March 4, 1947. W. E. RICHARD 2,416,845

REFRIGERATOR CABINET

Filed Feb. 25, 1942 2 Sheets-Sheet 1

Fig. 1

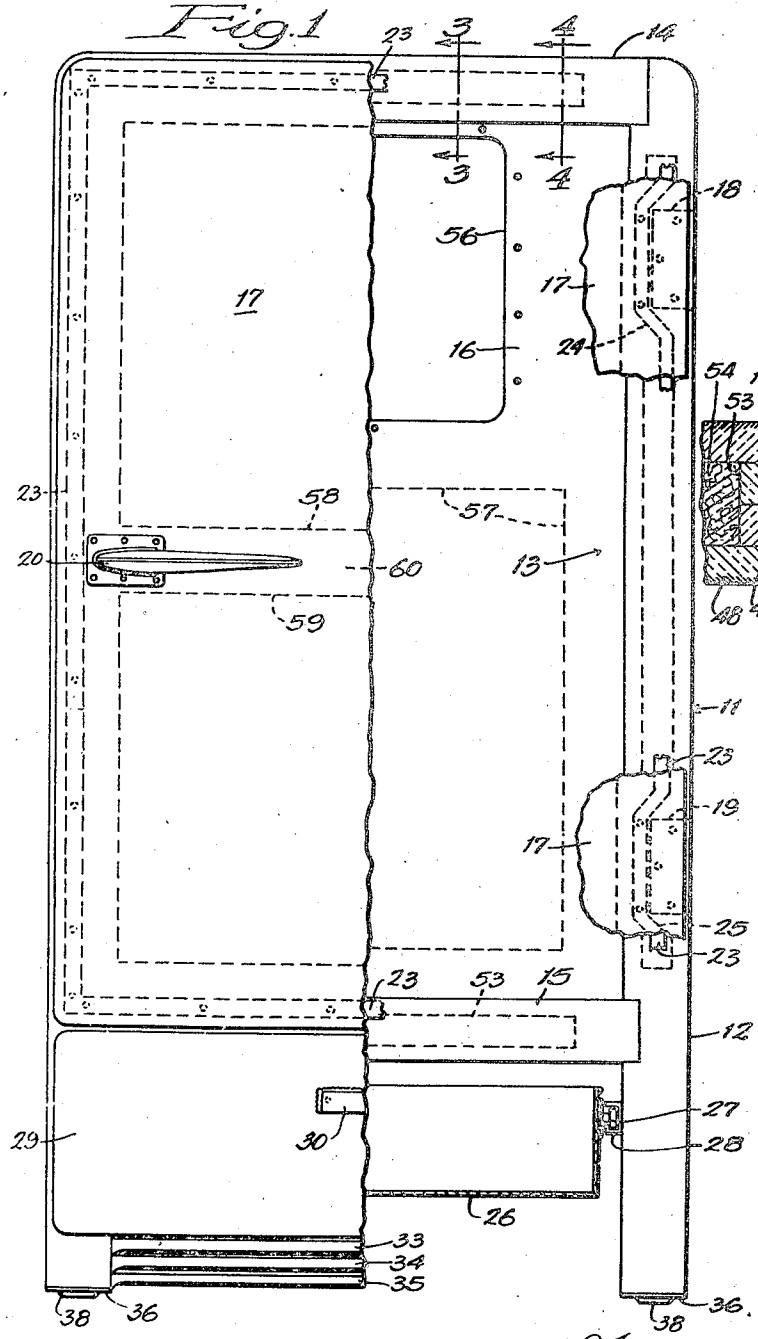

Fig. 6

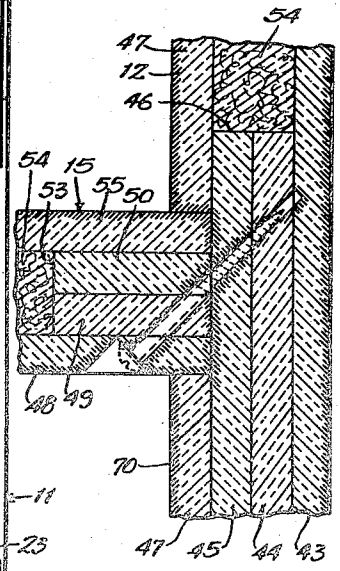

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Fig. 2

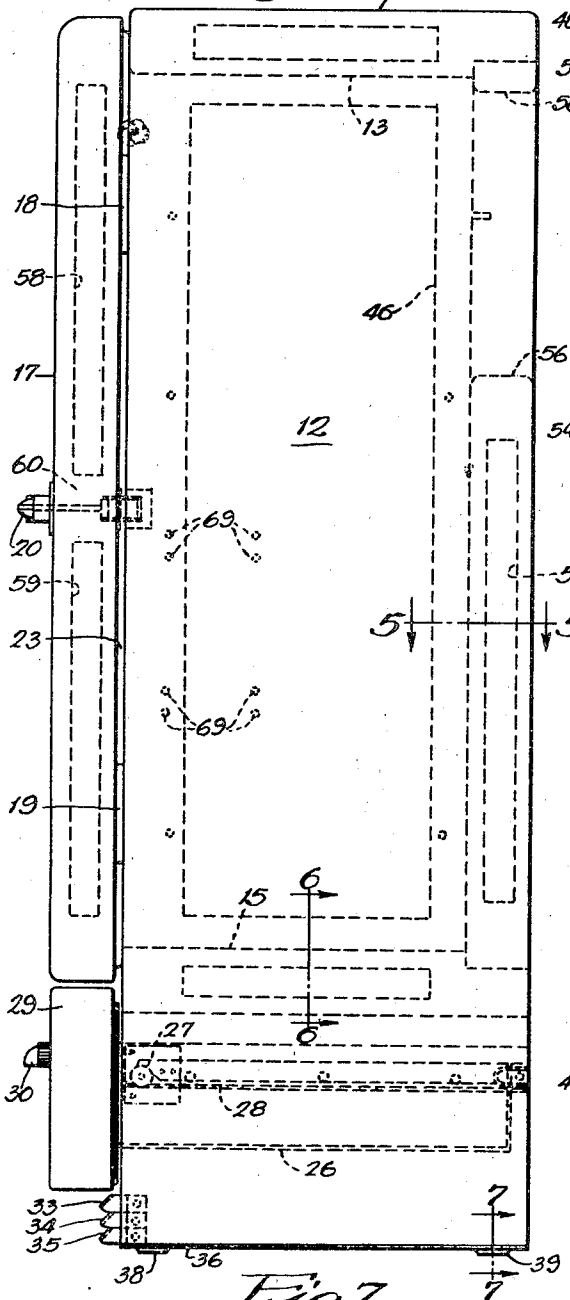


Fig. 3

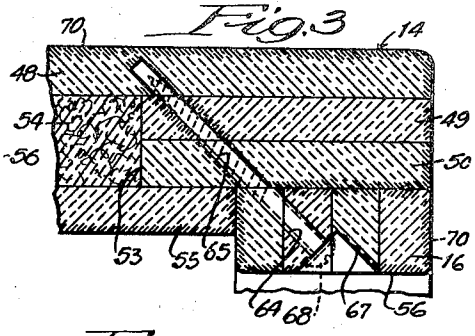


Fig. 4

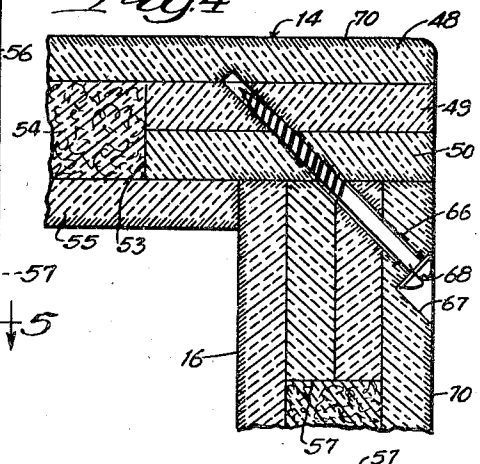


Fig. 5

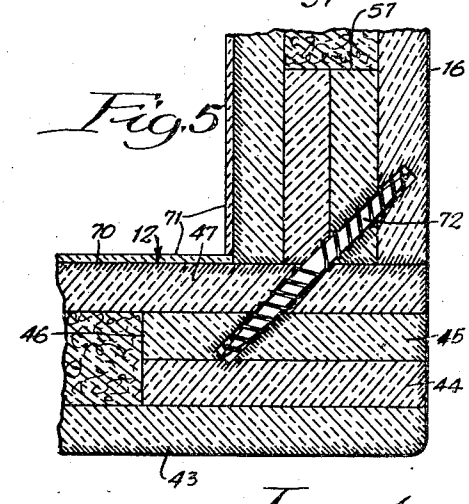
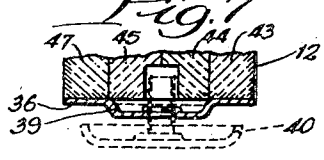


Fig. 7



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Patented Mar. 4, 1947

2,416,845

UNITED STATES PATENT OFFICE

2,416,845

REFRIGERATOR CABINET

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Application February 25, 1942, Serial No. 432,285

2 Claims. (Cl. 312—146)

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My invention relates to refrigerator cabinets, and the method of making them, and is particularly concerned with a refrigerator cabinet which in effect is unitary, and which, by a novel construction employing plastic-impregnated sheet or molded porous insulating material provides a light, strong and economical cabinet of extremely high insulative efficiency.

In a wall made from fibrous or other porous material, a lesser compactness of the fibers or basic physical particles of the material is usually attended by a decrease in coefficient of thermal conductivity, and also, because a given amount of less compact material, occupies greater space, by a lesser weight per unit volume. Thus when the fibers of a fibrous substance (let us say a material formed from wood fibers to use a well known example), are formed into a board-like sheet under rather light pressure and using but a small amount of binder, an extremely efficient insulating material is formed. But such material has little mechanical strength, and it is difficult to process with ordinary cutting tools. A loosely packed sheet of material with but little binder is particularly hard to cut to shape where an inset joint, such as a rabbeted joint, is required, because the loosely packed and insecurely bonded fibers have a tendency to tear and pull out, and are difficult to cut accurately with cutting tools such as those used for wood working. When strength and tooling characteristics are improved by an increased amount of binder and more forming pressure, much of the thermal insulative value is sacrificed.

Among the objects of my invention are the following:

To increase both the strength and the thermal insulating characteristic of a plasticized refrigerator cabinet formed from panels of insulative material;

To raise the insulating characteristic of the walls of a refrigerator cabinet formed of fibrous or porous material, the surfaces of which are plastic impregnated, to a coefficient above that of the plastic impregnated material itself;

To construct the component wall panels of a refrigerator cabinet so that they can be assembled with inset or rabbeted joints without the necessity for subsequent tooling or grooving operations, which object is accomplished, according to my invention, by making the panels of laminated sheet insulating material of substantial mechanical strength, the laminae of which are assembled in longitudinally offset relation to each other, the surfaces of the panels being plastic impregnated;

To increase the mechanical strength and insulating characteristic of a refrigerator, by the use of a wall panel having a shell of fibrous or porous material the surfaces of which are plastic impregnated, the panels being constructed with inner cavities filled with insulative material of higher

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insulating characteristic than that of the shell portion of the panels.

These and other objects and advantages of my invention will be set forth more fully in the following description and in the accompanying drawings.

In the drawings, of which there are two sheets,

Fig. 1 is a view in front elevation of a refrigerator cabinet made in accordance with my invention, a portion of the door and of the front portion of a lower drawer and lower louvers being broken away;

Fig. 2 is a view in side elevation of the cabinet illustrated in Fig. 1;

Fig. 3 is an enlarged, fragmentary, sectional view of the upper rear corner of the cabinet taken on the plane of the line 3—3 of Fig. 1;

Fig. 4 is a similarly enlarged, fragmentary, sectional view, taken on the plane of the line 4—4 of Fig. 1;

Fig. 5 is a similarly enlarged, fragmentary, sectional view taken on the plane of the line 5—5 of Fig. 2;

Fig. 6 is a similarly enlarged, fragmentary, sectional view, taken on the plane of the line 6—6 of Fig. 2; and

Fig. 7 is a similarly enlarged, fragmentary, sectional view taken on the plane of the line 7—7 of Fig. 2.

Referring to the drawings in detail, a refrigerator cabinet 11 comprises side walls 12, a top panel 14, a compartment bottom panel 15, and a compartment back panel 16. A compartment door 17 is mounted on the cabinet by means of hinges 18 and 19 and is provided with a latch member 20.

A resilient gasket 23 is mounted on the rear face of the door 17 around the marginal edge thereof to engage the forward facing edges of the panels comprising the sides, top and bottom, respectively, of a refrigerator compartment 13. The door gasket 23 is offset inwardly as at 24 and 25 to clear the hinges 18 and 19 respectively.

A drawer 26 for the storage of vegetables and the like, is supported on rollers 27 mounted for rolling movement on channeled tracks 28 which are mounted on the inner faces of the side panels 12 in the space beneath the compartment bottom panel 15.

The drawer 26 is provided with a front panel 29 which is designed to harmonize with the compartment door 17, a drawer pull 30 being secured to the front of the panel for manipulating the drawer.

Three louver strips 33, 34, and 35 are mounted to extend across the space between the lower portions of the side panels beneath the drawer panel 29, and serve to dress up the lower portion of the refrigerator as well as to provide a strengthening reinforcement between the lower end por-

tions of the side panels below the compartment bottom member 15.

The lower edges of each of the side wall panels 12 is shod with a metal plate 36 to protect and reinforce these lower edges of the side panels. These plates each have a pair of embossed, downwardly projecting protuberances 38 and 39, one at the front and one at the rear, to act as supporting feet for the refrigerator. If desired, threaded leg levelers, 40 indicated in dotted lines in Fig. 7, may be threaded into central openings in these protuberances.

The detailed structure of the side panels 12 is shown in Figs. 1, 2, 5, 6 and 7. Since the side panels are similar to each other with the exception that one is the reverse of the other, only the right-hand panel, as illustrated in Fig. 1, will be described. The panel is composed of four layers or laminae of insulating board, which, for the purpose of the present description, may be assumed to be of the wood-fiber type, although it will be apparent to those skilled in the art that other types of insulating board may be equally suitable.

The outer layer or lamination 43 of this panel is continuous throughout the entire area of the panel. Two central or intermediate layers 44 and 45 of similar material are formed each with a rectangular opening 46, extending throughout most of the entire upper portion of these layers. Although the intermediate layers 44 and 45 are illustrated as comprising single sheets with the rectangular cut-out openings 46 therein, it will be apparent that these layers may be applied in the form of strips, surrounding the desired open areas 46, and secured to the continuous outer layer, with the marginal edges of the intermediate layers coextensive with those of the outer layer 43.

An innermost layer 47 of each side panel is coextensive with the front, rear, and bottom edges of the outer layer 43 and of the intermediate layers 44 and 45, however, the inner layer 47 terminates a short distance downwardly from the top of the panel, as defined by the upper edges of the other layers 43, 44 and 45 to receive an end of the top panel 14 in the rabbet thus formed. The inner layer 47 preferably is made in two pieces, as best illustrated in Fig. 6, these pieces being separated to receive the end of the bottom panel 15 therebetween to form a grooved butt joint, as best illustrated in Fig. 6.

The compartment top panel 14 and the compartment bottom panel 15 may be substantially similar to each other, each comprising an overall outer layer 48 of insulating board and two intermediate layers 49 and 50 (see Figs. 1, 3, 4 and 6). The outer marginal edges of the intermediate layers are coextensive with the edges of the outer layer, and each has a rectangular central opening 53 therein, to form a cavity adapted to be filled with light, loose insulating material 54, such as rock wool.

The innermost, or compartment-side layer 55 of each of these compartment top and bottom panels, respectively, is coextensive with the front and side marginal edges of the other three layers 48, 49 and 50 of these members, but the rear edge of each of these innermost layers is cut away the thickness of the back panel 16, to form rabbeted joints with the upper and lower ends, respectively, of the compartment back panel, as illustrated in Figs. 2 and 3.

The compartment back panel 16 is formed with a rectangular opening 56 in the upper portion thereof which is adapted to receive a refrigerating unit, not illustrated. The portion of the back panel below the opening 56 is provided with a rectangular cavity 57 which may be formed similarly to the cavities in the other panels previously described, and filled with suitable insulating material 54 of low thermal conductivity or "k" factor.

The construction of the compartment door 17 is illustrated in Fig. 1 and Fig. 2. The door is formed with two cavities 58 and 59 therein, separated by a solid central horizontal strip 60 upon which is mounted the latch 20. This strip, in addition to providing a strengthened support for the latch 20, also serves to brace the outer and inner layers of the door which are secured to the opposite sides of this strip.

Each of the panels enclosing the refrigerator compartment 13 is constructed with a cavity or cavities therein, the cavities being filled with light, loose, insulating material 54, of low thermal conductivity such as rock wool, before applying the final lamination which completes the panel and encloses the cavities.

After the various panels have been assembled as above set forth, the edges of the panels may be trimmed to size as by means of suitable cutting machines, such as a planer, slicer, or joiner, and may be finished approximately to their final dimensions. The edges of the various panels, where desired or necessary, may be rounded or otherwise contoured.

In assembling the panels to form the cabinet, the panels may be secured together by screws, such as are illustrated in Figs. 3 to 6, inclusive, but I desire to have the holes into which the screws are inserted provided with plastic impregnated surfaces, for the dual purpose of sealing these holes against the entrance of moisture, and for providing a more secure gripping medium for the threads of the screws.

Therefore, when the panels are in their roughly finished form, after the completion of the processes above described, I prefer to drill the screw holes in the various panels as at 64 and 65 in Fig. 3, and at 66 in Fig. 4. The holes preferably are counterbored as at 67 to receive the heads of screws 68 used to secure the panels together. At the same time I also prefer to drill holes to receive shelf supporting studs 69 in the side walls 12 and 13.

After the holes are made, the exposed surfaces of all of the panels are coated with hardenable plastic material 70 which is applied in a state sufficiently fluid to impregnate slightly the outer fibrous surfaces of the panels, the plastic impregnating material being flowed into the various screw holes which then are cleaned of any excess plastic material which otherwise might fill these holes and close them off before the plastic is hardened. Instead of the standard headed screws illustrated in Figs. 3, 4 and 6, I may use double pointed right and left hand threaded screws 72, such as that illustrated in Fig. 5, to secure the panels together. These screws preferably are of the self-driving type with long pitch threads which cause the screw to rotate merely by pressing the panels together in the direction of the axis of the screw. This construction provides a "blind" joint with no exposed screw heads or recesses, a decided advantage both from the standpoint of appearance and sanitation.

The plastic material used as a coating for the panels may be of any suitable type, and since such plastic materials are numerous, and are well

known to the art, it is believed unnecessary to cite specific examples of such materials. The plastic preferably is applied to the panel while soft or in a liquid state, and may be applied by any suitable method, such as by brushing, spraying, dipping, molding or "knifing." For covering the outer and inner surfaces of the panels I may use sheets 71 of plastic material applied to the panels and secured thereto by suitable adhesive (see Fig. 5).

After the plastic has been applied, as above set forth, the plastic may be hardened, either, in the case of a thermo-plastic, by permitting it to cool after being applied in a heated state, or if of the type requiring baking, then by baking it at a suitable temperature for a required period of time. If an air-hardening plastic is used, it may be hardened in the customary manner by exposing the panels to the air, and permitting them to dry for a required period.

After the plastic has been applied, the surfaces of the panels may be given a final smoothing and finishing treatment as by fine sanding with a suitable sanding machine, or by rubbing with suitable abrasive, detergent or polishing materials, to provide a desired surface finish, which may be anything from a dull mat to a high gloss.

I prefer to use as a plastic, a substance of a color and texture which will be suitable for the finished refrigerator cabinet, so that no subsequent treating or finishing operations are required after the various panels have been assembled as illustrated, to form the completed refrigerator cabinet. If desired, however, after the cabinet has been assembled, a finish coat of suitable paint or lacquer may be applied, as by spraying, after which the cabinet may be subjected to a conventional baking period if required by the particular finish coat which is employed.

In assembling the panels which form the cabinet, I may apply a quantity of hardenable plastic substance to the surfaces comprising the joints. While this plastic substance is soft, the joints are drawn tightly together, so that when the plastic is hardened, the joint is sealed and strengthened thereby. Any excess plastic material which is squeezed out in tightening the joint, may be wiped off before it hardens to leave the joint in a smooth finished condition.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

I claim:

1. A refrigerator cabinet constructed of a pair of side panels, a top panel, a rear panel and a bottom panel, the said rear panel being formed with an aperture for receiving a mechanical refrigeration unit, and the said bottom panel being disposed above the lower ends of the side panels and engaging the lower end of the rear panel to form a drawer space below said bottom panel, and a door panel hingedly mounted on one of said side panels for closing the front of said cabinet, all of said panels being constructed of an outer layer and an inner layer of rigid fibrous and porous insulating material, the said inner and outer layers being spaced and joined about the borders of each panel by a plurality of intermediate laminations of said fibrous insulating material, forming a chamber in each panel between the inner and outer layers and inside the border laminations said chamber being filled with loose fibrous insulating material, the said laminations providing solid and rigid portions adjacent to the edges of each panel, through which the panels are secured together by means of diagonally extending threaded fastening means.

2. A refrigerator cabinet constructed of a pair of side panels, a top panel, a rear panel and a bottom panel, the said rear panel being formed with an aperture for receiving a mechanical refrigeration unit, and the said bottom panel being disposed above the lower ends of the side panels and engaging the lower end of the rear panel to form a drawer space below said bottom panel, and a door panel hingedly mounted on one of said side panels for closing the front of said cabinet, all of said panels being constructed of an outer layer and an inner layer of rigid fibrous and porous insulating material, the said inner and outer layers being spaced and joined about the borders of each panel by a plurality of intermediate laminations of said fibrous insulating material, forming a chamber in each panel between the inner and outer layers and inside the border laminations said chamber being filled with loose fibrous insulating material, the said laminations providing solid and rigid portions adjacent to the edges of each panel, through which the panels are secured together by means of diagonally extending threaded fastening means, the said assembled cabinet being coated on the inside and outside with a hard plastic water-proof covering impregnating the insulating material for a limited distance from the surface and extending over and closing the joints between panels to provide the exterior and interior with a durable air-tight coating.

WILLIAM EDWARD RICHARD.

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