April 19, 1932. W. FOURNESS 1,854,468

REFRIGERATING CABINET

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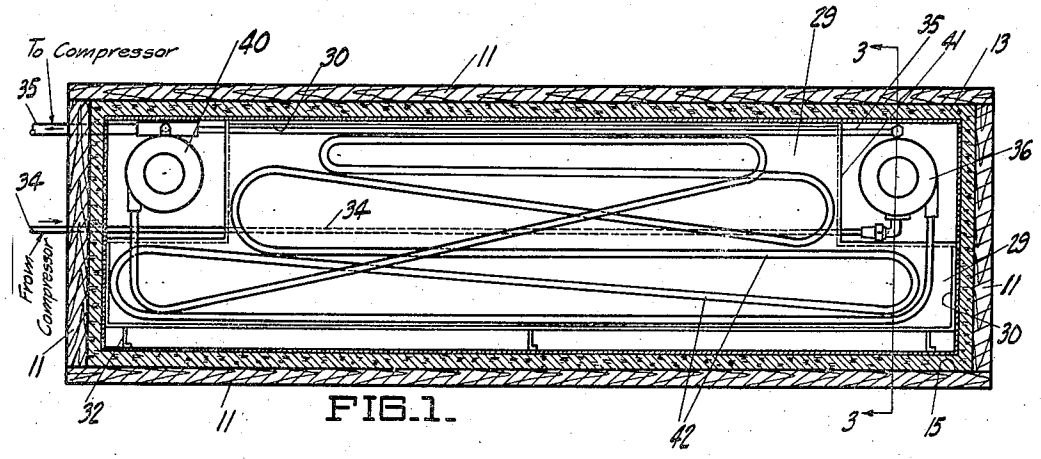

FIG. 1.

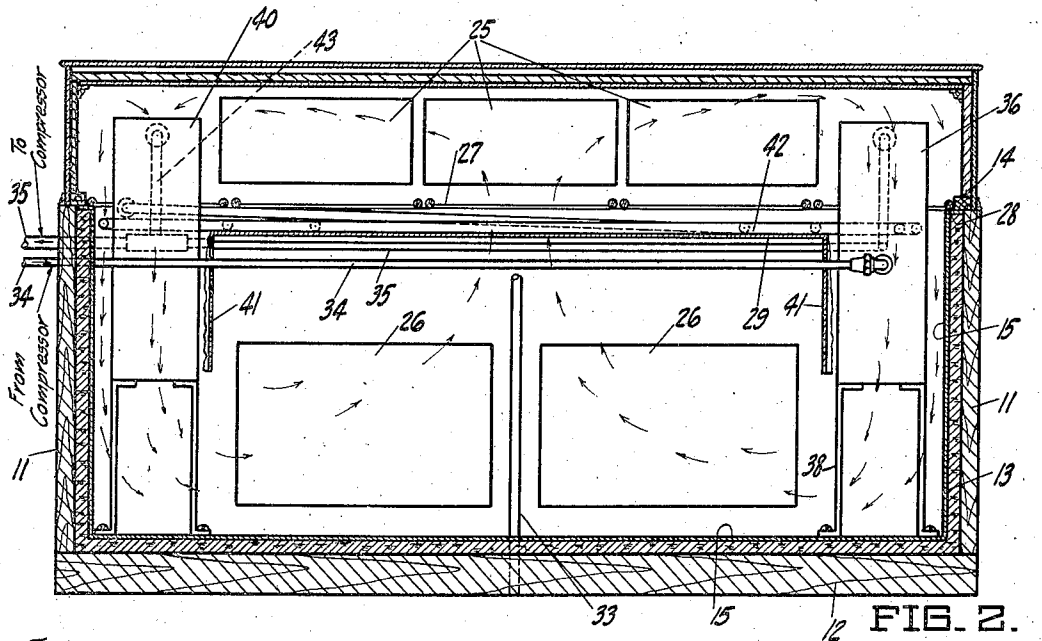

FIG. 2.

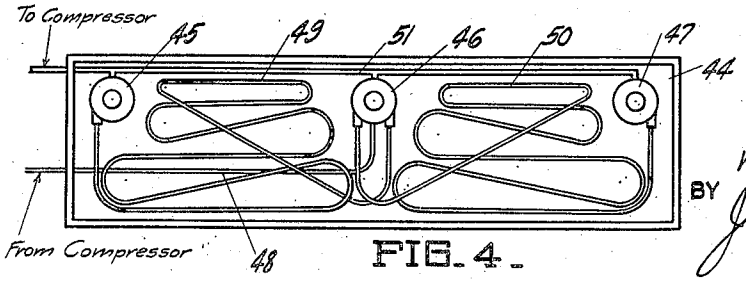

FIG. 4.

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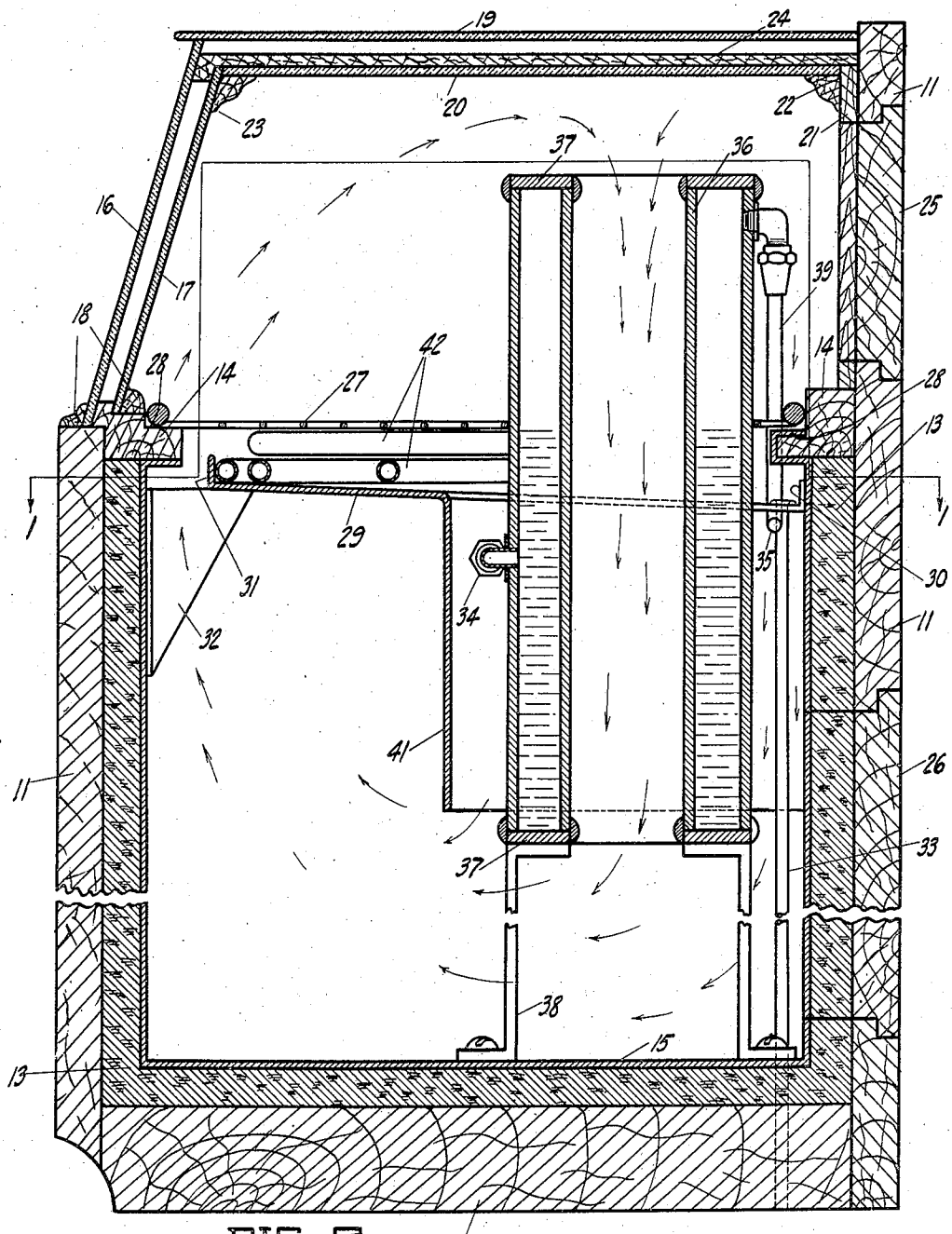

FIG. 3.

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Patented Apr. 19, 1932 1,854,468

UNITED STATES PATENT OFFICE

WILFRED FOURNESS, OF PASADENA, CALIFORNIA, ASSIGNOR BY MESNE ASSIGNMENTS, TO FOURNESS DEVELOPMENT CORPORATION LTD., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

REFRIGERATING CABINET

Application filed August 3, 1926. Serial No. 126,903.

This invention relates to refrigeration and cooling, and especially to a system adapted to maintain a low temperature in a store display cabinet.

Such cabinets are now in quite common use; for example, in groceries and in butcher shops, where perishable food is displayed for a long interval. The method of cooling such cabinets usually involves the passage of a cold refrigerant through a series of convolutions, placed in the interior of the cabinet in such a way that a substantially uniform low temperature is obtained in all parts of the cabinet. The cooling effect is secured in the same manner as in the usual refrigerating system; for example, a refrigerant such as sulphur dioxide, can be caused to pass through the usual cycle of expansion and evaporation with attendent absorption of heat, in an expansion space, usually in the form of a series of convolutions. It has been attempted in prior systems to provide uniform low temperatures in the cabinet by proper distribution of the convolutions; but this is sometimes inconvenient, nor is it always thoroughly efficacious.

It is one of the objects of my invention to secure substantial uniformity of temperature in a simple and inexpensive manner.

It is another object of my invention to provide this uniformity by setting up a movement of the air in convection currents, in the space to be cooled.

It is still another object of my invention to make it possible to fit the system to any sized space to be cooled, by providing additional units of equipment.

My invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of my invention. For this purpose I have shown a form in the drawings accompanying and forming part of the present specification. I shall now proceed to describe this form in detail, which illustrates the general principles of my invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of my invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a horizontal sectional view, of a cabinet incorporating my invention, the section being taken substantially along plane 1—1 of Fig. 3, but with certain parts omitted for clarity;

Fig. 2 is a longitudinal vertical section, of the cabinet shown in Fig. 1;

Fig. 3 is a sectional view, taken along plane 3—3 of Fig. 1; and

Fig. 4 is a diagram showing how my invention can be adapted to larger size spaces or cabinets.

In the present instance I show my invention applied to a store cabinet, having an interior space well insulated against heat. For example, the cabinet in general can have exterior walls 11 of wood, as well as a bottom 12 of wood. A heavy cork lining 13 can be used if desired. A rim or band 14 extends completely around the cabinet and over the lining of insulation 13. Sheet metal flashing 15 covers the layer 13 and provides in addition a water tight lining.

The rim 14 serves to support the glass front structure, which consists in this instance of two spaced sloping glass walls 16 and 17. These plates 16 and 17 rest upon the band 14, and can be held in place thereat by molding 18. The top of the cabinet can also be formed of double glass plates 19 and 20. The rear edges of these plates are fastened to the rear wall 11 and a lining 21 of wood which extends above band 14. Molding 22 across this lining 21 serves as a rest for the bottom plate 20. Both plates 19 and 20 are cemented or otherwise fastened adjacent their front edges to plates 16 and 17; and a molding 23 can be used at the corner between the two plates 17 and 20. A wooden spacer 24 (Fig. 3) can be used between these plates to brace the glass structure further.

The cabinet can be provided with a series of doors 25 and 26, whereby access to the interior of the cabinet from the rear thereof can be secured. These doors are indicated as rabbeted in the rear wall 11, and as made up of insulation and flashing linings in a manner similar to the walls of the cabinet.

As thus far described, the cabinet is of the

conventional type, that is well heat insulated, and that can be used to display meat or other foods. Trays 27 of wire or the like can rest on the shoulders 28 formed above the cork insulation 13 and by the aid of the band 14. Upon these trays the food on display can rest. A slight distance below the trays, a pan 29 of sheet metal is provided to catch drippings; the rear and sides being supported by the aid of upturned flanges 30, upon the rear and side walls of the cabinet. The front edge is also flanged, as indicated at 31, Fig. 3, but is spaced from the front of the cabinet to permit air circulation between the upper and lower portions of the cabinet. A plurality of brackets 32 serve to support this front edge. The pan 29 slopes to the rear in order to drain the moisture; and a drain pipe 33 serves to drain this moisture from the pan.

The refrigerant in a liquid state is supplied to the various expansion spaces inside of the cabinet, through a pipe 34; and it returns in a gaseous state from the cabinet through a pipe 35. Both these pipes extend below the pan 29. The liquid refrigerant passes through pipe 34 into a container or chamber 36, the details of which are disclosed most clearly in Fig. 3. This chamber presents a large and sudden increase in the area of the space through which the refrigerant must pass, and therefore rapid evaporation with cooling, results. Such a chamber is described and claimed in a pending application filed May 10, 1926, in my name, entitled "Refrigerating system" and having Serial Number 109,306. It is in the form of a double walled container, in the present instance cylindrical, between the walls of which the refrigerant is conducted.

The chamber 36 is chown in this instance as made from an inner and outer cylinder to which the apertured ends 37 are welded to form a closed container. By placing the chamber 36 in an upright position, it is seen that the inner cylinder forms a flue for the passage of air, which is cooled by contact with the chamber and settles close to the bottom of the cabinet. The chamber 36 rests on legs or supports 38 fastened to the bottom of the cabinet, but which do not impede the flow of convection currents in the chamber.

The provision of a flue-like container is of considerable importance. It initiates an efficient movement of cold air in the cabinet and provides a uniform degree of cold therein.

The pipe 34 leads into the chamber 36 at or below the normal liquid line therein. The outlet pipe 35 has an upwardly extending portion 39 (Fig. 3) connecting near the top of the chamber 36, well above the liquid level therein.

I preferably provide another expansion chamber 40 of the same structure as chamber 36, but at the other end of the cabinet. The pan 29 is cut around these tanks, and has depending portions 41 defining a square space with the corners of the cabinet to accommodate these chambers.

I conduct refrigerant from chamber 36 into chamber 40 through a pipe or conduit 42 in the form of a series of convolutions, disposed immediately below the trays 27. These convolutions also assist in cooling the interior of the cabinet, and thus serve a double function. The conduit 42 connects to both tanks 36 and 40 below the liquid level, whereby the transfer of cold refrigerant through the conduit is effected. The expanded gaseous refrigerant in tank 40 passes through a conduit 43 into pipe 35 leading to the compressor. This conduit 43 connects to tank 40 adjacent the top thereof.

It is evident that the system produces rapid convection currents of cooling air; and in addition a large cooling surface, formed by conduit 42, is effective to equalize the temperature. It is to be noted that but one of the chambers 36, 40, is in direct connection with the refrigerant supply; the other chamber being connected to this chamber through the coil 42.

Due to this feature, it is obviously feasible to connect other chambers also to the chamber 36, in order to provide a system of larger capacity. Such a system is shown diagrammatically in Fig. 4. In this case, the large cabinet 44 has three tanks 45, 46 and 47. The center tank 46 is connected to the outlet of a compressor, as by pipe 48, whereby refrigerant in a liquid state is supplied to the system. The other chambers 45 and 47 are each connected to chamber 46 through convoluted conduits 49 and 50, similar to conduit 42, and arranged near the liquid level in the chambers. A common return pipe 51 connects to the vapor space in all three chambers.

It is evident that this arrangement can be further multiplied by the addition of further containers and convoluted pipes.

I claim:

1. In a refrigerator, means forming a space to be cooled, a plurality of containers in said space, means for leading refrigerant to one of said containers, means for conducting refrigerant away from all of said containers, and means whereby refrigerant is distributed from said one container to the others, comprising a convoluted conduit.

2. In a refrigerator, means forming a space to be cooled, a pair of cylindrical, vertically arranged, double-walled containers in said space, the inner wall of each container defining a clear vertical flue, a conduit for leading refrigerant into one of the containers, a conduit for leading refrigerant away from both containers, said conduit being connected adjacent the top of each container, and a coiled conduit connecting the two containers.

3. In a refrigerator, means forming a space

to be cooled, a pair of closed containers, one adjacent each end of the space, and each having an open flue extending substantially vertically therethrough, and connections between the containers for providing a circulatory space for the refrigerant.

4. In combination, means forming a space to be cooled, a plurality of closed double walled containers in said space, each container having a clear upright flue therethrough, and having substantial volume so as to accommodate a refrigerant, and to permit it to expand, and connections between the containers for providing a circulatory space for the refrigerant.

In testimony whereof I have hereunto set my hand.

WILFRED FOURNESS.