Nov. 7, 1967 W. L. MORRISON 3,351,223

INSULATED ENCLOSURE

Filed Dec. 30, 1963 2 Sheets-Sheet 1

FIG. 1

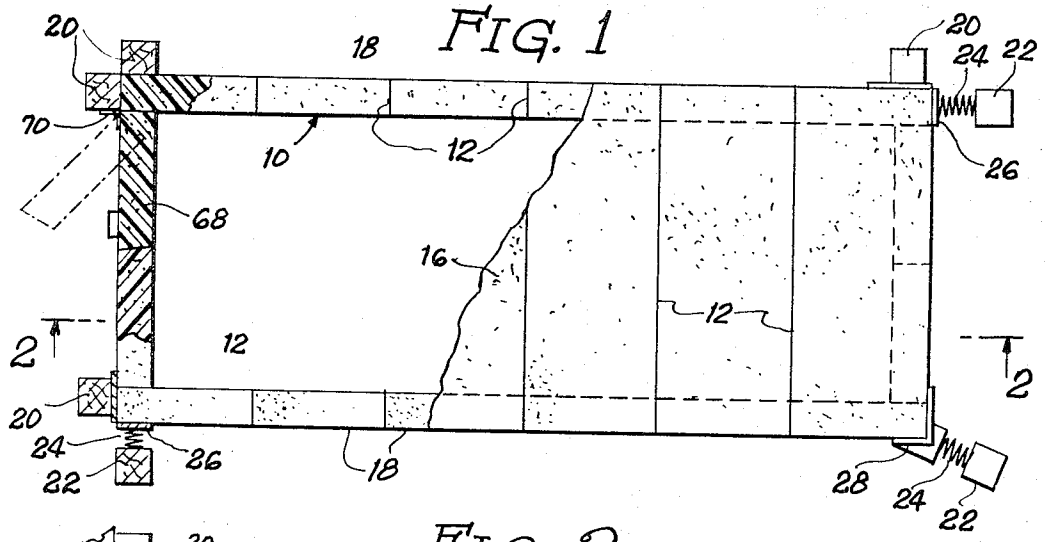
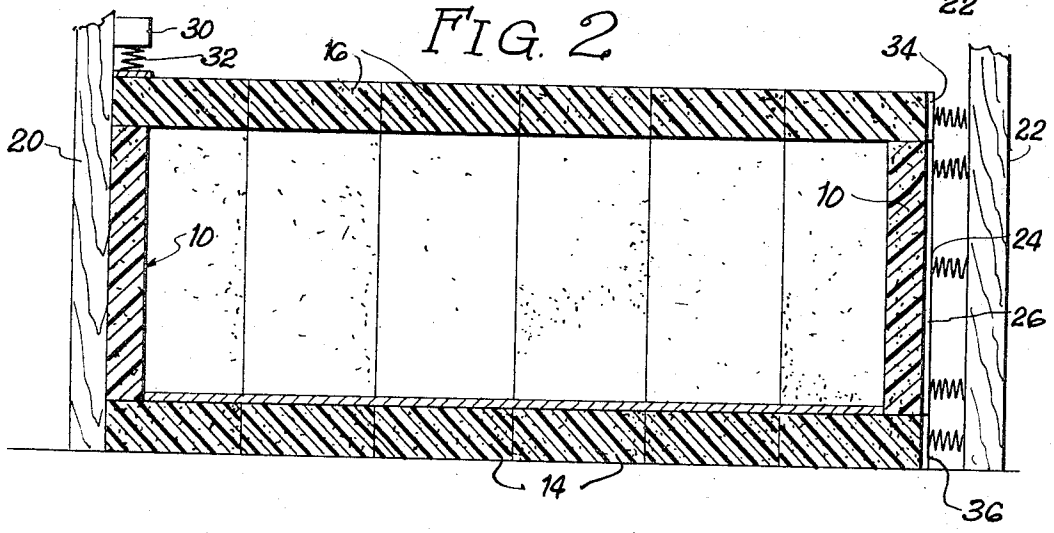


FIG. 2



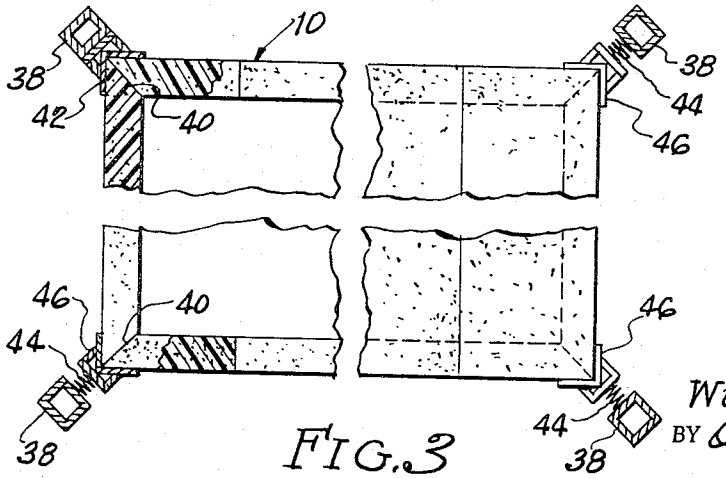


FIG. 3

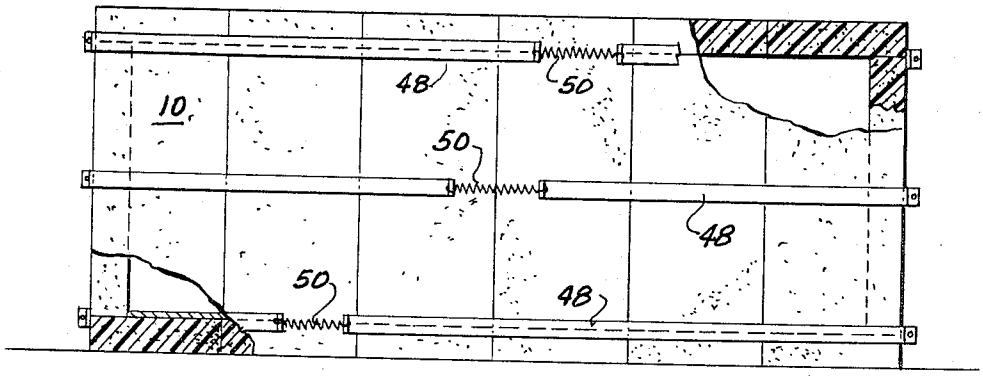
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FIG. 4



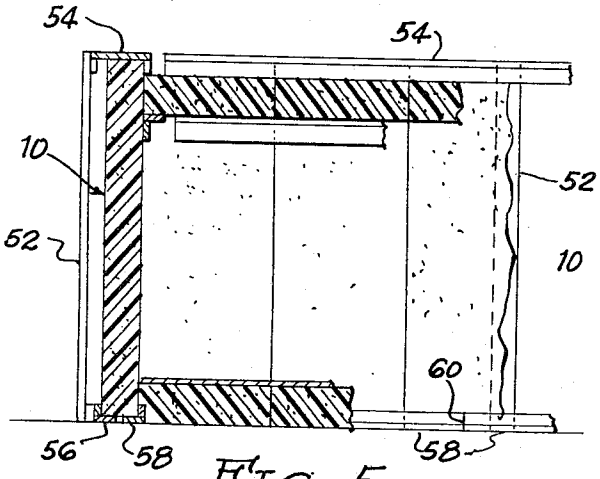


FIG. 5

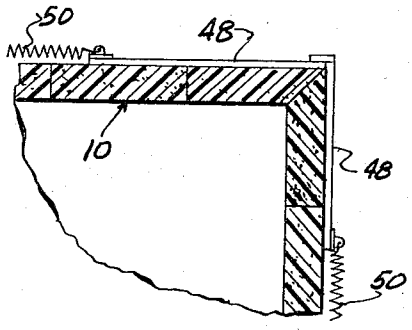


FIG. 6

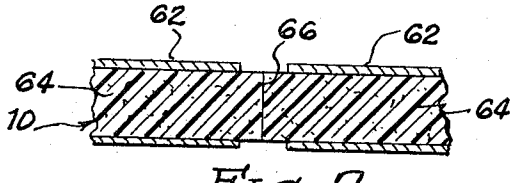


FIG. 7

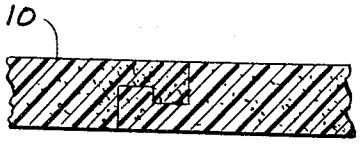


FIG. 8

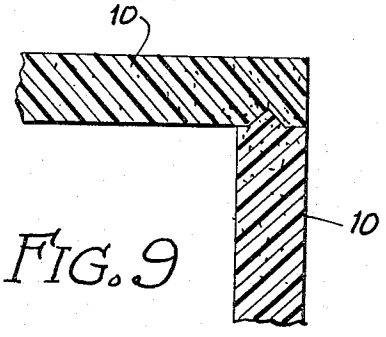


FIG. 9

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3,351,223

INSULATED ENCLOSURE

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Filed Dec. 30, 1963, Ser. No. 334,498
2 Claims. (Cl. 220—12)

This application is a continuation-in-part of applicant's copending application Ser. No. 15,869, filed Mar. 18, 1960, now Patent No. 3,115,982, issued Dec. 31, 1963.

This invention relates to an insulated enclosure for use in the storage and/or transportation of goods. The invention is particularly concerned with an enclosure which is capable of retaining goods in a refrigerated state over long periods of time without the aid of continuously applied refrigeration.

In the above noted copending application, there was described an insulated container which was particularly suitable for use in the transportation of refrigerated goods. The structure described therein was designed for use as a freight car of the type commonly used by railroads for transporting frozen foods and the like over long distances. During transportation, the refrigerator freight cars are subjected to various environmental conditions including high temperatures when transportation occurs in the warm weather or in more temperate climates. Instead of employing conventional refrigeration of the freight cars, the structure described in the previous application was such that initial refrigeration could be maintained for at least the duration of the transportation. Thus, frozen goods could be inserted in the insulated freight car and could be kept therein for several days without experiencing a detrimental rise in temperature. This was accomplished without the necessity for externally applied refrigeration.

It is an object of this invention to provide a refrigerated enclosure which is also capable of maintaining a high state of refrigeration over long periods of time.

It is a more particular object of this invention to provide a refrigerated enclosure which can be easily constructed for use as a portable or stationary structure for maintaining refrigeration over extended periods of time.

These and other objects of this invention will appear hereinafter and for purposes of illustration, but not of limitation, specific embodiments of this invention are shown in the accompanying drawings in which:

FIGURE 1 is a plan view of one form of an insulated enclosure characterized by the features of this invention;

FIGURE 2 is a cross-sectional view of the insulated enclosure taken about the line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary plan view of an alternative form of an insulated enclosure;

FIGURE 4 is an elevational view of an additional alternative form of insulated enclosure;

FIGURE 5 is a fragmentary sectional view illustrating an alternative supporting structure;

FIGURE 6 is a fragmentary cross-sectional view illustrating a supporting structure of the type shown in FIGURE 4; and

FIGURES 7, 8 and 9 comprise detail sectional views illustrating panel interlocking alternatives.

The construction of this invention comprises a plurality of individual insulating panels which are situated in edge-to-edge relationship. The panels are arranged to completely enclose the insulated space which is intended to confine refrigerated articles. A specific type of supporting structure is provided for the insulated panels whereby the adjacent edges thereof will be pressed together. Accordingly, the enclosure is adapted to completely seal off the interior space from the outside atmosphere.

The accompanying drawings illustrate various constructions which are suitable for achieving the objects of this invention. In FIGURES 1 and 2, a plurality of panels **10** are arranged whereby the adjoining edges **12** of respective panels are in abutting relationship. In the illustrated embodiment, the panels form a bottom wall **14**, a top wall **16** and side walls **18**. It will be understood, however, that some of the walls, especially the bottom wall, may be formed of constructions other than an assembly of insulating panels. Thus, a concrete floor or the like could make up the bottom wall and a suitable insulated enclosure could still be achieved. It must be kept in mind, however, that any associated elements which have a relatively high heat conductivity are to be avoided.

The supporting structure for the arrangement illustrated in FIGURES 1 and 2 comprises a plurality of upright posts. The posts **20** are arranged whereby the side walls of the construction are directly supported by the posts. Other posts **22** have resilient means **24** associated therewith. Bearing plates **26** are attached to the ends of the resilient means, and these bearing plates force the panel assemblies against the posts **20**. In every case, one end of a particular wall is supported by a post **20** while the opposite end of that wall is engaged by a bearing plate. It will be noted that in the case of the lower right-hand corner of the enclosure, an angle bar **28** is employed as the bearing plate. Since the post **22** associated therewith is disposed on a diagonal of the enclosure, the plate **28** imparts forces to two walls simultaneously.

The panels **14** forming the side walls of the enclosure rest on top of the panels **10** forming the bottom wall. Similarly, the panels forming the top wall rest on the side panels. Additional resilient means **30** and bearing plates **32** may be associated with the top wall to seal off these edges. However, in some cases, such additional pressure applying means may be dispensed with.

It will be noted that the bearing plate **26** shown in FIGURE 2 is divided into three sections including the upper section **34** and the lower section **36**. The division of this pressure plate in this manner accommodates any possibility of differential expansion which may occur between the top, bottom and side walls. Thus, each section of the pressure plate can act independently to maintain a sealing relationship between abutting edges of the panels.

In the construction shown in FIGURE 3, four posts **38** are arranged in each of the corners of the enclosure. The panels **10** which make up the outermost panels in each side wall are mitered as shown at **40** to facilitate the achievement of the desired sealing relationship. At the upper left-hand corner, an angle bar **42** provides a stationary bearing plate for the assembly. At the other three corners, resilient means **44** are engaged with bearing plates **46**. Each of these pressure applying assemblies operates to produce a sealing relationship between each of the panels forming the side walls. The angle bars can be employed as pressure plates for the bottom and top walls and additional pressure can be vertically imparted to the top wall.

FIGURE 4 illustrates a still further embodiment wherein pressure applying bands **48** encompass the slabs **10** forming the side walls of the structure. Each of the bands includes a tension spring **50** which operates to urge the respective insulating slabs into sealing engagement. The bands also press against the slabs forming the top and bottom walls. In addition to the bands shown, others can be run in the opposite direction to thereby cross the top and bottom of the assembly.

FIGURE 5 illustrates an arrangement wherein the slabs **10** are fitted into tracks which serve to retain the slabs in a desired relationship. The track members can be interconnected so that a portable frame for the structure can be achieved. Vertical connecting means **52** are

illustrated for this purpose. It will be understood that connecting means of various designs can be employed.

The upper tracks or channel guides **54** are wider than the panels **10** to permit removal of the panels for replacement or for access to the interior of the enclosure where necessary. Also for this purpose, the lower tracks are formed in two sections **56** and **58**. The outer section **56** can be separated from the assembly to permit removal of the associated slab **10**.

It will also be noted that the tracks **58** are divided as shown at **60** so that removal of the slabs can be simplified. Thus, two adjacent sections **58** can be separated in order to permit removal of a single panel. Various known insulating slabs or panels can be employed in the formation of structures characterized by the features of this invention. However, a panel of the design illustrated in FIGURE 7 is preferred. In this panel, outer protecting members **62** which may be formed of plywood or other durable material enclose insulating material **64**. The member **62** extends short of the junction **66** of the panels so that the portions **64** of these panels are free to engage each other. Expanded polystyrene, such as that employed in Dylite panels, manufactured by Koppers Co., Inc., comprises a suitable material for the interior of the panels. Panels **10** of this design will form an excellent seal since the pressure applied to the panels will cause compression of the portions **64** in the interface to the extent that an essentially continuous wall will be provided by the several panels.

The discussion relative to FIGURE 7 is pertinent with regard to one of the most important features of this invention. In prior art constructions, means are usually associated with adjacent insulating panels in order to secure them together. Irrespective of the materials which are employed as the securing means, it has been found that substantial heat loss will result. With the arrangement of this invention, there are no foreign elements at the interface between any two panels. Accordingly, the insulation at the joints of the panels can be as effective as the insulation elsewhere. In this connection, it is contemplated that the facing **62** be removed from any panels where this facing would interfere with a proper joint.

FIGURES 8 and 9 illustrate designs for interlocking of adjacent slabs **10**. It is appreciated that other panel constructions employ similar interlocking means; however, these means have been illustrated in order to emphasize the importance of achieving joints without the inclusion of other materials. The interlocking illustrated can be achieved in panels without the provision of special connecting devices. Even where wooden materials are employed in forming the connecting means, a substantial difference in heat transfer characteristics has been recognized.

It will be noted that in each of the embodiments disclosed herein, relative movement between the panels and their supporting structure is allowed. Any expansion or contraction in the panels which occurs during changes in temperature is permitted without the danger of breaking the sealing relationship between the panels. The resilient means employed in these constructions are effective to press the adjacent panels together from all directions.

It will also be noted that the embodiments illustrated permit the formation of structures which can be maintained in a stationary location or which are portable in nature. Where the post members illustrated are employed, these members can be embedded in the ground or in concrete casings. On the other hand, such members may be assembled into a unitary frame. Such a frame or a frame including tracks as shown in FIGURE 5 can be easily transported. Reference is also made to the aforementioned copending application for suggestions regarding suitable frames.

In most assemblies of the type described, it is desirable to provide a door for access to the assembly. Such a door is illustrated at **68** in FIGURE 1. Suitable hinge means **70** can be associated therewith. It will be understood, however, that assemblies without a door which are constructed for temporary use are also contemplated.

It will be understood that various changes and modifications may be made in the constructions described which provide the characteristics of this invention without departing from the spirit thereof particularly as defined in the following claims.

That which is claimed is:

1. A self-contained insulated, rectangular parallelepipedic shaped enclosure comprising a plurality of individual flat insulating panels, said panels defining at least tne side walls and the top wall of said enclosure, each of said walls including a plurality of panels positioned in edge to edge relationship with the panels forming the top wall resting on the top edges of the panels forming the side walls, stationary vertical posts positioned to engage both of the exterior faces making up a corner portion betwen adjacent side walls, other vertical posts fixed in position to engage the other corner portions of the same side walls, posts fixed in position in spaced relation to the corner portions of the other two side walls and resilient means between said spaced posts and said adjacent corner portions of the other two side walls acting in a plane perpendicular to the first posts constantly to urge the side walls in the direction towards the fixed posts engaging the first side walls.

2. A self-contained insulated enclosure of rectangular parellelepipedic shape comprising a plurality of individual insulating panels, said panels defining at least the side walls and top wall of said enclosure, each of said walls including a plurality of panels positioned in edge to edge relationship, te panels forming the top wall resting on the top edges of the panels forming the side walls, a bottom wall on which the panels forming the side walls rest, a band extending longitudinally about the side walls intermediate their upper and lower edges including a resilient portion whereby the band resiliently engages the side walls for urging them together in the assembled relation, other longitudinally extending resilient bands straddling the adjacent meeting edge portions between the side walls and the top wall and between the side walls and the bottom wall to hold the panels together while securing the top wall and the bottom wall to the side wall panels.

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