Nov. 5, 1940. C. D. WALLACH 2,220,501

REFRIGERATOR STRUCTURE AND CORNER CONSTRUCTION THEREFOR

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Fig. 1

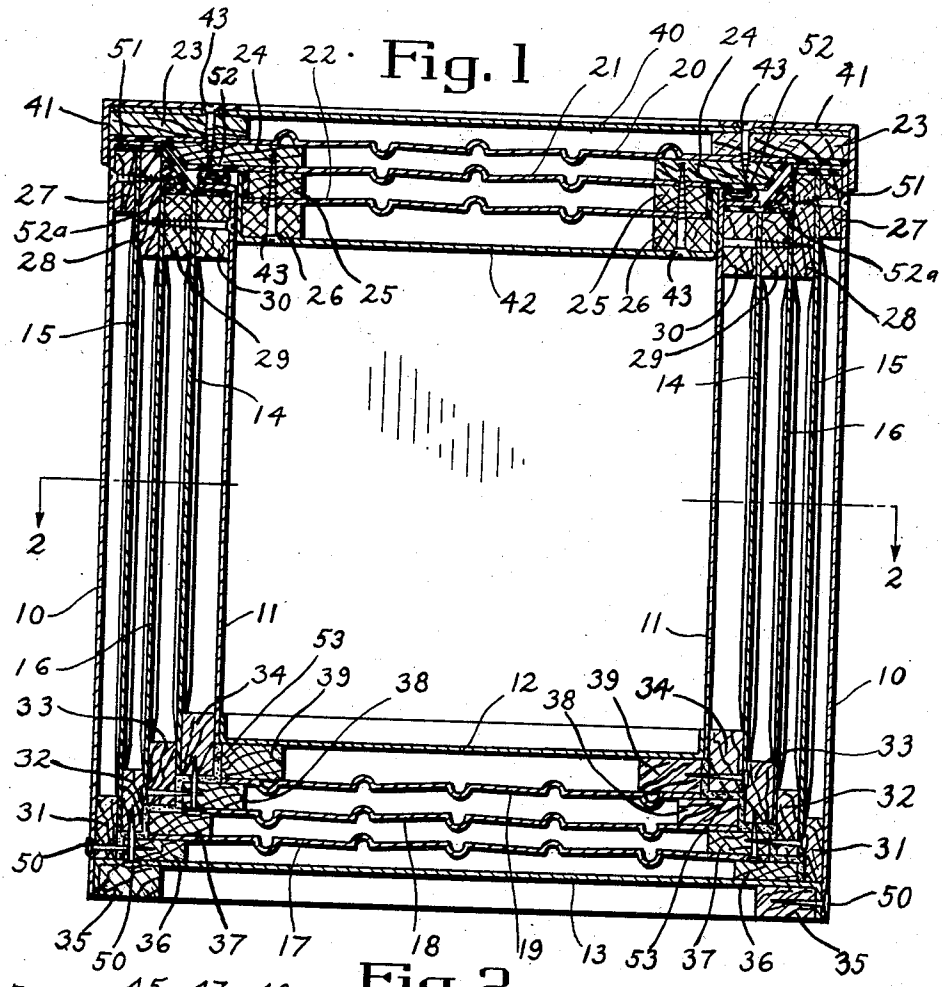
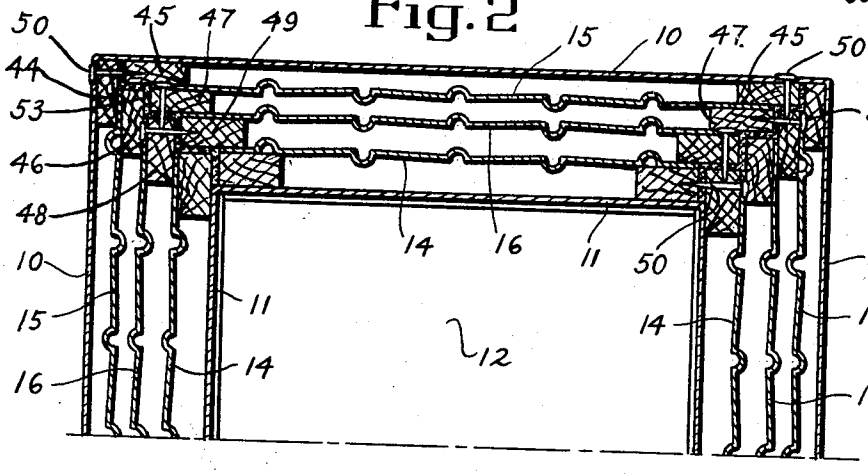


Fig. 2



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REFRIGERATOR STRUCTURE AND CORNER CONSTRUCTION THEREFOR

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Fig. 3

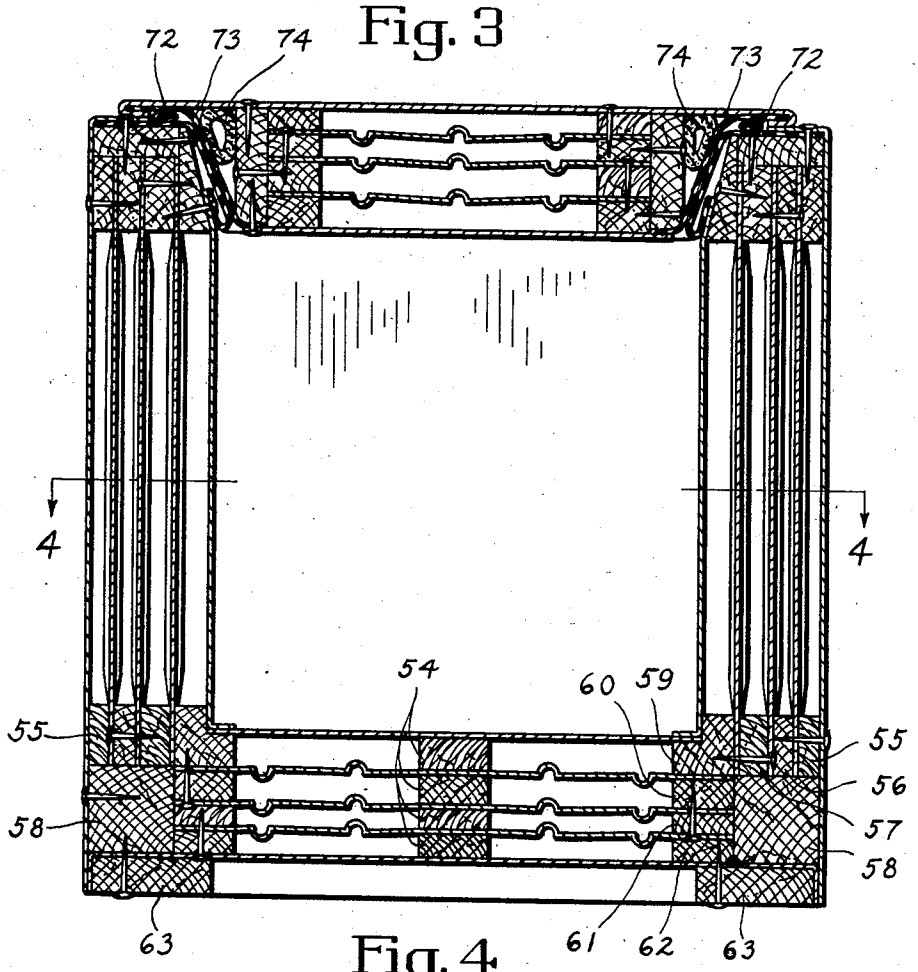
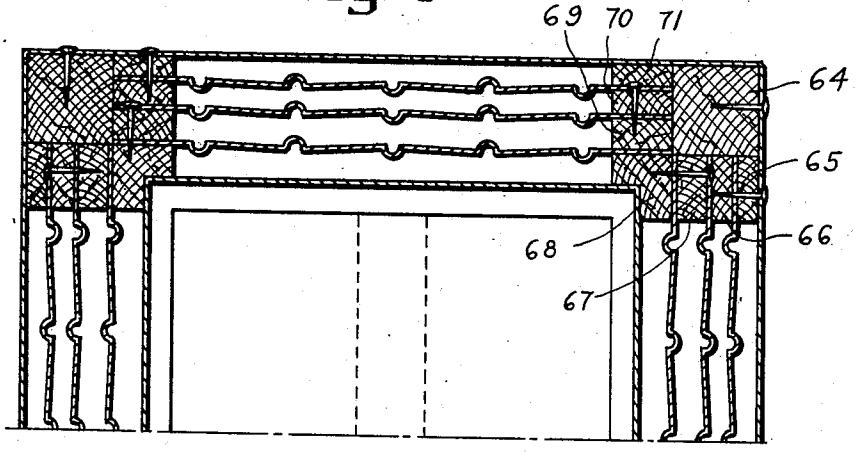


Fig. 4



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REFRIGERATOR STRUCTURE AND CORNER CONSTRUCTION THEREFOR

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Fig. 5

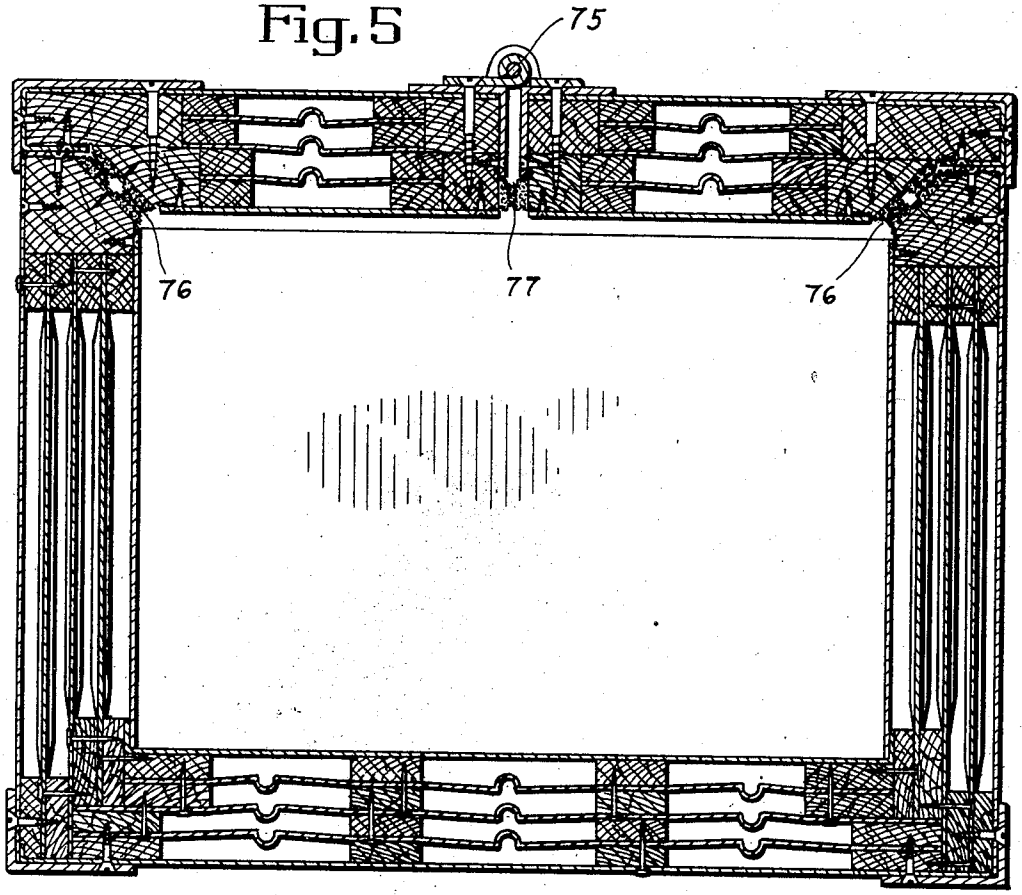
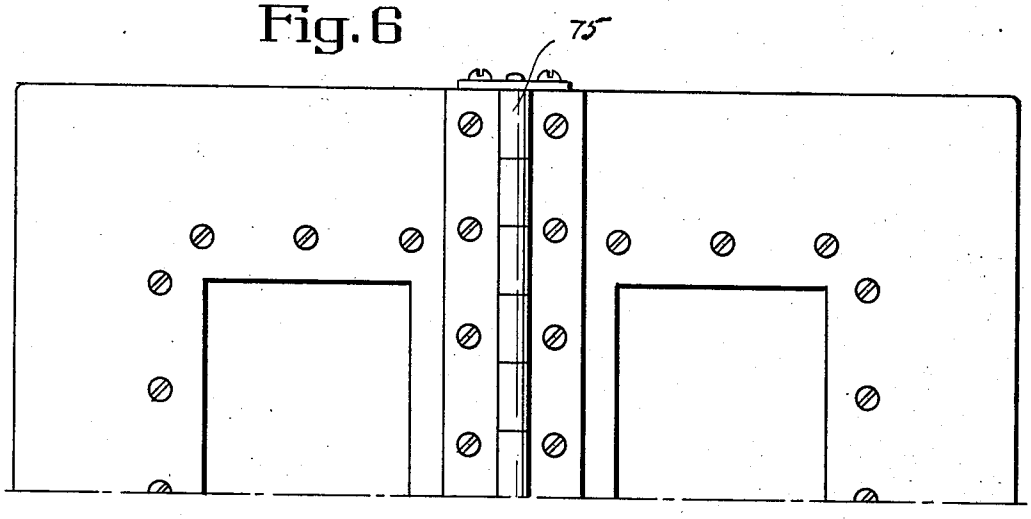


Fig. 6



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REFRIGERATOR STRUCTURE AND CORNER CONSTRUCTION THEREFOR

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Fig. 7

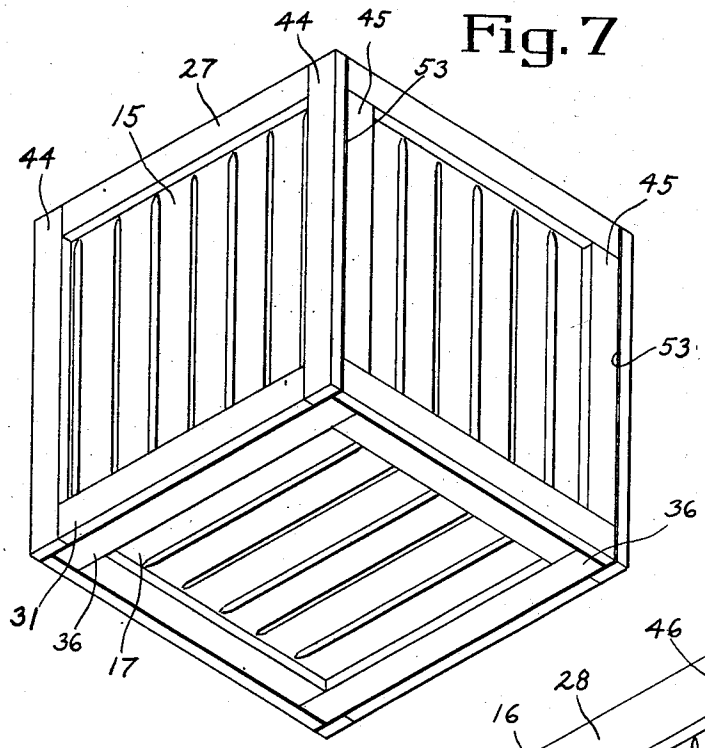


Fig. 8

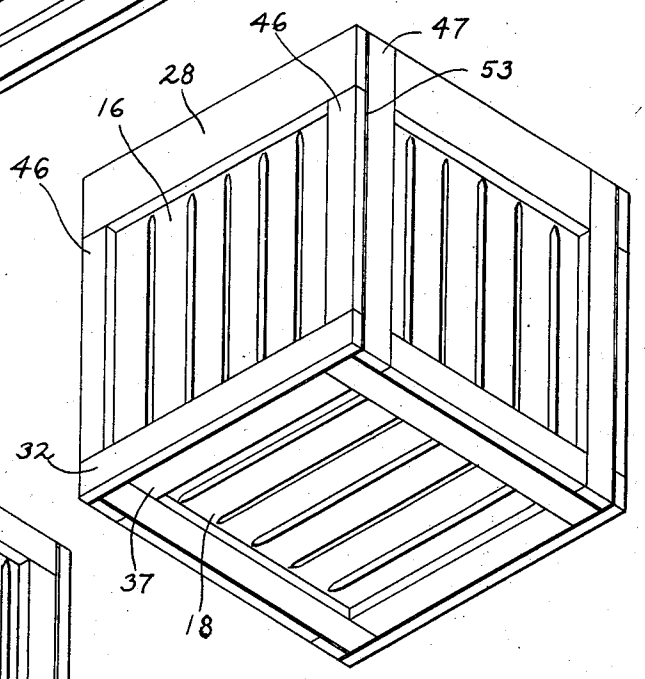
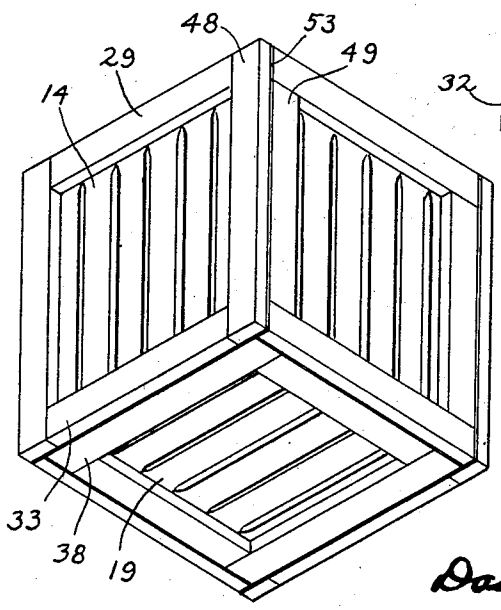


Fig. 9



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Patented Nov. 5, 1940 2,220,501

UNITED STATES PATENT OFFICE

2,220,501

REFRIGERATOR STRUCTURE AND CORNER CONSTRUCTION THEREFOR

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Application December 5, 1935, Serial No. 52,981

3 Claims. (Cl. 220—9)

This invention relates to insulated containers and more especially to a refrigerator wall and corner construction. It is especially adapted for use as a container for transporting or storing a concentrated refrigerant, such as commercial Dry Ice.

An object of the invention is to provide a metallic insulated wall construction utilizing nested air spaces, and also utilizing corner members of cellular material arranged to provide a durable inexpensive wall and corner construction suitable for this purpose.

Another object is to provide a container of this character with an opening for the admission and discharge of the contents, and a closure means for said opening, together with suitable sealing means between the closure means and the opening which will approximate in thermal efficiency that of the walls themselves.

A further object is to provide a corner construction for devices of this character which utilizes corner spacing and structural strips which are stepped or staggered in position largely for the purpose of reducing to a minimum heat losses by introducing an obstacle in the conducting path, or partly-conducting path, formed by said corner construction.

Another object is to provide, in a refrigerator structure, means on the base thereof for positioning the major portion of the area of the base away from the surface on which it rests, said means being of substantially non-heat-conducting character.

Another object is to provide a removable closure means or lid for one of the surfaces of the container or refrigerator, together with means for sealing said lid in position on the container, said sealing means being suitably insulated against heat transference therethrough, even though the lid is held in position only by its own weight.

Another object is to provide an insulated container with a removable side or lid such that when same is removed, the opening exposed will comprise substantially the entire area of said side.

A still further object is to provide a container structure utilizing commercial black steel sheets processed for maximum heat insulating efficiency in accordance with the teachings in the Le Grand Patent No. 1,910,703, including the character of the material, its non-uniform spacing in relation to the hot and cold sides of its walls, its angularly-opposed and ribbed formation, and its various other features and attendant advantages.

All these and other objects as suggested hereinbelow are attained by the methods and means now to be described, and illustrated in the accompanying drawings, in which—

Figure 1 is a vertical sectional view through a main portion of one embodiment of the structure designed particularly for the transportation of Dry Ice.

Fig. 2 is a horizontal half-sectional view of the structure of Fig. 1, taken through the line 2—2 of said Fig. 1.

Fig. 3 is a vertical sectional view through the main portion of a modified form of the construction of Fig. 1.

Fig. 4 is a horizontal half-sectional view taken through the line 4—4 of Fig. 3.

Fig. 5 is a vertical sectional view taken through a main portion of a still different modfied form of Fig. 1.

Fig. 6 is a top half-plan view of the structure of Fig. 5.

Fig. 7 is an isometric view, viewed from a lower corner, of the preferred embodiment of Fig. 1, with the lid omitted, and the outer sides and bottom members removed.

Fig. 8 is a view similar to Fig. 7, but showing the visual surface members as viewed in Fig. 7, removed.

And Fig. 9 is a view similar to Fig. 7, but showing the visual surface members as viewed in Fig. 8, removed.

Like numerals refer to like parts throughout the several views.

The invention as shown in the embodiment, Figs. 1, 2, 7, 8, and 9 consists essentially of a more or less rectangular container comprising a continuous outside member 10, preferably of a suitable metal, but having flat surfaces, and a continuous flat metallic inside member 11, completely surrounding the four sides of the container. A flanged bottom member 12, also formed from a sheet of flat metal, such as commercial black steel, but preferably rust-proofed or otherwise coated, is inserted and fastened in fluid-tight position along the inner lower surface portion of member 11, as clearly shown. A downwardly-flanged flat metallic sheet 13 is inserted in and affixed to the inner lower surfaces of outside member 10, as shown, to form the outside bottom of the container.

Between the inside and outside container members are spaced metallic heat-insulating sheets 14, 14, 14, 14, nearest the inside of the container; 15, 15, 15, 15 nearest the outside of the

container; and 16, 16, 16, 16 intermediate thereto. These three sets of spaced insulating sheets aligned in series around the four side walls separate the space between inner and outer side wall members into four air spaces. It will of course be understood that in place of the three heat-insulating sheets any number from one up may be used, depending upon the degree of insulation required. These heat-insulating sheets preferably have oppositely-disposed spaced embossed ribs arranged vertically and separating oppositely-disposed angular sections, as shown in Fig. 2, for the purpose both of making each insulating member more rigid and for greater insulating efficiency.

Similar aligned heat-insulating sheets 17, 18, 19 are assembled, as shown, in spaced relation between the inside bottom member 12 and the outside bottom member 13. It will be noted that the thickness of the several nested air spaces around all the walls of the container increases progressively from the outside in. This is not absolutely necessary, although it is believed that in some instances at least, a somewhat greater heat-insulating efficiency is obtained where the spacing is somewhat smaller near the warmer or hotter side of the construction, which in this instance would be the outside, since the purpose of the container is to house a colder object, such as Dry Ice, within.

The lid member consists of an outer flat sheet 40 assembled beneath a hollow downwardly-flanged frame member 41, an upwardly-flanged inner flat sheet 42, and aligned and spaced heat-insulating sheets 20, 21, 22 similar to those used in the bottom and sides.

The frame construction for the lid, Fig. 1, consists preferably of wooden strips or other fibrous insulating members 23, 24, 25, 26, shaped in cross-section as shown and in continuous rectangular frame-like shape and adapted to seal off the several air spaces. These members are secured to each other and to the other members comprising the top structure, by any suitable means, as by screws 43.

Likewise the upper ends of the four sides are formed from similar material but shaped in cross-section as shown at 27, 28, 29, and 30.

The bottom frame structure, as shown in Fig. 1, is likewise built up of similar strip material assembled in staggered relation as shown, these members being numbered 31, 32, 33, 34, 35, 36, 37, 38, and 39. These strips shown in cross-section are likewise assembled in frame-like relation when viewed in plan, and it will be noticed that they are of varying thickness so as to separate the several insulating sheets so as to form air spaces of progressively greater width as the center or cold side of the container is approached. It will also be noticed that in this form of the invention the various insulating sheets 17, 18, and 19, and so forth, are of different length and width from each other to accommodate them for fastening between the different corner strips which are arranged to form a generally beveled corner assembly.

The vertical corners, as viewed in cross-section in Fig. 2 are likewise of varying widths of similar strips, numbered 44, 45, 46, 47, 48, and 49, and fastened together and to the outside and inside members 10, 11 and insulating sheets 14, 15, 16 in manner as shown, with brads 50, (or screws 43, or other suitable fastening means).

Figs. 7, 8, and 9 show more fully the staggered and overlapping construction of these corners. In Fig. 7, outer covering 10, bottom sheet 13, and base frame 35 are removed. In Fig. 8, the layer of members shown in Fig. 7 is removed. And in Fig. 9 those parts visible in Fig. 8 are removed.

Note that in Fig. 7 vertical strips or separators 44, 44 extend to the corners, across the ends of horizontal separators 27, 31. But in the adjoining side the horizontal frame strips extend across the ends of vertical strips 45, 45. The horizontal strips of the right hand panel are fastened together by a vertical strip 44. Similarly the bottom horizontal strip of the right hand panel fastens together the strips 36, 36 of the bottom panel.

In Fig. 8, which shows the panels underlying those of Fig. 7 in corresponding positions, in the left hand panel the horizontal separators 28 and 32 extend to the corners, across the ends of the vertical strips 46, 46 of this panel. Thus the horizontal separators of this panel are long enough to fasten together the vertical strips of the corresponding outside panel shown in Fig. 7.

The relative lengths of corresponding strips in the other panels of Fig. 8 are similarly reversed, so this same relation between adjoining panels or side members holds throughout.

In the next layer of panels, the relative lengths of the separators are changed again, as shown in Fig. 9, the relation being the same as in Fig. 7. Successive layers would be similarly reversed, regardless of the number of layers of sheets employed.

The joint between the lid and the rest of the container is shown in Fig. 1 to be a multi-directional one, to present the maximum resistance to leakage of cold to the outside. The lid contacting surface of this joint and its complementary container-body contacting surface, are lined with insulating flexible members 51, preferably of sheet rubber, shaped as shown, and held at one or both ends between the strips and adjacent flanges. A continuous surrounding strip of pneumatic tubing 52 is preferably fastened as shown to one of the inner horizontal surfaces to make a seal-tight insulating joint between lid and body. Also a continuous surrounding strip of suitable compressible hollow packing 52a is enclosed between member 51 and the angular space above separators 29, 29, 29, 29. This construction provides ample insulation for the lid joint, even though the lid is held in place only by its own weight.

A suitable adhesive mastic layer or coating 53 is applied both to insulatably separate and aid in holding together the various separators, as shown.

The modified form of the invention shown in Figs. 3 and 4 employs a somewhat more block-like corner construction than that already described. The ends of the insulating sheet are not arranged in bevel fashion at the corners, but instead the sheets in each series are all of the same length. Fibrous separating strips 54 are employed mid-way between the ends of the bottom panel members to retain the spaced relation of the several members. Corner and separator members 55, 56, 57, 58, 59, 60, 61, 62, 63, dimensioned and shaped proportionately substantially as shown, are used to make up the bottom corner construction, and separator and corner members 64, 65, 66, 67, 68, 69, 70, 71, also shaped and dimensioned substantially as shown, are used to make up the vertical corner construction at each of the four corners.

The construction of the top or lid of this modification is as shown in Fig. 3, where 72 represents a flattened rubber tube section attached to the lid, 73a contacting surface members of sheet rubber affixed as shown, and 74 a continuous hollow rubber packing which is compressible between the members as shown. It will be noted that this lid differs from that of Fig. 1 in not having its edges come down over the sides of the box to help seal the joint.

The modified form shown in Figs. 5 and 6 discloses a 45-cube container having the lid consist of two parts hinged at 75. The corner sections and spacers are built up substantially as shown, and canvas or felt is used as an insulating seal at 76 and 77. It will be noted that in this type, also, the lid has its edges overlie the sides of the container. Otherwise the construction is quite similar to that previously described.

It is to be understood that the present disclosure is for the purpose of illustration only, and that the invention is not limited thereto. To those skilled in the art, many modifications of the invention will be readily apparent, and it will also be obvious to such skilled persons that parts of the device and method may be used without other parts thereof, many such combinations readily suggesting themselves. Therefore, it should be, and is to be distinctly understood that for a definition of the limitations of the invention, reference must be had to the appended claims.

Having now described the invention, what is claimed as new and for which Letters Patent of the United States is desired, is:

1. In a heat insulated container, insulated wall members formed of a plurality of spaced sheets of metallic heat reflecting material, spacing and mounting frames around the periphery of said sheets, the spacing and mounting frames of the respective sheets of one wall being stepped and interfitting in spaced relation with complementary stepped frames of the adjacent walls at the corners of said container, and means for securing the frames of one wall in heat insulating relation to those of the adjacent wall at said corners, said means comprising a continuous heat insulating adhesive mastic in said space and spacing said frames apart but securing them together, some of said frames being irregular in outline to follow the multiplanar surfaces of the sheets to which they are attached and said mastic having the necessary variations in thickness to fill any of the spaces resulting from the irregularity of said frames, whereby heat flow due to improperly fitted frames is prevented.

2. In a heat insulated container, insulated wall members formed of a plurality of spaced sheets of metallic heat reflecting material providing a series of successive surfaces inclined with respect to the normal, spacing and mounting frames around the periphery of said sheets, some of said frames having irregularities throughout their extent due to the inclinations of the sheets to which they are attached, the spacing and mounting frames of the respective sheets of one wall being stepped and interfitting in spaced relation with complementary stepped frames of the adjacent walls at the corners of said container, and means for securing the frames of one wall in heat insulating relation to those of the adjacent wall at said corners, said means comprising a heat insulating adhesive mastic in said space and of variable thickness spacing said frames apart but securing them together, and metallic fasteners extending from the frames in one wall into the opposed frames of the next wall in directions at right angles to each other, whereby heat flow due to improperly fitted frames is prevented.

3. In a heat insulated container, insulated wall members formed of a plurality of spaced sheets of metallic heat reflecting material providing a series of successive surfaces inclined with respect to the normal, spacing and mounting frames around the periphery of said sheets, some of said frames having irregularities throughout their extent due to the inclinations of the sheets to which they are attached, each of said sheets extending across the face of its frame to the outside edge thereof, the spacing and mounting frames of the respective sheets of one wall being stepped and interfitting in spaced relation with complementary stepped frames of the adjacent walls at the corners of said container, and means for securing the frames of one wall in heat insulating relation to those of the adjacent wall at said corners, said means comprising a continuous heat insulating adhesive mastic in said space and of substantial thickness spacing said frames apart but securing them together, said mastic having irregularities in thickness due to the irregularities in the frames in order to fill the spaces caused thereby, whereby heat flow due to improperly fitted frames is prevented.

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