March 24, 1931. G. E. WEISSENBURGER ET AL 1,797,385

REFRIGERATING APPARATUS

Filed Dec. 30, 1929

Fig. 1.

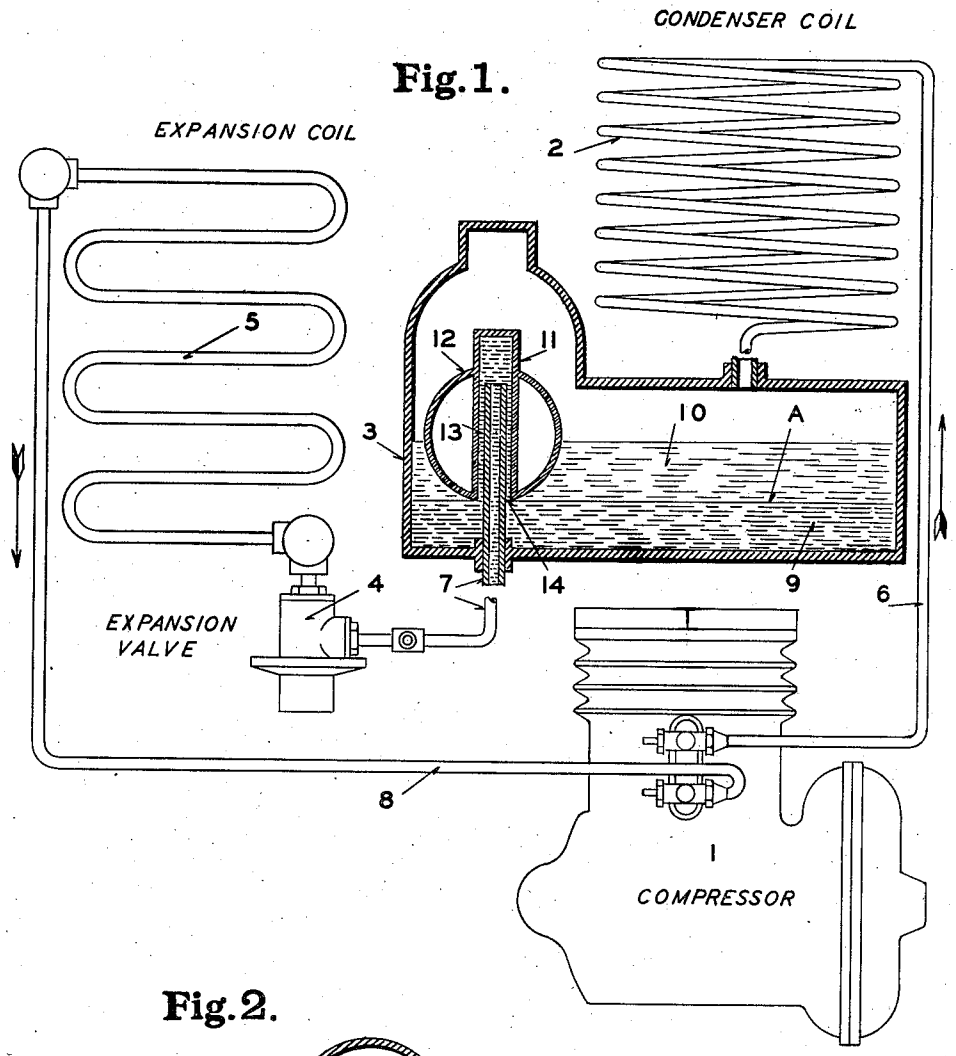
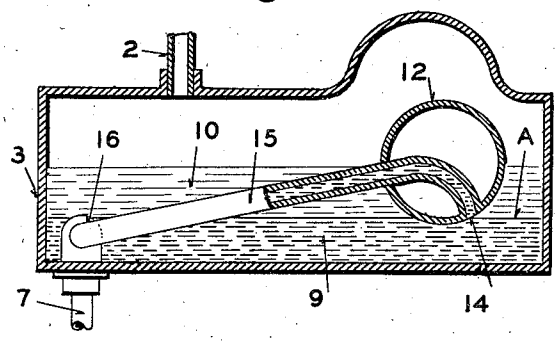


Fig. 2.



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UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

Application filed December 30, 1929. Serial No. 417,334.

Our invention relates to a refrigerating system and is particularly directed to providing means for preventing the trapping of lubricant in the refrigerant receiver.

In a refrigerating system a portion of the oil placed in the crank case of the compressor for lubricating its moving parts will work past the piston and be carried over into the system together with the compressed refrigerant. Such oil should be returned to the compressor to maintain proper working conditions in the system. If, however, the oil is of less specific gravity than the liquefied refrigerant and is not wholly soluble therein, it will float on the surface of the refrigerant and consequently will be trapped in the refrigerant receiver or, in case no receiver is used, in some other part of the system, such as the condenser. This trapping of oil not only reduces the capacity of the system for containing refrigerant but also interferes with the proper lubrication of the compressor with resultant liability of injury to its moving parts.

The object of our invention is to provide float controlled means for varying the height of the point of discharge from the receiver, thus maintaining a uniform amount of lubricant in the receiver irrespective of the amount of refrigerant therein. In this manner we prevent the trapping of additional lubricant with its resultant objectionable features.

In the accompanying drawings, which illustrate a refrigerating system of the compressor-condenser-expander type having our invention embodied therein, Figure 1 is a vertical section through the receiver, the other parts of the system being shown diagrammatically, and Figure 2 is a sectional view of a modified form of receiver.

Our system comprises a compressor 1, a condenser coil 2, a receiver 3, an expansion valve 4, and an expansion coil 5. Any suitable liquefiable gas, such as sulphur dioxide (SO_2) may be used for the refrigerant. After being compressed in the compressor this refrigerant passes through a pipe 6 to the condenser coil where it is liquefied and discharged into the receiver. The object of this receiver is to hold a surplus supply of the liquefied refrigerant to compensate for variation in the operation of the system. Liquefied refrigerant passes from the receiver through a pipe 7 to the expansion valve and thence into the expansion coil from which it is returned in gaseous form to the compressor through pipe 8.

Liquefied refrigerant 9 enters the receiver 3 (Figure 1) from the condenser coil 2 and, owing to its greater density, lies on the bottom of the receiver, being covered by a body of oil 10 which has been carried over from the compressor with it. In the form of Figure 1 the pipe 7 projects vertically into the receiver and is open at its upper end. This upper end is surrounded by a movable tube 11 controlled by a float 12. The float is preferably spherical in form and the tube preferably passes centrally through and is rigidly secured to it. The pipe forms a guide for the tube in its vertical movement responsive to the buoyance of the float and the tube is somewhat larger in diameter than the pipe so as to provide an annular space 13 between the two parts for the passage of liquid from the receiver to the open upper end of the pipe. Tube 11 has its upper end closed but is open at its lower end to provide a downwardly opening outlet 14 which rises and falls with the float, thus determining the level at which the liquid is discharged from the receiver to the expansion valve. Float 12 is so proportioned as to size and weight that it will only sink a predetermined distance in the oil 10; for example, about one-half its diameter, as shown in the drawings. This will determine the depth of the layer of oil as the dividing line A between the oil and refrigerant will coincide with the position of the outlet opening 14. The volume of refrigerant in the receiver may change, owing to variations in the operation of the system, the float and the oil rising and falling in response to such change, and only refrigerant will pass through the receiver as long as the amount of oil therein remains constant. However, as soon as additional oil is carried over into the receiver the outlet opening 14 will be raised sufficiently to cause oil in like amount to be discharged.

Thus the trapping of more than the predetermined quantity of oil is prevented.

In Figure 2 we have shown a modification in the construction of the discharge means. In this form a tube 15 is connected by a liquid-tight pivot joint 16 to the discharge pipe 7. This tube passes through the float 12 and has its open outer end curved downwardly to provide the outlet opening 14, which rises and falls with the float.

Having fully described our invention, what we claim as new and desire to secure by Letters Patent of the United States is:

1. In a refrigerating system, the combination with a compressor and an expansion device, of a liquid receiver interposed between said compressor and expansion device and containing a refrigerant and a lubricant of lower specific gravity than the refrigerant, of float controlled discharge means operable at varying levels for limiting the depth of the lubricant.

2. In a refrigerating system, the combination with a compressor and an expansion device, of a liquid receiver interposed between said compressor and expansion device and containing a refrigerant and a lubricant of lower specific gravity than the refrigerant, of a float movable in the receiver, said float being provided with a discharge opening movable therewith and communicating with the expansion device.

3. In a refrigerating system, a liquid receiver, a discharge pipe projecting upwardly in said receiver, a vertically movable tube surrounding said pipe, said tube being closed at its upper end and open at its lower end and forming a discharge conduit communicating with the discharge pipe, and a float in the receiver controlling the movement of said tube.

In testimony whereof, we hereunto affix our signatures, this 26th day of December, 1929.

G. E. WEISSENBURGER.
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