Aug. 28, 1934. C. C. RITTER 1,971,384

METHOD OF MAKING REFRIGERATOR DOORS

Original Filed Nov. 30, 1929 3 Sheets-Sheet 1

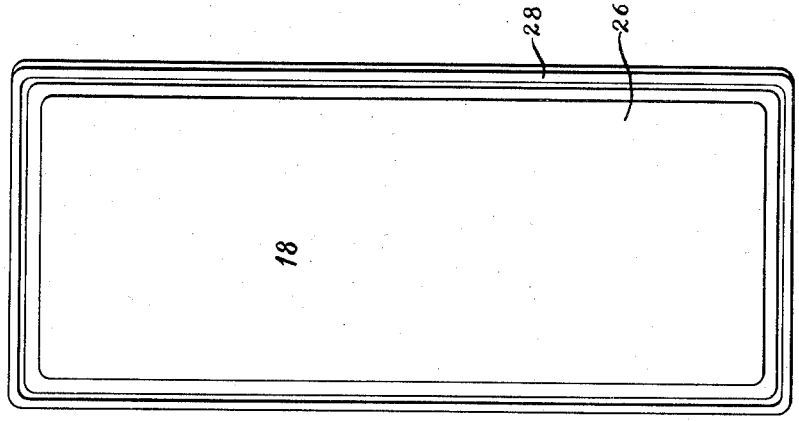

Fig. 1

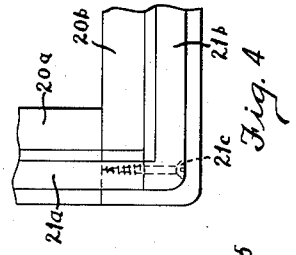

Fig. 4

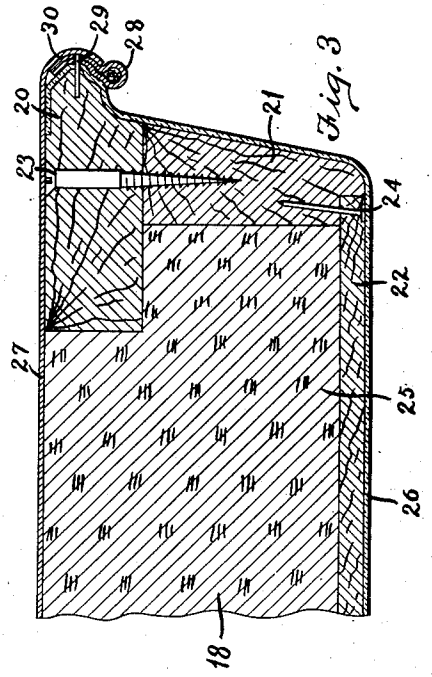

Fig. 3

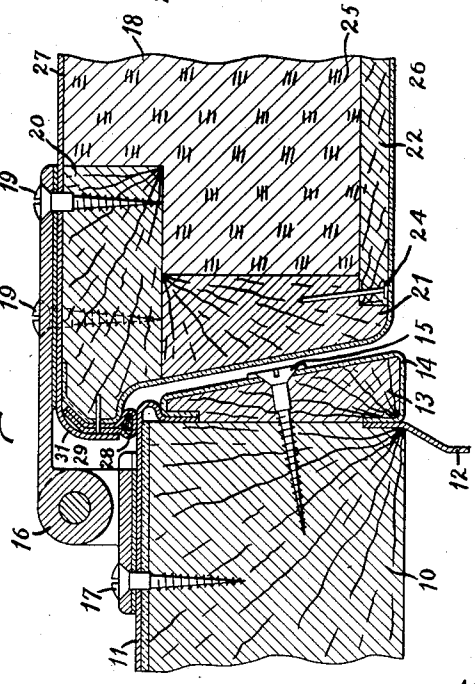

Fig. 2

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METHOD OF MAKING REFRIGERATOR DOORS

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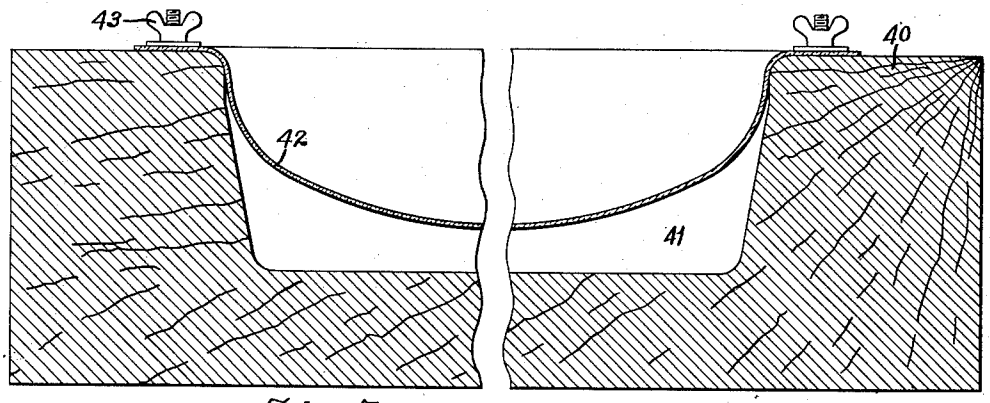

Fig. 5

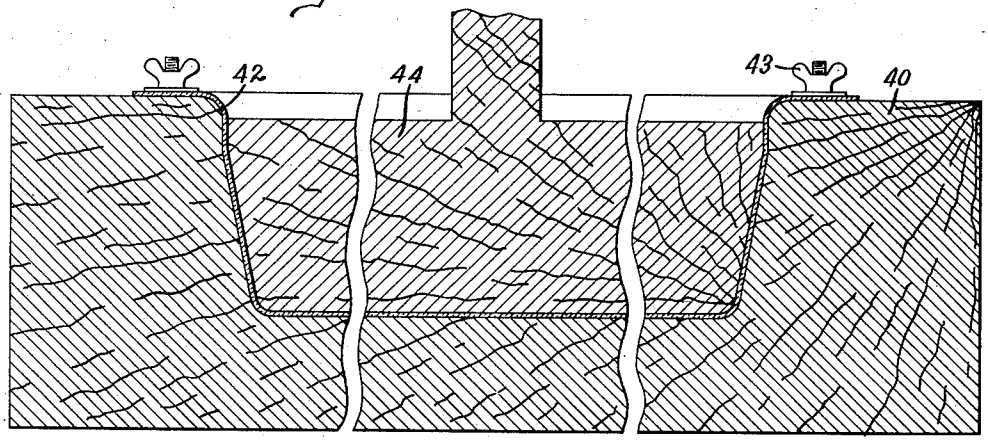

Fig. 6

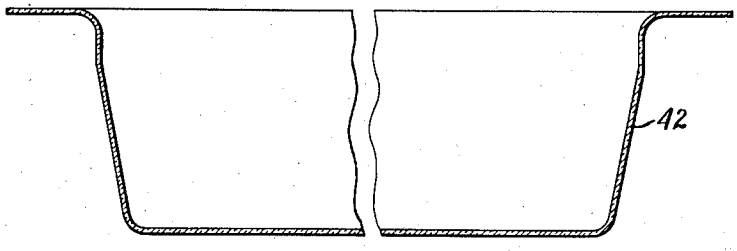

Fig. 7

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METHOD OF MAKING REFRIGERATOR DOORS

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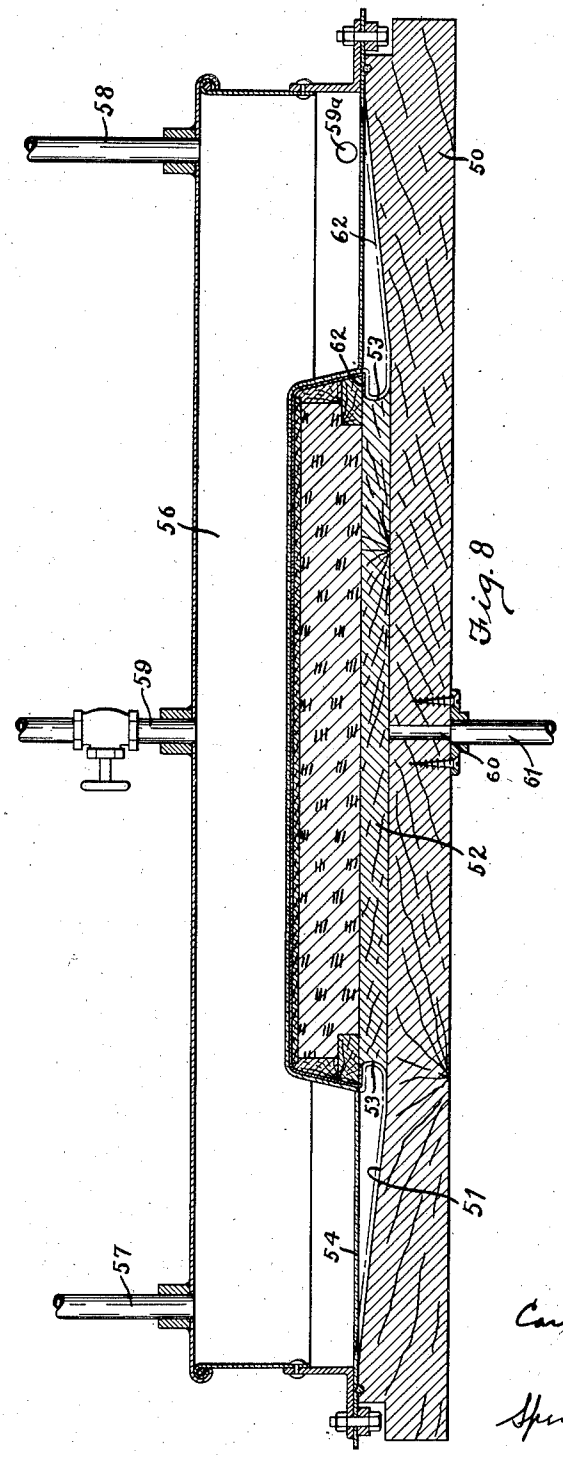

Fig. 8

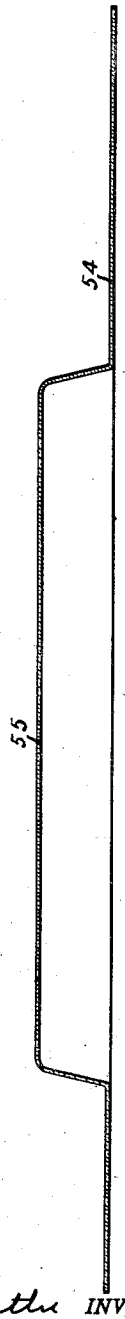

Fig. 9

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UNITED STATES PATENT OFFICE

1,971,384

METHOD OF MAKING REFRIGERATOR DOORS

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Application November 30, 1929, Serial No. 410,854
Renewed January 17, 1934

2 Claims. (Cl. 18—59)

This invention relates to refrigerating apparatus and more particularly to a method of constructing refrigerator doors.

One of the objects of this invention is to provide a method of applying a moulded lining to a supporting form and more particularly to provide a method of applying a moulded shell of pyralin or other thermoplastic molding compound to a portion of a refrigerator, for example to a refrigerator door.

Another object is to provide a method of applying a pyralin shell to the innerface of a refrigerator door, at the same time extruding all air from between the door and the pyralin shell to thereby insure a smooth surface to the finished door.

A further object is to provide a method of moulding the material into shells of the shape desired and particularly into the shape of a refrigerator door.

A still further object is to reduce the thermal conductivity of a refrigerator cabinet around the door or access opening.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is an elevation of the inside of the door embodying features of this invention;

Fig. 2 is a cross sectional view, for instance, horizontal, of the hinged side of the door construction;

Fig. 3 is a cross sectional view of the opposite edge of the door from that shown in Fig. 2;

Fig. 4 is a detail of an embodiment of this invention;

Fig. 5 is a cross sectional view of a guide or die for forming the shell particularly the pyralin shell;

Fig. 6 is a cross sectional view of the apparatus shown in Fig. 5 with the corresponding die in register;

Fig. 7 is a cross sectional view of the finished pyralin shell;

Fig. 8 is a cross sectional view of the apparatus for attaching the shell to the form; and

Fig. 9 is a cross sectional view of the flexible diaphragm used in the apparatus shown in Fig. 8.

In one aspect, this invention contemplates the application of a moulded material to a supporting form by moulding the material into a shell substantially similar in shape to the shape of the form, placing the shell on the form which may have been previously treated with shellac or any other adhesive material, heating the shell to cause a softening thereof and drawing the shell firmly against the form by creating a vacuum beneath the form and the shell.

In another aspect, this invention contemplates means for moulding the material into a shell of the shape described, means for forcing the shell on to the form including means for heating or otherwise softening the shell and means for creating a vacuum beneath the form and the shell.

One method of practicing this invention may be in the production of refrigerator cabinets and particularly in the construction of the door or closure members therefor having a shell of a thermo-plastic molding compounds such as pyralin for its innerlining, and apparatus for carrying out such a process has been disclosed. It is to be understood however, that a pyralin lined refrigerator door is merely one of many forms that could be used for illustrative purposes.

In Fig. 1 to 4 there is shown a refrigerator cabinet or rather the door construction of a refrigerator cabinet. In such cabinets there is always provided one or more openings in the walls thereof, normally closed by door members. Around such an opening it is customary to provide a wooden frame, the upright portion of which is shown at 10 provided with the outer metal covering 11 and the inner porcelain lining 12. It will be understood that the metal covering 11 extends completely around the refrigerator cabinet, while the lining 12 forms the food compartment and is visible only when the door is open. A door jamb 13 is located along the inner edge of the frame 10. This jamb should be constructed of insulating material and is herein shown as constructed of wood provided with an outer covering 14 of pyralin and securely attached to the frame 10 by the screws 15. One or more hinges 16 may be attached to the frame member 10 by means of the screws 17 and also to the door member, generally indicated at 18, by the screws 19. The door member 18 should be constructed of insulating material and is herein shown as composed of a plurality of wooden rectangular blocks 20, 21, and 22 secured together in any convenient manner, as for instance, by the screws 23 and the staples 24. These blocks form the frame work of the door and support the cork insulating material 25, the innerlining 26, the outer panel 27 and the sealing members 28. The door member 18 is conveniently assembled by first setting up the wooden blocks and the insulating material, then applying the innerlining 26 in a manner to be fully described hereinafter, then securing the sealing members 28 to the blocks, as for instance, by the staples 29 and finally by placing thereon the outer panel 27. This outer panel is provided with a bent edge as shown at 30 and with three straight edge flanges, one of which is shown at 31 (Fig. 2). The bent edge 30 (Fig. 3) may be first placed over the sealing member 28 and the panel then pivoted to the left and the straight edges may be secured to the blocks by the screws 19.

As shown in Fig. 4, the door need not necessarily be constructed exactly as described above and as shown in Figs. 2 and 3. Thus the part corresponding to the block 20, may be composed of two upright members 20*a*, joined by two horizontal members 20*b*, and these members may be joined in any convenient manner, for instance, by a dovetailed joint in the usual manner, by making the members 20*a* and 20*b* of half width at their overlapping edges. The member corresponding to the rectangular block 21 may also be composed of two vertical members 21*a* joined by two horizontal members 21*b* as for instance, by means of the screws 21*c*. This construction is particularly effective when the members 20 and 21 are to be made of wood as in this case.

As before stated, both the door jamb 13 and the door itself are lined with a suitable thermoplastic compound such as pyralin and both may be lined therewith by means of the process hereinafter described. For purposes of illustration, however, apparatus for applying the pyralin to the door has been disclosed although it should be understood that the apparatus with but slight modification may be used for lining other forms and that the lining may be any material which may be moulded and drawn on by suction pressure as disclosed hereinafter.

Referring to Figs. 5, 6, and 8, there is shown a rectangular wooden form 40 provided with a central depression 41 which is of a form similar to the shape of the form to be treated, in this case similar to the form of the door. In carrying out the process, a sheet of the material to be moulded, in this case a sheet of pyralin 42 (.03 in. thick) is securely clamped to the form 40 by means of the clamps 43. Hot water (190–212° F.) is then poured on to the pyralin sheet causing it to soften and take the position indicated in Fig. 5. The block 44 is then firmly pressed down into the depression 41 as shown in Fig. 6 causing the pyralin to take the position shown in Fig. 6. The pyralin is then cooled and the block 44 removed, leaving the pyralin in substantially the shape shown in Fig. 7. It is to be understood that this constitutes but one method of forming the pyralin shell and that any other method may be practiced within the scope of this invention.

The pyralin shell may now be attached to the door member 18 by means of the apparatus shown in Fig. 8. This apparatus may comprise a base member 50 provided with a slight concave upper surface 51 on which is placed a supporting block 52. This block 52 supports the form to be treated and should be slightly smaller than the form and should be provided with concave edges 53 for a purpose to be hereinafter described. A flexible diaphragm 54 shown in this case at 55 as shaped to the form of the refrigerator door, is hermetically sealed to the base member 50 by the washer 50*a* and the tank 56, the diaphragm having its enlarged portion placed directly above the supporting member 52. Means should be provided for heating or cooling the apparatus and in this case this means constitutes a tank 56 removably mounted above the base 50 and serving when in assembled form to hermetically seal the diaphragm to the base. Any heating agent may be circulated through the tank 56 through the conduit 57 and any cooling agent may be circulated through conduit 58 and the tank may be provided with an over flow pipe 59 and drain 59*a* normally closed in any known manner. The conduits 57, 59, and 58 should be flexibly connected to their respective sources so that the tank 56 may be removed. Means should also be provided for drawing a vacuum between the base 50 and the diaphragm and in this case, such means comprises the opening 60 communicating with the conduit 61 which may be connected to a suction pump (not shown).

In operation, the door is prepared for covering by applying thereto a moderate coat of orange shellac or any other adhesive material. It has been found that the adherence of the shell is slightly better if this adhesive material is not thoroughly dried although good results are obtained even with dried adhesive. While still tacky the shell of pyralin is placed on the door and both the shell and the form placed on the supporting member 52. The diaphragm 54 is then placed over the shell and the form and the tank 56 placed thereon and securely fastened to hermetically seal the diaphragm to the base. A vacuum of about 25 inches is then drawn beneath the diaphragm to draw the pyralin snugly around the form. The vacuum is then broken and cold water is run into the tank 56 through the conduit 58. When the water covers the door member, steam is passed into the tank 56 through the conduit 57 until the temperature of the water rises to about 190–200° F. At this temperature, the suction is again applied and the vacuum is held until the door has cooled to approximately 130–140° F. It is then gradually released and the door removed by reversing the operation of assembling.

It should be noted that by providing a support slightly smaller than the door, the diaphragm tends to wrap around the under edges and take the position indicated at 60 (Fig. 8) thereby lapping the pyralin over the edges of the door as indicated at 61.

After removal, the door need only be ashed and slightly polished and it is ready for the application of the outer panel 27 and sealing members 28 as heretofore set forth.

It should be understood that this broad principle of using suction pressure to line objects with a normally solid substance may be used in other connections and the embodiment herein shown is for illustrative purposes only.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. The method of applying a thermoplastic molding compound to forms which comprises forming a thermoplastic compound into a shell of substantially the shape of the form, placing the shell on the form, placing the form and shell beneath a flexible diaphragm, softening the shell and exerting a force on said diaphragm to force the softened shell firmly against the form to cause the said shell to embrace the form.

2. The method of applying the thermoplastic molding compound to forms which comprises forming the thermoplastic compound into a shell of substantially the shape of the form, treating the surface of the form with an adhesive material, placing the shell on the treated surface, placing the form and shell beneath a flexible diaphragm, and exerting a force on said diaphragm to force the shell firmly against the treated surface.

CARL CLIFFORD RITTER.