Feb. 20, 1968 E. J. BUZICKY 3,369,336

INSULATED WALL STRUCTURE

Filed Nov. 19, 1964

Fig. 1.

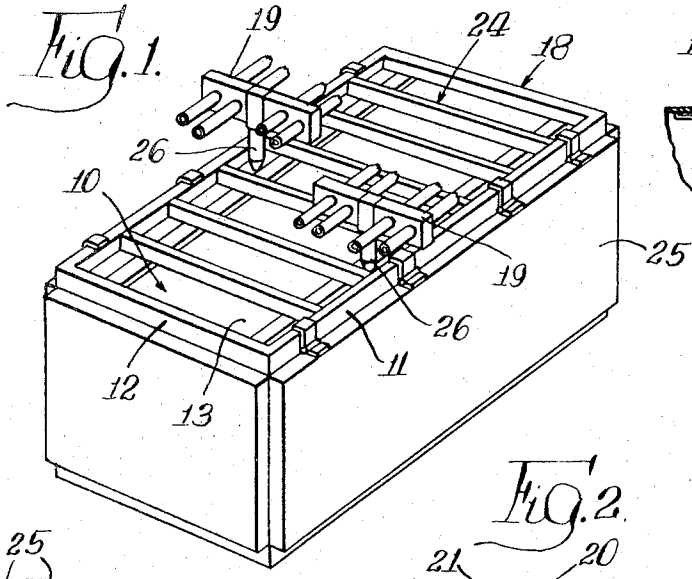


Fig. 4.

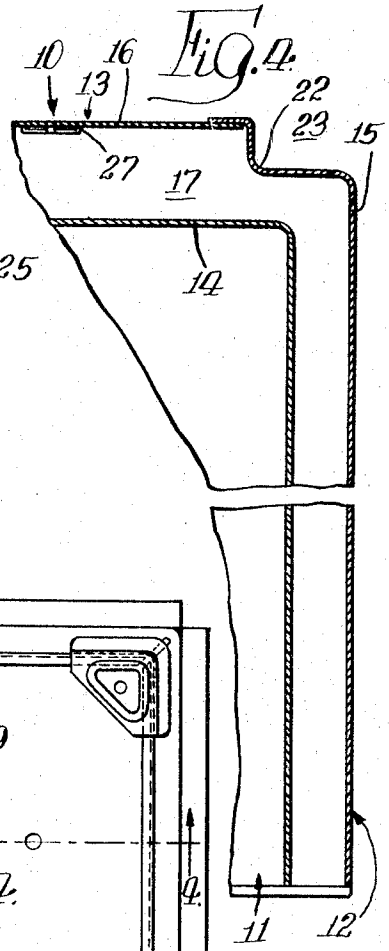


Fig. 2.

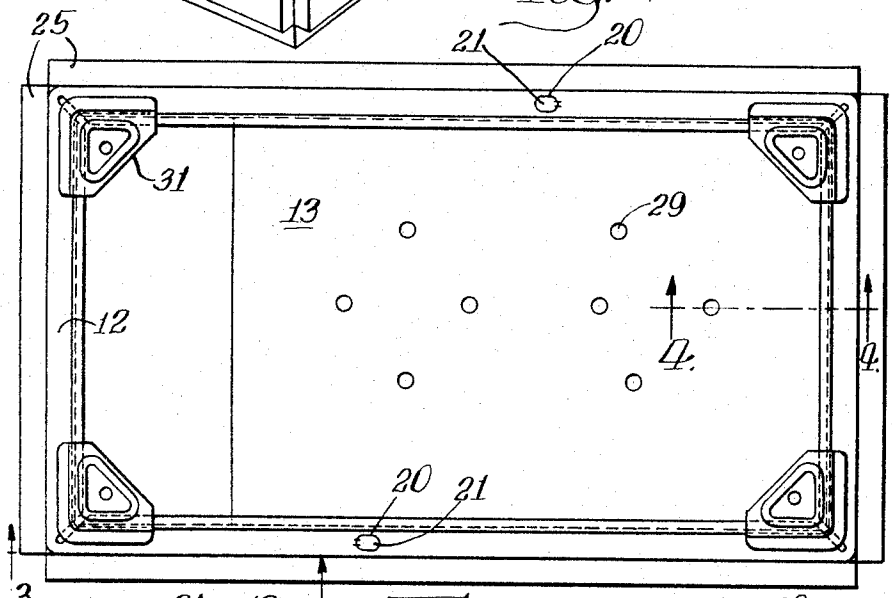


Fig. 3.

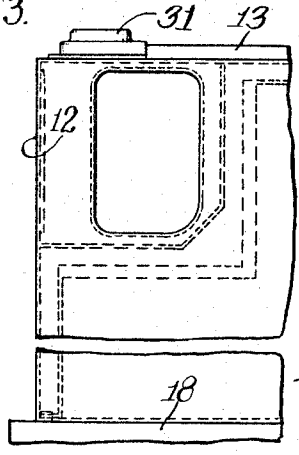


Fig. 5.

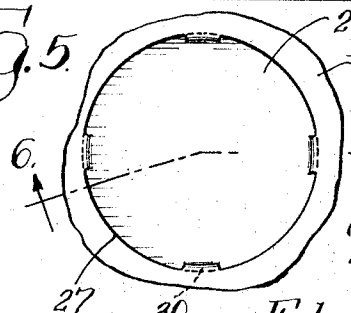
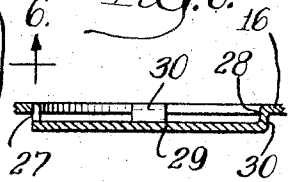


Fig. 6.



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INSULATED WALL STRUCTURE

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ABSTRACT OF THE DISCLOSURE

A wall structure wherein the space between a pair of spaced panels is vented through at least one panel when foamed plastic is being installed between the panels by being foamed in place, thereby to prevent excessive pressure build-up between the panels and provide uniformity of the foaming process.

Specification

This invention relates to insulated wall structures and in particular to insulated wall structures for use in refrigeration apparatus.

In one well known form of insulated wall structure, insulation is foamed in place between a pair of spaced panels. Illustratively, where the wall structure is to comprise a wall of a refrigeration apparatus, such as a freezer, one of the panels comprises the outer cabinet panel of the freezer and the other of the panels comprises the liner of the freezer. A problem arises in the foaming of the insulation in place between the panels in that at times the foam insulation does not distribute itself uniformly throughout the space between the panels leaving void spaces wherein the insulating effect is relatively low as compared to the remainder of the structure. Further, the nonuniformity of the foaming process causes excessive pressure build-up in portions of the space deforming the panels and providing poor insulation in these portions, as the K factor of the resultant dense portions is substantially lowered. The problem of excessive pressure is further quite serious in that at times the panels may burst, presenting a serous safety hazard as well as requiring that the complete panel structure be discarded.

The present invention comprehends an improved wall structure utilizing a foam plastic insulation, eliminating the disadvantages of the known structures as discussed above in a novel and simple manner.

Thus, a principal feature of the present invention is the provision of a new and improved insulated wall structure.

Another feature of the invention is the provision of such an insulated wall structure having new and improved means for assuring a uniform distribution of the foam plastic throughout the space between the wall panels.

A further feature of the invention is the provision of such an insulated wall structure including new and improved means for preventing the development of excessive pressures during the foaming of the insulation material therein.

Still another feature of the invention is the provision of such an insulated wall structure comprising a panel having a plurality of distributed apertures, and a body of foam plastic contiguous with one face of the panel, the apertures having a small transverse dimension preselected to restrict passage of plastic therethrough as a result of normal pressures produced in the foaming of the plastic while permitting visual determination of the presence of the foam plastic at each of the apertures.

A yet further feature of the invention is the provision

of an insulated wall structure wherein the transverse dimenson of the aperture is further preselected to provide substantially free venting therethrough of air under normal pressure, or plastic to be forced outward from the one panel face by the foaming plastic under abnormal high pressure to permit substantially free foaming of the plastic against the one panel face.

Still another feature of the invention is the provision of such an insulated wall structure wherein the apertures are defined by an opening through the panel and closure means removably carried by the panel to close a major portion of the opening, the opening having a preselected transverse dimension permitting substantially free passage of plastic therethrough subsequent to a removal of said closure means for providing foam plastic from the face of the panel opposite the one face.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a perspective view of a refrigerator cabinet having a fixture, fragmentarily illustrated, associated therewith for use when providing foam plastic within the wall structure of the cabinet;

FIGURE 2 is a plan view of the bottom of the cabinet;

FIGURE 3 is a fragmentary vertical elevation taken substantially along the line 3—3 of FIGURE 2, illustrating a corner portion of the cabinet;

FIGURE 4 is a fragmentary vertical section taken substantially along the line 4—4 of FIGURE 2;

FIGURE 5 is a fragmentary plan view of one of the panel openings with a closure disposed thereover to define the control aperture means; and

FIGURE 6 is a vertical section taken substantially along the line 6—6 of FIGURE 5.

In the exemplary embodiment of the invention as disclosed in the drawing, a cabinet generally designated 10 is shown to comprise a cabinet for use in a refrigeration apparatus such as a chest freezer. The cabinet structure including the side walls 11, end walls 12, and bottom wall 13 is defined by an inner liner 14 and an outer panel 15 which includes a bottom panel 16 forming a space 17 therebetween. As shown in FIGURES 2 and 3, the bottom wall 13 may be provided with a plurality of legs 31 for supporting the cabinet on a surface such as a floor.

A fixture generally designated 18 is provided around the cabinet 10 to install the foam plastic within the space 17. Herein, the fixture includes conventional pouring heads 19 for delivering the plastic material to be foamed within space 17 through a pair of inlets 20 in the side walls 11. As shown in FIGURE 2, the inlets 20 comprise openings selectively closed by flaps 21 hingedly connected at one portion to an inturned portion 22 of the side walls 11 and end walls 12. The inturned portion 22 defines a conventional toe space 23. The fixture 18 includes a frame structure generally designated 24 having support panels 25 for encompassing the outer panels of the cabinet structure and holding the cabinet structure rigid during the foaming operation. The mixture includes suitable means (not shown) for closing the space 17 at the upper end of the side walls 11 and end walls 12 (N.B., during the foaming operation the upper end of the side and end walls are lowermost, as illustrated in FIGURE 4, the foaming operation being performed with the cabinet in an upside down arrangement with the bottom wall uppermost, as illustrated in FIGURES 3 and 4).

To permit the filling of the space 17 with foam plastic,

the flaps 21 are swung to open the inlets 20 permitting the nozzles 26 of the pouring heads 19 to project therethrough into the space 17, whereupon a suitable foam plastic may be delivered into the space 17 to form the foamed-in-place insulation therein. After the desired quantity of foam plastic is delivered through the inlets, the nozzles are withdrawn and the flaps 21 repositioned across the inlets to complete the filling operation.

As discussed briefly above, a problem arises in such foamed-in-place structures in that, while the plastic will normally uniformly foam the side wall and end wall spaces therein, the foam insulation, at times, does not extend uniformly through the horizontal spaces. Illustratively, in such chest freezer cabinets the foam plastic at times may not form uniformly across the horizontal space 17 between the liner 14 and the bottom wall panel 16. This condition, however, is readily determinable in the instant cabinet structure 10 by means of a plurality of distributed apertures 27 in the bottom panel 16 through which the presence, or absence, of the foam plastic in the portion of space 17 contiguous to the apertures may be seen.

Apertures 27 are further suitably dimensioned so as to provide a free venting of the space 17 during the foaming operation, thereby providing improved uniform distribution of the foam plastic throughout the space 17 in bottom wall 13. More specifically, the apertures are preselected to provide substantially free venting of air from the space 17 while effectively precluding the flow of foam plastic therethrough under the normal pressures produced in the foaming of the plastic. However, the apertures are preselected to permit a flow of the plastic outwardly therethrough as a result of abnormal high pressures produced therein during the foaming operation. Thus, the apertures provide a further improved forming of the foamed plastic insulation in the space 17 by relieving excessive pressures within the space heretofore presenting serious safety and quality control problems in the formation of such foam insulation wall structure.

In the illustrated embodiment, each aperture 27 (see FIGURE 6) is defined by a relatively large circular opening 28 in the bottom wall panel 16 which is formed in the panel 16 by upsetting a circular piece 29 from the panel while leaving a plurality of connecting legs 30 connected between the panel 16 and piece 29. Thus, apertures 27 comprise the segmentally annular openings extending along the periphery of the circular closure piece 29 between the legs 30. Herein, four such legs 30 are provided whereby the aperture 27 is defined by four annular segments of slightly less than 90° each. The length of the legs 30 thusly defines the transverse dimension of the aperture 27 which, as discussed above, is preselected to permit the desired observation of the absence or presence of plastic in the space adjacent the aperture, the venting of air, the venting of plastic under abnormal pressures, and the retention of the plastic in the space 17 under normal pressures produced in the foaming operation.

Upon observation that the foam plastic does not extend to directly behind a selected aperture 27, the introduction of suitable foam plastic to remedy this condition is effected simply and quickly in the present cabinet structure by the removal of the closure piece 29 defining that aperture and the introduction of a suitable quantity of foam plastic material through the now accessible opening 28 into space 17. Removal of the closure piece is effected simply by applying a tool such as a screwdriver into the aperture 27 to pry the closure piece free from the panel 16 by breaking the legs 30 thereof. The forming of the foam plastic across the opening 28 eliminates the necessity for providing any replacement closure piece across the opening.

The cabinet structure 10 thusly provides an improved insulating wall structure wherein foamed insulation is distributed uniformly and substantially and completely throughout the wall space 17. As dense portions are effectively eliminated by precluding the development of excessive pressure in any portion of the space 17, a substantial cost saving is effected as the total quantity of the relatively expensive foamed plastic utilized in each cabinet structure is only that necessary to provide the desired density of insulation throughout. Further, the cabinet structure provides for improved safety in the construction thereof by effectively eliminating the possibility of bursting as has resulted from the development of excessive pressure in known cabinet structures.

While I have shown and described one embodiment of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

The embodiment of the invention in which an exclusive property or privilege is claimed is defined as follows:

1. A wall structure comprising: a panel having a plurality of distributed apertures; and a body of foamed-in-place plastic contiguous with one face of the panel, said apertures having a preselected small transverse dimension and defining means for effectively precluding passage of plastic therethrough as a result of normal superatmospheric pressures produced in the foaming of the plastic while permitting visual determination of the presence of the foam plastic at each of said apertures.

2. The wall structure of claim 1 wherein the transverse dimension of said apertures is further preselected to provide substantially free venting therethrough of air forced against said one panel face by the foaming plastic to permit substantially free foaming of the plastic against said one panel face.

3. The wall structure of claim 1 wherein the transverse dimension of said apertures is further preselected to permit passage of plastic therethrough as a result of abnormal high pressures produced in the foaming of the plastic.

4. A wall structure comprising: a panel having a plurality of distributed apertures; and a body of foamed-in-place plastic contiguous with one face of the panel, said apertures having a preselected small transverse dimension and defining means for effectively precluding passage of plastic therethrough as a result of normal superatmospheric pressures produced in the foaming of the plastic while permitting visual determination of the presence of the foam plastic at each of said apertures, said apertures being defined by an opening through said panel and closure means removably carried by said panel to close a major portion of said opening, said opening having a preselected transverse dimension permitting substantially free passage of plastic therethrough subsequent to a removal of said closure means for providing foam plastic therethrough from the face of said panel opposite said one face.

5. The wall structure of claim 4 wherein said closure means comprises a portion of said panel.

6. The wall structure of claim 4 wherein said closure means comprises a closure member and means for securing said closure member to said panel adjacent said opening.

7. The wall structure of claim 4 wherein said closure means comprises a portion of said panel displaced from said panel to form said opening and means for securing said portion to said panel adjacent said opening.

8. The wall structure of claim 4 wherein said closure means comprises a portion of said panel displaced from said panel to form said opening and means for securing said portion to said panel in alignment with said opening and spaced from said panel to define an annular aperture between the periphery of said portion and the portion of the panel dening said opening.

9. The wall structure of claim 1 including means on the panel defining an opening for delivery of foam plastic material therethrough; a flap extending movably across the

opening; and hinge means connecting the flap to the panel for retaining the flap across the opening while permitting selective disposition of the flap away from the opening during delivery of foam plastic through the opening.

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