

Feb. 7, 1967

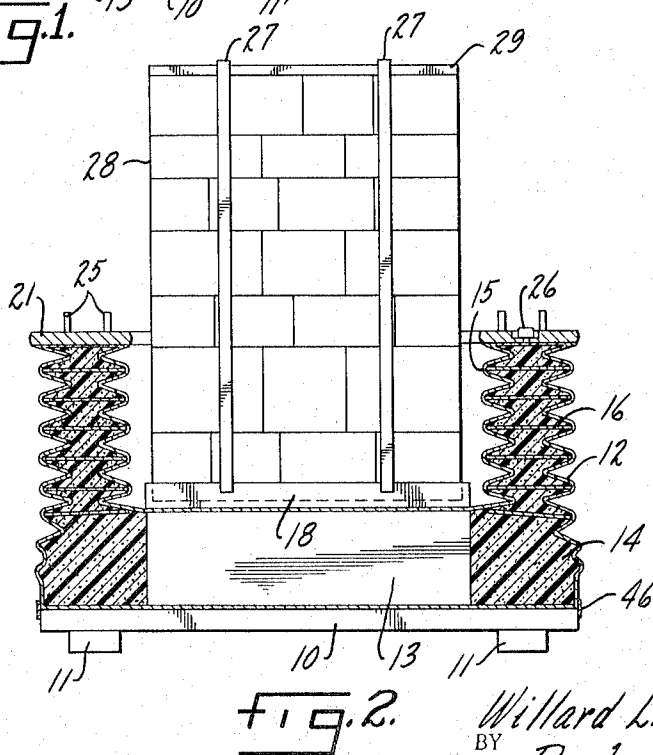
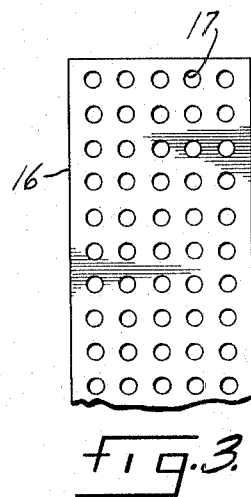
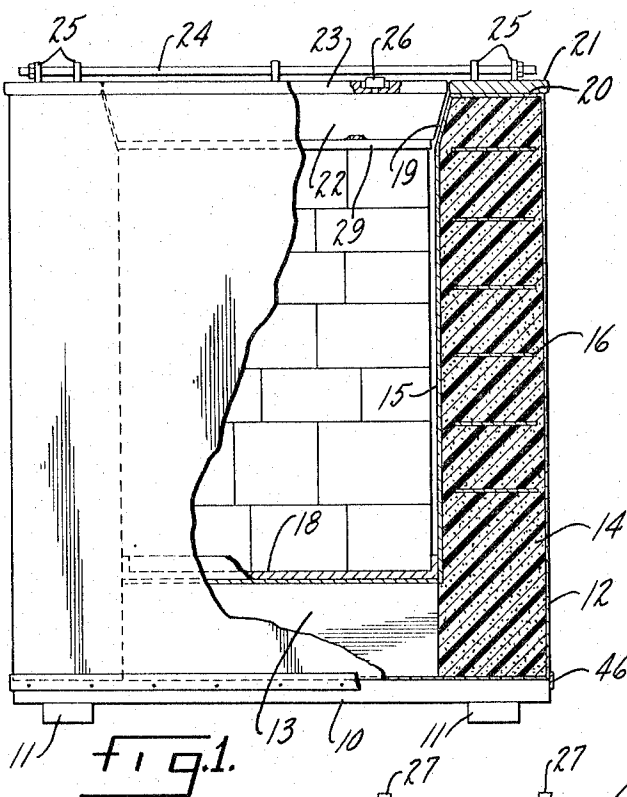
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3,302,815

INSULATED SHIPPER CONTAINER

Filed Feb. 28, 1963

3 Sheets-Sheet 1



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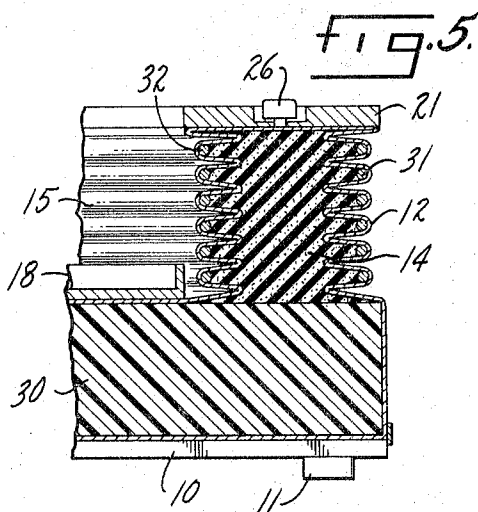
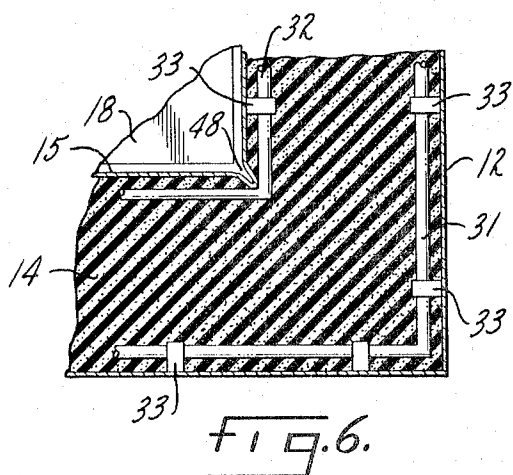
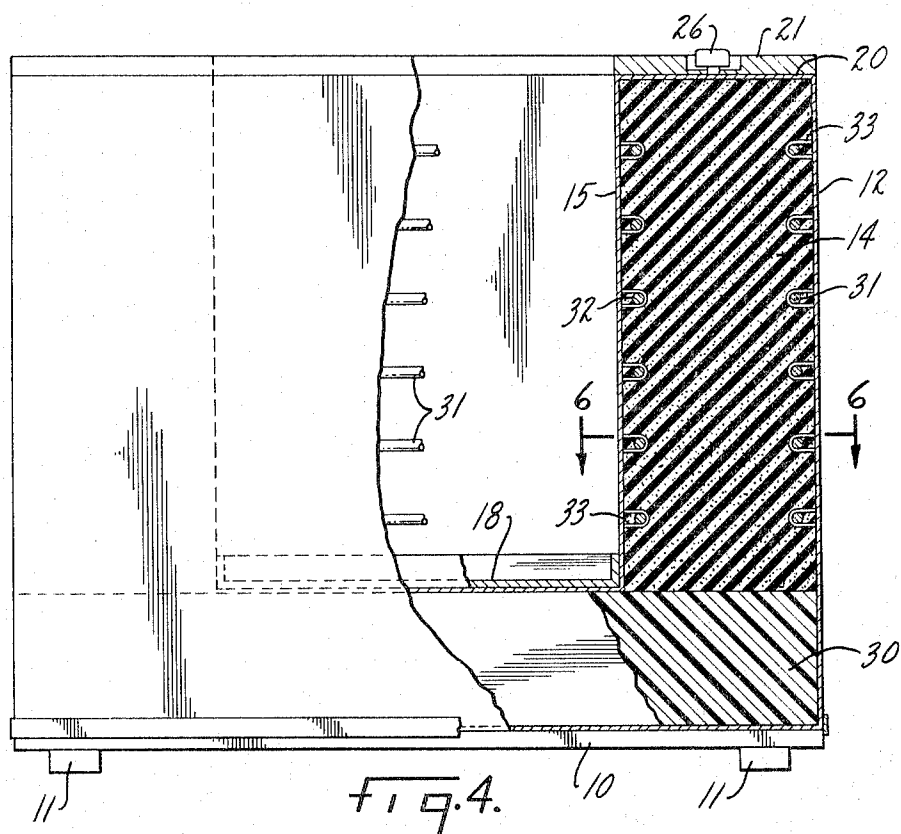
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3 Sheets-Sheet 2



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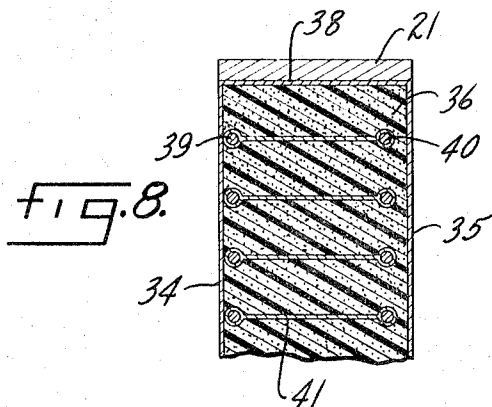
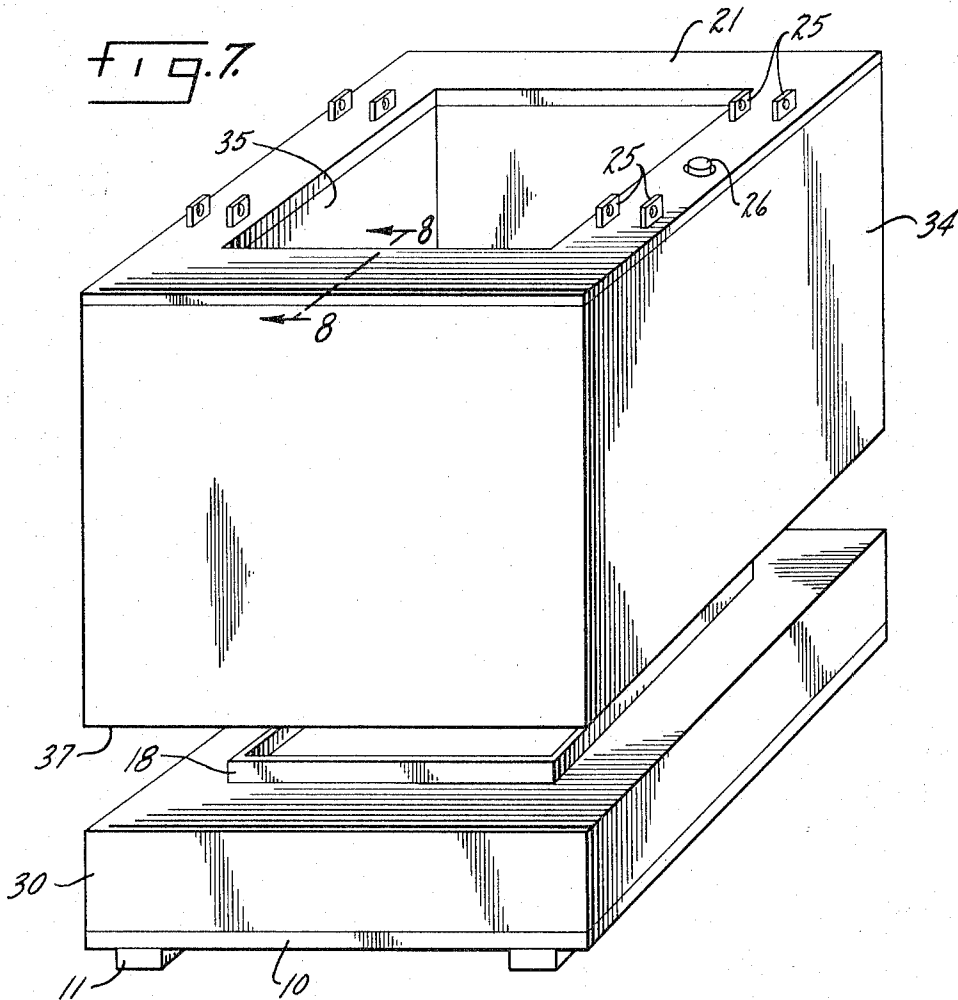
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3 Sheets-Sheet 3



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3,302,815

INSULATED SHIPPER CONTAINER

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10 Claims. (Cl. 220-9)

This invention relates to improvements in insulated shipper containers and has for one object to provide a portable collapsible shipper container especially adapted for insulated shipment of less than carload lots.

Another object is to provide an insulated shipper container which can be easily loaded and unloaded and which can be collapsed empty for return shipment, thereby greatly reducing the cost of return shipment of the container.

Another object is to provide a flexible, expandable, collapsible insulating container that is light, cushions the contents against excessive shock and is easily assembled and disassembled.

Another object is to provide a shipper container which includes only two main separable parts, the ported container itself and the removable door attaching means.

Other objects will appear from time to time throughout the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

FIGURE 1 is a section through the container in its loaded, expanded, insulating position;

FIGURE 2 is a similar section showing the container collapsed for loading or unloading;

FIGURE 3 is a detail of a spacer as used in the container of FIGURES 1 and 2;

FIGURE 4 is a section similar to FIGURE 1 through a modified form of container;

FIGURE 5 is a detail of the modified form showing the container of FIGURE 4 collapsed;

FIGURE 6 is a section along the line 6-6 of FIGURE 4;

FIGURE 7 is an exploded perspective of a modified form of shipper container;

FIGURE 8 is a section along the line 8-8 of FIGURE 7.

Like parts are indicated by like characters throughout the specification and drawings.

Referring to FIGURES 1, 2 and 3, a rigid pallet 10 is skidded at 11 for use with the usual type of fork lift truck. A fabric-like, gas tight bag or membrane 12 of any suitable flexible material which may be flexible plastic, coated canvas or any other suitable material that is flexible and water and gas tight, rests upon the upper surface of the pallet 10 and extends upwardly therefrom to the top of the container, forming the outer shell thereof. The bottom of the bag will be adhered to the pallet 10 and will enclose, adhered to the inner surface thereof, a rigid load supporting, insulating body 13, the cross sectional area of which is such that its boundaries are well within and out of contact with the periphery of the bag 12.

Contained within the bag 12 extending upwardly from the bottom thereof is a soft, expandable, contractable insulating body 14. It fills the space between the bag 12 and the rigid load supporting insulating body 13 and extends upwardly substantially to the top of the bag 12, thus defining a relatively thick insulating mass within the bag 12 and defining a storage chamber which in turn is bounded or lined by an inner gas tight bag or membrane 15 which rests upon and at its bottom is adhered to the insulating body 13. Relatively stiff, thin, spacer or stop plates 16 of non-conducting material extend horizontally in the area occupied by the soft, expandable, contractable

2

insulating material 14. These spacer plates terminate short of and are out of contact with the bags 12 and 15 and are embedded in the insulating material 14. They are apertured or foraminous as at 17 to permit air passage.

Each spacer is spaced farther from the inner bags 15 than from the outer bag 12.

A rigid tray 18 rests upon and is adhered to the bottom of the bag 15, is upwardly flanged about its periphery and is generally co-extensive with the insulating body 13. The bag 15 is flared at its upper end as at 19, a flexible annular diaphragm 20 is adhered to the upper ends of bags 12 and 15 and provides a gas tight closure for the insulating space enclosed by the bags. A door frame 21 adhered to the diaphragm 20 defines the loading and unloading port of the container.

An expandable, contractable plug or door 22 closes the insulating chamber, is tapered to conform to the contour of the space defined by the flared portion 19 of the bag 15 and comprises a gas tight bag enclosing the insulating material 14. This door is faced by a rigid panel 23. Holding rods 24 extend through loops 25 on the frame and door panel 21 to hold the door in position, closing the container. One or more valved air ducts 26 are disposed in the frame 21 in communication with the interior of the insulating gas tight chamber defined by the bags 12, 15 and diaphragm 20. A similar valved duct 26 in the door panel 23 communicates with the interior of the door 22.

When the container is to be used, the door 22 previously collapsed by withdrawal of air, will be ready for use. Air will be exhausted through the valved duct 26. This results in a collapsing of the inter-cellular soft, spongy, expandable, contractable insulation. Air pressure will tend to squeeze the walls inwardly against the spacers 16 and will also tend to force the frame 21 downwardly, thus reducing the total volumetric capacity of the insulation. The bag wall will collapse inwardly between the spacers 16 as indicated and the result will be a low relatively rigid, collapsed wall body. It will be noted that the wall shrinks inwardly, thus increasing the width of the space immediately above the tray 18.

Tension straps 27 may be attached to the flanges of the tray and extend loosely outwardly over the collapsed insulation. Then packages of frozen food 28 are stacked on the tray to a height substantially equal to the depth of the insulating chamber between the tray 18 and the door 22. This can be done because as indicated, the inner bag has been pulled away against the spacers 16. The fact that the spacers are further removed from the inner than from the outer wall of the insulating chamber insures a substantial retreat of the inner bag wall from the area to be occupied by the material and from the material. When the desired amount of material has been assembled, a plate 29 will be placed upon the top of the pile. The holding straps 27 will be tightened over the material and the tie plate 29, thus defining a rigid bale of frozen food. The valve 26 then will be opened and the expendable, contractable, inter-cellular insulation will as a result of its memory, expand from the position shown in FIGURE 2 to the position shown in FIGURE 1. At that time the collapsed door 22 will be put in place, the holding bars 21 being inserted. The valve 26 in the door will be opened, air will enter to permit the door to expand laterally against the bag 15, against the cover 23 and the plate 29 owing to the memory of the insulating material. Thus there is defined a solid, manipulatable insulated shipper container.

When the container with its load arrives at destination, the door 22 will be exhausted of air to collapse it. The holding bars 24 may be removed and the door will be removed in collapsed position. The insulating chamber

defined by the bags 12 and 15 will be exhausted returning from the position shown in FIGURE 1 to that shown in FIGURE 2, exposing the frozen packages so that when the holding straps are released and the plate 29 removed, the frozen packages may be taken out of the container. This will be done easily because the bag 15 by atmospheric pressure is forced against the spacers 16 out of contact with the frozen material.

In the modified form of FIGURES 4 and 5 and 6, the spacers 16 are omitted and in place of the hard, load supporting insulation 13, a slab of insulation 30 extends clear across the pallet 10.

Metal rings 31 and 32 respectively encircle the storage chamber, conform generally to the contour of the bags or membranes 12 and 15 but are spaced inwardly therefrom, being connected thereto by flexible loops 33. These loops and the rings 31 and 32 are embedded in the flexible, contractable, expandable insulation. They act in much the same way as the spacer 16. That is to say, when the insulation is exhausted, the rings limit the inward movement of the bag walls so as to insure that most of the collapse of the insulation will be vertical instead of horizontal and to insure that the bag walls will assume the general accordion folded position from which they can be easily expanded and which does not in any way interfere with the loading of the frozen goods onto the tray 18.

The expansion or contraction of the gas tight insulating wall or envelope is gradual. When collapsed it is out of contact with the load, being insulated. As it expands it tends to come in contact with the load toward the end of its expansion so that contact with the load does not effectively interfere with vertical expansion or contraction. As the insulation contracts or collapses the bag 15 tends to draw away from the load to free it for vertical movement.

The shipper container is preferably rectangular in horizontal cross section. Thus the rings 31, 32 are rectangular. If the container were of other shape, the rings would conform.

Spacers 16 in each side wall or panel of the shipper container may be independent of the spacers in the adjacent panel though if desired, they might be connected.

The intersection of the vertical part of the bag 12 and the pallet 10 is preferably reinforced by a ferrule 46.

In the modified form shown in FIGURES 7 and 8, the insulating body 30 has adhered to it the flanged pan 18. The flanged pan which defines the area to be occupied by material to be insulated is encompassed by a continuous, insulating wall. This wall comprises an outer membrane 34 inner membrane 35 and an inter-cellular, expandable, contractable, insulating material 36. The upper and lower extremities of the membranes 34 and 35 are joined by diaphragms 37, 38 which are in gas tight connection with the membranes to enclose the insulation 36 in a gas tight chamber. The annular insulating wall is adhered at bottom to the insulating pad 30 and at top to the door frame 21 which carries the valved duct 26. The insulating body 36 contains stop rings 39 and 40 which are embedded in the insulation 36 but spaced from the membranes 34 and 35. The rings extend clear around the insulating wall and are tied together by cloth sheets 41 so that they are free to raise and lower as pressure changes the elastomeric, inter-cellular formation.

The container of FIGURES 1, 2, and 3 may be assembled conveniently by first adhering the bag 12 to the pallet 10. Then the load supporting insulation block 13 would be put in place in the bag and cemented to the bag bottom. Thereafter the bag 15 will be put in place and cemented to the insulating block 13. The tray 18 will then be cemented to the bottom of the bag 15. Formed intercellular plastic will then be poured into the space between the two bags to a suitable height. Then a spacer will be put in place and more insulation will be placed above it for a suitable distance with another

spacer being put in place. This continues until the space between the two bags is completely filled, when the gas tight diaphragm 20 is adhered to the insulating material and to the two bags to complete the gas tight chamber for the insulating material. The door frame 21 is then adhered to the diaphragm 20 being apertured to receive the valved duct 26, the stem of which penetrates into the air chamber.

The modification of FIGURES 4, 5 and 6 may be somewhat differently assembled if desired. The two bags, the load supporting insulation and the tray will be assembled as before. The rings 31, 32 will be placed adjacent the bag walls 12 and 15 connected to them by loops 33. The bags will be held in their upper position. Thus the panel and the soft expandable, contractable insulating filler can in one operation be injected into the insulating space to fill the space between the two bags.

The insulation of FIGURES 1, 2, 3 and 7 and 8 may also if desired be cast or formed in advance independently of the bags 12 and 15 and after the bags are assembled such monolithic insulation may be inserted in the space between the bags 12 and 15 and may or may not be adhered thereto.

The importance of the apertures 17 in the spacers 16 is that it makes it possible for the plastic insulation to penetrate the openings and tie the insulation above and below the plate together but more important than that, it leaves a free passage for the air as it is drawn from the insulation to cause its collapse or travels to the insulation as the insulation expands.

Inter-cellular rubber-like elastomeric or other plastic insulation material has a memory. When it is collapsed by mechanical pressure it shrinks. When that pressure is relieved, it tends to expand to return to its original size and shape. When air is withdrawn from the space containing this insulation, atmospheric pressure applies mechanical pressure to the top and both sides of the bag assembly, squeezes the bag walls together horizontally but that can only take place through a limited excursion, being spaced by the spacers, or the rings, long before the air is all exhausted. Further exhaustion of the air causes the bag assembly to collapse vertically. Since the vertical walls of the bag assembly are much greater in area than the top of the bag assembly, withdrawal of the air tends to collapse the vertical walls more rapidly thus accomplishing an early separation between the bag walls and the load and leaving the bag free to collapse vertically without material interference with the load.

If desired, the expansion from the initial collapsed position may be expedited by forcing air into the insulating containing chamber to assist the insulation in expanding in accordance with its memory.

In FIGURE 2, I have illustrated the shipper container collapsed with the holding straps now exposed so that they may be released to remove the load from the tray 18. When that is done, the door 22 may be put in place associated with the collapsed shipper container for return shipment.

It will be understood that the peculiar characteristic of the elastomeric material is such that the supporting characteristic of the mass is a function of the modulus of the walls of the cellular formation as related to its normal optimum geometry which of course means that the material has a memory and when distorted in volume or shape will when the pressure or power resulting from the distortion is withdrawn, resume its initial optimum shape or geometry.

This change in size and shape resulting from work done upon the mass and accompanied by its return to its original size and shape—the memory characteristic—is especially well adapted to insulation but can, of course, be useful under other circumstances and for other purposes.

The spacer plates 17 may be made of fabric or paper

or other material. They may be very thin and very flexible because being interspersed with the insulation these layer members of a different nature, being so related in position to the insulation, tend to promote collapse in a direction from side to side and perpendicular to the layer plates even though by themselves their structural strength would hardly seem to be able to bring this about. It is probably the result of the different nature of the material and also perhaps a result of resistance to air flow in the layers of different nature. Under some circumstances the rings in FIGURES 4, 5, 6 and 8 may be dispensed with and paper sheets alone being sufficient to limit the lateral collapse and insure both lateral and vertical collapse of the insulation.

While there is shown a special type of base appropriate for use with a fork lift truck, any base that is insulated and will carry a load might well be used, for example, a base very similar to, if not identical to the insulating and structural character of the side walls.

The inner membranes 15 and 35 may well be of elastomeric, stretchable material so that the wall may collapse away from the contents of the zone by merely stretching the effective length of the membrane. If the membrane is reinforced with fabric so it will not stretch the same result may be obtained by means of pleats 48 at the corners where the membranes 15 and 35 draw back.

I claim:

1. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, laterally away from the contents of the zone and downwardly toward the base, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape.

2. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, laterally away from the contents of the zone and downwardly toward the base, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape,

the wall being free to expand from its collapsed position upwardly and laterally to again encompass the zone when air is admitted to the chamber and the plastic is free to resume its original size and shape.

3. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse

under atmospheric pressure, laterally away from the contents of the zone and downwardly toward the base, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape,

stop means for positively limiting the lateral collapse of the wall comprising a series of rings encircling the zone buried in the plastic insulation, vertically spaced within the chamber, a series of said rings being adjacent each of the wall membranes, flexible air pervious webs extending laterally through the insulation, tying the rings together.

4. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, laterally away from the contents of the zone and downwardly toward the base, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape,

the inner membrane at its top being outwardly flared to define a downwardly tapering access port bounding the upper end of the storage zone, a rigid door frame encircling said port at the top of the wall, an expandable, contractable door, means for removably attaching it to the door frame to hold it in position to close the port.

5. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, laterally away from the contents of the zone and downwardly toward the base, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape,

the inner membrane at its top being outwardly flared to define a downwardly tapering access port bounding the upper end of the storage zone, a rigid door frame encircling said port at the top of the wall, an expandable, contractable door, means for removably attaching it to the door frame to hold it in position to close the port,

the door including a gas tight chamber, expandable contractable insulating material contained therein, a valved aperture for said chamber through which air may be withdrawn to collapse the door for removal and through which air may be caused to enter to expand the door to make a tight closure for the port.

6. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight in-

insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, laterally away from the contents of the zone and downwardly toward the base, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape,

stop means for limiting the lateral collapse of the wall, the stop means being free to collapse with the wall downwardly toward the base.

7. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, laterally away from the contents of the zone and downwardly toward the base, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape,

stop means for positively limiting the lateral collapse of the wall, the stop means being free to collapse with the wall downwardly toward the base,

said stop means comprising non-heat-conducting plates perpendicular to and out of contact with the inner membrane and spaced vertically apart within the insulation chamber.

8. In an insulated shipper container, a load supporting insulating base, an insulating expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure both vertically and horizontally when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape.

9. In an insulated shipper container, a load supporting insulating base, an insulating, expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape.

10. In an insulated shipper container, a load supporting insulating base, an insulating, expandable, contractable wall extending upwardly from the base, encompassing and defining a cold storage zone closed at the bottom by the base, the wall including inner and outer membranes extending upwardly from the base, defining a gas tight insulation chamber, expandable, contractable, insulating material substantially filling the chamber, a valved air duct into the chamber, the wall being free to collapse under atmospheric pressure, when air is withdrawn from the chamber through the valved air duct, and to remain collapsed while the duct is closed, the insulation in the chamber being of inter-cellular, foamed, elastomeric plastic material, having a memory which causes it when released after distortion to resume its original size and shape,

means to limit lateral collapse of the wall, said means being free to collapse with the wall toward the base.

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