 2, bottom filling and unloading can be provided.

A heat exchanger 9 is also shown as being located within the vessel 1, and this provides heating or cooling of the liquid. The heat exchanger 9 can be a coil or any other type of known heating or cooling element. An external heat exchanger located exteriorly of the vessel, such as beneath the base 2, can also be provided.

Figs. 1 to 7 show the box housing 10 which will be referred to as the rigid box 10 in the following description. Thus, the rigid box 10 has a rigid cylindrical wall in the case of a circular box and four rigid walls 11 in the case of a square or rectangular box, as in the drawings. The box 10 supports the sleeve 5 against pressure within the vessel 1, protecting the sleeve 5 against external damage, and the walls of the box 10 also serve to guide the platform 3 in its vertical movements between the expanded and retracted positions. The box 10 also allows the platform 3 to be locked in its upper expanded position as it will be described hereinafter. The walls 11 have smooth inner surfaces to minimize the possibility of the sleeve 5 being punctured or damaged. The box 10 includes a full bottom wall 12, as seen in Figs. 2, 3, 5, 6 and 15. Alternatively, only a partial bottom wall 12a can be provided to the box 10 (see Fig. 7). The walls 11 include a pair of end walls 13 and a pair of side walls 14.

A pale 15 forms the bottom portion of the box 10 and includes four fixed side walls terminating at hinges 28. The remainder of the rigid side walls 14 above the hinges 28 are in the form of pivoting side lid panels 18, while the end walls 13 include end lid panels 17. Each of the lid panels 17 and 18 are rigid panels which form part of the box 10. The hinges 28, which will be described further, allow the lid panels 17 and 18 to be in vertical planes forming the walls 13 and 14 respectively, or the lid panels 17 and 18 can be folded over each other, as shown in Figs. 1, 2 and 3, thereby forming a false floor of the cargo container C when the expansible vessel 1 is in a retracted position.

The end lid panels 17 are first folded over onto the platform 3, and the side lids 18 are folded over

onto the end lid panels 17, with the edges of the side lid panels 18 overlapping each other, as shown in Fig. 2. The end lid panels 17 may be actuated manually by means of a winch or other power mechanism (not shown). The side lid panels 18 will normally be actuated by power means, as will be described later.

The container C which is suitable for being located on a truck bed or vehicle V is the combination of the box 10 and the expansible vessel 1. The container C, therefore, is an autonomous unit which is capable of carrying a liquid within the vessel or solid cargo on the top of the folded-over lid panels 17 and 18. A receiving floor 20 must be strong enough to withstand the load and weight of the container C and its cargo. The floor 20 may be a truck bed V or the bed on the interior of a closed truck box. The floor 20 of the vehicle V, as shown in Fig. 2, is adapted to receive the expansible container C. The floor 20, in the present illustrated case, is mounted on the truck body V. Of course, the expansible container C can be loaded within a shipping container, a railroad car, an airplane, a sea ship, or any form of storage facility. Also, more than one expansible container C can be mounted on the same receiving floor. A fastening system 22 passing through the bottom wall 12 (or 12a) can be provided to secure the expansible container C on the truck bed V. If the container C only includes the partial bottom wall 12a of Fig. 7, then the expansible vessel 1 and, more particularly, the base 2 thereof directly overlies the floor 20 of the vehicle V.

It is easy to remove the vessel 1 of the box 10 simply by removing one of the end walls 13 including its respective pale wall and by then sliding the vessel 1 out of the box 10.

Fig. 7 shows a parallel guiding system which allows the parallel vertical displacement of the platform 3 with respect to the bottom wall 2 of the expansible vessel 1. The assembly of the parallel system is identified by the numeral 23, and it is made up of a cable 24 anchored at 27a to the base 2, passing through a pulley or an eyebolt 26a on the platform 3, and crossing over to pass through another eyebolt 26b also mounted on the platform 3. The cable 24 is then anchored at 27b to the box 10. A similar cable 25 is anchored at 27c to the bottom wall 2 and passes through eyebolts 26a and 26b, as shown, to be anchored by anchor 27d on the box 10 at the top thereof. One such cable arrangement 23 is provided for each of the four peripheral sides of the platform 3 with one eyebolt being provided at each corner of the platform 3 for receiving the cables of adjacent peripheral edges of the platform, as seen in Fig. 4.

As the platform 3 travels vertically either along arrows 90 or 92, the cables 24 and 25 displace in

opposite directions through the eyebolts 26a and 26b and along the top surface of the platform 3. The counter balancing effect of both cables 24 and 25 on the platform 3 ensures the parallelism thereof with respect to the base 2.

Basically, the system 23 allows the platform 3 to move vertically in a parallel system to avoid damage to the sleeve 5 (not shown in Fig. 7). The cable and pulley arrangement provides parallel movement for a tridimensional body.

Indeed, due to various frictions between the sleeve 5 and the walls 11 during platform movement, the platform 3 has a tendency to tilt thereby causing gaps between the periphery of the platform 3 and the walls 11. This results in the flexible sleeve 5 folding and being pushed by the pressure in the gaps and getting caught therein which may damage and even rupture the flexible sleeve 5.

The parallel system 23 also stabilizes the movement of the platform 3 and permits movements of the platform 3 by compressed air without requiring the stabilizing effect of liquids. This allows the positioning of the platform 3 in its upper position with the vessel 1 being empty and the locking of the platform 3 to the lid panels 17 and 18 by way of latch assemblies 34 which will be described hereinbelow. The loading of the vessel 1 with liquid thus becomes a much safer operation. It also permits the unloading of the liquid with the platform 3 in its upper position. This avoids tilting of the platform 3 while the liquid inside the vessel 1 is unloaded.

As previously mentioned, each hinge 28 provides a pivoting joint between the lid panels 17 and 18 and the pale 15. As shown in Fig. 8, the hinge 28 must operate so that the inner surfaces of the walls 11 which include the pale 15 and the lid panels 17 and 18, are smooth and flush and do not show any projections which could damage or puncture the sleeve 5 under liquid pressure and also facilitate an unimpeded displacement of the platform 3 along the walls 11. Furthermore, in closed or retracted position, the top surfaces of the pale 15 and of the lid panels 17 and 18 are flush and level, as also seen in Fig. 8. This prevents solid cargo from wedging into the hinge 28 and damaging the same when, for instance, the lid panels 17 and 18 are opened.

Referring to Figs. 1 and 8, the lower end of each one of the lid panels 17 and 18 includes a series of spaced apart convex end portions 29, referred hereinafter as ball portions 29, which mate with corresponding spaced apart concave seats 33 defined in the upper end of the pale 15. Each ball portion 29 is separated by a concave lid seat 30 formed at the bottom of a recess defined in the lower ends of the lid panels 17 and 18 (see Fig. 8a). A pale corner 32 which fits within this recess

and which has perpendicular upper and inner surfaces contacts at its apex 32a the concave lid seat 30 (see Figs. 1 and 8a). A shaft 31 extends through the ball portions 29 of the lid panels and through the upper pale corners 32 of the pale 15 in a position to ensure a concentricity of the movable mating portions forming the hinge 28. Therefore, upon a pivot of, for instance, the side lid panel 18, the ball portions 29 rotate along the concave pale seats 33 while the concave lid seats 30 rotate with the pale corners 32 sliding thereon.

The provision of a plurality of ball portions 29 separated by the pale corners 32 distributes the load applied to the lid panels 17 and 18 equally along the pale 15 by way of the pale corners 32.

One manner of constructing the hinge 28 is for the ball portions 29 and the lid and pale seats 30 and 33 to have a radius of curvature R equal to half the diagonal of a square inscribed in a circle of radius R and having sides equal to the thickness of the lid panels 17 and 18, as seen in Fig. 8.

Accordingly, the following formulas can be obtained:

$$D = 2R \text{ and } D^2 = t^2 + t^2;$$

therefore,

$$D = t\sqrt{2} \text{ and } R = \frac{1}{2} \sqrt{2}$$

where

t is the thickness of the lid panels 17 and 18, and

D is twice the radius of curvature R of the ball portions 29 and of the lid and pale seats 30 and 33, respectively, and also corresponds to the diagonal of a square having t as sides.

In the open position, the inside surfaces of the lid panels 17 and 18 are level, smooth, and flush with the inside surfaces of the pale 15. In the closed position, the lid panels 17 and 18 are in contact with and supported by inside tips 94 of the pale seats 33. The lid panels 17 and 18 rotate freely 90 degrees around the center of the shaft 31 between the open vertical and closed horizontal positions.

The close contact between the ball portions 29 and the concave pale seats 33 minimizes penetration of materials into the platform area and thus seals the platform 3 from the outside and consequently reduces the possibility of damage to the flexible sleeve 5 or to the hinges 28.

The latch assemblies 34 are provided about the periphery of the platform 3 to lock the platform, when expanded, to the walls 11. For instance, these latch assemblies 34 which are provided at intervals around the periphery of the platform 3 (see Fig. 4) each include cooperating inner and

outer latches 35 and 36 mounted respectively on the platform 3 and on the walls 11, as will now be described with reference to Figs. 9 to 11.

The outer latch 36 is a L-shaped bracket 37 having its horizontal portion secured to the wall 11 and its vertical portion extending downwards at a distance from the wall 11. An elongated slot 38 is defined horizontally through the vertical portion of the bracket 37.

The inner latch 35 includes a L-shaped angle 39 having its vertical portion mounted at a lower end thereof to the platform 3 and having its horizontal portion extending from the upper end of the vertical portion towards the outside, that is towards the wall 11. A slot 40 is defined in the horizontal portion of the angle 39 parallel to the wall 11. The angle slot 40 is adapted to engage the vertical portion of the bracket 37 when the platform 3 is raised. The lower edges of the vertical portion of the bracket 37 are chamfered to facilitate the penetration thereof in the slot 40 of the angle 39. The top edges defining the angle slot 40 are counter-sunk also to facilitate the penetration of the bracket 37 in the angle 39.

A cam 41 which is mounted by way of a cam shaft 42 on the underside of the horizontal portion of the angle 39 is adapted to rotate in a horizontal plane. The cam 41 includes a head 41a which is adapted to engage the bracket slot 38 upon a pivot of the cam 41. The bracket slot 38 tapers towards the wall 11 in order to facilitate the penetration of the cam head 41a therein.

The chamfers and tapers besides assisting the penetration also correct any misalignment of the bracket 39 with the angle slot 40 and of the cam head 41a with the bracket slot 38.

As seen in Figs. 4 and 9, a single cable or rope 43 connects all of the cams 41. By pulling the rope 43 in one direction, all of the cams 41 are engaged in the corresponding bracket slots 38 of the wall brackets 37, while pulling the rope 43 in the opposite direction disengages the cams 41 from the wall brackets 34. The rope 43 is connected to each cam 41 by means of a pivot 44. The pivot 44 rotates in the cam body 41b.

The pulleys 45, as shown in Fig. 4, are provided on the platform 3 to guide the rope 43 in its reciprocating movement. A pulling and locking mechanism 46, as shown in Fig. 4, may be provided for pulling the rope in either direction as required for locking the rope 43 in either the latch locked or unlocked positions.

When it is required to move the platform 3 upwardly to its uppermost position, the wall brackets 37 engage the angle slots 40 until the platform 3 movement is stopped when the horizontal portions of the inner angles 39 contact the underside of the horizontal portions of the wall brackets 37.

The wall brackets 37 fit tightly into the inner angles 39. Compressed air is applied to the platform 3, thus forcing it upward, and consequently, the wall brackets 37 are forced into the corresponding angle slots 40 for proper alignment. In this situation, the platform 3 is prevented from further upward and horizontal movement.

After the platform 3 reaches its uppermost position, the cams 41 are actuated by means of the pulling and locking mechanism 46 (rotated along arrow 96 in Fig. 4) acting on the rope 43, and the cam heads 41a engage in the bracket slots 38. The rope 43 is then locked in place, and vessel pressure is released which allows the platform 3 to slightly lower until the cam heads 41a are supported by the wall brackets 37. The platform 3 is thus prevented from any downward movement. To unlock the platform 3, the platform is pushed upwardly by air pressure once the vessel 1 is empty of liquid to free it from its weight right up to its uppermost limit, where the platform 3 contacts the wall brackets 37, and then the cams 41 are actuated by means of the rope 43 along arrow 98 retracting the cams which rotate as indicated by arrow 100 and allowing the platform 3 to move downwardly. The platform 3 will lower under its own weight with the rate of descent being controlled by controlling the flow of air out of the vessel 1 through the vent 7.

The latch assemblies 34, therefore, provide the following functions, that is:

- to prevent further upward movement of the platform 3,
- to prevent downward movement of the platform 3, and
- to tie all the walls 11 to the platform 3 to increase the strength of the walls.

Thus, the platform 3 is firmly locked with the walls creating a strong fixed rigid box having a top, base, and walls. This prevents any movement of the platform 3 either in vertical or horizontal directions. The walls 11 are strengthened by means of this connection with the platform 3 which prevents their bulging under the pressure of the liquid in the vessel 1 and allows for lighter and stronger design, thereby reducing the cost and weight of the walls 11. As many as 20 or more latch assemblies 34 may be mounted on a 20 x 8 foot expandable container C.

The latch assemblies may be adapted in order to vary their vertical position in the box 10, thereby changing the position of the platform 3 and consequently varying the volume of the vessel 1 and reducing the sloshing.

This can be achieved by having a series of removable bolts securing the outer latches 36 to the lid panels 17 and 18 and by adapting these lid panels to receive the bolts at various elevations. As

a result, the container C becomes a variable volume container. This eliminates the need of baffles to reduce sloshing and liquid movement when the container is not filled up to the top.

Such a vertical adjustability of the platform 3 is necessary, for example, in the case where a container is designed to carry a specified limit weight of water and where a liquid of higher specific gravity than water is intended to be loaded in and transported by the container. Indeed, the allowed volume for such a liquid is lower than that of water, and thus require a lower positioning of the platform 3 to reduce the vessel volume.

Referring now to Figs. 12 to 15, there is shown the flanges 47 which are provided for effecting a hermetic seal between the flexible side walls of the sleeve 5 and the platform 3 and the base 2. There is a first peripheral flange 48 at the top of the flexible sleeve 5 and a peripheral bottom flange 49 sealing the sleeve 5 respectively to the platform 3 and to the bottom wall 2. The seal is accomplished without, for example, having to fold the peripheral top portion of the sleeve 5 over the upper peripheral surface of the platform 3. Customarily, a seal of two pieces is executed in one plane and the two joining surfaces lie in the same plane. If a one-plane arrangement was applied to the present container C, a special pocket-type three-wall corner would have to be made. This would preclude the use of a readily available, standard sheet precured material to manufacture the flexible sleeve 5. An uncured material would be required to form the corner which would necessitate complicated and expensive molding and curing facilities and operations.

The present sealing method allows for the sealing on four separate sides situated in four different vertical planes including four vertical corners. This is made possible by splitting the outer flange into sections without compromising the continuity of the seal and sealing pressure between the inner and outer flanges. The length of the outer flange is adjustable.

An inner flange 50 in the form of a continuous bar extends around the edges of the platform 3. The bar is welded to the platform 3 and projects upwardly therefrom. Similarly, a continuous bar or flange 50a extends around the edges of the base 2, with the bar being welded to the base and projecting upwardly from the base. At intervals in the inner flanges 50 and 50a, there is a series of horizontal holes having diameters sufficient to receive a series of bolts 58 and 58a. Hereafter, only the top flange 48 will be described as the bottom flange 49 is similar thereto. Corresponding reference numerals for the bottom flange 49 are characterized by the suffix "a" attached thereto.

An outer flange 51 is split into straight sections 52 and corner sections 53. The outer flange 51 is located between the inner flange 50 and the walls 11. The outer flanges 51 and 51a extend respectively around the platform 3 and the base 2. The length of the outer flange 51 is adjustable to permit application of sufficient and continuous sealing pressure at the total periphery of the flexible sleeve 5. At intervals corresponding to that of the inner flange 50, there is a series of horizontal apertures having a diameter sufficient to receive the series of bolts 58.

There may be four or more of the straight sections 52 for the outer flange 51. The corner sections 53 are provided at each corner. Joints 54 are each formed by a female notch 55 defined in one outer flange section and a cooperating male shoulder 56 protruding from a successive outer flange section in order to prevent discontinuity of the straight and corner sections 52 and 53. The joints 54 allow for changing the relative positions of two successive sections, thus making possible adjustment of the length of the outer flange 51. For adjustment purposes, the two joining sections may be slid towards each other or away from each other as indicated respectively by arrows 102 and 104 in Figs. 12 and 14. In Figs. 13 and 14, two sections 52 and 53 are so engaged, yet are free to slide freely. The shoulder 56 of one section penetrates into the notch 55 of an adjacent section. A continuous gasket 57 extends between the inner flange 50 and the sleeve 5. The gasket 57 eliminates leakage of the contents of the vessel 1. Bolts 58, of course, pass through the inner flange 50, the gasket 57, the vessel 1 and the outer flange 51 once the sections of the outer flange 51 have been properly adjusted. Self locking nuts 59 and bolts 58 provide the necessary pressure to the sealing surfaces.

Now referring to Fig. 10, arresting brackets 60 prevent pinching which might occur in the infiltration gaps 61 defined between the platform 3 and outer flange 51 and the walls 11. The arresting brackets 60 are split into shorter sections for added flexibility and gap adjustment and are placed along the straight sections 52 of the outer flange 51. The arresting brackets 60 each include a horizontal bar 62 oriented towards the outer flange 51. The bar 62 defines a longitudinal groove 64 to fit on and to slidably receive the bottom horizontal leg of the top outer flange 51, as shown in Fig. 10. The groove 64 allows the arresting bracket 60 to be held by and slide away from and towards the outer top flange 51. The arresting bracket 60 also includes a vertical plate 63 extending downwards from the horizontal bar 62 which is adapted to slide on the inner surface of the walls 11. This plate 63 has the role of a flapper which is pushed by the sleeve 5 against the walls 11 and enables the closing of the

infiltration gap 61.

The arresting bracket 60 basically prevents the wall of the flexible sleeve 5 from being pushed and caught in the gap 61 between the outer flange 51 and the box walls 11. This normally occurs when the gap 61 is large enough for the sleeve 5 to be squeezed and pushed into the gap 61. This is facilitated by wall friction between the box walls 11 and the sleeve material as well as by the internal pressure of the vessel 1. When the sleeve material penetrates into the gap 61, the sleeve 5 may become damaged and punctured.

The penetration gap 61 increases with any slight tilt of the platform 3. If the penetration gap 61 is too small, the platform 3 may jam inside the walls 11.

The top horizontal grooved bar 62 receives in its groove 64 the bottom horizontal leg of the top outer flange 51 so that the bracket 60 may slide freely toward and away from the outer flange 51 and consequently may slide toward and away from the box walls 11. When the sleeve 5 is pushed toward the box walls 11 and toward the platform 3 and the gap 61, the sleeve 5 pushes the vertical plate 63 and thus the arresting bracket 60 against the walls 11, thereby closing the gap 61, and preventing the sleeve 5 from penetrating into the gap 61. The arresting bracket 60 makes possible the use of flat sheet material to fabricate the sleeve 5.

The arresting bracket 60 eliminates the need for:

- the sleeve to be formed or pleated with a series of corrugations so that the sleeve can extend in concertina-like fashion,
- reinforcing the outwardly directed corrugations with strips,
- the provision of tie belts secured to the strips and to the platform.

A typical side lid actuator 65 which is shown in Figs. 16 and 17 operates the side lid panels 18, for instance, and there would be four actuators 65 for each two lid panels. The actuators 65 open the lid panels 18 as well as close the lid panels. Normally, the lid panels 18 are too heavy to be closed or opened manually. There is a considerable limitation of headroom space between the lid panels 18 and the vehicle floor 20 because of interference with the vehicle structure. If one end of the arm was fixed to the cylinder shaft and the other to the lid panel 18, it would require considerable headroom.

In order to overcome this headroom problem, each actuator 65 includes a cylinder 66 which is pivotally mounted to the container C by a pin 72, a cylinder shaft 67 reciprocating out of the cylinder 66 and a crook lever arm 68 having upper and lower arms 69 and 70 which is connected at one end by a pivot 73 to the end of the cylinder shaft

67 and which is provided at the other end with one or two rollers 71 that can move freely and in continuous running contact with the surface of the lid panels 18. The lid panels 18 require the greatest force at the beginning of the pivoting movement from the closed position. This requirement is matched by the longest force lever at the beginning of upward movement, the force lever being the variable distance between the lid hinge 28 and roller contact point with the lid panel 18. As the lid panel 18 moves upwards, the force lever becomes shorter.

As the cylinder shaft 67 gets shorter (see arrow 108a) and the arm 68 rotates about an arm shaft 74 (see arrow 108b), the rollers 71 apply pressure on the lid panel 18 and move it upwards until the lid panel 18 is fully opened (see arrow 108c). When the cylinder shaft 67 expands, the roller shaft 75 slides on and pulls the cables 76 which extend parallel to and spaced from the underside of the lid panel 18 between a pair of brackets 77 and which bear against the roller shaft 75 for closing the lid panel 18.

Thus, the lid actuator 65 includes the cylinder 66 which can be pneumatic or hydraulic power operated and the cylinder shaft 67 which is pivotally connected to the crook arm 68 which is in turn pivotally mounted to the arm shaft 74, dividing the crook arm 68 into the upper and lower arms 69 and 70. The lower arm 70 is connected to the cylinder shaft 67 by the pivot 73. The rollers 71 are provided at the other end of the upper arm 69. The cylinders 66 are themselves pivotally mounted about the fixing pins 72 which are secured to a C-shaped bracket 106 fixed to the structure.

The pivot shaft 74 may also be fixed to the structure at both ends. The rollers 71 are mounted on the roller shaft 75 with the cable 76 extending between the brackets 77 and retaining the rollers 71 against the lid panel surface.

Now referring to Figs. 4 and 6, an end lid actuator mechanism 110 is provided to raise each of the end lid panels 17 once the side lid panels 18 have been opened by the lid actuators 65. The end lid actuator mechanisms 110 each include a winch 112 mounted in a horizontal plane between the C-shaped bracket 106. A pair of cables 114 are wound around each of the winches 112 and are guided by eye-bolts 116 before being connected on the outside to the upper corners of the end lid panels 17. A counterclockwise rotation of the winches 112 will cause the cables 114 to wind therearound, thereby pulling at an angle from above on the end lid panels 17 and raising the same from their retracted position to their expanded position. A clockwise rotation of the winches 112 will allow the end lid panels 17 to lower under gravity forces.

It is noted that the side walls 14 and thus the side lid panels 18 extend horizontally, when the box 10 is expanded, further than the end walls 13 and the end lid panels 17 in order that, when the box 10 is completely retracted, the side lid panels 18 cover the side and end lid actuators 65 and 110 to prevent solid cargo from damaging the same. Furthermore, such a construction results in that the end lid panels 17 when raised, extend between the side lid panels 18, thereby providing support therefor without further assistance from the side lid actuators 65, whereas the end lid panels 17 will get their outwards support from the tight cables 114 of the end lid actuators 110.

As seen in Fig. 4, tie straps 78 may be provided and are used to tie up opposite pairs of the walls 11 to prevent bulging of the walls by inner pressure while the platform 3 is moving vertically and before the latch assemblies 34 are engaged. The tie straps 78 limit as they become tight the expansion or opening of the end and side lid panels 17 and 18 to their vertical positions when the end and side lid actuators 110 and 65 are respectively operated. The tie straps or tie cables 78 are installed permanently and are stored underneath the lid panels 17 and 18 when retracted.

The box 10 may be formed of plain fixed walls which are all made from one part panels. On the other hand, the box 10 may comprise pivoting walls which are all lidded, as illustrated. Also, the box 10 can be made of one lidded wall with the three remaining walls being plain fixed walls, or of any other combination of plain and lidded walls.

Advantages of lidded walls with respect to plain unhinged walls will now be presented.

In general, receiving vehicles and cargo containers do not have sufficient strength to resist liquid pressure of the flexible container. Also, the inner surface of the receiving vehicles and cargo containers is not smooth and continuous enough to avoid damage to the flexible sleeve.

The lid system makes the expansible container autonomous and independent of the wall structure of the receiving vehicles and cargo containers. Also, the expansible container may be mounted on a flat bed not having any side walls.

Since the lid panels serve as walls in the vertical position and as a false floor in the horizontal position, the need for separate structural panels is eliminated. The lids' double function reduces the structural members which would be otherwise required for the walls and the false floor. This reduces weight and cost of the expansible containers.

The lid panels forming the false floor are firmly supported at their periphery on the hinge mechanism. This eliminates a cantilever hanging of the platform when the walls are unhinged and cannot

close. The false floor supported centrally on the pillars and secured on its periphery to the pale through a hinge arrangement is much stronger and rigid than a floor supported on pillars only.

When the lid panels close, there is a full and unobstructed width of the receiving container. Space is at a premium when transporting solid cargo. In the case of four hinged walls, the horizontal dimensions of the receiving vehicles or cargo containers remain unchanged before and after installation of the expansible container.

The lid system eliminates any contamination of the solid cargo in the case when the inside surface of the box walls gets dirty. Without the lid panels, the solid cargo is in contact with the inner surface of the walls. When the lid panels are closed, the lid system ensures that the solid cargo is only in contact with the outside surface of the lid panels and with the walls of a receiving vehicle container.

The lid system allows installation of latches projecting from the lid panels on the inside of the box. Also, a strap system may be installed to tie together the opposite lid panels. This prevents bulging of the walls by internal pressure during the vertical movements of the platform and, in the case of the ascent of the platform, before it is locked in place by the latch system. When the lid panels are closed, all protruding items are hidden away and do not interfere with the solid cargo. Without the lid system, no protruding objects could be tolerated inside the walls, and consequently, no latches or other locking devices or straps could be permanently installed on the inside of the walls.

The false floor, made of two overlapping lid panels, prevents any foreign material from falling and getting caught between the walls and sleeve, thus preventing damage to the sleeve.

The platform may be open at its top, allowing easy access to various mechanisms like the latches, the arresting brackets, the parallel system, the straps and also allowing visual observation as to whether the sleeve is caught between the wall and peripheral flange. By closing the lid panels, all items and mechanisms are protected and hidden, and there is no interference with the solid cargo. The false floor is smooth and clean.

Claims

1. A cargo container (C) adapted to transport liquids and, alternatively, solid cargo, comprising:-
 - (a) a box-like housing (10) having rigid side walls (11-15);
 - (b) an expansible vessel (1) mounted inside the box-like housing (10) adapted for receiving and containing the liquids, said expansible vessel (1) including a rigid bottom wall

(2), a rigid top wall (3) extending perpendicular to the rigid side walls, and flexible impermeable side walls (5) extending between the vessel top wall and the rigid bottom wall (2), the vessel top wall (3) having alternative configuration within the box-like housing (10), namely a lower position where the top wall (3) is adjacent to the bottom of the housing with the vessel side walls (5) collapsed therebetween and an upper position; said vessel top wall (3) being adapted for movement within the box-like housing between said upper and lower positions by virtue of gaps (61) defined between said vessel top wall (3) and said rigid side walls (11-15) when the vessel top wall (3) is being vertically displaced; and

(c) means (23) for maintaining said vessel top wall (3) substantially parallel to said bottom wall when the vessel top wall (3) is vertically displaced, whereby said vessel (1) can receive fluid therein for raising said vessel top wall (3) to said upper position; characterised by

(d) means (34) for securing said vessel top wall (3) to the housing in said upper position;

(e) means (60) for preventing said vessel side walls (5) from penetrating into said gaps (61) during expansion of said vessel (1).

2. A cargo container (C) as defined in Claim 1, wherein a sleeve (5) forms the vessel side walls, said sleeve (5) being made from a straight, flat, uncorrugated, flexible and impermeable material sealingly secured at opposite ends thereof to said vessel top and bottom walls (3,2).
3. A cargo container (C) as defined in Claim 2, wherein said rigid side walls (11-15) include at least one panel (17,18) adapted to be folded down onto the vessel top wall (2) when the expansible vessel (1) is retracted in order to serve as a floor for the solid cargo.
4. A cargo container (C) as defined in Claim 3, wherein each of said rigid side walls (11-15) comprises one said panel (17,18), a separate hinge means (28) being provided for mounting each of the panels (17,18) to said box-like housing (15) between horizontal folded and vertical unfolded positions, vessel top wall support means (6) being provided for supporting in said upper position said vessel top wall (3) parallel to said vessel bottom wall (2) and spaced apart therefrom for preventing damage

to the retracted sleeve (5), said panels (17,18) being adopted in said folded position thereof to overlap one another and the vessel top wall (2) for forming a continuous plane horizontal false floor for the solid cargo which is supported by said hinge means (28) and said vessel top wall support means (6).

5. A cargo container (C) as defined in Claim 4, wherein said vessel top wall support means (6) comprises a series of spacer means (6) extending at right angles in said vessel (1) from said vessel bottom wall (2) for providing distributed support to said vessel top wall (3) in said lower position. 5 10
6. A cargo container (C) as defined in Claim 5, wherein each said spacer means (6) comprises a pillar (6). 15 20
7. A cargo container (C) as defined in Claim 4, wherein said hinge means (28) are adopted to provide in said unfolded position a substantially continuous plane inner vertical surface to each of said rigid side walls (13-15) in order to allow for minimal size gaps between said vessel top wall (3) and said rigid side walls (13-15) while allowing the vertical displacement of said vessel top wall (3), said hinge means (28) being further adapted to provide in said folded position a substantially continuous plane upper surface to each of said rigid side walls (13-15) for receiving the solid cargo. 25 30
8. A cargo container (C) as defined in Claim 7, wherein said hinge means (28) is formed by a peripheral end of said panel (17,18) cooperating with an upper portion of a fixed lower section (15) of a respective one of said rigid side walls (11,13,14) of said box-like housing (10), said panel peripheral end comprising at least one convex arcuate portion (29) extending between top and bottom walls of said panel (17,18) and having a curvature radius R about a pivot axis, said pivot axis being coplanar with a longitudinal symmetry plane of said panel (17,18) with said curvature radius R being established by the formula: 35 40 45

$$R = \frac{t}{2} \sqrt{2} \quad ,$$

wherein t equals a thickness of said panel (17,18);
said convex arcuate panel portion (29) being rotatable within a longitudinal concave recess

(33) or semi-circular cross-section having a radius equal to said curvature radius R and defined about said pivot axis at a 45° angle in a top inner corner of said upper portion between ends of said upper portion of said fixed lower section (15) of said respective rigid side wall (13,14), said panel (17,18) being rotatable on a shaft (31) coaxial with said pivot axis and extending through said panel peripheral end and having the ends thereof mounted in said ends of said upper portion.

9. A cargo container (C) as defined in Claim 8, wherein said panel peripheral end comprises a series of longitudinally aligned and spaced apart convex arcuate portions (29) with a series of corresponding spaced apart concave recesses (23) being defined in said top inner corner of said upper portion of said fixed lower section (15) of said rigid side wall (13,14), whereby said upper portion defines a series of top inner corner sections (32a) longitudinally spaced by said concave recesses (33), concave seat portions (30) of curvature radius R being defined in said panel peripheral end between said convex arcuate portions (29) and opposite said top inner corner sections (32a), said concave seat portions (30) being adapted to rotate on said top inner corner sections (32a) upon a pivot of said panel (17,18). 20 25 30
10. A cargo container (C) as defined in Claim 4, wherein peripheral top and bottom flange assemblies (48,49) are provided for sealingly securing said sleeve (5) vertically around vertical peripheral sides respectively of said vessel top and bottom walls (3,2). 35
11. A cargo container (C) as defined in Claim 10, wherein both said top and bottom flange assemblies (48,49) comprise a peripheral inner flange (50,50a) secured around said peripheral sides and a peripheral outer flange (51,51a) mounted to said vessel (1) with said sleeve end vertically surrounding said inner flange (50,50a) and being secured between said inner (50,50a) and outer flanges (51,51a). 40 45
12. A cargo container (C) as defined in Claim 11, wherein a seal gasket (57,57a) is provided between said sleeve end and said inner flange (50,50a). 50
13. A cargo container (C) as defined in Claim 12, wherein said outer flange (51,51a) comprises corner sections (53,53a) and at least one straight section (52,52a) extending between each pair of successive corner sections 55

(53,53a).

14. A cargo container (C) as defined in Claim 13, wherein said corner (53,53a) and straight (52,52a) sections, include, portions (54) horizontally overlapping each other, each arrangement of said overlapping portions (54) including a recess means (55) defined longitudinally at the end of one of said portions and adapted to slidably receive a finger means (56) protruding from the other one of said portions, whereby a proper longitudinal insertion of said finger means (56) in said recess means (55) provides for a longitudinal adjustability of said corner (53,53a) and straight (52,52a) sections one with respect to the other while maintaining a continuous peripheral contact between said outer flange, (51,51a) and said sleeve end and thus a continuous peripheral seal.

15. A cargo container (C) as defined in Claim 4, wherein said means (60) for preventing said vessel side walls (5) from penetrating, into the gaps, (61) formed between said vessel top wall (3) and said rigid side walls (11-15) comprises at least one gap closing bracket (60) provided at each peripheral side of said vessel top wall (3) for preventing said sleeve (5) from wedging into said gaps (61), said bracket (60) comprising a vertical plane outer surface and an inner surface which defines a horizontally extending groove (64), said vessel top wall (3) comprising at each peripheral side thereof at least one horizontal member (52) extending outwards towards said rigid side walls (11-15) and being spaced therefrom and slidably engaging said groove (64), said sleeve (5) extending downwards from said vessel top wall (3) and under said bracket (60) and bearing against a portion (63) of said bracket (60) lower than said groove (64) for maintaining said outer surface of said bracket (60) against said rigid side walls (11-15) and thus close said gap (61), said bracket (60) being slidable on said horizontal member (52) in order to cover various gap sizes while still being retained in position between said vessel top wall (3) and said rigid side walls (11-15).

16. A cargo container (C) is defined in Claim 4, wherein said means (34) for securing said vessel top wall (3) in said upper position comprises a series of latch assemblies (34) provided for securing said vessel top wall (3) to said panels (17,18) in said upper position of said vessel top wall (3), whereby said vessel (1) can be expanded by air pressure from said lower position to said upper position of said

top wall (3) at which point said vessel top wall (3) is secured to said panels (17,18) by said latch assemblies (34) thereby allowing removal of air pressure in the expanded vessel for receiving the liquids.

17. A cargo container (C) as defined in Claim 16, wherein said latch assemblies (34) comprise cooperating inner (35) and outer (36) latches provided respectively along the upper periphery of said vessel top wall (3) and the inner periphery of said panels (17,18), each pair of cooperating inner and outer latches (35,36) being adapted to engage one another at said upper position of said vessel top wall (3) and to be secured together for mounting the vessel top wall (3) to the unfolded panels (17,18) in said upper position.

18. A cargo container (C) as defined in Claim 17, wherein said outer latches (36) each comprise an inverted L-shaped bracket (37) having a vertical portion projecting downwards at a distance from a respective one of said panels (17,18) and a bracket slot (38) defined in said vertical portion, said inner latches (35) each comprising an inverted L-shaped angle (39) projecting upwards from said vessel top wall (3) and having a horizontal portion spaced apart therefrom and extending outwards towards the respective panel (17,18), an angle slot (40) being defined in said horizontal portion with said vertical portion of said wall bracket (37) being slidable in said angle slot (40), said inner latch (35) also including a cam means (41) pivotally mounted under said horizontal portion of said angle (39) and adapted upon a pivot thereof to engage said bracket slot (38), whereby, when said vessel top wall (3) is being raised, said wall bracket (37) engages said angle slot (40) with the upwards movement of said vessel top wall (3) being limited by said angle (39) abutting an underside of said wall bracket (37) horizontal portion thereby allowing said cam means (41) to be pivoted for engagement in said bracket slot (38) and for limiting a downwards movement of said vessel top wall (3) when the vessel air pressure is removed from said vessel (1).

19. A cargo container (C) as defined in Claim 18, wherein a cable means (43) is fixed in succession to the cam means (41) of each of said series of latch assemblies (34), the ends of said cable means (43) being attached to a pulling and locking mechanism (46) provided on said vessel top wall (3) for forming a closed loop, whereby said cable means (43) can be

pulled selectively in either one of two directions for one of engaging and disengaging said cam means (41) of said inner latches (35) from said outer latches (36).

20. A cargo container (C) as defined in Claim 4, wherein said means (23) for maintaining said vessel top wall (3) parallel to said vessel bottom wall (2) when the vessel top wall (3) is vertically displaced comprises a parallelism means (23) for each peripheral side of said vessel top wall (3), each said parallelism means (23) including first and second tight cable means (24,25) and a pair of cable guiding means (26a,26b) provided at successive corners of said vessel top wall (3), said first and second cable means (24,25) being attached at first ends thereof (27b,27d) to different upper corners of a respective one of said panels (17,18) corresponding to said successive corners, said first ends (27b, 27d) of said cable means (24,25) being attached at a same horizontal level and symmetrically on each side of a vertical symmetry plane of said vessel top wall (3), said symmetry plane being perpendicular to the respective panel (17,18), said cable guiding means (26a,26b) being also horizontally level and disposed symmetrically on each side of said symmetry plane, said cable means (24,25) extending downwards with each cable means (24,25) first engaging a different one of said guiding means (26b,26a), then extending parallel to said vessel top wall (3) and engaging the other guiding means (26a,26b), said cable means (24,25) being secured at second ends (27a,27c) to said container (C) lower than said vessel top wall (3) in said lower position, said second ends (27a,27c) of said cable means (24,25) being also attached at a same horizontal level and symmetrically on each side of said symmetry plane, whereby, upon vertical movement of said vessel top wall (3), said cable means (24,25) displace in opposite parallel directions between said cable guiding means (26a,26b), said tight cable means (24,25) exerting counterbalancing forces on said vessel top wall (3) thereby maintaining the parallelism thereof.

21. A cargo container (C) as defined in Claim 20, wherein each said guiding means (26a,26b) comprises an eye-bolt mounted on an upper corner surface of said vessel top wall (3).

22. A cargo container (C) is defined in Claim 4, wherein panel pivoting means (65,68) are provided for pivoting said panels (17,18) from at least said folded position to said unfolded position thereof.

tion thereof.

23. A cargo container (C) as defined in Claim 22, wherein said panel pivoting means (65,68) comprises at least one actuator means (65) for pivoting each of at least two of said panels (17,18) between said folded and said unfolded positions thereof, said actuator means (65) including a cylinder (66) pivotally mounted in a substantially horizontal position to said container (C) lower than said hinge means (28), a cylinder shaft (67) reciprocating in said cylinder (66) and pivotally mounted to a first end of a lever arm (68), roller means (71) being rotatably mounted at a second end of said lever arm (68) and being adapted for rolling against the panel (17,18) while maintaining contact therewith, said lever arm (68) being rotatably mounted in a vertical plane to said container (C) intermediate said first and second ends thereof and higher than said cylinder (66) for pivoting about a horizontal axis, and being adapted to raise and lower the panel (17,18) when said cylinder shaft (67) is respectively retracted and expanded with respect to said cylinder (66).

24. A cargo container (C) as defined in Claim 22, wherein said panel pivoting means (65,68) comprises at least one actuator means (65) for pivoting each of at least two of said panels (17,18) from said folded to said unfolded positions thereof, said actuator means (65) including a winch means (112) rotatably mounted to said container (C), a pair of cable means (114) attached at first ends thereof to said winch means (112) and at second ends thereof each to a different one of the two inward corners of the panel when folded, cable guiding means (116) being provided between said winch means (112) and the panel (17,18) at a location at least as high as said second ends of said cable means (114) when the panel (17,18) is unfolded, whereby said winch means (112) is adapted to wind said cable means (114) therearound and to thus pull on the panel (17,18) in order that the panel pivots upwards towards said unfolded position.

25. A cargo container (C) as defined in Claim 22, wherein panel unfolding limiting means (78) are provided to prevent said panels (17,18) from pivoting during raising thereof past said unfolded vertical position thereof.

26. A cargo container (C) as defined in Claim 25, wherein said panel unfolding limiting means (78) comprises strap means (78) extending

tight from upper ends of pairs of opposite panels (17,18) when in said unfolded position thereof.

27. A cargo container (C) as defined in Claim 4, wherein said vessel (1) is provided with a liquid loading and unloading pipe means (8). 5
28. A cargo container (C) as defined in Claim 4, wherein said vessel (1) is provided with a vent opening (7). 10
29. A cargo container (C) as defined in Claim 4, wherein said vessel top wall (3) is provided with a manhole (4). 15
30. A cargo container (C) as defined in Claim 4, wherein said vessel (1) is provided with a heat exchanger (9) for maintaining the liquids at substantially constant temperatures. 20
31. A cargo container (C) as defined in Claim 28, wherein an air blower is adapted to be connected to said vent opening (7) for supplying air pressure in said vessel (1) for raising said vessel top wall (3) towards said upper position. 25
32. A cargo container (C) as defined in Claim 4, wherein anchor means (22) are provided for securing the cargo container (C) on a vehicle. 30
33. A cargo container (C) as defined in Claim 4, wherein said box-like housing (10) comprises a rigid floor (12,12a) connecting lower ends of said rigid side walls (11, 13-15), said vessel bottom wall (2) overlying said box housing rigid floor (12,12a). 35
34. A cargo container (C) as defined in Claim 17, wherein a plurality of said series of said latch assemblies (34) are provided at various horizontal planes, whereby said vessel top wall (3) can be secured to the unfolded panels (17,18) at various horizontal positions intermediate said upper and said lower positions thereof, thereby providing a variable volume vessel (1) for the cargo container (C). 40 45
35. A cargo container (C) as defined in Claim 28, wherein means are provided for varying a size of said vent opening (7) and thus the air flow therethrough in order to control the rate of descent of said vessel top wall (3) from said upper position to said lower position. 50

Patentansprüche

1. Zusammenklappbarer Behälter für flüssige oder trockene Waren, umfassend:
 - a) ein kastenähnliches Gehäuse (10) mit starren Seitenwänden (11-15);
 - b) einen innerhalb des kastenförmigen Gehäuses (10) befestigten dehnbaren Behälter zur Aufnahme und zum Aufbewahren der Flüssigkeiten, wobei der dehnbare Behälter (1) eine starre Bodenwand (2) und eine feste obere Wand (3) umfaßt, die sich senkrecht zu den Seitenwänden erstrecken, und die flexiblen, undurchlässigen Seitenwände (5) sich zwischen der Behälteroberwand und der festen Bodenwand (2) des Gehäusebodens erstrecken, die Behälteroberwand (3) innerhalb des kastenförmigen Gehäuses alternative Formen aufweist, nämlich eine untere Lage, in der die obere Wand (3) benachbart zum Boden des Gehäuses angeordnet ist, wobei die Behälterseitenwände (5) dazwischen zusammengefaltet sind, und eine obere Lage, und die Behälteroberwand (3) innerhalb des kastenförmigen Gehäuses zwischen der oberen und unteren Lage mittels zwischen der Behälteroberwand (3) und den starren Seitenwänden (11-15) gebildeten Spalten (61) bewegbar ist, wenn die Behälteroberwand (3) vertikal versetzt wird; und
 - c) Mittel (23), um die Behälteroberwand (3) im wesentlichen parallel zum Gehäuseboden zu halten, wenn die Behälteroberwand (3) vertikal versetzt wird, wodurch der Behälter (1) ein Fluid aufnehmen kann, um die Behälteroberwand (3) in die ausgedehnte Lage anzuheben, gekennzeichnet durch
 - d) eine Einrichtung (34) zum Befestigen der Behälteroberwand (3) am Gehäuse in der oberen Lage,
 - e) eine Einrichtung (60) zum Verhindern, daß die Behälterseitenwände (5) in die Spalte (61) während der Ausdehnung des Behälters (1) gelangen.
2. Warenbehälter (C) nach Anspruch 1, wobei eine Hülse (5) die Behälterseitenwände bildet, die aus einem ebenen, flachen, nichtgewellten, flexiblen und undurchlässigen Material besteht, das dichtend an gegenüberliegenden Enden an den oberen und unteren Behälterwänden (3,2) befestigt ist.
3. Warenbehälter (C) nach Anspruch 2, wobei die starren Seitenwände (11-15) mindestens eine Platte (17,18) umfassen, die nach unten auf die

obere Behälterwand (2) geklappt werden kann, wenn der dehnbare Behälter (1) zusammengezogen ist, um als Boden für feste Waren zu dienen.

4. Warenbehälter (C) nach Anspruch 3, wobei jede der starren Seitenwände (11-15) eine Platte (17,18), eine getrennte Gelenkeinrichtung (28) zum Befestigen jeder der Platten (17,18) am kastenförmigen Gehäuse (15) zwischen horizontal geklappten und vertikal nicht geklappten Lagen, und Lagerungen (6) für die obere Behälterwand, um die obere Behälterwand (3) in der zurückgezogenen Lage parallel zur unteren Behälterwand (2) im Abstand davon zu lagern, um eine Beschädigung der zurückgezogenen Hülse (5) zu verhindern, umfaßt, wobei die Platten (17,18) in der geklappten Lage einander und die obere Behälterwand (2) überlappen, um einen kontinuierlichen, ebenen, horizontalen Zwischenboden für die festen Waren zu bilden, der mittels der Gelenkeinrichtungen (28) und den Lagereinrichtungen (6) für die obere Behälterwand gelagert wird.
5. Warenbehälter (C) nach Anspruch 4, wobei die Lagereinrichtung (6) für die obere Behälterwand eine Reihe von Abstandshaltern (6) umfaßt, die sich rechtwinklig von der unteren Behälterwand (2) in den Behälter (1) erstrecken, um eine verteilte Lagerung für die obere Behälterwand (3) in der zurückgezogenen Lage zu bilden.
6. Warenbehälter (C) nach Anspruch 5, wobei jeder der Abstandshalter (6) eine Stütze (6) umfaßt.
7. Warenbehälter (C) nach Anspruch 4, wobei die Gelenkeinrichtungen (28) in der nichtgeklappten Lage eine im wesentlichen kontinuierliche, ebene, innere, vertikale Oberfläche für jede der starren Seitenwände (13-15) bilden, um Spalte mit minimaler Größe zwischen der oberen Behälterwand (3) und den starren Seitenwänden (13-15) auszubilden, und dennoch eine vertikale Versetzung der oberen Behälterwand (3) zu ermöglichen, wobei die Gelenkeinrichtungen (28) weiter in der geklappten Lage eine im wesentlichen kontinuierliche, ebene, obere Fläche für jede der starren Seitenwände (13-15) zur Aufnahme der festen Ware schaffen.
8. Warenbehälter (C) nach Anspruch 7, wobei die Gelenkeinrichtung (28) von einem Umfangsende der Platte (17,18) gebildet wird, das mit einem oberen Abschnitt eines festen unteren Abschnitts (15) einer entsprechenden festen

Seitenwand der Seitenwände (11,13,14) des kastenförmigen Gehäuses (10) zusammenwirkt, wobei das Plattenumfangsende mindestens einen konvexen, bogenförmigen Abschnitt (29) umfaßt, der sich zwischen der oberen und unteren Wand der Platte (17,18) erstreckt und einen Krümmungsradius (R) um eine Schwenkachse aufweist, und die Schwenkachse zu einer Längssymmetrie-Ebene der Platte (17,18) koplanar ist und der Krümmungsradius (R) durch die Formel:

$$R = \frac{1}{2} \sqrt{2}$$

ausgedrückt wird, wobei t gleich der Dicke der Platte (17,18) ist;

der konvexe, bogenförmige Plattenabschnitt (29) innerhalb einer longitudinalen, konkaven Aussparung (33) mit halbkreisförmigem Querschnitt drehbar ist, der einen Radius gleich dem Krümmungsradius (R) aufweist und um die Schwenkachse bei einem 45° Winkel in einer oberen inneren Ecke des oberen Abschnitts zwischen den Enden des oberen Abschnitts des festen unteren Abschnitts (15) der entsprechenden festen Seitenwand (13,14) gebildet wird, wobei die Platte (17,18) auf einer koaxial zur Schwenkachse verlaufenden und sich durch das Plattenumfangsende erstreckende Welle drehbar ist, deren Enden in den Enden des oberen Abschnitts befestigt sind.

9. Warenbehälter (C) nach Anspruch 8, wobei das Plattenumfangsende eine Reihe von in Längsrichtung ausgerichteten, beabstandeten, konvexen Bogenabschnitten (29) mit einer Reihe von entsprechenden beabstandeten, konkaven Aussparungen (33), die in der oberen inneren Ecke des oberen Abschnitts des festen unteren Abschnitts (15) der starren Seitenwand (13,14) gebildet werden, wodurch der obere Abschnitt eine Reihe von oberen inneren Eckenabschnitten (32a) bildet, die in Längsrichtung durch die konkaven Aussparungen (33) beabstandet sind, aufweist, wobei weiter konkave Sitzabschnitte (30) mit einem Krümmungsradius (R) in dem Plattenumfangsende zwischen den konvexen, bogenförmigen Abschnitten (29) und den gegenüberliegenden oberen inneren Eckenabschnitten (32a) gebildet werden, die zur Drehung auf den oberen inneren Eckenabschnitten (32a) bei einer Schwenkung der Platte (17,18) geeignet sind.

10. Warenbehälter (C) nach Anspruch 4, wobei obere und untere Flanschanordnungen (48,49) vorgesehen sind, um die Hülse (5) vertikal rings um die vertikalen Umfangsseiten der

oberen und unteren Behälterwand (3,2) entsprechend dichtend zu befestigen.

11. Warenbehälter (C) nach Anspruch 10, wobei die oberen und unteren Flanschanordnungen (48,49) einen inneren Umfangsflansch (50,50a) umfassen, der rings um die Umfangsseiten angeordnet ist, und weiter einen äußeren Umfangsflansch (51,51a) umfassen, der an dem Behälter (1) befestigt ist, wobei das Hül-
senende den inneren Flansch (50,50a) vertikal umgibt und zwischen den inneren (50,50a) und den äußeren Flanschen (51,51a) befestigt ist.
12. Warenbehälter (C) nach Anspruch 11, wobei eine Dichtpackung (57,57a) zwischen der Hülse und dem inneren Flansch (50,50a) vorgesehen ist.
13. Warenbehälter (C) nach Anspruch 12, wobei der äußere Flansch (51,51a) mindestens Eckabschnitte (53,53a) und mindestens einen geraden Abschnitt (52,52a) umfaßt, der sich zwischen dem Paar aufeinanderfolgender Eckabschnitte (53,53a) erstreckt.
14. Warenbehälter (C) nach Anspruch 13, wobei die Ecke (53,53a) und die geraden Abschnitte (52,52a) Abschnitte (54) umfassen, die sich horizontal einander überlappen, wobei jede Anordnung der überlappenden Abschnitte (54) eine Aussparungseinrichtung (55) umfaßt, die in Längsrichtung am Ende eines der Abschnitte gebildet wird und gleitend eine Fingereinrichtung (56) aufnimmt, die von dem anderen der Abschnitte vorsteht, wodurch ein geeignetes longitudinales Einsetzen der Fingereinrichtung (56) in die Aussparungseinrichtung (55) eine longitudinale Einstellbarkeit der Ecke (53,53a) und der geraden Abschnitte (52,52a) eine in bezug auf die andere schafft, während ein kontinuierlicher Umfangskontakt zwischen dem äußeren Flansch (51,51a) und dem Hül-
senende und somit eine kontinuierliche Umfangsdichtung beibehalten wird.
15. Warenbehälter (C) nach Anspruch 4, wobei die Einrichtung (60) zum Verhindern, daß die Behälterseitenwände (5) in die zwischen der oberen Wand (3) des Behälters und den starren Seitenwänden (11-15) gebildeten Spalte (61) eindringen, mindestens eine den Spalt schließende Halterung (60) umfaßt, die an jeder Umfangsseite der oberen Behälterwand (3) vorgesehen ist, um zu verhindern, daß sich die Hülse (5) in den Spalten (61) verkeilt, wobei die Halterung (60) eine vertikale, ebene, äußere Fläche und eine Innenfläche umfaßt, die eine sich horizontal erstreckende Nut (64) bilden, und wobei die obere Behälterwand (3) an jeder Umfangsseite mindestens ein sich nach außen in Richtung der starren Seitenwände (11-15) erstreckendes horizontales Teil (52) umfaßt, das von den seitenwänden (11-15) beabstandet ist und gleitbar mit der Nut (64) in Eingriff bringbar ist, wobei weiter die Hülse sich nach unten von der oberen Behälterwand (3) und unter die Halterung (60) erstreckt und gegen einen Teil (63) der Halterung (60) unterhalb der Nut (64) anliegt, um die Außenfläche der Halterung (60) gegen die starren Seitenwände (11-15) zu halten und somit den Spalt (61) zu schließen, wobei weiter die Halterung (60) auf dem horizontalen Teil (52) gleitbar ist, um verschiedene Spaltgrößen abzudecken, während sie in einer Lage zwischen der oberen Behälterwand (3) und den festen Seitenwänden (11-15) zurückgehalten wird.
16. Warenbehälter (C) nach Anspruch 4, wobei die Einrichtung (34) zum Befestigen der oberen Behälterwand (3) in der ausgedehnten Lage eine Reihe von Riegelanordnungen (34) umfaßt, um die obere Behälterwand (3) an den Platten (17,18) in der ausgedehnten Lage des Behälters (1) zu befestigen, wodurch der Behälter (1) mittels Luftdruck von der zurückgezogenen Lage zur ausgedehnten Lage ausgedehnt werden kann, an welchem Punkt die obere Behälterwand (3) an den Platten (17,18) mittels der Riegelanordnungen (34) befestigt wird, so daß der expandierte Behälter entspannt werden kann, um Flüssigkeiten aufzunehmen.
17. Warenbehälter (C) nach Anspruch 16, wobei die Riegelanordnungen (34) zusammenwirkende innere (35) und äußere (36) Riegel umfassen, die längs des oberen Umfangs der oberen Behälterwand (3) und des inneren Umfangs der Platten (17,18) entsprechend vorgesehen sind, jedes Paar der zusammenwirkenden inneren und äußeren Riegel (35,36) in der ausgedehnten Lage des Behälters (1) miteinander in Eingriff bringbar ist und miteinander befestigbar ist, um die expandierte obere Behälterwand (3) an den aufgeklappten Platten (17,18) zu befestigen.
18. Warenbehälter (C) nach Anspruch 17, wobei die äußeren Riegel (36) jeweils eine umgekehrt L-förmige Halterung (37) umfassen, die einen sich nach unten um eine Strecke von einer der Platten (17,18) erstreckenden vertikalen Abschnitt und einen in dem vertikalen Abschnitt ausgebildeten Halterungsschlitz (38) umfaßt,

wobei weiter die inneren Riegel (35) jeweils einen umgekehrt L-förmigen Winkel (39) aufweisen, der sich von der oberen Behälterwand (3) nach oben erstreckt und einen horizontalen davon beabstandeten Abschnitt aufweist, der sich nach außen in Richtung der entsprechenden Platte (17,18) erstreckt, wobei weiter ein Winkelschlitz (40) in dem horizontalen Abschnitt ausgebildet wird und der vertikale Abschnitt der Wandhalterung (37) in dem Winkelschlitz (40) gleitbar ist, weiter der innere Riegel (35) ebenfalls eine Nockeneinrichtung (41) aufweist, die schwenkbar unter dem horizontalen Abschnitt des Winkels (39) befestigt ist und nach einer Schwenkung mit dem Halterungsschlitz (38) in Eingriff bringbar ist, wodurch, wenn die obere Behälterwand (3) ausgedehnt wird, die Wandhalterung (37) mit dem Winkelschlitz (40) in Eingriff tritt, wobei die Aufwärtsbewegung der oberen Behälterwand (3) durch den Winkel (39) begrenzt ist, der an eine Unterseite des horizontalen Teils der Wandhalterung (37) anschlägt, wodurch sich die Nockeneinrichtung (41) verschwenken kann, um mit dem Halterungsschlitz (38) in Eingriff zu treten und um eine Abwärtsbewegung der oberen Behälterwand (3) zu begrenzen, wenn der Luftdruck aus dem Behälter (1) entfernt wird.

19. Warenbehälter (C) nach Anspruch 18, wobei eine Seileinrichtung (43) in Folge an der Nockeneinrichtung (41) jeder der Reihe der Riegelanordnungen (34) befestigt ist, weiter die Enden der Seileinrichtung (43) an einem Zieh- und Verriegelungsmechanismus (46) angebracht sind, der an der oberen Behälterwand (3) vorgesehen ist, um eine geschlossene Schlaufe zu bilden, wodurch die Seileinrichtung (43) wahlweise in eine von zwei Richtungen gezogen werden kann, um die Nockeneinrichtung (41) der inneren Riegel (35) mit den äußeren Riegeln (36) in Eingriff zu bringen oder sie davon zu lösen.

20. Warenbehälter (C) nach Anspruch 4, wobei die Einrichtung (23), um die obere Behälterwand (3) parallel zur unteren Behälterwand (2) zu halten, wenn die obere Behälterwand (3) vertikal versetzt wird, eine Parallelhaltungseinrichtung (23) für jede Umfangsseite der oberen Behälterwand (3) umfaßt, jede Parallelhaltungseinrichtung (23) erste und zweite feste Seileinrichtungen (24,25) und ein Paar Seilführungseinrichtungen (26a,26b) umfaßt, die an aufeinanderfolgenden Ecken der oberen Behälterwand (3) vorgesehen sind, die erste und zweite Seileinrichtung (24,25) an ersten Enden dersel-

ben (27b,27d) an unterschiedlichen oberen Ecken einer entsprechenden Platte der Platten (17,18), die den aufeinanderfolgenden Ecken entspricht, aufgebracht ist, wobei weiter die ersten Enden (27b,27d) der Seileinrichtung (24,25) im gleichen horizontalen Niveau und symmetrisch an jeder Seite einer vertikalen Symmetrie-Ebene der oberen Behälterwand (3) angebracht sind, wobei die Symmetrie-Ebene senkrecht zu der entsprechenden Platte (17,18) verläuft, weiter die Seilführungseinrichtung (26a,26b) ebenfalls ein horizontales Niveau aufweist und symmetrisch an jeder Seite der Symmetrie-Ebene angeordnet ist, sich die Seileinrichtung (24,25) nach unten erstreckt, wobei jede Seileinrichtung (24,25) zuerst mit einer unterschiedlichen der Führungseinrichtungen (26b,26a) in Eingriff tritt und sich dann parallel zur oberen Behälterwand (3) erstreckt und mit der anderen Führungseinrichtung (26a,26b) in Eingriff tritt, weiter die Seileinrichtung (24,25) an zweiten Enden (27a,27c) an dem Behälter (C) unterhalb der oberen Behälterwand (3) in der zurückgezogenen Lage befestigt ist, die zweiten Enden (27a,27c) der Seileinrichtung (24,25) ebenfalls in dem gleichen horizontalen Niveau und symmetrisch an jeder Seite der Symmetrie-Ebene angebracht sind, wodurch, nach der vertikalen Bewegung der oberen Behälterwand (3), die Seileinrichtung (24,25) in gegenüberliegende parallele Richtungen zwischen den Seilführungseinrichtungen (26a,26b) versetzt wird, und die feste Seileinrichtung (24,25) Ausgleichskräfte auf die obere Behälterwand (3) aufbringt, um die Parallelität derselben aufrecht zu erhalten.

21. Warenbehälter (C) nach Anspruch 20, wobei jede Führungseinrichtung (26a,26b) einen an einer oberen Eckfläche der oberen Behälterwand (3) befestigten Augenbolzen umfaßt.

22. Warenbehälter (C) nach Anspruch 4, wobei Plattenschwenkeinrichtungen (65,68) zum Schwenken der Platten (17,18) aus mindestens der zusammengeklappten Lage zur aufgeklappten Lage vorgesehen sind.

23. Warenbehälter (C) nach Anspruch 22, wobei die Plattenschwenkeinrichtungen (65,68) mindestens eine Betätigungseinrichtung (65) zum Schwenken einer von mindestens zwei Platten (17,18) zwischen der zusammengeklappten und der aufgeklappten Lage derselben aufweist, wobei die Betätigungseinrichtung (65) einen schwenkbar in einer im wesentlichen horizontalen Lage zum Behälter (C) unterhalb der Gelenkeinrichtung (28) befestigten Zylinder

- (66) aufweist, eine Zylinderstange (67) im Zylinder (66) hin- und herbewegbar und schwenkbar an einem ersten Ende eines Hebelarms (68) angeordnet ist, Rollen (71) drehbar an einem zweiten Ende des Hebels (68) befestigt sind, um gegen die Platte (17,18) zu rollen, während sie damit in Berührung stehen, wobei der Hebelarm (68) drehbar in einer vertikalen Ebene zum Behälter (C) zwischen dem ersten und zweiten Ende desselben und oberhalb des Zylinders (66) befestigt ist, um um eine horizontale Achse zu schwenken und um die Platte (17,18) anzuheben oder abzusenken, wenn die Zylinderstange (67) in bezug auf den Zylinder (66) zurückgezogen oder nach außen bewegt wird.
24. Warenbehälter (C) nach Anspruch 22, wobei die Plattenschwenkeinrichtung (65,68) mindestens eine Betätigungseinrichtung (65) zum Schwenken einer von mindestens zwei Platten (17,18) aus der zusammengeklappten zur aufgeklappten Lage umfaßt, wobei die Betätigungseinrichtung (65) eine Windeneinrichtung (112) aufweist, die drehbar an dem Behälter (C) befestigt ist, ein Paar Seileinrichtungen (114) an ersten Enden derselben an der Windeneinrichtung (112) und an zweiten Enden derselben an einer unterschiedlichen der zwei inneren Ecken der Platten im zusammengeklappten Zustand angebracht sind, weiter Seilführungseinrichtungen (116) zwischen der Windeneinrichtung (112) und den Platten (17,18) an einer Stelle mindestens in der Höhe der zweiten Enden der Seileinrichtungen (114) vorgesehen sind, wenn die Platten (17,18) aufgeklappt sind, wodurch die Windeneinrichtung (112) die Seileinrichtungen (114) aufwickeln und so an den Platten (17,18) ziehen, so daß die Platten nach oben in die aufgeklappte Lage verschwenkt werden.
25. Warenbehälter (C) nach Anspruch 22, wobei Plattenaufklappbegrenzungseinrichtungen (78) vorgesehen sind, um zu verhindern, daß die Platten (17,18) während ihres Anhebens über die aufgeklappte vertikale Lage hinausgeschwenkt werden.
26. Warenbehälter (C) nach Anspruch 25, wobei die Plattenaufklappbegrenzungseinrichtungen (78) Bandeinrichtungen (78) aufweisen, die sich fest von den oberen Enden von Paaren gegenüberliegender Platten (17,18) erstrecken, wenn sie sich in der aufgeklappten Lage befinden.
27. Warenbehälter (C) nach Anspruch 4, wobei der Behälter (1) mit einer Flüssigkeitbeladungs- und -entladungsrohreinrichtung (8) versehen ist.
28. Warenbehälter (C) nach Anspruch 4, wobei der Behälter (1) mit einer Entlüftungsöffnung (7) versehen ist.
29. Warenbehälter (C) nach Anspruch 4, wobei die obere Behälterwand (3) mit einem Mannloch (4) versehen ist.
30. Warenbehälter (C) nach Anspruch 4, wobei der Behälter (1) mit einem Wärmetauscher (9) versehen ist, um die Flüssigkeiten bei im wesentlichen konstanten Temperaturen zu halten.
31. Warenbehälter (C) nach Anspruch 28, wobei ein Luftgebläse mit der Entlüftungsöffnung (7) verbindbar ist, um den Behälter (1) zum Anheben der oberen Behälterwand (3) in Richtung der ausgedehnten Lage mit einem Luftdruck zu beaufschlagen.
32. Warenbehälter (C) nach Anspruch 4, wobei Verankerungen (22) zum Befestigen des Warenbehälters (C) an einem Fahrzeug vorgesehen sind.
33. Warenbehälter (C) nach Anspruch 4, wobei das kastenförmige Gehäuse (10) einen starren Boden (12,12a) aufweist, mit dem die unteren Enden der starren Seitenwände (11,13-15) verbunden sind, und wobei die Behälterbodenwand (2) auf dem starren Boden (12,12a) des kastenförmigen Gehäuses aufliegt.
34. Warenbehälter (C) nach Anspruch 17, wobei eine Vielzahl von einer Reihe der Riegelanordnungen (34) an verschiedenen horizontalen Ebenen vorgesehen ist, wodurch die obere Behälterwand (3) an den aufgeklappten Platten (17,18) in verschiedenen horizontalen Lagen zwischen der ausgedehnten und der zurückgezogenen Lage befestigbar sind, um einen Behälter (1) für den Warenbehälter (C) unterschiedlichen Volumens zu schaffen.
35. Warenbehälter (C) nach Anspruch 28, wobei Einrichtungen zum Verändern der Größe der Entlüftungsöffnung (7) und somit zum Verändern der dadurch erfolgenden Luftströmung vorgesehen sind, um die Absenkgeschwindigkeit der oberen Behälterwand (3) von der ausgedehnten Lage zur zurückgezogenen Lage zu steuern.

Revendications

1. Un conteneur de cargaison (C) conçu pour le transport de liquides et, alternativement, de marchandises solides, comprenant:
 - (a) un enceinte (10) en forme de boîte et ayant des murs de côté rigides (11-15);
 - (b) un vaisseau expansible (1) installé à l'intérieur de l'enceinte (10) en forme de boîte et conçu pour recevoir et contenir des liquides, ledit vaisseau expansible (1) incluant un mur inférieur rigide (2), un mur supérieur rigide (3) se prolongeant de façon perpendiculaire aux murs de côté rigides, et des murs de côté (5) flexibles et imperméables se prolongeant entre le mur supérieur et le mur inférieur rigide du vaisseau, le mur supérieur (3) du vaisseau ayant des configurations alternatives à l'intérieur de l'enceinte (10) en forme de boîte, c'est-à-dire une position inférieure dans laquelle le mur supérieur (3) est adjacent au bas de l'enceinte avec les murs de côté (5) du vaisseau étant affaissés entre ceux-ci et une position supérieure; ledit mur supérieur (3) du vaisseau étant conçu pour se déplacer à l'intérieur de l'enceinte en forme de boîte entre lesdites positions supérieure et inférieure par la voie d'espacements (61) ménagés entre ledit mur supérieur (3) du vaisseau et lesdits murs de côté rigides (11-15) lorsque le mur supérieur (3) du vaisseau est déplacé verticalement; et
 - (c) des moyens (23) pour maintenir ledit mur supérieur (3) du vaisseau sensiblement parallèle au mur inférieur lorsque le mur supérieur (3) du vaisseau est déplacé verticalement, d'où ledit vaisseau (1) peut accueillir un fluide afin d'élever ledit mur supérieur (3) du vaisseau à ladite position supérieure; caractérisé par
 - (d) des moyens (34) pour attacher ledit mur supérieur (3) du vaisseau à l'enceinte dans ladite position supérieure;
 - (e) des moyens (60) pour empêcher lesdits murs de côté (5) du vaisseau de pénétrer dans lesdits espacements (61) pendant l'expansion dudit vaisseau (1).
2. Un conteneur de cargaison (C) suivant la revendication 1, dans lequel une manche (5) forme les murs de côté du vaisseau, ladite manche (5) étant faite d'un matériau droit, plat, non ondulé, flexible et imperméable qui est attaché de façon étanche à ses extrémités opposées aux murs supérieur et inférieur (3, 2) du vaisseau.
3. Un conteneur de cargaison (C) suivant la revendication 2, dans lequel lesdits murs de côté rigides (11-15) incluent au moins un panneau (17, 18) Conçu pour être rabattu sur le mur supérieur (2) du vaisseau lorsque le vaisseau expansible (1) est rétracté afin de servir comme plancher pour les marchandises solides.
4. Un conteneur de cargaison (C) suivant la revendication 3, dans lequel chacun des murs rigides de côté (11-15) comprend l'un desdits panneaux (17, 18), des moyens-charnières séparés (28) étant fournis pour installer chacun des panneaux (17, 18) à ladite enceinte (15) en forme de boîte entre des positions horizontale rabattue et verticale dépliée, des moyens de support (6) du mur supérieur du vaisseau étant fournis pour supporter dans ladite position rétractée ledit mur supérieur (3) du vaisseau de façon parallèle audit mur inférieur (2) du vaisseau et avec espacement par rapport à ce dernier afin d'empêcher des dommages à la manche (5) rétractée, lesdits panneaux (17, 18) étant conçus dans ladite position rabattue pour se chevaucher les uns les autres et chevaucher le mur supérieur (2) du vaisseau afin de former un faux plancher continu, plan et horizontal pour les marchandises solides qui est supporté par lesdits moyens-charnières (28) et lesdits moyens de support (6) du mur supérieur du vaisseau.
5. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel lesdits moyens de support (6) du mur supérieur du vaisseau comprennent une série de moyens d'espacement (6) se prolongeant à angle droit dans ledit vaisseau (1) à partir du mur inférieur (2) du vaisseau afin de fournir un support distribué audit mur supérieur (3) du vaisseau dans ladite position rétractée.
6. Un conteneur de cargaison (C) suivant la revendication 5, dans lequel chacun desdits moyens d'espacement (6) comprend un pilier.
7. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel lesdits moyens-charnières (28) sont conçus pour ménager dans ladite position dépliée une surface intérieure verticale, plane et sensiblement continue, à chacun desdits murs de côté rigides (13-15) afin de permettre des espacements de grandeur minimale entre ledit mur supérieur (3) du vaisseau et lesdits murs de côté rigides (13-15) tout en permettant le déplacement vertical dudit mur supérieur (3) du vaisseau, lesdits moyens-charnières (28) étant également

conçus afin de fournir dans ladite position rabattue une surface supérieure, plane et sensiblement continue, à chacun desdits murs de côté rigides (13-15) pour recevoir les marchandises solides.

8. Un conteneur de cargaison (C) suivant la revendication 7, dans lequel lesdits moyens-charnières séparés sont formés par une extrémité périphérique dudit panneau (17, 18) qui coopère avec une portion supérieure d'une section inférieure fixe (15) d'un mur respectif desdits murs de côté rigides (11, 13, 14) de ladite enceinte (10) en forme de boîte, ladite extrémité périphérique du panneau comprenant au moins une portion convexe et arquée (29) se prolongeant entre des murs supérieur et inférieur dudit panneau (17, 18) et ayant un rayon de courbure R autour d'un axe de rotation, ledit axe de rotation et un plan longitudinal de symétrie dudit panneau (17, 18) étant coplanaires, ledit rayon de courbure R étant déterminé par la formule:

$$R = \frac{t}{2} \sqrt{2} \quad ,$$

dans lequel t est égal à l'épaisseur dudit panneau (17, 18);

ladite portion de panneau (29) convexe et arquée pouvant se déplacer à rotation à l'intérieur d'un évidement longitudinal et concave (33) de section semi-circulaire ayant un rayon égal audit rayon de courbure R et ménagé autour dudit axe de rotation à un angle de 45° dans un coin supérieur et intérieur de ladite portion supérieure entre des extrémités de ladite portion supérieure de ladite section inférieure fixe (15) dudit mur de côté rigide (13, 14) respectif, ledit panneau (17, 18) pouvant se déplacer à rotation sur un arbre (31) coaxial avec ledit axe de rotation et se prolongeant à travers ladite extrémité périphérique du panneau et ayant ses extrémités installées dans lesdites extrémités de ladite portion supérieure.

9. Un conteneur de cargaison (C) suivant la revendication 8, dans lequel ladite extrémité périphérique du panneau comprend une série de portions arquées et convexes (29) qui sont alignées de façon longitudinale et espacées les unes des autres avec une série d'évidements (33) correspondants qui sont espacés et concaves étant ménagés dans ledit coin supérieur intérieur de ladite portion supérieure de

ladite section inférieure fixe (15) dudit mur de côté rigide (13, 14), d'où ladite portion supérieure ménage une série de sections supérieures et intérieures de coin (32a) qui sont espacées longitudinalement par lesdits évidements concaves (33), des portions-sièges concaves (30) de rayon de courbure R étant ménagés dans ladite extrémité périphérique du panneau entre lesdites portions arquées et convexes (29) et vis-à-vis lesdites sections supérieures et intérieures de coin (32a), lesdites portions-sièges concaves (30) étant conçus pour se déplacer à rotation sur lesdites sections supérieures et intérieures de coin (32a) suivant un pivot dudit panneau (17, 18).

10. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel des assemblages supérieurs et inférieurs de raccordement (48, 49) sont fournis pour attacher de façon étanche ladite manche (5) verticalement autour des côtés périphériques et verticaux respectivement desdits murs supérieur et inférieur (3, 2) du vaisseau.

11. Un conteneur de cargaison (C) suivant la revendication 10, dans lequel lesdits assemblages supérieurs et inférieurs de raccordement (48, 49) comprennent tous deux une saillie intérieure périphérique (50, 50a) attachée autour desdits côtés périphériques et une saillie extérieure périphérique (51, 51a) attachée audit vaisseau (1) avec ladite extrémité de la manche entourant de façon verticale lesdites saillies intérieures (50, 50a) et étant attachée entre lesdites saillies intérieures (50, 50a) et extérieures (51, 51a).

12. Un conteneur de cargaison (C) suivant la revendication 11, dans lequel un joint d'étanchéité (57, 57a) est fourni entre ladite extrémité de la manche et ladite saillie intérieure (50, 50a).

13. Un conteneur de cargaison (C) suivant la revendication 12, dans lequel ladite saillie extérieure (51, 51a) comprend des sections de coin (53, 53a) et au moins une section droite (52, 52a) se prolongeant entre chaque paire de sections de coin (53, 53a) successives.

14. Un conteneur de cargaison (C) suivant la revendication 13, dans lequel lesdites sections de coin (52, 53a) et droites (52, 52a) incluent des portions (54) qui se chevauchent de façon horizontale, chaque arrangement desdites portions chevauchantes (54) incluant un moyen d'évidement (55) ménagé longitudinalement à l'extrémité de l'une desdites portions et conçu

pour recevoir à glissement un moyen-doigt (56) dépassant de l'autre desdites portions, d'où une insertion longitudinale appropriée du moyen-doigt (56) dans le moyen d'évidement (55) permet un ajustage longitudinal desdites sections de coin (53, 53a) et droites (52, 52a) l'une par rapport à l'autre tout en conservant un contact périphérique continu entre ladite saillie extérieure (51, 51a) et ladite extrémité de manche et ainsi un joint périphérique qui est étanche et continu.

15. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel lesdits moyens (60) pour empêcher lesdits murs de côté (5) du vaisseau de pénétrer dans les espacements (61) ménagés entre le mur supérieur (3) du vaisseau et les murs de côté rigides (11-15) comprend au moins une patte (60) de fermeture d'espacement fournie à chaque côté périphérique dudit mur supérieur (3) du vaisseau pour empêcher ladite manche (5) de s'enclaver dans lesdits espacements (61), ladite patte (60) comprenant une surface extérieure verticale et plane et une surface inférieure qui ménage une rainure (64) qui se prolonge horizontalement, ledit mur supérieur (3) du vaisseau comprenant à chacun de ses côtés périphériques au moins un membre horizontal (52) se prolongeant vers l'extérieur en direction desdits murs de côté rigides (11-15) et étant espacé de ces derniers et engageant à glissement ladite rainure (64), ladite manche (5) se prolongeant vers le bas dudit mur supérieur (3) du vaisseau et sous ladite patte (60) et s'appuyant contre une portion (63) de ladite patte (60) plus basse que ladite rainure (64) pour maintenir ladite surface extérieure de ladite patte (60) contre lesdits murs de côté rigides (11-15) et ainsi fermer ledit espacement (61), ladite patte (60) pouvant se déplacer à glissement sur le membre horizontal (52) de façon à embrasser différentes grandeurs d'espacement tout en demeurant en position entre ledit mur supérieur (3) du vaisseau et lesdits murs de côté rigides (11-15).
16. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel lesdits moyens (24) pour attacher ledit mur supérieur (3) du vaisseau dans ladite position déployée comprennent une série d'assemblages de loquet (34) fournis pour attacher ledit mur supérieur (3) du vaisseau audits panneaux (17, 18) dans ladite position déployée dudit vaisseau (1), d'où ledit vaisseau (1) peut être déployé par pression d'air de ladite position rétractée à ladite position déployée au moment où ledit mur supé-

rieur (3) du vaisseau est attaché audits panneaux (17, 18) à l'aide desdits assemblages de loquet (34) permettant ainsi le retrait de la pression d'air du vaisseau déployé pour recevoir des liquides.

17. Un conteneur de cargaison (C) suivant la revendication 16, dans lequel lesdits assemblages de loquet (34) comprennent des loquets intérieurs (35) et extérieurs (36) qui coopèrent ensemble et qui sont fournis respectivement le long de la périphérie supérieure dudit mur supérieur (3) du vaisseau et le long de la périphérie intérieure desdits panneaux (17, 18), chaque paire de loquets intérieur et extérieur (35, 36) en coopération étant conçus pour s'engager l'un à l'autre à la position déployée dudit vaisseau (1) et pour être assujettis ensemble afin d'installer le mur supérieur (3) du vaisseau aux panneaux dépliés (17, 18).
18. Un conteneur de cargaison (C) suivant la revendication 17, dans lequel lesdits loquets extérieurs (36) comprennent chacun une patte (37) en forme de L renversé et ayant une portion verticale se prolongeant vers le bas et à distance d'un panneau respectif (17, 18) et d'une rainure (38) de patte ménagée dans ladite portion verticale, lesdits loquets intérieurs (35) comprenant chacun une cornière (39) ayant la forme d'un L renversé et se prolongeant vers le haut à partir du mur supérieur (3) du vaisseau et ayant une portion horizontale à distance de ce dernier et se prolongeant vers l'extérieur en direction d'un panneau respectif (17, 18), une rainure (40) de cornière étant ménagée dans ladite portion horizontale avec ladite portion verticale de ladite patte (37) pouvant être déplacée à glissement dans ladite rainure (40) de cornière, ledit loquet intérieur (35) incluant également un moyen à came (41) monté à pivot sous ladite portion horizontale de ladite cornière (39) et conçu suivant son pivot pour s'engager dans ladite rainure (38) de patte, d'où, lorsque ledit mur supérieur (3) du vaisseau est en train d'être déployé, ladite patte (37) s'engage dans ladite rainure (40) de cornière, le mouvement vers le haut dudit mur supérieur (3) du vaisseau étant limité par ladite cornière (39) s'appuyant contre le dessous de ladite portion horizontale de la patte (37) permettant ainsi audit moyen à came (41) d'être pivoté afin d'être engagé dans ladite rainure (38) de patte et afin de limiter un mouvement vers le bas dudit mur supérieur (3) du vaisseau lorsque la pression d'air est retirée dudit vaisseau (1).

19. Un conteneur de cargaison (C) suivant la revendication 18, dans lequel un moyen-câble (43) est fixé de façon successive aux moyens à came (41) de chacun desdits assemblages de loquet (34), les extrémités dudit moyen-câble (43) étant attachées à un mécanisme de tirage et de verrouillage (46) fournit sur ledit mur supérieur (3) du vaisseau afin de former une boucle fermée, d'où ledit moyen-câble (43) peut être tiré de façon sélective dans l'une ou l'autre de deux directions pour engager ou dégager lesdits moyens à came (41) desdits loquets intérieurs (35) des loquets extérieurs (36).
20. Un conteneur de cargaison (C) suivant la revendication 4, dans lesquels lesdits moyens (23) pour maintenir ledit mur supérieur (3) du vaisseau parallèle audit mur inférieur (2) du vaisseau lorsque ledit mur supérieur (3) du vaisseau est déplacé verticalement comprennent un moyen de parallélisme pour chaque côté périphérique dudit mur supérieur (3) du vaisseau, chacun des moyens de parallélisme (23) incluant des premier et deuxième moyens-câbles (24, 25) qui sont tendus et une paire de moyens de guidage (26a, 26b) de câble fournis aux coins successifs dudit mur supérieur (3) du vaisseau, lesdits premier et deuxième moyens-câbles (24, 25) étant attachés à des premières extrémités (27b, 27d) de ceux-ci à des coins supérieurs différents d'un panneau respectif desdits panneaux (17, 18) correspondant audits coins successifs, lesdites premières extrémités (27b, 27d) desdits moyens-câbles (24, 25) étant attachées à un même niveau horizontal et de façon symétrique de chaque côté d'un plan vertical de symétrie dudit mur supérieur (3) au vaisseau, ledit plan de symétrie étant perpendiculaire au panneau respectif (17, 18), lesdits moyens de guidage (26a, 26b) de câble étant également horizontalement à niveau et disposés de façon symétrique de chaque côté dudit plan de symétrie, lesdits moyens-câbles (24, 25) se prolongeant vers le bas avec chaque moyen-câble (24, 25) engageant d'abord un différent moyen de guidage (26b, 26a), se prolongeant ensuite de façon parallèle au mur supérieur (3) du vaisseau et engageant l'autre moyen de guidage (26a, 26b), lesdits moyens-câbles (24, 25) étant attachés à des deuxième extrémités (27a, 27c) de ceux-ci audit conteneur (C) plus bas que ledit mur supérieur (3) du vaisseau dans ladite position rétractée, lesdites deuxième extrémités (27a; 27c) desdits moyens-câbles (24, 25) étant également attachées à un même niveau horizontal et de façon symétrique de chaque côté dudit plan de symétrie, d'où, suivant un mouvement vertical dudit mur supérieur (3) du vaisseau, lesdits moyens-câbles (24, 25) se déplacent dans des directions opposées et parallèles entre lesdits moyens de guidage (26a, 26b) de câble, lesdits moyens-câbles tendus (24, 25) exerçant des forces contrebalançantes sur ledit mur supérieur (3) du vaisseau maintenant ainsi le parallélisme de ce dernier.
21. Un conteneur de cargaison (C) suivant la revendication 20, dans lequel chaque moyen de guidage (26a, 26b) comprend un piton installé sur une surface supérieure de coin dudit mur supérieur (3) du vaisseau.
22. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel des moyens de pivot de panneau (65, 68) sont fournis pour faire pivoter lesdits panneaux (17, 18) à partir d'au moins ladite position rabattue à ladite position dépliée.
23. Un conteneur de cargaison (C) suivant la revendication 22, dans lequel lesdits moyens de pivot de panneau (65, 68) comprennent au moins un moyen-moteur (65) pour pivoter chacun d'au moins deux desdits panneaux (17, 18) entre lesdites positions rabattue et dépliée de ces derniers, ledit moyen-moteur (65) incluant un cylindre (66) monté à pivot audit conteneur (C) dans une position sensiblement horizontale et plus basse que lesdits moyens-charnières (28), un piston (67) ayant un mouvement de va-et-vient dans ledit cylindre (66) et étant monté à pivot à une première extrémité d'un bras de levier (68), des moyens-galets (71) étant montés en rotation à une seconde extrémité dudit bras de levier (68) et étant conçus pour rouler sur le panneau (17, 18) tout en conservant contact avec ce dernier, ledit bras de levier (68) étant monté en rotation dans un plan vertical audit conteneur (C) à une position intermédiaire entre ses première et deuxième extrémités et plus élevée que ledit cylindre (66) afin de pivoter suivant un axe horizontal, et étant conçu pour élever et abaisser le panneau (17, 18) lorsque ledit piston (67) est respectivement rétracté et déployé par rapport audit cylindre (66).
24. Un conteneur de cargaison (C) suivant la revendication 22, dans lequel lesdits moyens de pivot de panneau (65, 68) comprennent au moins un moyen-moteur (65) pour pivoter chacun d'au moins deux desdits panneaux (17, 18) entre lesdites positions rabattue et dépliée

de ces derniers, ledit moyen-moteur (65) incluant un moyen-treuil (112) monté en rotation audit conteneur (C), une paire de moyens-câbles attachés à leurs premières extrémités audit moyen-treuil (112) et à leurs deuxièmes extrémités chacun à un différent coin de deux coins intérieurs du panneau lorsque rabattu, des moyens de guidage (116) de câble étant fournis entre ledit moyen-treuil (112) et ledit panneau (17, 18) à un endroit au moins aussi élevé que lesdites deuxièmes extrémités desdits moyens-câbles lorsque le panneau (17, 18) est déplié, d'où ledit moyen-treuil (112) est conçu pour enrôler lesdits moyens-câbles (114) et pour ainsi tirer sur le panneau, (17, 18) de façon à ce que le panneau pivote vers le haut et en direction de ladite position dépliée.

25. Un conteneur de cargaison (C) suivant la revendication 22, dans lequel des moyens limitatifs de déploiement de panneau (78) sont fournis pour empêcher lesdits panneaux (17, 18) de pivoter durant leur ascension plus loin que ladite position verticale et déployée de ces derniers.

26. Un conteneur de cargaison (C) suivant la revendication 25, dans lequel lesdits moyens limitatifs de déploiement de panneau (78) comprennent des moyens-courroies (78) se prolongeant de façon tendue des extrémités supérieures de paires de panneaux opposés (17, 18) lorsque dans ladite position dépliée de ces derniers.

27. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel ledit vaisseau (1) est muni de moyens de canalisation (8) pour le chargement et le déchargement de liquides.

28. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel ledit vaisseau (1) est muni d'un évent (7).

29. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel ledit mur supérieur (3) du vaisseau est muni d'un trou d'homme (4).

30. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel ledit vaisseau (1) est muni d'un échangeur de chaleur (9) pour maintenir les liquides à des températures sensiblement constantes.

31. Un conteneur de cargaison (C) suivant la revendication 28, dans lequel une soufflerie à air est conçue pour être connectée audit évent (7)

pour fournir une pression d'air dans ledit vaisseau (1) afin d'élever ledit mur supérieur (3) du vaisseau vers ladite position déployée.

5 32. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel des moyens d'ancrage (22) sont fournis pour fixer le conteneur de cargaison (C) sur un véhicule.

10 33. Un conteneur de cargaison (C) suivant la revendication 4, dans lequel ladite enceinte (10) en forme de boîte comprend un plancher rigide (12, 12a) qui connecte des extrémités inférieures desdits murs de côté rigides (11, 13-15), ledit mur inférieur (2) du vaisseau étant superposé sur ledit plancher rigide (12, 12a) de l'enceinte.

20 34. Un conteneur de cargaison (C) suivant la revendication 17, dans lequel une pluralité desdites séries desdits assemblages de loquet (34) sont fournies suivant plusieurs plans horizontaux, d'où ledit mur supérieur (3) du vaisseau peut être fixé aux panneaux (17, 18) dépliés à plusieurs positions horizontales intermédiaires aux positions déployée et rétractée de ces derniers, fournissant ainsi au conteneur de cargaison (C) un vaisseau (1) à volume variable.

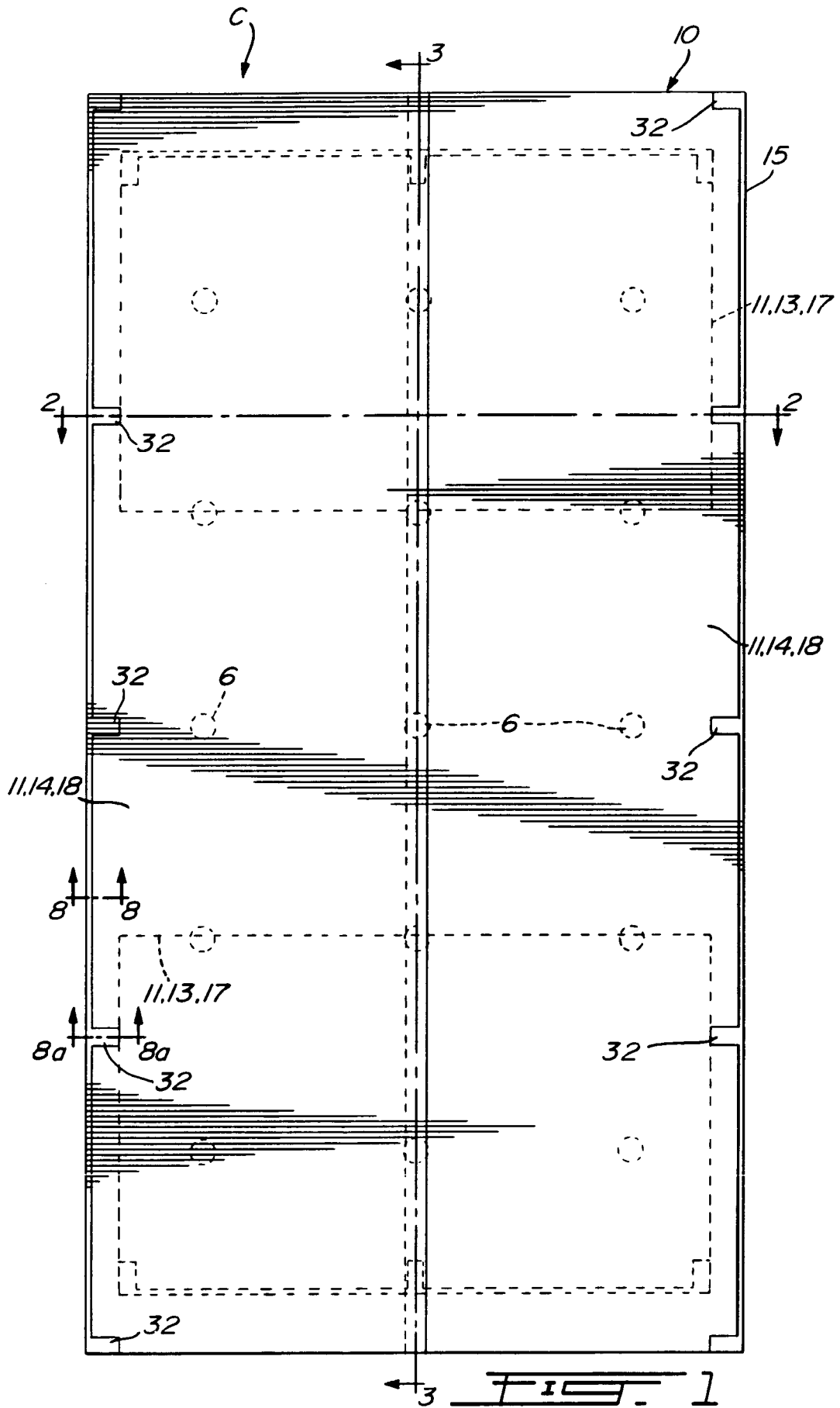
25 35. Un conteneur de cargaison (C) suivant la revendication 28, dans lequel des moyens sont fournis pour varier la grandeur dudit évent (7) et donc la circulation d'air à travers ce dernier de façon à contrôler la vitesse de descente dudit mur supérieur (3) du vaisseau de ladite position déployée à ladite position rétractée.

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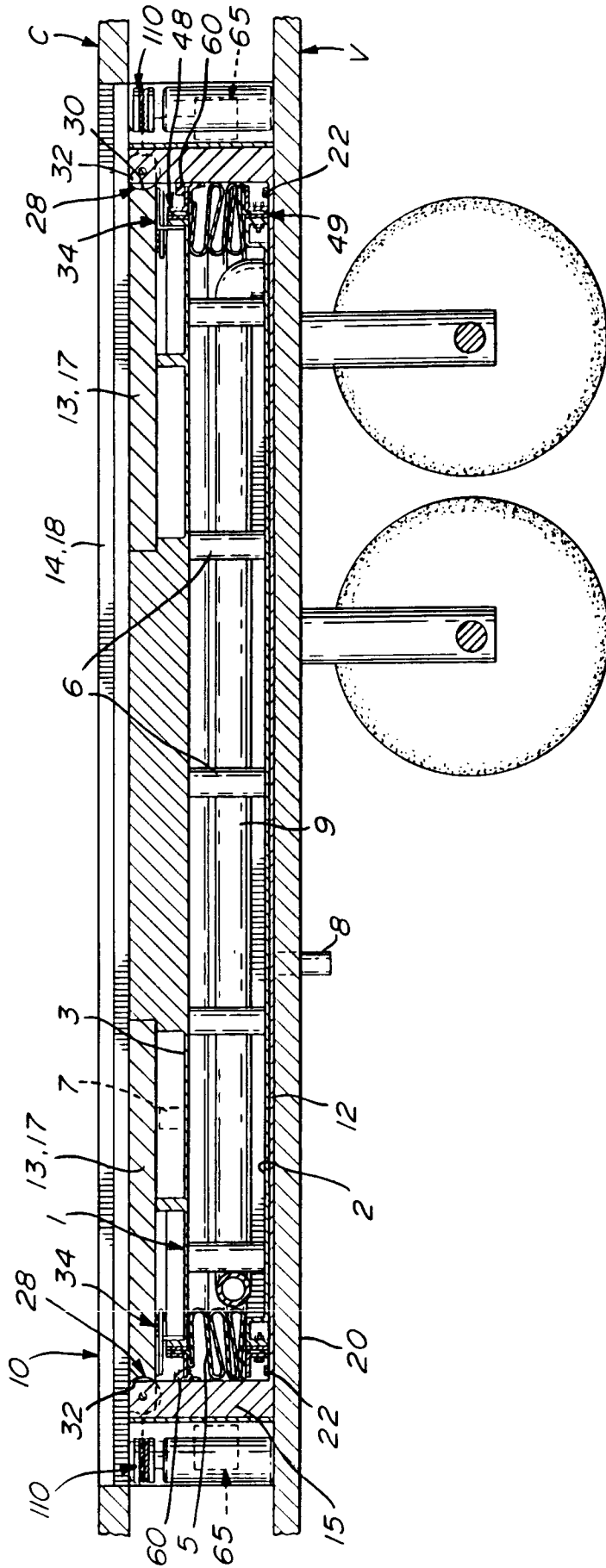
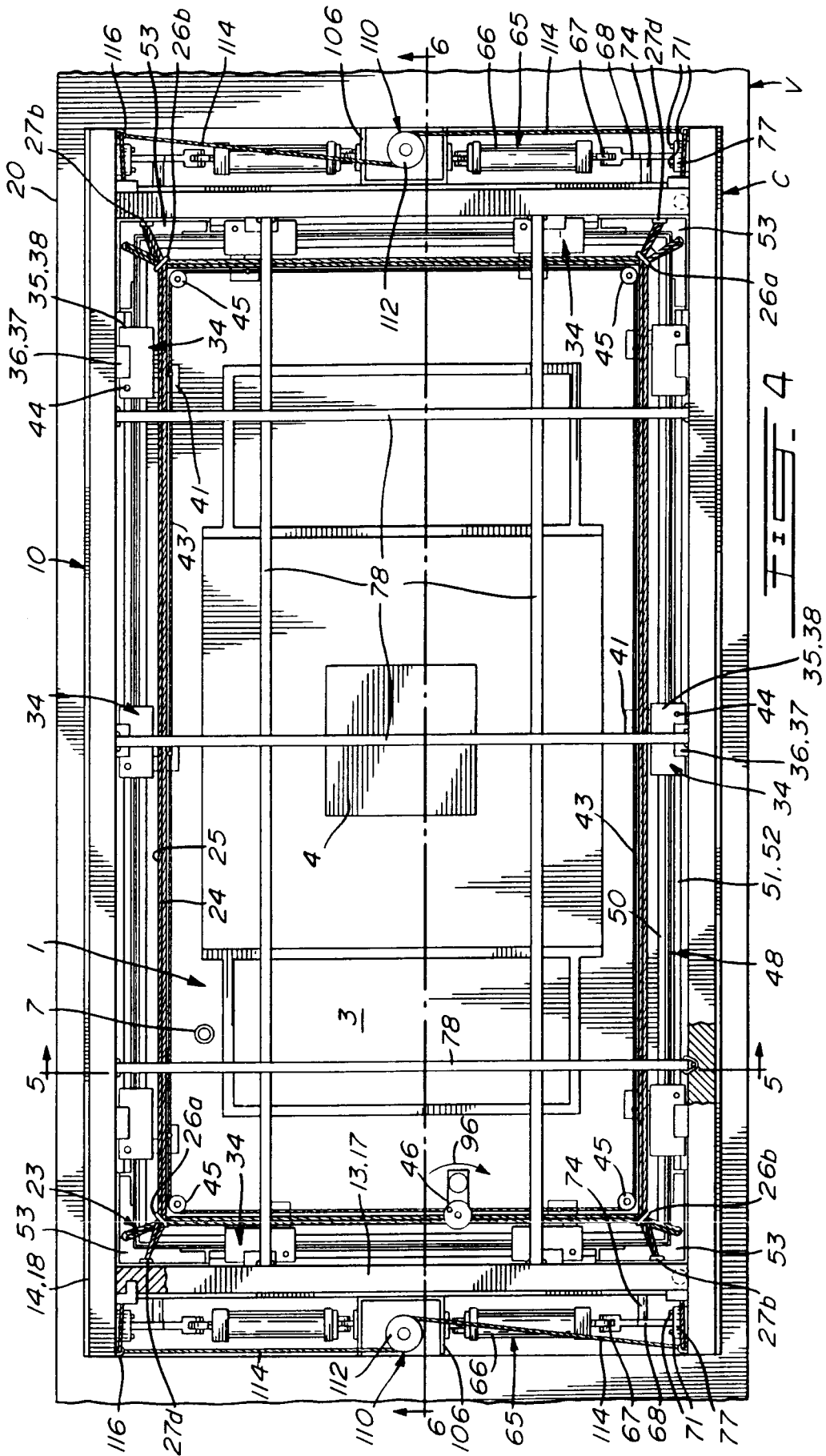


FIG. 3



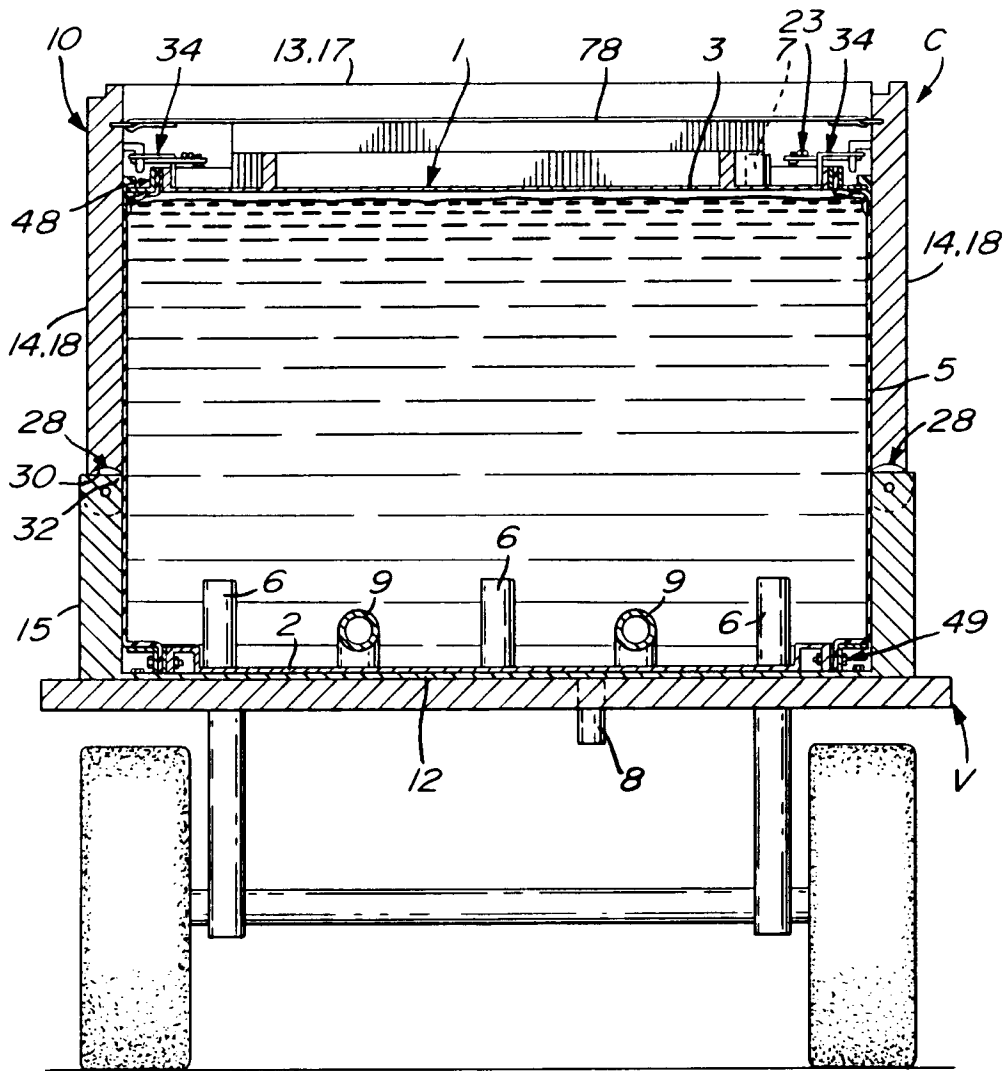


FIG. 5

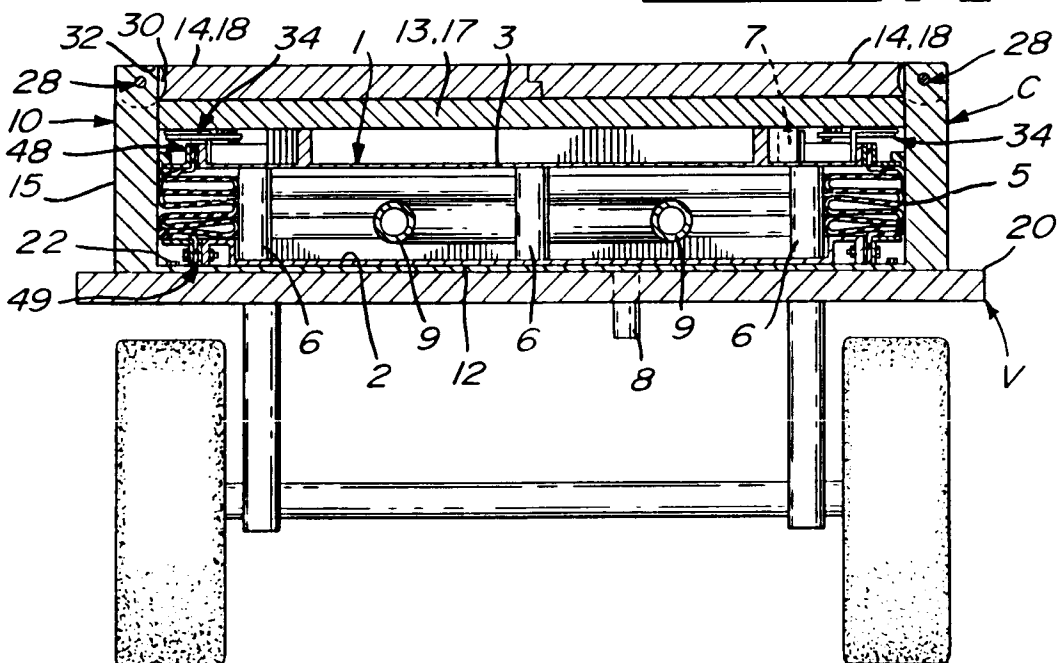
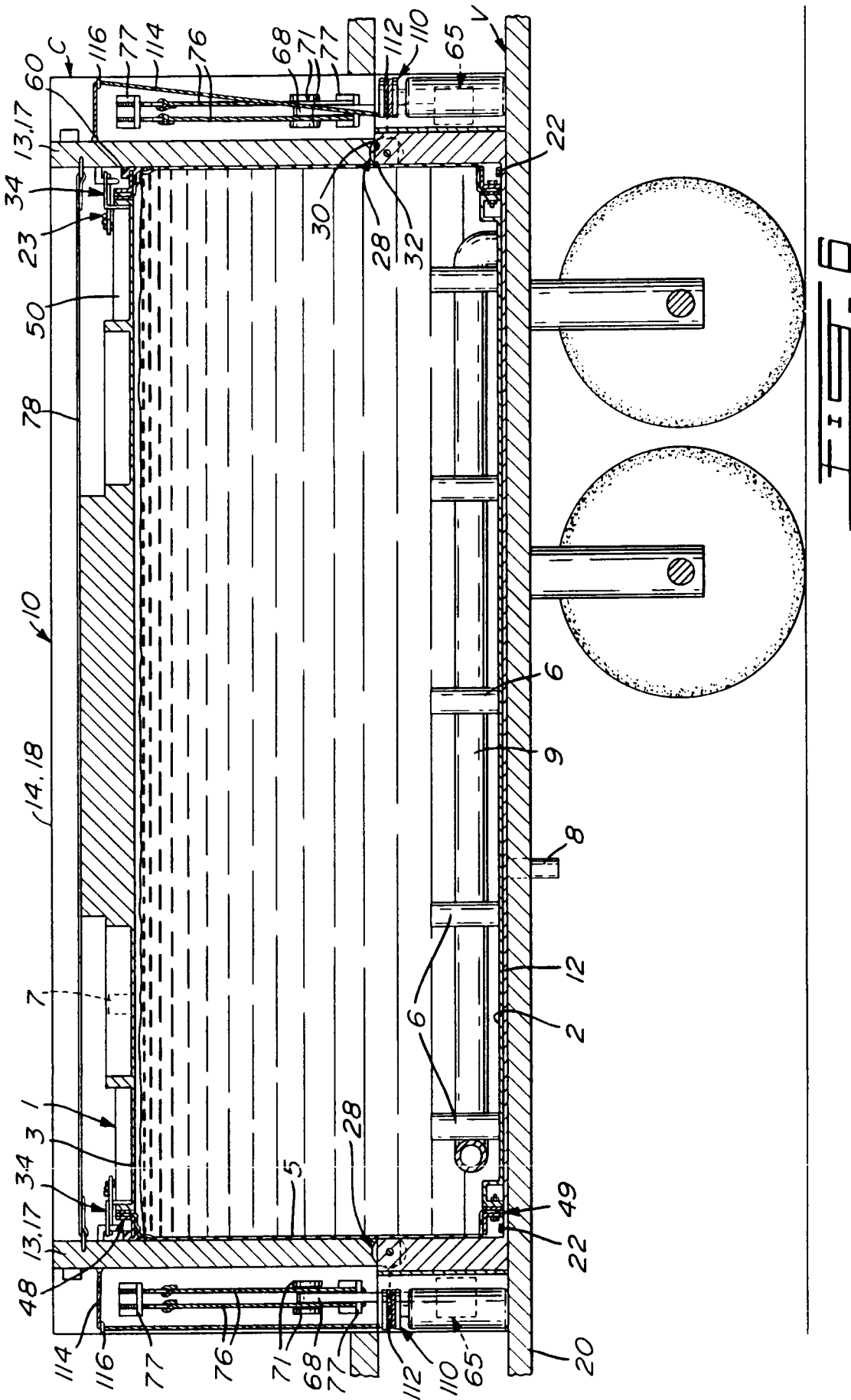
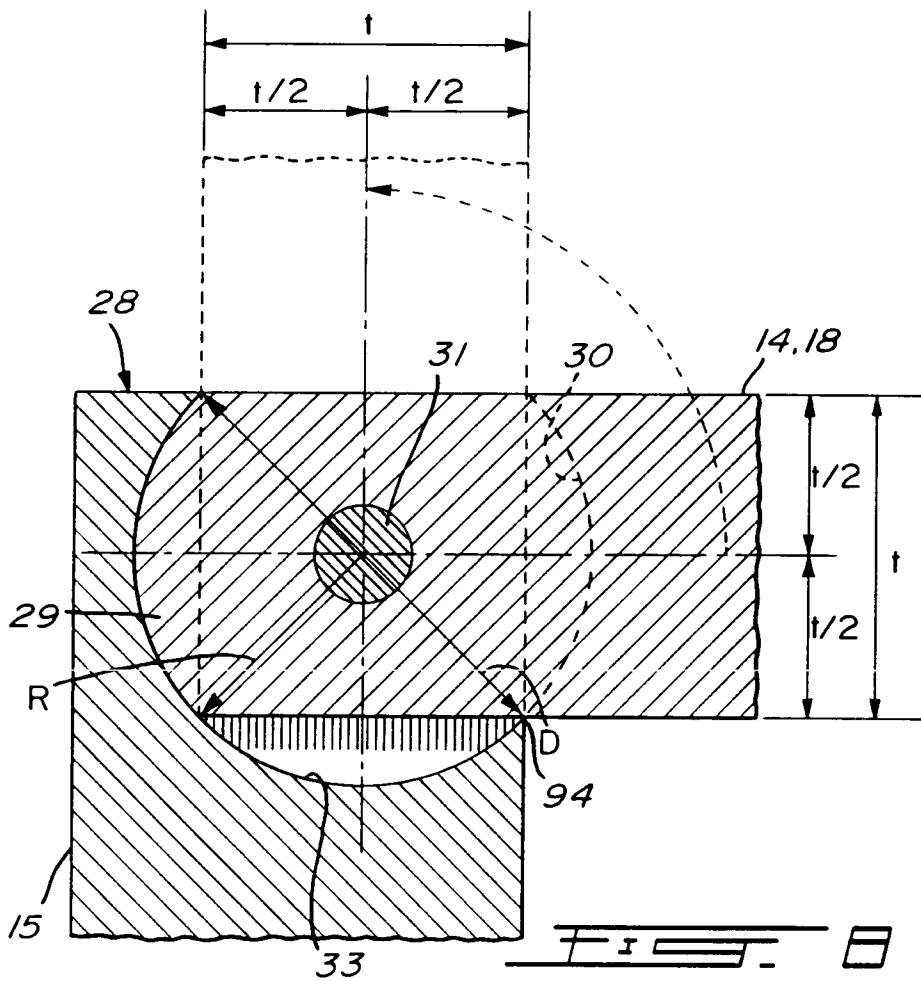
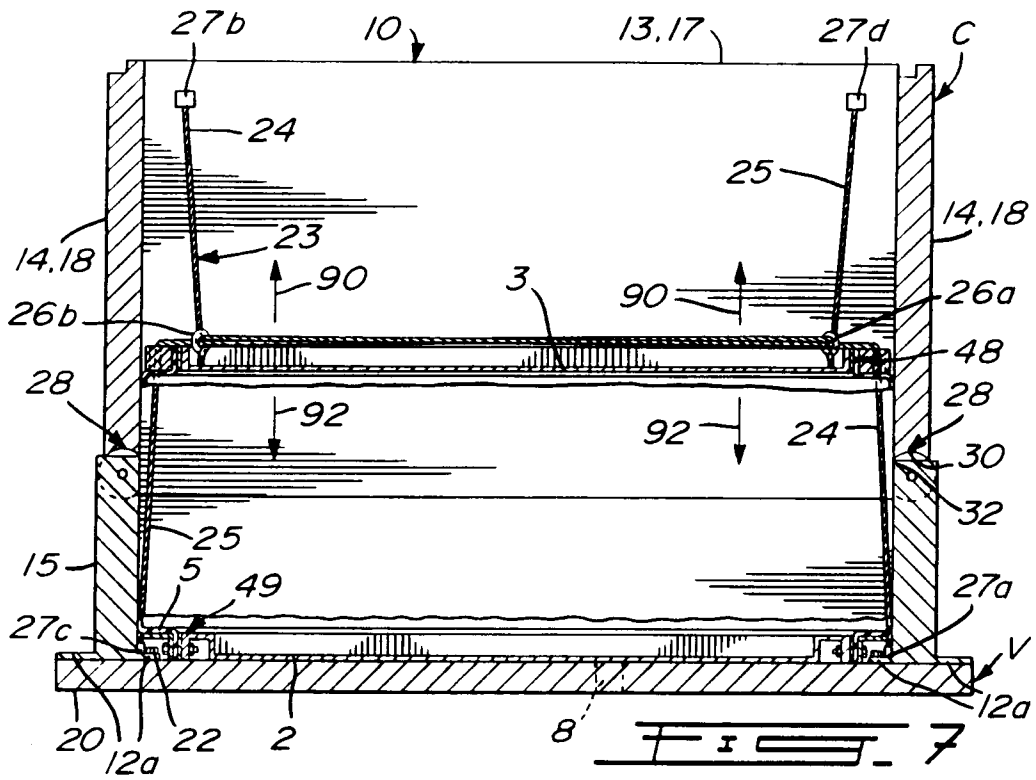
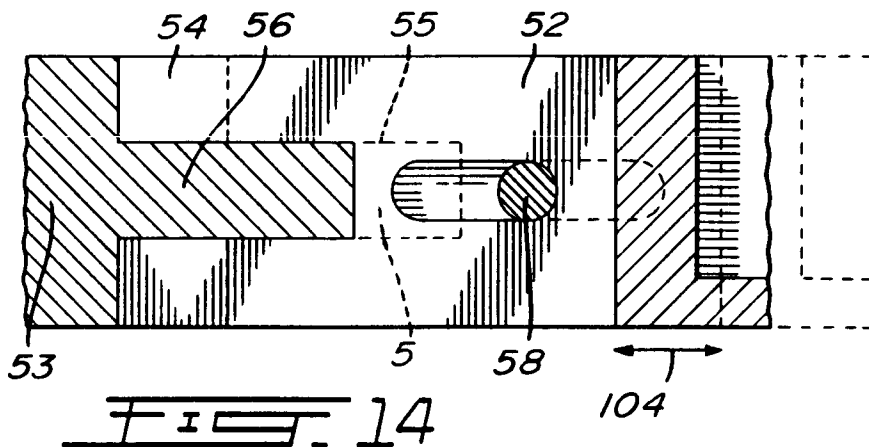
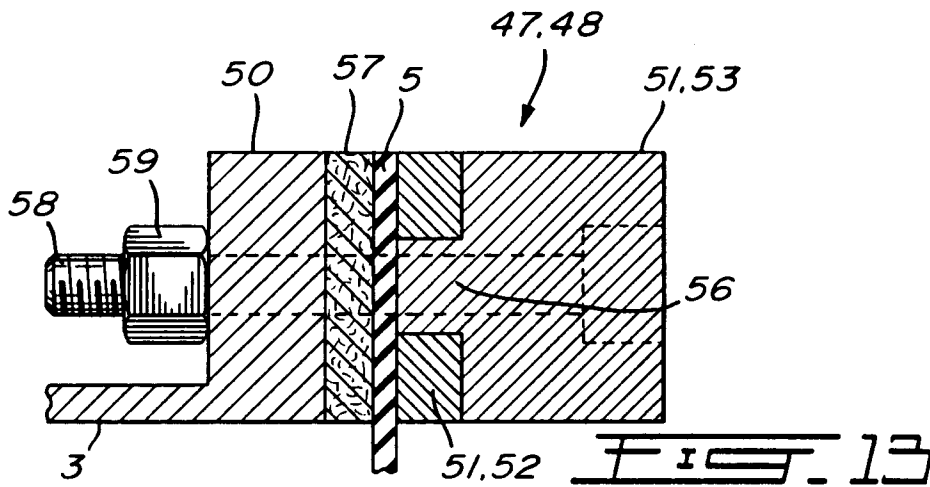
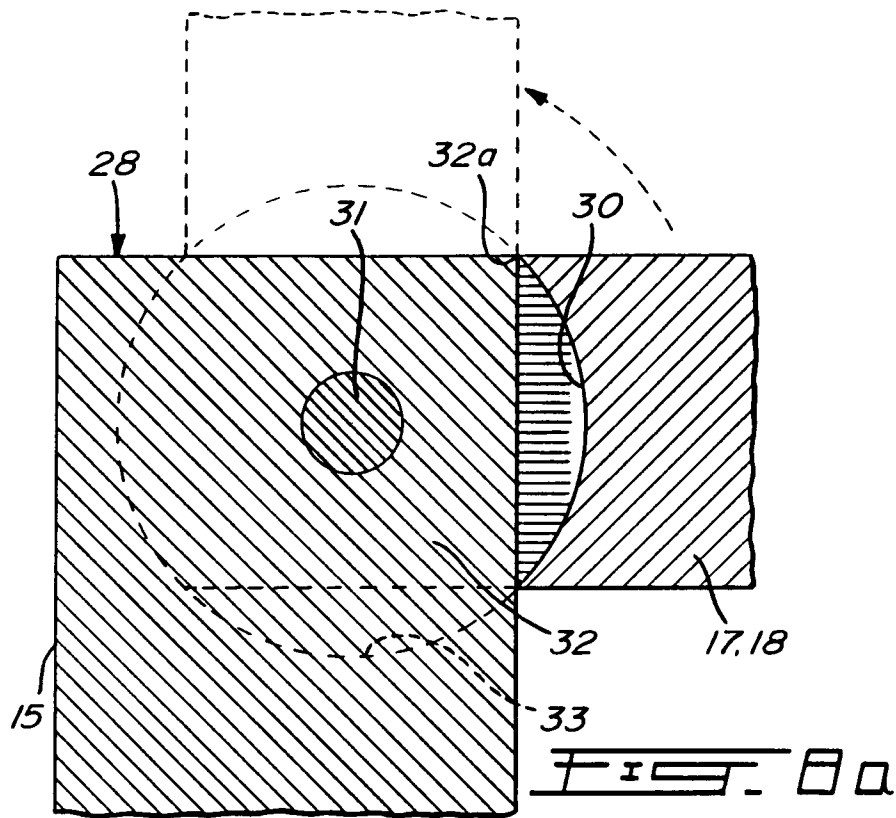


FIG. 2







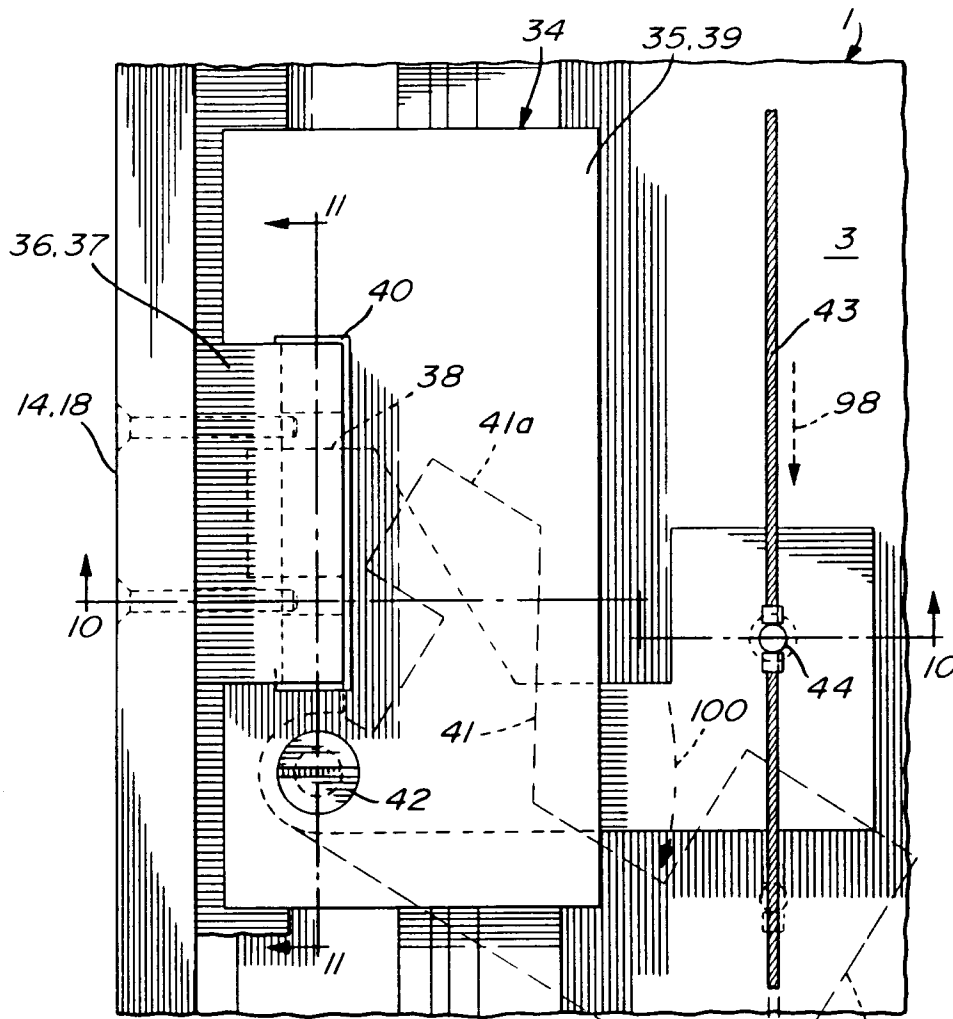


FIG. 9

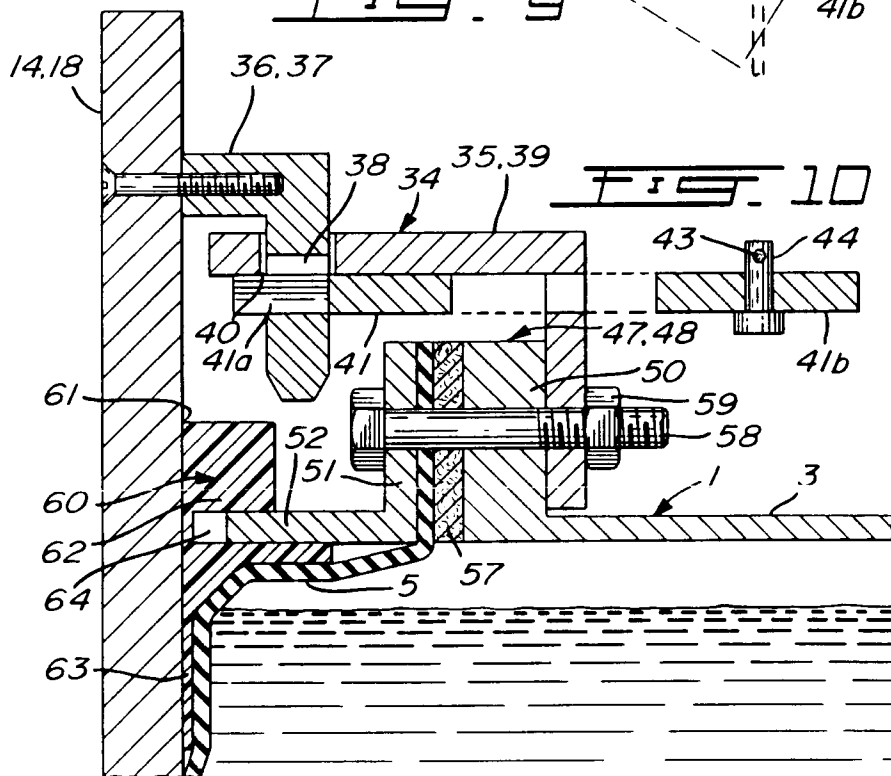


FIG. 10

