Dec. 22, 1931. W. D. COLLINS ET AL 1,837,253

REFRIGERATION

Filed Sept. 27, 1930 3 Sheets-Sheet 1

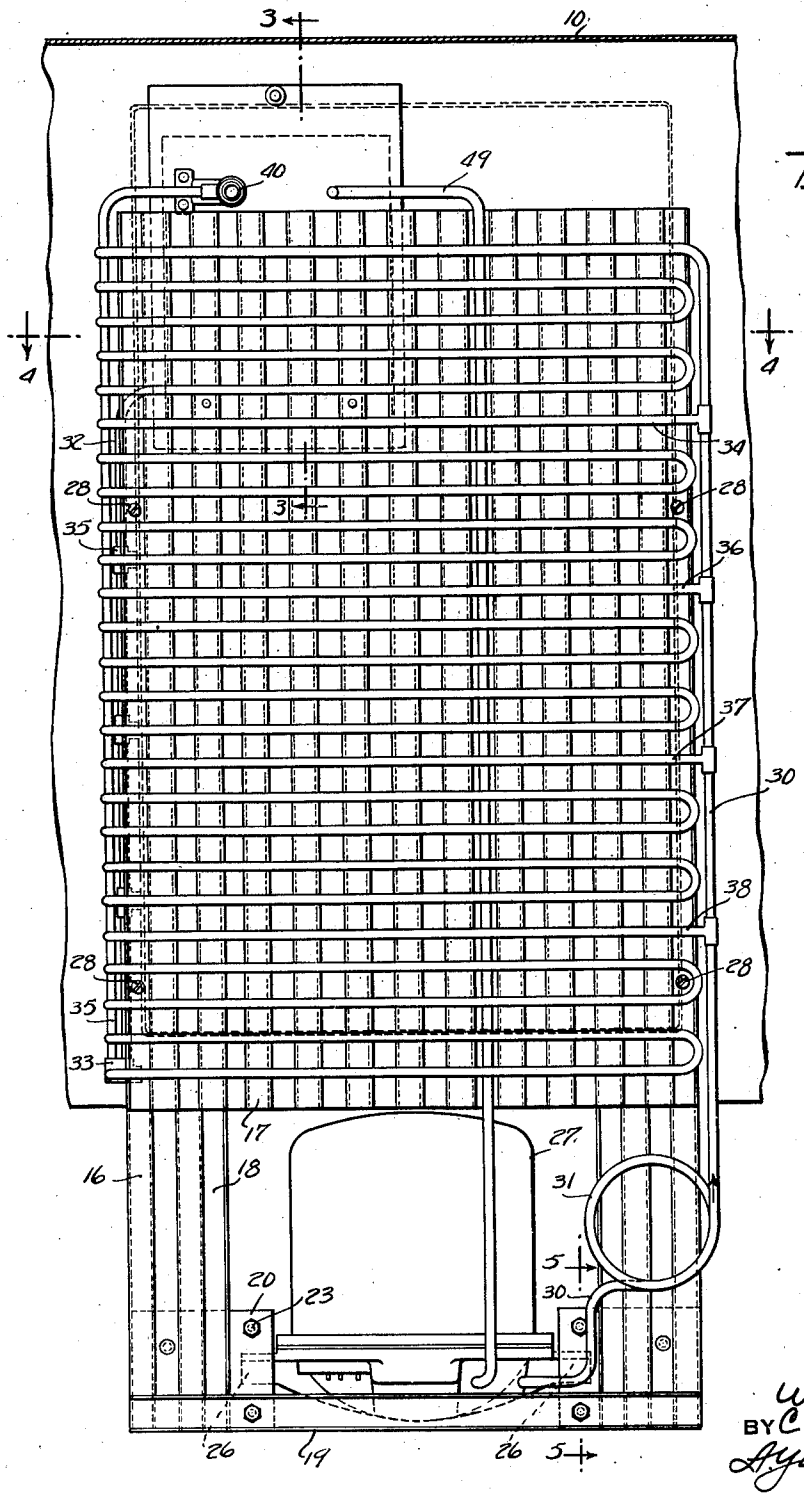


FIG. 1.

INVENTOR
W. D. Collins
BY C. E. Ploeger
Ayalas Doyle
ATTORNEY

Dec. 22, 1931. W. D. COLLINS ET AL 1,837,253

REFRIGERATION

Filed Sept. 27, 1930 3 Sheets-Sheet 2

FIG. 2.

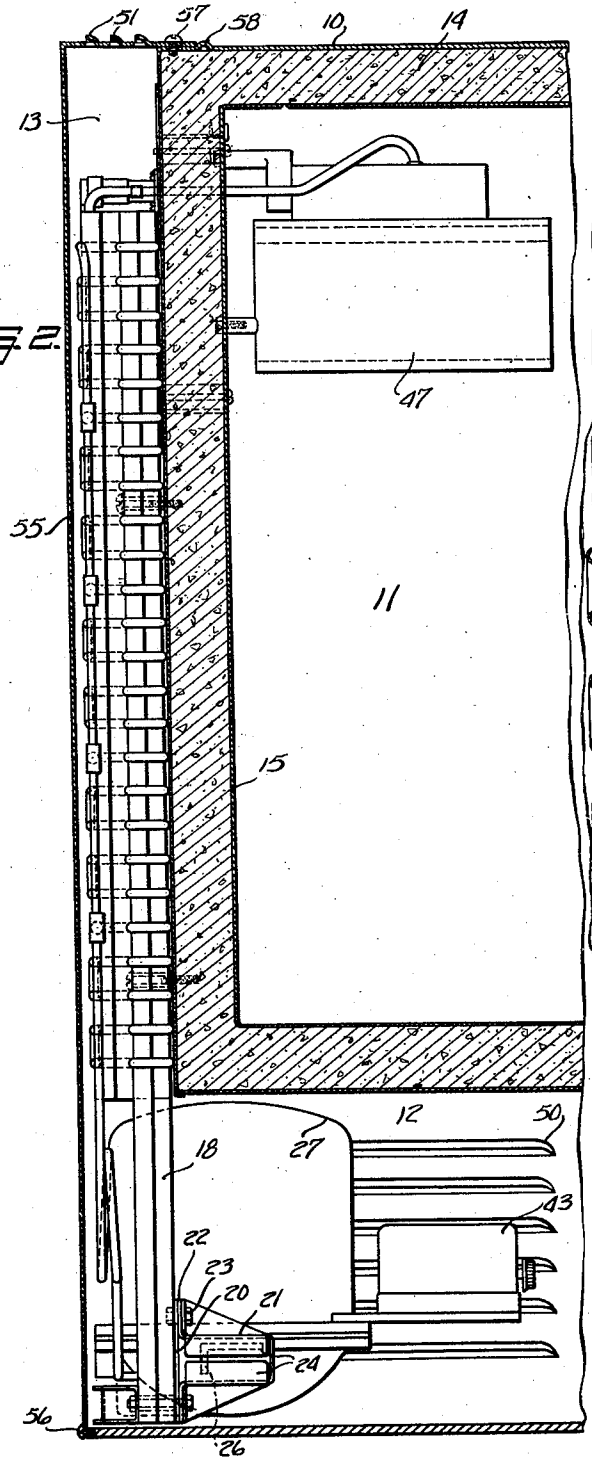
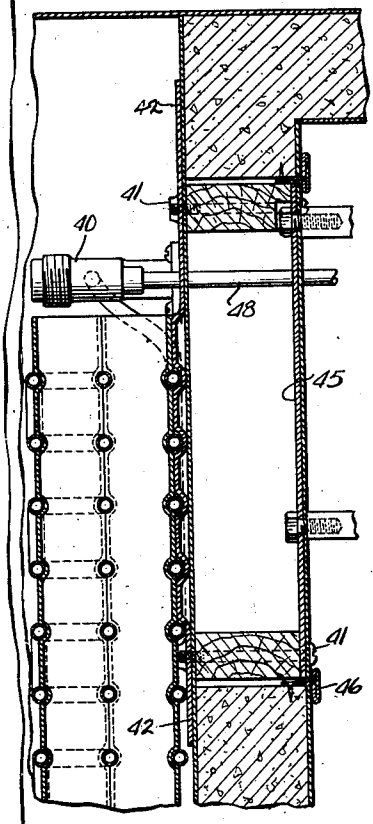


FIG. 3.



INVENTOR,
W. D. Collins
BY C. E. Ploeger
A. Yates & Dowell
ATTORNEY

Dec. 22, 1931. W. D. COLLINS ET AL 1,837,253

REFRIGERATION

Filed Sept. 27, 1930 3 Sheets-Sheet 3

FIG. 4.

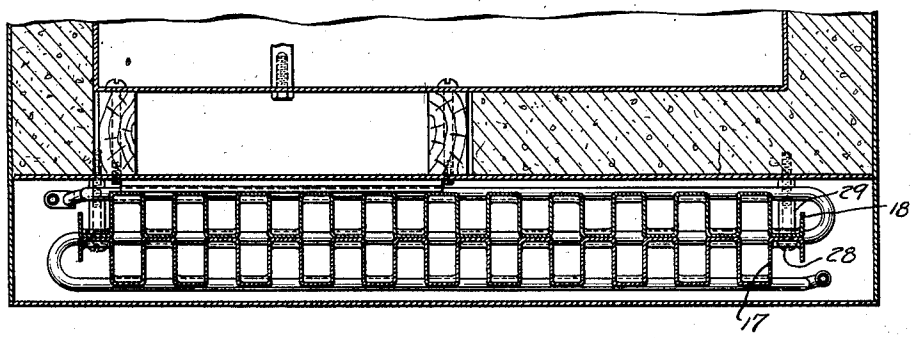


FIG. 5.

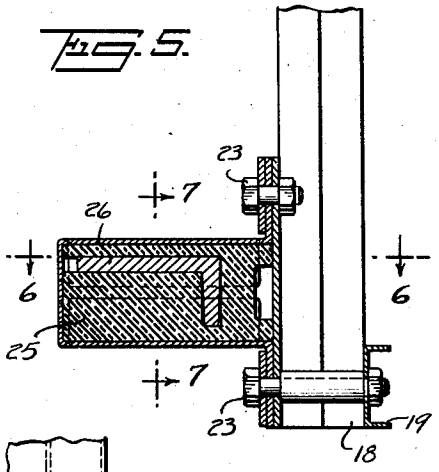
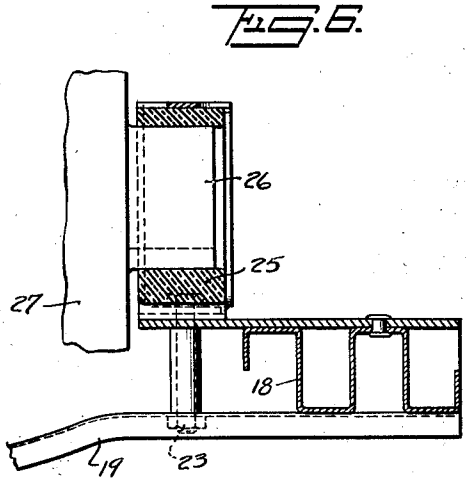


FIG. 6.



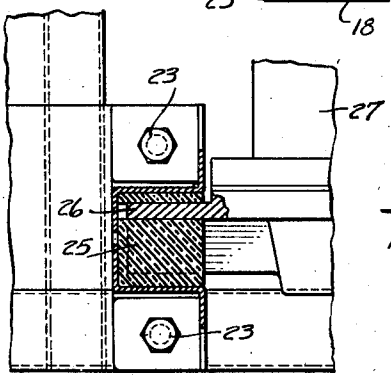


FIG. 7.

INVENTOR
W. D. Collins
BY C. E. Ploeger
Myers & Dowell
ATTORNEY

Patented Dec. 22, 1931 1,837,253

UNITED STATES PATENT OFFICE

WILLIAM D. COLLINS AND CLYDE EDWARD PLOEGER, OF EVANSVILLE, INDIANA, ASSIGNORS TO SERVEL INC., OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

REFRIGERATION

Application filed September 27, 1930. Serial No. 484,803.

Our invention relates to mechanical refrigerating apparatus and particularly to refrigerating apparatus of the compression type.

An object of our invention is to provide improved means for mounting such an apparatus in a refrigerator cabinet so that it may be readily removed as a unit.

Other objects and advantages will be apparent from the following description taken in conjunction with the accompanying drawings which form a part of this specification and on which:

Fig. 1 is a rear elevational view of a preferred embodiment of our invention;

Fig. 2 is a side cross-sectional view of the apparatus shown in Fig. 1;

Fig. 3 is an enlarged cross-sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 1;

Fig. 5 is a detailed cross-sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 5; and

Fig. 7 is a cross-sectional view taken on the line 7—7 of Fig. 5.

Referring to the drawings, reference character 10 indicates the outer shell of a refrigerator cabinet preferably constructed of sheet metal and comprising a refrigerating compartment 11 and an apparatus compartment 12. A flue 13 is formed in the rear of the cabinet behind compartment 11 and such flue is provided with a removable rear shell or cover plate 55 secured in place in any suitable manner as for example by screws 56 at the bottom and screws 57 at the top. In order to provide a neat joint along the forward edge of the shell, a raised shoulder 58 is formed in shell 10 against which this edge abuts. Refrigerating compartment 11 is suitably lined with insulating material 14 and is provided with an inner liner 15. Apparatus compartment 12 is located beneath compartment 11 while flue 13 extends upwardly from compartment 12 and behind compartment 11.

The refrigerating apparatus comprises a supporting frame designated generally by reference character 16. This frame comprises a pair of channel members 17 and 18, preferably welded together and which extend vertically within flue 13. The lower end of channel member 17 does not extend into the machinery compartment and the central part of channel 18 is terminated at the lower end of channel 17. However, portions of channel member 18 extend to near the bottom of the machinery compartment, as is shown in Fig. 1, and the lower ends of these portions are joined together by means of a channel 19. Secured to the lower ends of channel 18 and to channel 19 are plates 20 which serve to support brackets 21. Brackets 21 are U-shaped and are provided with flanges 22 through which bolts 23 are passed to secure the brackets and plates 22 to channels 18 and 19. Brackets 21 are provided with wings or flanges 24 on one side thereof for the purpose of retaining rubber blocks 25 in position therein. Blocks 25 each have an L-shaped recess to receive an L-shaped member 26 which forms supporting arms for a housing 27 within which an electric motor and a gas compressor are contained. An electric switch 43 for the control of the electric motor is suitably mounted on the front of housing 27.

The upper part of frame 16 is secured to the front wall of flue 13 in any suitable manner, as by means of bolts 28 which pass through channels 17 and 18 and engage tapped holes in the front wall of the flue. A sleeve 29 surrounds bolt 28 and serves to properly space the frame from the wall.

Communicating with housing 27 is a conduit 30 which extends upwardly from loop 31 provided for resiliency, to near the top of frame 16, then transversely across the rear of the frame, then back through apertures formed between channels 17 and 18, and then back once more along the front side of channel 18. The conduit 30 extends downwardly and makes three similar passes back and forth across the frame. This is repeated several times and the conduit then extends downwardly as conduit 32 and communicates with a liquid header 33. A conduit 34 communicates with conduit 30 at a point below the up-

permost point of the latter conduit and extends back and forth across the frame 16 and finally communicates with conduit 32 at the point 35. Three more conduits 36, 37 and 38 communicate with the upward run of conduit 30 at approximately evenly spaced points and, after passing back and forth transversely of the frame, communicate with conduit 32. A conduit 39 communicates with header 33 and extends upwardly to a junction 40. Conduits 30, 32, 34, 36, 37 and 38 constitute an air-cooled condenser. These conduits are maintained in good heat exchange relation with channels 17 and 18 by spot welding or otherwise so that the channels form an extended surface for heat dissipation. The channels also form passageways for the circulation of air past the conduits.

Secured to the upper portion of frame 16 by means of bolts 41 screwed into a plate 42, which plate is welded to the frame proper, is a removable section 45 of the rear wall of the refrigerating compartment 11. Around the opening in the rear wall of compartment 11 is placed a sealing strip 46 comprising a suitable flexible material the edges of which are tacked to the interior of the opening and which may extend into the compartment as shown in Fig. 3. Supported by removable section 45 is an evaporator 47.

A conduit 48 connects junction 40 with the inlet of evaporator 47 and a conduit 49 connects the outlet of the evaporator with housing 27.

Hermetically sealed within housing 27 is a compressor driven by an electric motor. Conduit 30 is connected to the discharge of the compressor and the various conduits mounted on frame 16 constitute, as above pointed out, an air-cooled condenser. Refrigerant vapor compressed in the compressor, passes through conduit 30 and in its passage through conduits 30, 34, 36, 37 and 38 it becomes liquefied due to removal of heat by the surrounding air. Liquid thus formed passes through conduit 32 into header 33 and thence upwardly through conduit 39 to junction 40 and thence through conduit 48 to the evaporator. In the evaporator the pressure of the refrigerant is reduced by means of a suitable valve and the liquid evaporates, thus absorbing heat from the interior of chamber 11 and producing refrigeration. Vaporized refrigerant is withdrawn through conduit 49 to the suction side of the compressor within housing 27.

Air is admitted to machinery compartment 12 through suitable openings in one or more of the walls constituting this compartment. In Fig. 2 these openings are shown as louvers 50 in the side of the compartment but they might be placed in the front or the rear. Due to the heating of the air within flue 13 by the condenser, a current of air is caused to pass upwardly through the flue and through the passages formed by channels 17 and 18 and out through suitable openings in the top of the flue. These openings might be merely holes cut in the top of the flue but it is preferable that they be formed as louvers 51 in order that they will not become closed if some article is placed over them.

The rear shell 55 may be removed in order that the refrigerating apparatus may be removed from the cabinet. In order to do this, after the shell has been removed by the removal of screws 56 and 57, bolts 28 are unscrewed and the entire assembly comprising frame 16, housing 27, wall section 45 and evaporator 47 may be withdrawn as a unit.

A hermetically sealed refrigerating apparatus is provided wherein the motor and compressor are located below the refrigerating compartment and out of sight. The condenser is located in a flue which extends the entire height of the cabinet and hence provides an excellent draft which results in efficient cooling. In the event that repairs become necessary to the apparatus, it may be removed as a unit and a new one placed in the cabinet with a minimum amount of labor.

It will be obvious to those skilled in the art that various other changes may be made in the construction and arrangement without departing from the spirit of the invention and therefore the invention is not limited to what is shown in the drawings and described in the specification but only as indicated in the appended claims.

What we claim is:

1. A refrigerator including, in combination, a cabinet having an apparatus compartment, a refrigerating compartment above said apparatus compartment, and a flue at the rear of said compartments; a refrigerating apparatus including a frame, a compressor unit mounted on the lower portion of said frame, condensers mounted on said frame, an evaporator mounted on the upper portion of said frame, said refrigerating apparatus unit being adapted to be secured to said refrigerator cabinet so that the compressor unit is within the apparatus compartment the condensers are within the flue, and the evaporator is within the refrigerating compartment.

2. A refrigerator including an apparatus compartment having air inlet openings therein, a flue extending vertically from the rear of said apparatus compartment, a refrigerating compartment positioned above said apparatus compartment and having an aperture in the rear wall thereof, a refrigerating unit including a frame, a compressor mounted on said frame, a closure member for said aperture mounted on said frame, an evaporator supported by said closure member and adapted to be inserted through said

aperture, condensers mounted on said frame, said refrigerating unit adapted to be secured in such position that the evaporator is within the refrigerating chamber, the closure member seals the aperture, the compressor is within the apparatus chamber, and the condensers are within said flue.

3. In a refrigerating apparatus, a frame, an evaporator suported by the upper part of said frame, a condenser supported on said frame, a pair of brackets secured to the lower part of said frame, a resilient member retained by each bracket and a compressor unit provided with a pair of supporting arms, said arms being supported by said resilient members.

4. In a refrigerating apparatus, a frame, an evaporator supported by the upper part of said frame, a condenser supported on said frame, a pair of brackets secured to the lower part of said frame, a block of resilient material retained by each bracket, and a machinery housing provided with a pair of supporting arms, said arms being supported by said resilient members.

5. In a refrigerating apparatus, a frame, an evaporator supported by the upper part of said frame, a condenser supported on said frame, a pair of brackets secured to the lower part of said frame, a block of resilient material having an L-shaped recess therein retained by each bracket, and a machinery housing provided with a pair of L-shaped supporting arms, said arms being supported in the recesses of said blocks.

6. In a refrigerating apparatus, a frame, an evaporator supported by the upper part of said frame, a condenser supported on said frame, a pair of U-shaped brackets secured to the lower part of said frame, a pair of wings on one side of each bracket, a block of resilient material in each bracket and retained in place partly by said wings, and a machinery housing provided with a pair of supporting arms, said arms being supported by said resilient blocks.

7. In a refrigerating apparatus, a frame, an evaporator supported by the upper part of said frame, a condenser supported on said frame, a pair of U-shaped brackets secured to the lower part of said frame, a pair of wings on one side of each bracket, a block of resilient material having an L-shaped recess therein in each bracket and retained in place partly by said wings, and a machinery housing provided with a pair of L-shaped supporting arms, said arms being supported in the recesses of said blocks.

8. In a refrigerating apparatus, a frame comprising a plurality of channel members, a machinery housing resiliently supported by the lower end of said frame, a condenser comprising a plurality of conduits extending back and forth transversely of and supported on said frame and an evaporator supported by the upper part of said frame.

9. In a refrigerating apparatus, a frame comprising a plurality of channel members, a machinery housing resiliently supported by the lower end of said frame, a condenser supported on said frame and comprising a vertically extending conduit, a plurality of conduits communicating with said upwardly extending conduit and passing back and forth transversely of said frame, a second vertically extending conduit, the aforesaid plurality of conduits communicating with said second vertical conduit, and an evaporator supported by the upper part of said frame.

10. In a refrigerating apparatus, a frame comprising a plurality of channel members, a machinery housing supported by the lower end of said frame, a condenser comprising a plurality of conduits extending back and forth transversely of and supported by said frame, said channel members being arranged to form passages for the circulation of air past said conduits, and an evaporator supported by the upper part of said frame.

11. In a refrigerating apparatus, a frame comprising a plurality of channel members, a machinery housing supported by the lower end of said frame, a condenser comprising a plurality of conduits extending back and forth transversely of and supported by said frame, said channel members being arranged in heat transfer relation with said conduits for providing an extended surface for heat dissipation, and an evaporator supported by the upper part of said frame.

12. In a refrigerating apparatus, a frame comprising a plurality of channel members, a machinery housing supported by the lower end of said frame, a condenser comprising a plurality of conduits extending back and forth transversely of and supported by said frame, said channel members being arranged in heat transfer relation with said conduits for providing an extended surface for heat dissipation, and to form passages for the circulation of air past said conduits, and an evaporator supported by the upper part of said frame.

In testimony whereof we affix our signatures.

WILLIAM D. COLLINS.
CLYDE E. PLOEGER.

DISCLAIMER

1,837,253.—*William D. Collins* and *Clyde Edward Ploeger*, Evansville, Ind. REFRIGERATION. Patent dated December 22, 1931. Disclaimer filed August 24, 1934, by the assignee, *Servel, Inc.*

Herewith enters this disclaimer to claims 1 and 2 thereof, to wit:

"1. A refrigerator including, in combination, a cabinet having an apparatus compartment, a refrigerating compartment above said apparatus compartment, and a flue at the rear of said compartments; a refrigerating apparatus including a frame, a compressor unit mounted on the lower portion of said frame, condensers mounted on said frame, an evaporator mounted on the upper portion of said frame, said refrigerating apparatus unit being adapted to be secured to said refrigerator cabinet so that the compressor unit is within the apparatus compartment the condensers are within the flue, and the evaporator is within the refrigerating compartment.

"2. A refrigerator including an apparatus compartment having air inlet openings therein, a flue extending vertically from the rear of said apparatus compartment, a refrigerating compartment positioned above said apparatus compartment and having an aperture in the rear wall thereof, a refrigerating unit including a frame, a compressor mounted on said frame, a closure member for said aperture mounted on said frame, an evaporator supported by said closure member and adapted to be inserted through said aperture, condensers mounted on said frame, said refrigerating unit adapted to be secured in such position that the evaporator is within the refrigerating chamber, the closure member seals the aperture, the compressor is within the apparatus chamber, and the condensers are within said flue."

[*Official Gazette September 18, 1934.*]