April 7, 1936. G. F. HOFFERBERTH 2,036,753

REFRIGERATING APPARATUS

Filed Jan. 31, 1923 3 Sheets-Sheet 1

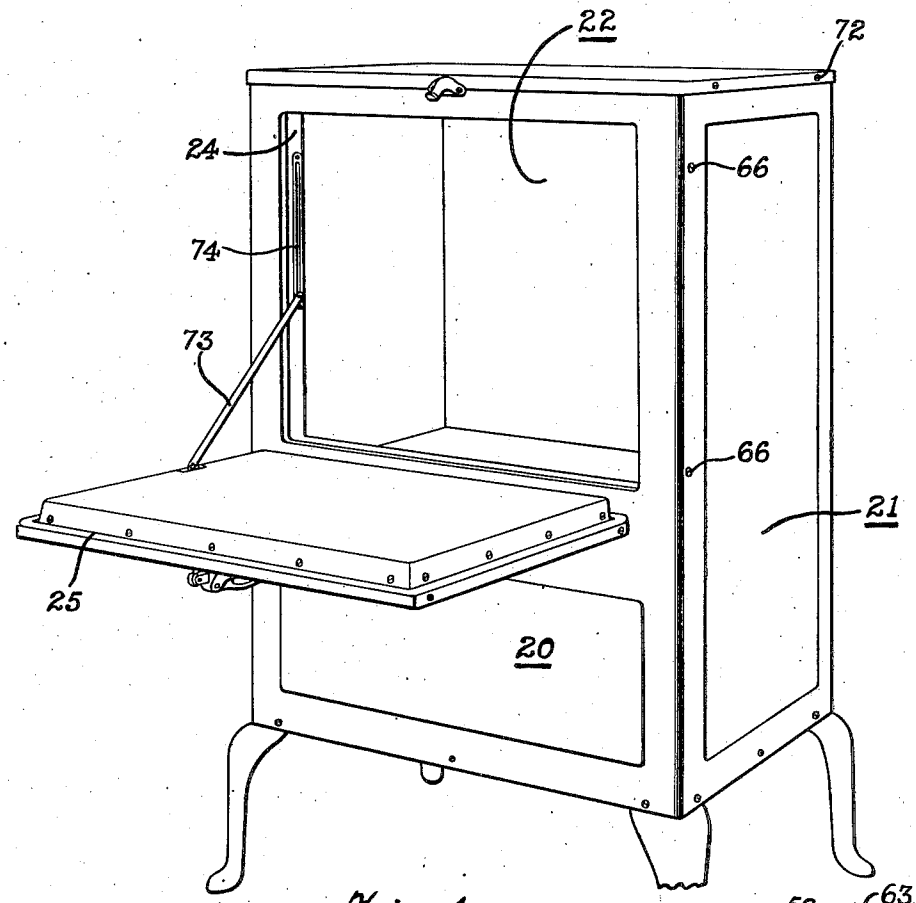


Fig. 1

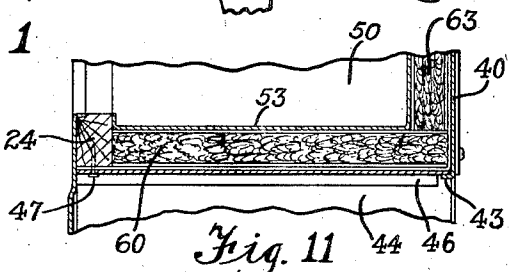
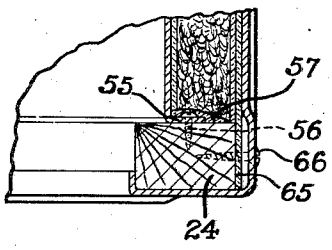


Fig. 11

Fig. 5



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REFRIGERATING APPARATUS

Filed Jan. 31, 1928 3 Sheets-Sheet 2

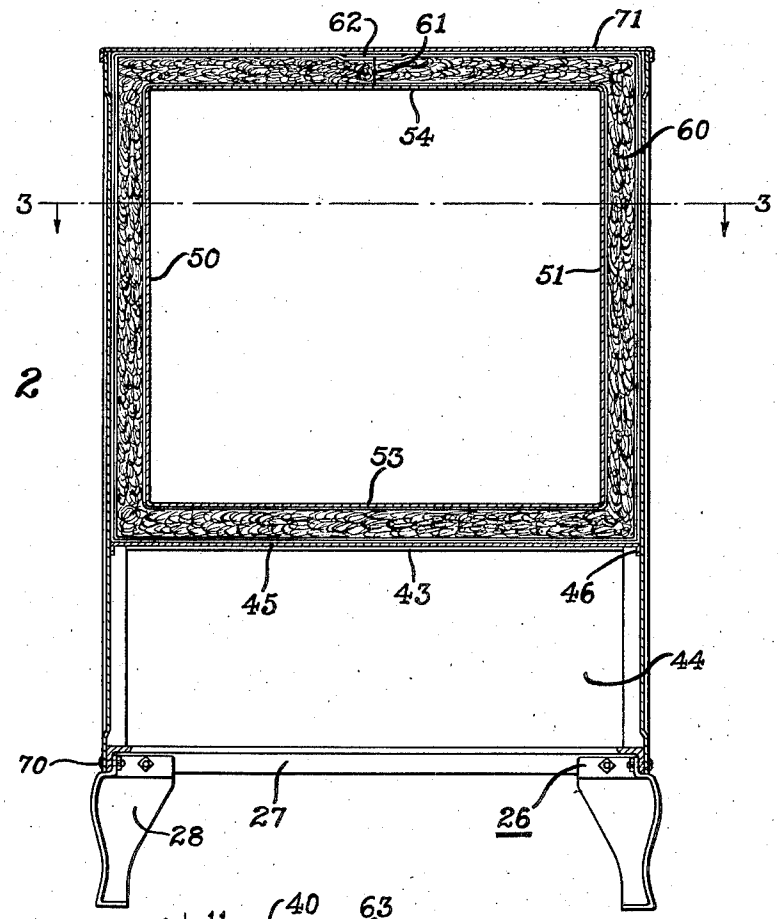


Fig. 2

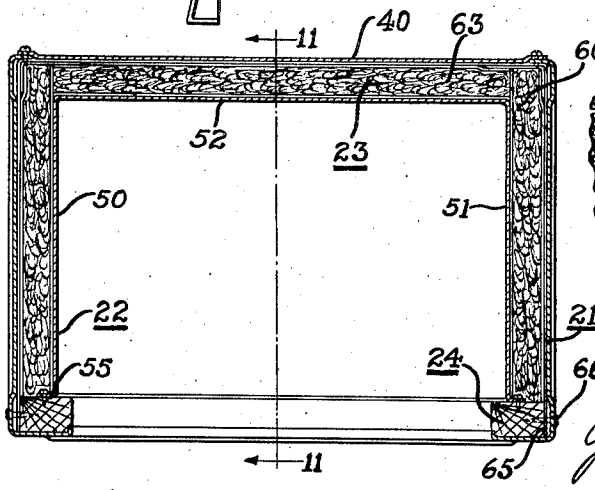


Fig. 3

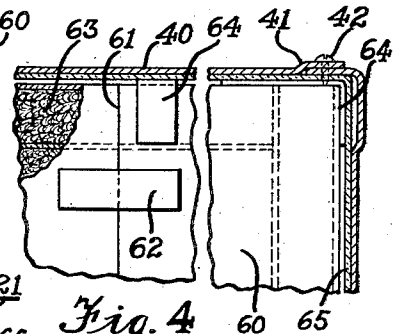


Fig. 4

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REFRIGERATING APPARATUS

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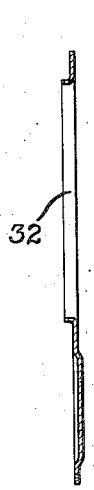


Fig. 7

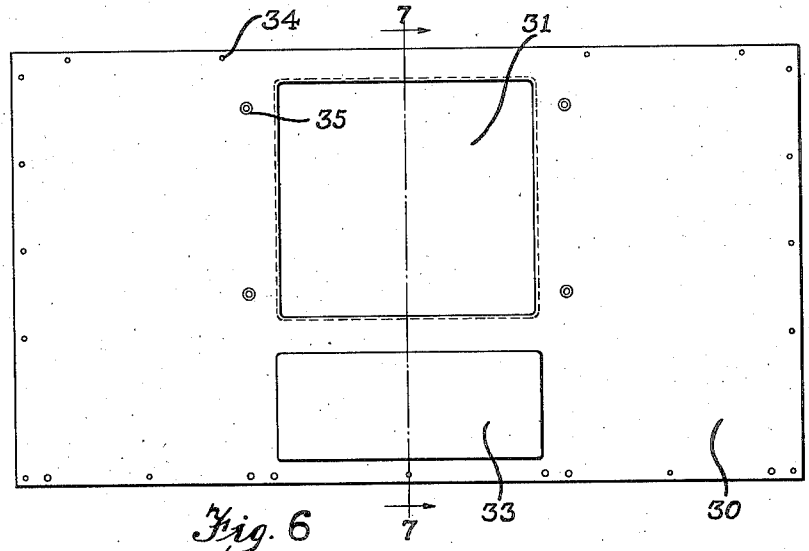


Fig. 6

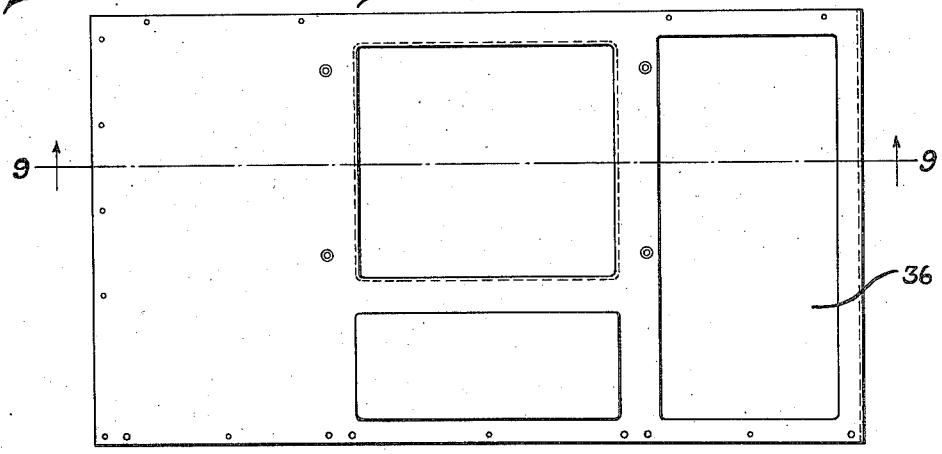


Fig. 8

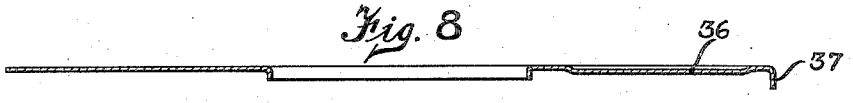


Fig. 9

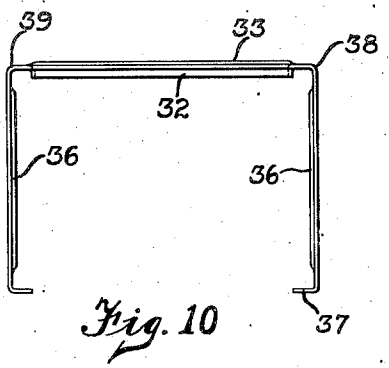


Fig. 10

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UNITED STATES PATENT OFFICE

2,036,753

REFRIGERATING APPARATUS

George F. Hofferberth, Dayton, Ohio, assignor, by mesne assignments, to General Motors Corporation, a corporation of Delaware

Application January 31, 1928, Serial No. 250,925

7 Claims. (Cl. 220—9)

This invention relates to refrigerators and more particularly to refrigerator cabinets.

An object of this invention is to provide a cabinet made of self-sustaining sheet metal.

Another object of this invention is to provide a frameless refrigerator cabinet.

Another object of this invention is to provide a refrigerator having hermetically sealed insulation.

Another object of this invention is to provide a refrigerator with insulation in sheet form.

Another object of this invention is to provide a refrigerator adapted to have its sheet metal parts assembled with self-tapping screws.

Another object of this invention is to provide a cabinet, the outer shell of which may be formed by stamping, punching and bending operations.

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 a perspective view of a refrigerator embodying my invention;

Fig. 2 is a transverse vertical cross-section of the same;

Fig. 3 is a horizontal cross-section along the line 3—3 of Fig. 2;

Fig. 4 is an enlarged detailed cross-sectional view of a corner and part of the back of the cabinet;

Fig. 5 is an enlarged detailed view of part of the front of the cabinet;

Fig. 6 is an elevation of a blank of sheet metal partly stamped and punched;

Fig. 7 is a cross-sectional view along the line 7—7 of Fig. 6;

Fig. 8 is an elevation of the blank shown in Fig. 6 with a further stamping thereon;

Fig. 9 is a cross-section on the line 9—9 of Fig. 8;

Fig. 10 is a top elevation of the blank after the stamping operations have been completed and after it has been bent to form the sides of the cabinet, and

Fig. 11 is a vertical cross sectional view of a portion of the cabinet taken along the line 11—11 of Fig. 3 showing details of construction of the bottom wall of the food compartment.

Features of my invention are embodied in a cabinet illustrated in the drawings, and generally designated as 20. This cabinet, by way of illustration, has an outside shell generally designated as 21, an inner lining generally designated as 22, insulation generally designated as 23, door jamb generally designated as 24, door generally designated as 25, and a pedestal structure generally designated as 26.

The outer shell 21 may be formed of sheet metal and may be made of two blanks. A larger blank 30 for forming the outer front and side walls, is more fully shown in Figs. 6 to 10 inclusive. The blank may be cut to the proper dimensions and the door opening 31 may be punched therein and, if desired, a flange 32 may also be formed in a press around the opening 31. Beneath the opening 31 a panel 33 may be pressed in the blank 30 for ornamentation and reinforcement. The proper holes 34 and 35 for reception of attaching devices such as screws or bolts may also be punched in the blank. As shown in Figs. 8 and 9 the blank may be further formed by punching a panel 36 near one end of the blank and a flange 37 at the end of the blank. A further punching operation would form a similar panel 36 and flange 37 at the other end of the blank. The operation would be identical with the one described relative to Figs. 7 and 8, and the results of this operation have not been shown in these figures, in order to illustrate more clearly the sequence of steps in developing the blank. As shown in Fig. 10 the blank may be further developed by bending at 38 and 39 in order to form a box-like structure which forms the front and side walls of the outer shell 21. The exterior surface of shell 21 may be painted with any suitable paint or lacquer or it may have a vitreous enamel baked thereon to provide finished exterior walls for the cabinet 20.

The outer shell 21 may be completed by attaching to the blank 30 a rear wall 40 provided with an offset 41 at each edge. Any suitable attaching means may be used as for example, self-tapping screws 42 may be driven into the proper holes provided therefor. It is to be understood that screws 42 are to be of such length as to traverse the thickness of the metal walls or shells to be secured together only and that they will not puncture or protrude into the hermetically sealed chamber to be hereinafter more fully described. The rear wall 40 may be a sheet metal plate, and it may extend from the top of the cabinet down to the edge 43 shown in Fig. 2. This leaves the cabinet with an opening in the rear of the lower compartment 44 in order to provide air circulation for cooling refrigerating machinery placed in the compartment 44.

A ceiling for the compartment 44 may be provided. For this purpose, a sheet metal plate 45,

having reinforcing flanges 46 along the side edges, may be secured to the bottom member of the door jamb 24 by any means, such as nails or screws 47. The rear edge of the plate 45 may be slipped under the bottom edge 43 of the rear wall 40 before the plate 45 is attached to the door jamb. For this purpose the bottom edge 43 of the back 40 may be in the form of a forwardly directed flange adapted to receive and support the plate 45.

The inner lining 22 may comprise an enameled sheet metal box having side walls 50 and 51, rear wall 52, bottom 53 and top 54. The inner lining 22 may also be provided with flange 55 along the opening thereof.

The door jamb 24 may comprise a rectangular wooden frame and the lining 22 may be attached to said door jamb by means of screws 56 passing through the flange 55. After the lining 22 has been attached to the door jamb 24, a seal of hydrolene, shown at 57, may be poured along the joint of the lining 22 of the door jamb 24 in order to provide a hermetic seal at this joint.

Preferably, after the lining 22 has been attached to the door jamb 24, the insulation 23 may be applied to the lining. Insulation used in this cabinet may be made in sheet form. A long rectangular sheet 60 may be wrapped around the sides 50 and 51, bottom 53 and top 54, and the ends of the sheet 60 may be brought together at 61 at the top of the lining. The ends of the sheet may be fastened together by gummed strips of paper 62 placed along the top of the insulation. The rear edges of sheet 60 may extend back beyond the rear wall 52 of the lining. A rectangular sheet 63 of insulation may be placed on the back of the lining 22 within the edges of the sheet 60, and the corner of the insulation thus formed between the sheet 60 and the sheet 63 may be fastened by gummed strips of paper 64. As an example of the type of insulation which may be used, I may use balsam wool, which is an insulation formed with two outer coverings and an intermediate layer of insulating material. After the insulation has been placed on the lining as hereinbefore described, a bag, shell or cover member 65 of waterproof material, such as paper having a fusible waterproof compound impregnated therein, may be placed over the insulation and the edges of the bag 65 may surround the door jamb 24. The bag, shell or cover member 65 forms the outer wall of a hermetically sealed chamber which houses the insulation 60. The edges of the bag 65 surrounding the door jamb 24 may be heated by any suitable means, and the waterproof material of the paper is thereby caused to adhere to the door jamb 24 and to form a hermetic seal at this point. It is seen that the insulation is thus hermetically sealed by the lining 22 and the bag 65, both of which are hermetically connected with the door jamb 24. A unit insertable in and removable from the cabinet is produced which comprises a door jamb, food compartment lining and hermetically sealed insulation on said lining.

The lining 22, together with the door jamb 24 and the insulation 23 may then be inserted in the outer shell 21, and the door jamb 24 may be secured to the outer shell by means of screws 66. The lining with its assembled insulation may be inserted either through the top of the cabinet or through the rear before the back 40 has been attached to the blank 30.

The pedestal assembly 26 may be made in any desired manner and is shown as a rectangular base 27, to which legs 28 are attached to the corners. The base 27 and legs 28 may be secured to the outer shell 21 by bolts 70 passing through the said members. The bolts 70 thus secure the outer shell to the base 27, and the base 27 to the legs 28. A top cover 71 may be placed over the shell 21 and this cover may also be secured as by screws 72. The door 25 may be hinged to the cabinet in any desired manner and the support 73, which slides in a slot 74, may be provided to support the door in its open position.

It is seen that the outer shell 21 is made of self-sustaining sheet metal and that no framework is necessary to hold the cabinet in shape. The side paneling 30 and 33 aids in making the outer shell 21 self-sustaining, for providing a supporting structure for the compartment and the hermetically sealed chamber surrounding the same, by forming offsets at the corners of the cabinet.

The cabinet may have any refrigerating means installed therein. If it is to be used for mechanical refrigeration, the mechanical part of the system may be installed in compartment 66, and the cooling element may be placed within the lining 22, preferably adjacent one of the upper corners thereof. If the system is of the compressor, air-cooled condenser type, the compressor with its prime mover, and the condenser may be mounted on the pedestal assembly 27 within the compartment 66, and the air may circulate through the opening in the rear of the cabinet and through the opening in the pedestal assembly. Refrigerant pipes may connect the part of the system in compartment 66 with the part of the system in the lining 22.

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. A refrigerator having an inner liner with side, top, bottom, and rear walls, a sheet of insulating material of a substantial thickness and low structural strength of sufficient length to extend completely around the sides, top, and bottom of the inner liner, said sheet extending completely around the side, top, and bottom walls of the inner liner and having its ends meeting, a sheet of insulating material extending over the rear wall, and metallic outer finish walls surrounding the inner liner in abutting relation to the insulating material and serving as the supporting frame structure of the refrigerator.

2. A refrigerator having an inner liner with side, top, bottom, and rear walls, a sheet of insulating material of a substantial thickness and low structural strength of sufficient length to extend completely around the sides, top, and bottom of the inner liner, said sheet extending completely around the side, top, and bottom walls of the inner liner and having its ends meeting, a sheet of insulating material extending over the rear wall, a bag of waterproof material extending around said insulation and said inner liner, and outer walls surrounding the inner liner, the insulating material and the bag.

3. A refrigerator cabinet comprising, an inner liner forming a refrigerating compartment within said cabinet and having an access opening, insulating material surrounding said inner liner, and means forming a supporting structure for

the liner and insulating material and forming as well the outer finish walls for the cabinet, said means comprising a substantially tubular sheet metal structure having an opening in one side thereof adapted to register with said compartment access opening and including a one-piece sheet of material formed into an element extending continuously across the side of the cabinet having the access opening therein and continuously along the two adjacent sides of the cabinet and having its ends connected at the side of the cabinet opposite the access opening.

4. A refrigerator cabinet comprising, an inner liner forming a refrigerating compartment within said cabinet and having an access opening disposed at the front of the cabinet, insulating material surrounding said inner liner, means forming a supporting structure for the liner and insulating material and forming as well the outer finish walls for the cabinet, said means comprising a substantially tubular sheet metal structure having an opening in the front thereof adapted to register with said compartment access opening, and said means including a single sheet portion of material formed into an element extending around both front corners of the cabinet and extending continuously across the front of the cabinet and continuously along the two sides of the cabinet and having its ends connected at the rear of the cabinet.

5. A refrigerator cabinet comprising, an inner liner forming a refrigerating compartment within said cabinet and having an access opening disposed at the front of the cabinet, insulating material surrounding said inner liner, means forming a supporting structure for the liner and insulating material and forming as well the outer finish walls for the cabinet, said means comprising a substantially tubular sheet metal structure having an opening in the front thereof adapted to register with said compartment access opening, said means including a single sheet portion of material formed into an element extending around both front corners of the cabinet and extending continuously across the front of the cabinet and continuously along the two sides of the cabinet and having its ends connected at the rear of the cabinet, sheet metal closure means extending across the tubular structure above and below the insulating material surrounding said liner and forming with the tubular structure a closed chamber, and means forming a hermetic seal for the insulating material within said closed chamber.

6. A refrigerator cabinet comprising, an inner liner forming a refrigerating compartment within said cabinet and having an access opening, insulating material surrounding said inner liner, and means forming a supporting structure for the liner and insulating material and forming as well the outer finish walls for the cabinet, said means comprising a substantially tubular sheet metal structure having an opening in one side thereof adapted to register with said compartment access opening and including a one-piece sheet of material formed into an element extending continuously across the side of the cabinet having the access opening therein and continuously along the two adjacent sides of the cabinet.

7. A refrigerator cabinet comprising, an inner liner forming a refrigerating compartment within said cabinet and having an access opening, insulating material surrounding said inner liner, and means forming a supporting structure for the liner and insulating material and forming as well the outer finish walls for the cabinet, said means comprising a substantially tubular sheet metal structure having an opening in one side thereof adapted to register with said compartment access opening and including a one-piece sheet of material formed into an element extending continuously across the side of the cabinet having the access opening therein and continuously along other sides of the cabinet and having its ends connected at a side of the cabinet other than the side thereof having the opening therein.

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