Dec. 27, 1955 F. LOBL 2,728,200

REFRIGERATED SHIPPING CONTAINERS

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Fig. 1.

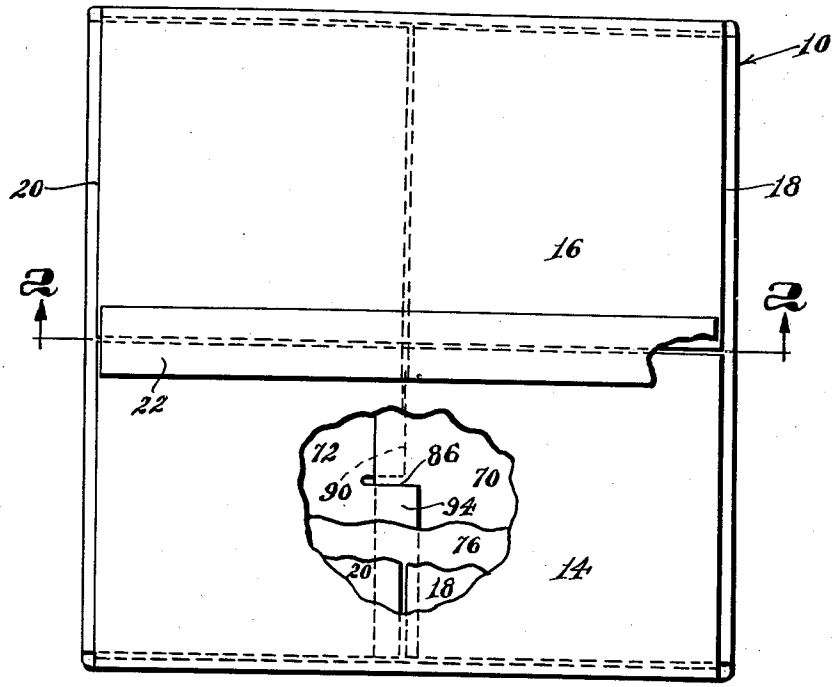


Fig. 4.

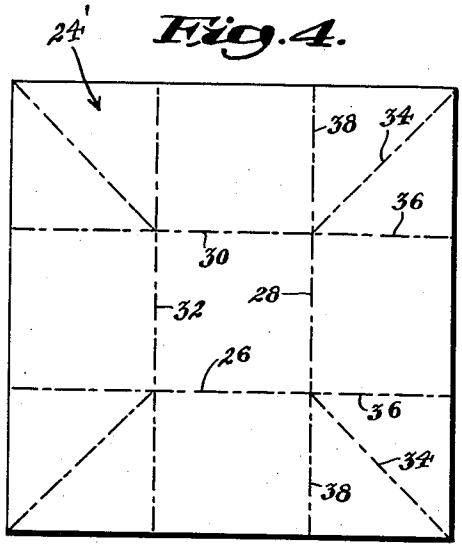
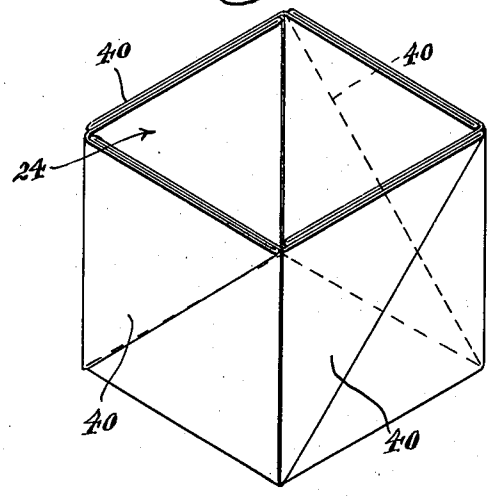


Fig. 5.



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Fig. 3.

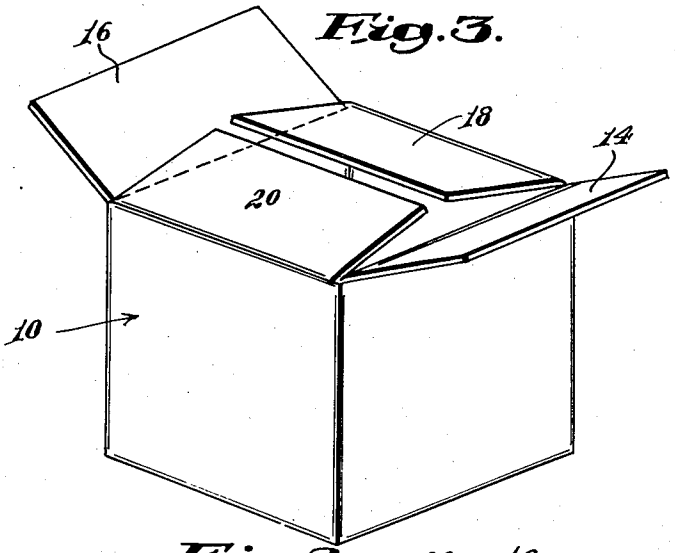
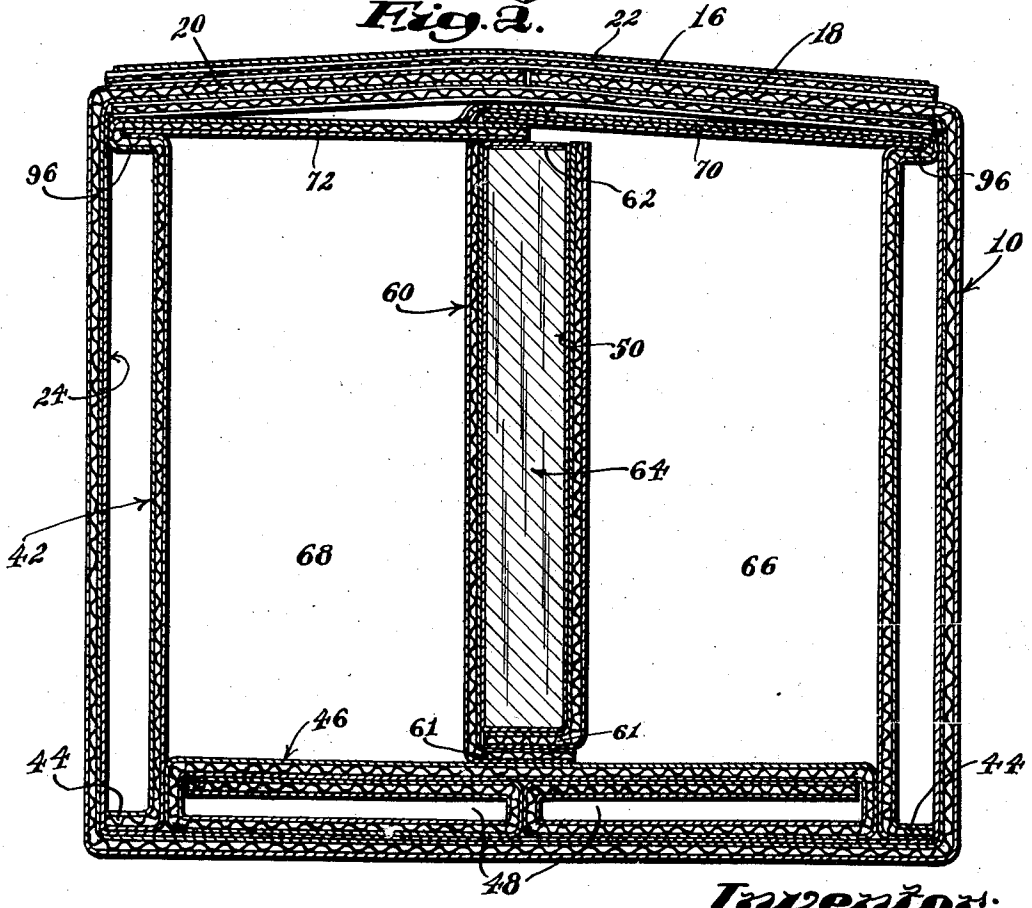


Fig. 2.



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Fig. 6.

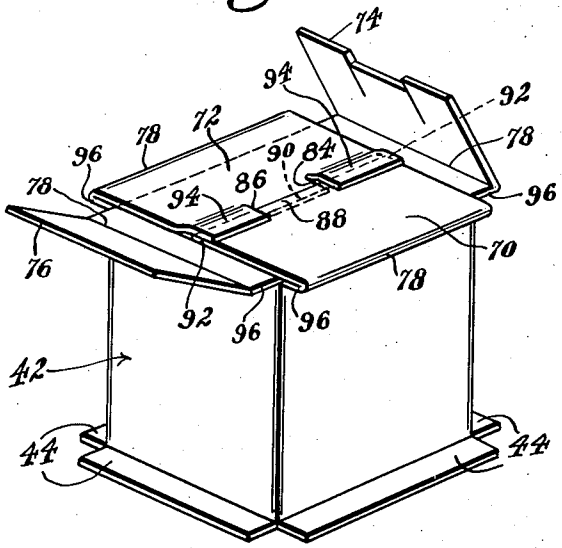


Fig. 8.

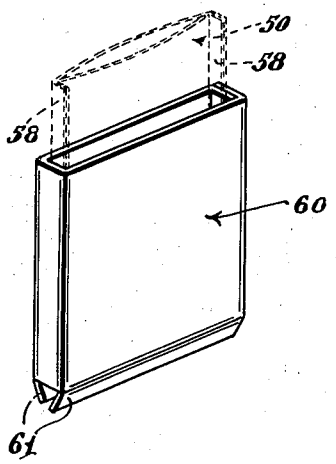


Fig. 7.

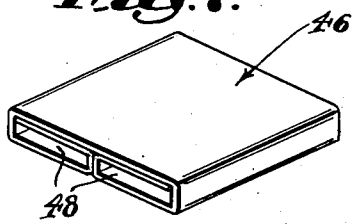


Fig. 10.

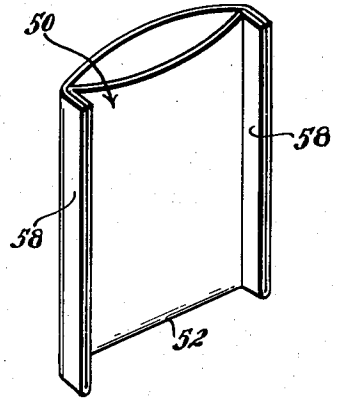
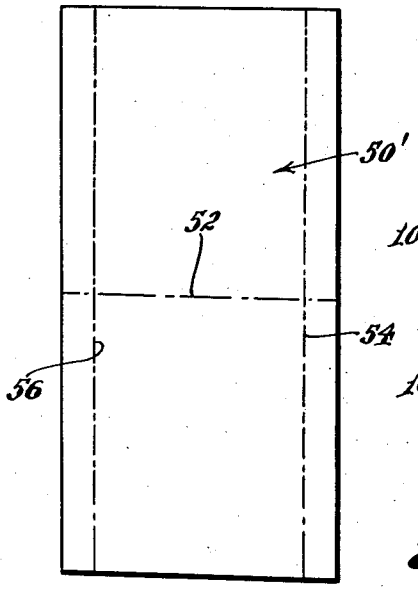


Fig. 9.



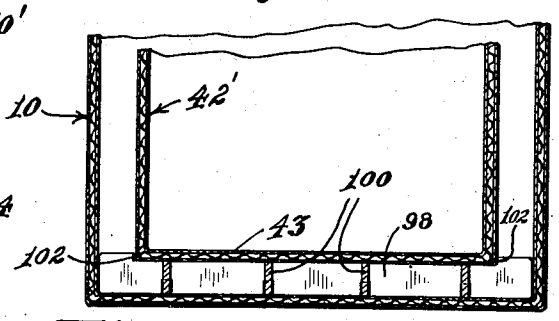


Fig. 11.

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2,728,200

REFRIGERATED SHIPPING CONTAINERS

Frederick Lobl, Middleboro, Mass.

Application May 1, 1953, Serial No. 352,424

5 Claims. (Cl. 62—83)

This invention relates to improvements in shipping containers, and more particularly to relatively light-weight refrigerated containers which have general utility in the transport of perishable items but which are especially well adapted and advantageous for air transport of perishable commodities and products from any particular location of packaging to a distant location which may involve travel from coast to coast across the country, or over-seas travel from continent to continent.

It is among the objects of the invention to provide a refrigerated shipping container having a generally rectangular inner chamber for holding commodities and products which are to be shipped, and having outer walls spaced from the chamber walls and providing air circulation space all around the side walls of the chamber and under the bottom wall of the chamber, the said chamber having a rectangular shiftable partition dividing its interior and formed of relatively inexpensive shape-retaining material adapted to contain a substantial quantity of ice, the said ice being enclosed in a sealed moisture-proof envelope within the shiftable shape-retaining partition. According to the invention, the inner chamber walls, the spaced outer walls, and the said shape-retaining shiftable partition are preferably formed of corrugated paper board stock, or the like, whereby the commodities and products within the chamber are effectively protected and refrigerated without danger of leakage of water which may result from melting of the ice within the shape-retaining partition.

Another object is to provide a refrigerated shipping container wherein an inner rectangular chamber is effectively insulated by substantial bodies of air confined in surrounding relation to the side walls and bottom wall of the chamber, and wherein a relatively rigid hollow partition is shiftable on edge within the said chamber and is adapted to receive therein a moisture-proof envelope containing a substantial quantity of ice, whereby the partition may be variously arranged within the said chamber in refrigerating relation to commodities and products enclosed within said chamber.

Yet another object of the invention is to provide an insulated refrigerated shipping container wherein a chamber for holding commodities and products to be shipped is substantially blanketed by insulating bodies of air around the sides and below the bottom of the chamber, and wherein an inexpensive throw-away shape-retaining hollow partition is shiftable within said chamber and adapted to protectively enclose therein a moisture-proof envelope wherein water may be sealed and frozen into a solid mass of ice which conforms generally to the interior shape of the said shape-retaining throw-away shiftable partition within which it is frozen.

A further object of the invention is to provide a refrigerated shipping container or carton having outer walls and spaced inner walls, with a moisture-proof insertible lining for the bottom and four side walls of the outer container, said inner walls defining a generally rectangular chamber having a refrigerating partition shiftable

therein, the said partition being a rectangular shape-retaining hollow member within which water in a moisture-proof envelope may be frozen into a solid block of ice which assumes the generally rectangular shape of the interior of the said partition, the said envelope ensuring against leakage of water which may result from melting of the ice, and the said liner ensuring against leakage of liquids which may come from commodities and products enclosed within said chamber for shipment.

It is, moreover, my purpose and object generally to improve the structure and effectiveness of refrigerated shipping containers, and more especially shipping containers wherein the refrigerant is frozen water sealed within a shape-retaining generally rectangular partition which is shiftable within the space or chamber in which the commodities and products being shipped are enclosed.

In the accompanying drawings:

Fig. 1 is a top plan view of a closed shipping container embodying features of my invention, with wall portions broken away;

Fig. 2 is a cross-sectional view on line 2—2 of Fig. 1, on a larger scale;

Fig. 3 is a perspective view of the outer container;

Fig. 4 is a plan view of a blank of moisture-proof sheet material from which the moisture-proof liner for the outer container may be formed;

Fig. 5 is an isometric view of the moisture-proof liner formed by folding the blank of Fig. 4;

Fig. 6 is an isometric view of the inner-wall-forming unit with two of its top flaps inter-locked and depressed to closing position across the top of the unit;

Fig. 7 is an isometric view of one variety of bottom member which may be arranged within the unit of Fig. 6, on a scale smaller than the scale of Figs. 5 and 6;

Fig. 8 is an isometric view of the partitioning container which is shiftable on edge within the unit of Fig. 6;

Fig. 9 is a plan view of a blank of moisture-proof sheet material from which the envelope for holding water and ice may be formed;

Fig. 10 is an isometric view of the envelope formed from the blank of Fig. 9 and adapted to be partially filled with water and inserted within the shape-retaining partitioning container of Fig. 8 preliminarily to freezing of the water into a rectangular cake of solid ice, or the envelope may contain cracked ice, or ice cubes; and

Fig. 11 is a cross-sectional view showing a modified structure wherein the inner unit of Fig. 6 is provided with a bottom wall and rests on a suitable support for spacing it above the bottom wall of the outer container.

Referring to the drawings, the outer container, indicated generally at **10**, may be a rectangular container or carton made of corrugated paper-board stock, with conventional flaps **14, 16, 18, 20** for closing its top. A strip of paper tape **22** is shown in Fig. 1 securing the closed flaps **14, 16**. The bottom of the outer container may be similarly closed by flaps, with the outer flaps secured by a strip of paper tape, the same as shown for the top of the outer container in Fig. 1 but, for convenience, the bottom wall is shown in Fig. 2 as having continuous integral extent across the bottom from side wall to side wall.

According to the invention, this outer container **10** is provided with a moisture proof liner, indicated generally at **24**, which conveniently may be formed by folding an integral sheet **24'** of moisture-proof paper, or the like (Fig. 4), into the rectangular liner **24** of Fig. 5, which fits nicely within the outer container to line the bottom wall and all four side walls thereof. The blank of Fig. 4 may be folded toward the eye on the fold lines **26, 28, 30, 32** together with a folding of each corner region along the fold lines **34, 36, 38** to provide a triangular flap **40** at each corner. One corner flap **40** is laid against each side wall formed by the folding of the blank at the fold

lines 26, 28, 30, 32, thereby to produce the rectangular liner of Fig. 5 whose flaps 40 require no fastenings inasmuch as they become maintained in their laid-over positions by the walls of the outer container 10 when the liner is inserted within the outer container. The top edges of the liner may terminate at or slightly below the top edges of the side walls of the outer container, as shown in Fig. 2. It should be understood, however, that the liner for the outer container 10 may be variously formed so long as it provides a moisture-proof structure fitting nicely within outer container 10.

After the liner 24 has been inserted within outer container 10, the inner-wall-forming unit 42 of Fig. 6 may be inserted within liner 24, as shown in Fig. 2. This unit 42 may be made of corrugated paper board stock, or of any other suitable material, and is in the form of a rectangle having four side walls and having its inner end open and its outer end adapted to be closed by interlocking end flaps. The inner open end of the unit has out-folded flange-extensions 44 of the side walls projecting at all four sides, for spacing the lower ends of the walls of the unit 42 a predetermined distance inward from the walls of outer container 10 with the flange-extensions 44 resting on the lined bottom of the outer container 10.

When the open end inner unit 42 of Fig. 6 is employed, a false bottom preferably will be provided at its open inner end, such as the false bottom member 46, shown on a small scale in Fig. 7. Member 46 may be folded, as in Fig. 7, from a single piece of corrugated paper board stock, or of any other suitable material, to provide a false bottom member having substantial air spaces at 48 between its upper and lower horizontal walls.

It is a feature of the invention that ice in solid block form, or cracked ice, or ice cubes may serve as the refrigerant for items which may be packed within the inner-wall-forming unit 42. The ice is enclosed and preferably sealed within a moisture-proof envelope 50 of moisture-proof paper, or other suitable moisture-proof sheet material, which may be formed from the blank 50' of Fig. 9, folded along the central fold line at 52, with the sheet stock of the two sections secured together along the opposite side margins defined by the fold lines 54, 56. The margins may be secured by any suitable moisture-proof adhesive, after which the envelope may be folded along the fold lines 54, 56 to provide the side flaps 58 as best seen in Fig. 10 wherein the envelope is shown on a small scale with the thicknesses of the sheet material considerably exaggerated. Envelope 50 is inserted within a rectangular partitioning receptacle 60 which must be constructed to retain its rectangular shape in the event that water in envelope 50 is frozen into a solid mass of ice within receptacle 60, and must retain its shape if and when ice therein melts. Hence, receptacle 60 is required to be of rugged shape-maintaining construction and yet it is desirable that it should be inexpensive so that it may be disposed of after a single use. I have found that corrugated paper board stock provides a partitioning receptacle 60 which is both inexpensive and adequately shape-maintaining under the various conditions to which it may be subjected. It may be assumed that the receptacle 60, as represented on a small scale in Fig. 8, is formed from a sheet of corrugated paper stock with opposite margins of the sheet lapped and secured together along one of the narrow sides or edges of the receptacle. One end of the receptacle 60 is open and the other end may be closed in any suitable manner, as by the end flaps 61.

Envelope 50 is substantially longer than receptacle 60 and when the envelope is inserted in receptacle 60 it projects substantially out of the open end of the receptacle as shown by dotted lines in Fig. 8, the side flaps 58 of the envelope engaging flatwise against the narrow sides or edges of receptacle 60.

Cracked ice or ice cubes may be put into the envelope 50 to serve as the refrigerant within partitioning receptacle 60. Preferably, however, water will be poured into the

envelope 50 to a level somewhat below the open end of the receptacle, following which the receptacle 60 with the water-containing envelope 50 therein, will be subjected to freezing temperatures until the water has been converted into a solid block of ice. In any case, the projecting open end portion of the envelope will be tightly closed, and preferably sealed, as by cement or thermal bonding of the open edge margins of the envelope, followed by folding of the projecting excess of envelope into the open end of receptacle 60, as at 62 in Fig. 2.

When water is frozen into a solid block of ice within receptacle 60, the block will conform generally to the interior rectangular contour of the receptacle 60, and the receptacle 60, with the solid ice therein, constitutes a solid rectangular partition which may be arranged on edge across the chamber within inner unit 42, and may be shifted therein as may be desired, and the partition retains its rectangular relatively rigid form notwithstanding that the ice therein may melt. Similarly, if envelope 50 contains cracked ice or ice cubes, the partition receptacle 60 maintains its rectangular shape both before and after the ice melts, more or less, within envelope 50. In every case, of course, any water resulting from melting of the ice is safely held within the moisture-proof envelope 50.

In a commercial procedure for refrigerated packaging of items or commodities for shipment in my improved shipping containers, a number of the water-containing envelopes 50, each encased in a receptacle 60, may be simultaneously subjected to freezing temperatures in a suitable refrigerator, or refrigerating plant, to cause freezing of the water in the encased envelopes 50 into solid blocks of ice with each block of ice 64 (Fig. 2) conforming generally to the rectangular shape of the interior of receptacle 60. The folded closure of the top end of the envelope permits needed elongation of the envelope for accommodation of expansion of contents during the conversion of the water into solid ice.

Each receptacle 60, with ice therein, is designed to serve as a shiftable refrigerating partition within the inner-wall-forming unit 42, as shown in Fig. 2 wherein the spaces 66, 68, on opposite sides of the partition, are available for holding the items or commodities which are to be shipped. The partition, when in place, serves also to reenforce and strengthen the shipping container as a whole.

The refrigerated partition 60 has nice fit between opposite side walls of the inner unit 42, and rests edgewise on the bottom wall or floor of the chamber within which commodities and products to be shipped are to be arranged. It may be slid to selected positions within the chamber with the generally flat engagements between the partition and the adjacent bottom and side walls tending to maintain the partition in particular selected positions generally similar to the disclosure in my Patent No. 2,496,296, dated February 7, 1950, wherein a comparable adjustable refrigerating partition is disclosed and claimed. It will be obvious that the refrigerating partition 60 may be shifted into contact and parallelism with either of two opposite walls of inner unit 42, to provide a single large space for reception of the items or commodities which are to be shipped. Also, if desired, the refrigerating partition 60 may be laid flat upon the bottom of the refrigerated chamber, in which case the items or commodities to be shipped would be packed in the space provided above the then horizontally disposed refrigerating partition 60.

Following arrangement of the refrigerating partition 60 in a desired position within unit 42, and after placing the items or commodities to be shipped in cooling relation to the refrigerating partition, the top closure flaps of the inner unit 42 are next closed and interlocked, with simultaneous formation of spacing flanges at the outer end of the inner unit 42.

Referring more particularly to Fig. 6, the outer or top end of inner unit 42 has the closure flaps 70, 72, 74 and 76 thereon and each of the said flaps has a fold line 78 a predetermined distance outward from its integral con-

nection to the adjacent wall of inner unit **42**. The flap **70** is slitted at **80** and **82**, and the two flaps **70**, **72** inter-engage edgewise and become interlocked as shown in Fig. 6. The central portion of the edge margin **70** is shown engaged over the portion **90** of flap **72** between the latter's slits **84**, **86**; and the end portions of the edge margin of flap **70** are shown engaged under the portions **94** of flap **72** outward of the latter's slits **84**, **86**. The flaps **70**, **72** are over-long so that, when they are depressed in the described inter-locking engagement, each flap folds on its fold line **78** to provide an outwardly projecting portion **96** which engages the adjacent lined wall of the outer container **10** to maintain a predetermined spaced relation of the upper ends of the inner and outer walls as in Fig. 2.

The flaps **74**, **76** of unit **42** inter-lock in the same manner as flaps **70**, **72** when the flaps **74**, **76** are turned inward and interengaged, and then are pressed downward upon the flaps **70**, **72** with resulting outward projection of portions **96** into spacing engagement with top portions of adjacent walls of outer container **10**, the same as described in connection with flaps **70**, **72**.

In Fig. 2, because of the exaggerated thickness of the corrugated stock, only the inter-locked flaps **70**, **72** of unit **42** are shown. Actually, the inter-locked flaps **74**, **76** intervene between the flaps **70**, **72** and the flaps **18**, **20** of the outer container **10**, which latter flaps are laid over upon inter-locked flaps **74**, **76** of unit **42**, followed by laying over the flaps **14**, **16** of the outer container upon the flaps **18**, **20**, and securing flaps **14**, **16** along their adjacent edges by the strip of paper tape **22**, or by any other suitable securing means.

Fig. 11 illustrates a modification in which the inner-wall-forming unit **42'** may be in all respects similar to the unit **42** of Fig. 6 excepting that the lower end of the unit is closed by a bottom wall **43** and the flanges **44** of the Fig. 6 unit are omitted. The inner unit **42'** of Fig. 11 may rest on any suitable support within the outer container **10**, the particular supporting means represented being crossing notched strips **98**, **100** of suitably rigid material interengaged egg-crate fashion in an open-work support for the inner unit **42'**, the upper edges of the strips being notched to provide shoulders at **102** for centering the inner unit **42'** within the outer container **10**. Obviously the inner unit **42'** may be otherwise supported above the bottom of outer container **10**, if desired.

It will be apparent from the foregoing description, in connection with the drawings, that I have provided a relatively inexpensive and relatively light-weight refrigerated shipping container which is entirely reliable for long distance transport of perishable contents without need for replenishing the refrigerant during transit and without danger of leakage of any liquids which may be within the container, such as liquid which may be discharged from lobsters, for example, and which may result from melting of the cake or block of ice **64**. It is assumed that the shipping container will be maintained right-side-up during handling and transit, and the container may be plainly marked to this effect. The ice is safely enclosed within the moisture-proof envelope **50** and any water derived from melting of the ice is safely maintained in envelope **50** which, in turn, is within the partitioning receptacle **60** having the character that it maintains its rectangular relatively rigid shape regardless of whether ice or water is within envelope **50**. However, when a solid block of ice is formed within envelope **50**, the ice melts slowly under ordinary shipping conditions and has been found to provide highly effective refrigeration for perishable contents of the container, such as lobsters, shipped by air from the East to the West coast, and shipped over other comparable long distances. The substantial air-circulation spaces around and under the inner unit **42** wherein the perishable contents are packed or otherwise arranged provide an extremely effective insulated and more or less isolated cold chamber within unit **42** such that relatively slow heat-transfer to the ice occurs, and the ice melts at such a slow rate that perishables are effectively refrigerated over relatively long periods.

The fact that the outer container **10** is effectively protected against leakage by the moisture-proof liner **24** makes my shipping container highly satisfactory for shipping liquid emitting perishables such as lobsters, and this protective liner is protected by the walls of the inner unit **42** or **42'** against puncture by pointed elements of the lobsters, or other contents.

The shipping container may, of course, be made in various sizes and, when desired, more than a single refrigerating partition **60** may be disposed within the unit **42** or **42'**.

Enveloped and encased blocks of ice **64** may be produced within any available refrigerating apparatus but, as earlier pointed out herein, a commercial procedure preferably will include provision for multiple-production of the ice cakes or blocks so that an ample supply of the refrigerating partition members **60** will be available for transfer to the shipping containers as needed. When desired, the envelopes **50** may contain cracked ice or ice cubes, as when no suitable freezing means is available for producing the ice blocks.

While I have disclosed herein what I presently consider to be a preferred embodiment of my invention, it should be understood that various changes may be made in the structure and the materials employed within the scope of the appended claims, and it is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

I claim as my invention:

1. A generally rectangular refrigerated container, comprising a bottom wall, four upstanding outer side walls, and four upstanding inner side walls in spaced general parallelism with said outer side walls, an integral sheet of flexible moisture-proof material folded to provide a moisture-proof generally rectangular lining for said bottom wall and said outer side walls, means at inner and outer edge portions of said inner side walls for maintaining a predetermined spacing of said inner walls from said outer side walls, a partition member extending between opposite ones of said inner side walls and shiftable to different positions between said inner side walls, said partition member comprising a relatively rigid rectangular hollow receptacle having opposite generally parallel flat surface portions slidably engaging flatwise against said opposite ones of said inner side walls, an envelope of moisture-proof flexible sheet material within said relatively rigid receptacle, a substantial quantity of ice enclosed within said envelope, closure flaps on said inner side walls for closing the top of the container across the inner space defined by said inner side walls, and closure flaps on said outer side walls foldable inward upon the first mentioned closure flaps for closing the entire top of the shipping container, said relatively rigid receptacle retaining its rectangular shape notwithstanding any melting of the ice within said moisture-proof envelope.

2. A generally rectangular refrigerated shipping container, comprising a bottom wall, four upstanding outer side walls, and four upstanding inner side walls in spaced general parallelism with said outer side walls, an integral sheet of flexible moisture-proof material folded to provide a moisture-proof generally rectangular lining for said bottom wall and said outer side walls, means at inner and outer edge portions of said inner side walls for maintaining a predetermined spacing of said inner side walls from said outer side walls, a partition member extending between opposite ones of said inner side walls and shiftable to different positions between said inner side walls, said partition member comprising a relatively rigid rectangular hollow receptacle having opposite generally parallel flat surface portions slidably engaging flatwise against said opposite ones of said inner side walls, an envelope of moisture-proof flexible sheet material within said rela-

tively rigid receptacle, said envelope having water therein frozen into a solid block of ice having substantially the shape of the hollow in said relatively rigid rectangular receptacle, inter-locking closure flaps on said inner side walls for closing the top of the container across the inner space defined by said inner side walls, and closure flaps on said outer side walls foldable inward upon said inter-locking flaps for closing the entire top of the shipping container, said relatively rigid receptacle retaining its rectangular shape during said conversion of the water in said envelope to said solid block of ice and subsequently during any melting of the ice within said moisture-proof envelope.

3. A generally rectangular refrigerated shipping container, comprising an outer container having a bottom wall and four upstanding side walls, an integral sheet of flexible moisture-proof material folded to provide a moisture-proof generally rectangular lining for said bottom and side walls of the outer container, a generally rectangular inner unit arranged within said outer container and having four side walls in spaced general parallelism with the side walls of the outer container, means providing a bottom wall for said inner unit in spaced general parallelism with the bottom wall of said outer container, a partition member, including a relatively rigid rectangular hollow receptacle extending within said inner unit from one side wall to an opposite side wall thereof, a moisture-proof envelope within said hollow receptacle, a refrigerating supply of ice within said envelope, closure flaps on the inner unit side walls for closing the top of the inner unit, one of said flaps being formed for interlocking coaction with another of said flaps whereby portions of said flaps are projected laterally into wall-spacing engagement with upper portions of adjacent side walls of said outer container, and means for closing the top of said outer container.

4. In a generally rectangular refrigerated shipping container having an outer container with a closable top, the combination therewith of a refrigerating inner structure comprising a generally rectangular moisture-proof lining element insertible within the outer container, a generally rectangular inner unit insertible within the lined outer container, the leading end of said inner unit being open and having out-turned flange portions for resting on the lined bottom wall of the outer container and for maintaining the walls of the inner unit in substantially spaced relation to the walls of the outer container, a false bottom unit insertible within said inner unit for closing the said open end thereof, said false bottom unit providing substantial air circulation space therein, a generally rectangular partition receptacle within the inner unit resting on said false bottom and extending as a partition between

opposite walls of the inner unit, said partition receptacle being relatively rigid and shape-retaining and having a moisture-proof envelope therein, and said envelope having a substantial quantity of ice therein, whereby said partition constitutes a refrigerating medium within the said inner unit, said inner unit having inter-locking closure flaps thereon and said flaps being over-long to provide portions which become thrust laterally outward as spacers between the walls of the inner unit and the walls of the outer container in response to the said inter-locking of the closure flaps.

5. A generally rectangular refrigerated shipping container, comprising an outer container having a bottom wall and four upstanding side walls formed of corrugated paper board stock, an integral sheet of flexible moisture-proof material folded to provide a moisture-proof generally rectangular lining for said bottom and side walls of the outer container, and means providing a refrigerating chamber within the said outer container, said means comprising an inner unit having four side walls formed of corrugated paper board stock and arranged in spaced general parallelism with the side walls of the outer container, means providing a bottom wall for said inner unit in spaced general parallelism with the bottom wall of said outer container, a partition receptacle of corrugated paper board stock within the said inner unit with one edge portion resting on said bottom wall of the inner unit and with two other opposite edge portions engaging flatwise against opposite side walls of said inner unit, said partition receptacle having a moisture-proof envelope therein, and said envelope having ice enclosed therein, closure flaps on the walls of said inner unit, said flaps being over-long and opposite ones of said flaps being adapted to inter-lock edgewise when closed to effect laterally outward projection of portions of the flaps into wall-spacing contact with side walls of the outer container, and closure flaps on the outer container walls for closing the top of the outer container.

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