

Aug. 7, 1928.

1,679,729

F. E. LYNN

REFRIGERATING SYSTEM

Filed July 18, 1927

2 Sheets-Sheet 1

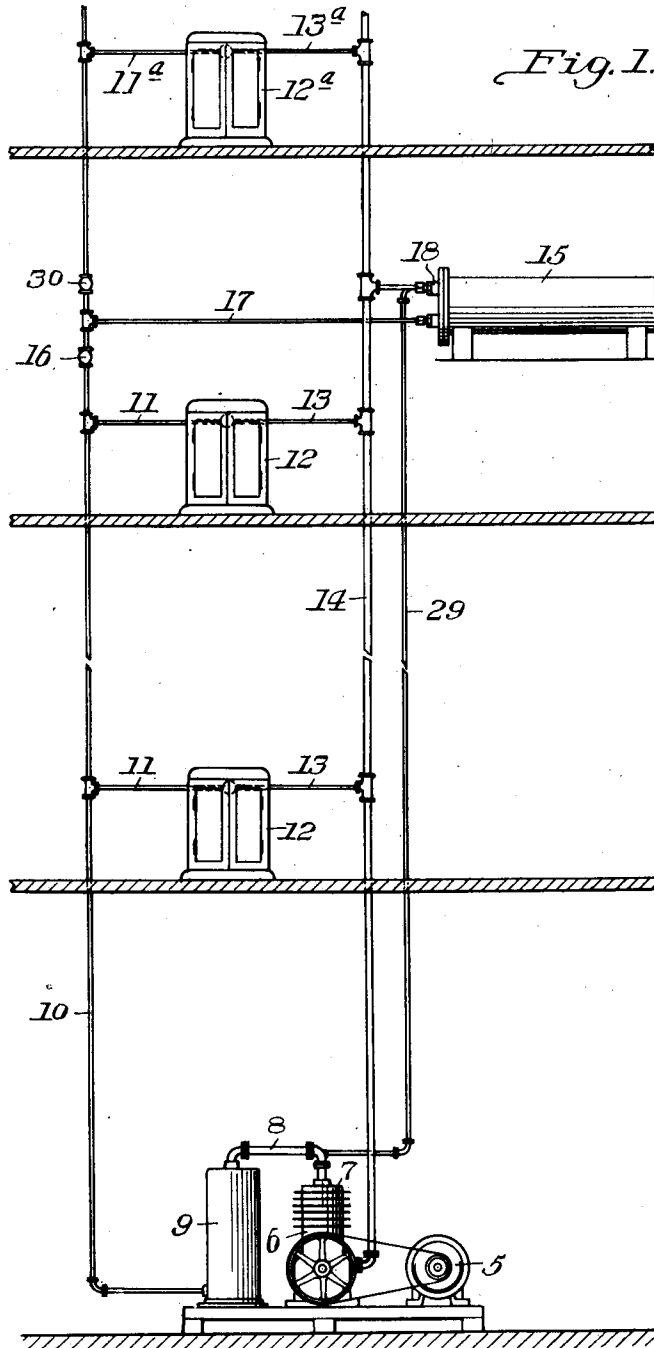


Fig. 1.

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Fig. 2.

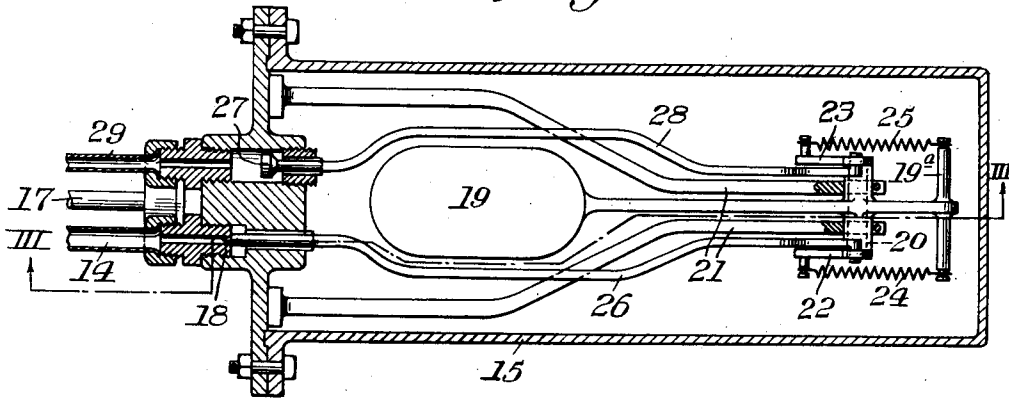
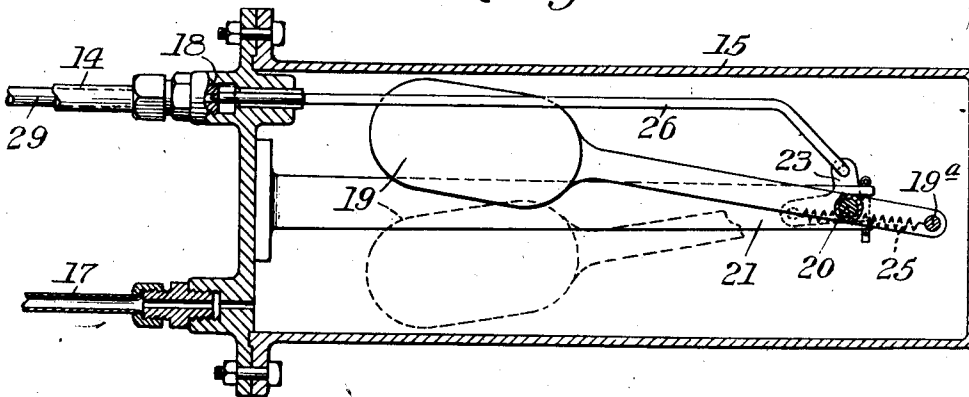


Fig. 3.



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REFRIGERATING SYSTEM.

Application filed July 18, 1927. Serial No. 206,453.

My invention relates to refrigerating systems, and more particularly to those wherein a plurality of refrigerating cabinets or the like are supplied with refrigerant liquid from a single compressor unit.

In apartment houses, for example, it is desirable to supply a refrigerating cabinet in each apartment from a central station, but difficulty is experienced in effecting a sufficiently uniform supply to the cabinets on the various floors of the building, for the reason that the pressure which is necessary to carry the liquid refrigerant to those cabinets on the higher floors is so much greater than is necessary for supplying the cabinets on the lower floors. This results in the cabinets on the upper floors not receiving a sufficient supply of refrigerant or none at all. The pressure necessary to properly supply the upper cabinets may be so great as to be dangerous at the lower levels.

Refrigerant pressures in the condenser are ordinarily not great enough to force the column of liquid refrigerant to the higher levels, or more distant points, and if the pressure within the condenser is increased by cutting down the supply of cooling medium, such pressure may become dangerously high, and such increase of pressure results in a corresponding decrease in the capacity and efficiency of the unit. It may be also noted that even if the system is constructed of such strength as to withstand pressures necessary to carry the liquid refrigerant to high levels, the act of compressing the refrigerant to the pressure necessary to reach the higher levels may result in such increase in temperature by reason of the compressing action, as to render it impossible to liquefy the refrigerating medium in the condenser, thereby rendering the refrigerating medium ineffective to perform its function.

My invention has for one of its objects the provision of a system wherein a refrigerant medium may be more efficiently distributed from a central point to the cabinets of a multi-cabinet system.

Another object of my invention is to simplify and improve generally the structure and operation of refrigerating systems.

One form which my invention may take is shown in the accompanying drawing,

wherein Figure 1 is an elevational view, in somewhat diagrammatic form, of a system embodying my invention; Fig. 2 is a sectional plan view, on an enlarged scale, of a portion of the apparatus of Fig. 1, and Fig. 3 is a sectional elevational view of the apparatus of Fig. 2.

The compressor unit may be of any well-known form, and is here shown as composed of an electric motor 5, a compressor 6 having a compression chamber 7, and a pipe 8 leading to a condensing chamber 9, wherein the compressed gas, which may be sulfurous (SO_2), is condensed. The condensed refrigerant is of course under pressure and in liquid form, and passes through a conduit 10 from which portions may flow laterally through pipes 11 to refrigerating cabinets 12, located at various floors of the building. It will be understood that a number of cabinets 12 may be served on a single floor, by suitably connecting them to the pipes 11 or directly to the conduit 10.

Within the cabinets 12, the refrigerant is permitted to expand into expansion or refrigeration coils (not shown), in a well-known manner, after which, in its gaseous form, it will pass through pipes 13 to a return line or conduit 14 that leads to the suction or intake side of the compressor 6, where it is again compressed and passed through the cycle of operations above described.

Refrigerator cabinets 12, connected to the line 10, may be placed at any number of desired levels, depending upon conditions, but where it is desired to supply other cabinets on higher floors, I provide refrigerant for the upper cabinets at an intermediate station, as indicated by the numeral 15 which represents a reservoir for receiving and temporarily storing a supply of liquid refrigerant, to be thereafter directed to cabinets 12 on the upper floors of the building.

Refrigerant liquid is supplied to the reservoir 15 through the pipe 10, past a downwardly seating check valve 16 and through a pipe 17. The pipe 17 leads into the lower portion of the chamber 15, the air or gas within such chamber being simultaneously exhausted past a valve 18 to the return line 14 that leads to the intake side of the compressor.

A float 19 is provided in the tank 15, such

float being loosely mounted upon a shaft 20 that is journaled in the ends of bracket arms 21 that are secured to one wall of the tank. Bell crank levers 22 and 23 are rigidly secured to the shaft 20 and have their horizontally-extended arms connected through tension springs 24 and 25 respectively with an extension 19^a of the float 19, so that when the float moves from its upper or full line position to its lower position (Fig. 3) the springs will be carried across the axial line of the shaft and tend to move the bell-crank levers 22 and 23 in a clockwise direction, while when the float moves to its upper position, upon filling of the chamber with liquid refrigerant, the outer ends of the springs will be carried downward below the axial line of the shaft 20 and move the bell crank levers in a counter-clockwise direction.

When the chamber 15 has become approximately filled with liquid refrigerant the float 19 will of course be raised and this movement will result in the bell crank lever 22 operating a link-like valve stem 26 to close the valve 18, through movement of the bell crank lever 22 in a counter-clockwise direction, to shut off communication between the chamber 15 and the return or suction line 14. At this time, a valve 27 will be moved to the left from its seat, through connection of its stem 28 with the vertically extending arm of the bell crank lever 23. This movement establishes communication between the upper portion of the chamber 15 and a conduit 29 that is preferably heat-insulated and which has connection with the compression chamber 7. The compressed gas within such chamber is therefore permitted to flow through the line 29 into the chamber 15 and force the liquid refrigerant therefrom through the pipe 17 to the conduit 10 where it will flow past an upwardly opening check valve 30 to supply lateral lines 11^a that lead to additional refrigerating cabinets 12^a. This refrigerant is prevented from flowing down through the conduit 10, by the check valve 16. From the cabinets 12^a, the gasified refrigerant will flow through pipes 13^a to the return line 14. For the taller buildings, a plurality of reservoirs 15 will be provided at different levels.

It will be seen that by employing gas pressure to force the refrigerant to the higher levels, the necessity of carrying an extremely long column of liquid refrigerant under necessarily high pressure is avoided, since the weight of gas in a given length of column is very small compared to a similar volume of liquid.

When the reservoir 15 has been emptied of a charge of liquid, the float 19 will fall to the position indicated by dotted lines in Fig. 3, thus opening the valve 18 and closing the valve 27, so that a new supply of refrigerant may flow into the reservoir and the cycle of operations above described repeated.

I claim as my invention:—

1. A refrigerating system comprising a compressor, a condenser, a reservoir disposed above the condenser, a cabinet, a connection between the condenser and the reservoir, a connection between the reservoir and the inlet side of the compressor, a connection between the reservoir and the said cabinet, a connection between the compression chamber of the compressor and the reservoir, and valves for controlling flow through said connections.

2. A refrigerating system comprising a compressor, a condenser, a reservoir disposed above the condenser, a cabinet, a connection between the condenser and the reservoir, a connection between the reservoir and the cabinet, a connection between the reservoir and the inlet side of the compressor, a connection between the compression chamber of the compressor and the reservoir, a float in said reservoir, a valve for each of the two last-named connections, and mechanism operated by said float, for closing the valve in the connection leading to the inlet side of the compressor and for opening the valve in the connection leading to the said compression chamber, when the float in the reservoir rises under the action of refrigerating liquid entering said chamber.

3. A refrigerating system comprising a compressor, a condenser, a reservoir disposed above the condenser, a cabinet, a connection between the condenser and the reservoir, a connection between the reservoir and the cabinet, a connection between the reservoir and the inlet side of the compressor, a connection between the compression chamber of the compressor and the reservoir, a float in said reservoir, a valve for each of the two last-named connections, mechanism operated by said float for closing the valve in the connection leading to the inlet side of the compressor and for opening the valve in the connection leading to the said compression chamber, when the float in the reservoir rises under the action of refrigerating liquid entering said chamber, and for operating said valves in the reverse direction, when the liquid level in said reservoir falls.

4. The combination with cooling stations at different levels and a reservoir intermediate said levels, of means for supplying liquid refrigerant to the lower station and to the reservoir, and means for causing a flow of liquid from the reservoir to the upper station.

5. The combination with cooling stations at different levels and a reservoir intermediate said levels, of means for supplying liquid refrigerant to the lower station and

to the reservoir, and means for periodically causing a flow of liquid from the reservoir to the upper station.

5 6. The combination with cooling stations at different levels and a reservoir intermediate said levels, of means for supplying liquid refrigerant to the lower station and to the reservoir, means for periodically

causing a flow of liquid from the reservoir to the upper station, and means controlled 10 by the volume of liquid in said reservoir for causing a flow of such liquid from the reservoir to the upper station.

In testimony whereof I, the said FREDERICK E. LYNN, have hereunto set my hand.
FREDERICK E. LYNN.