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CONTROL MECHANISM FOR EVAPORATORS

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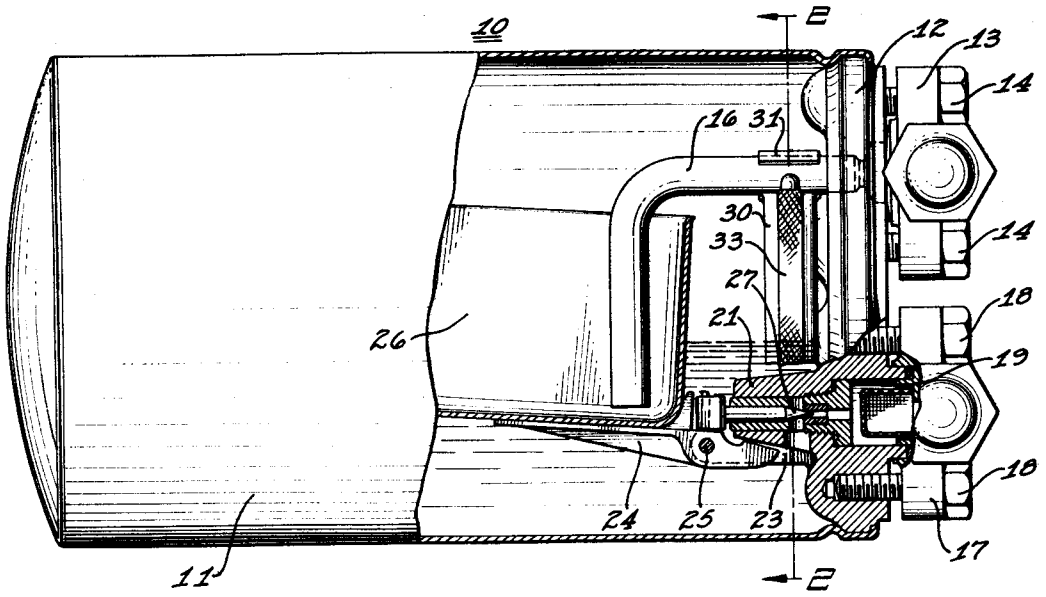

FIG. 1

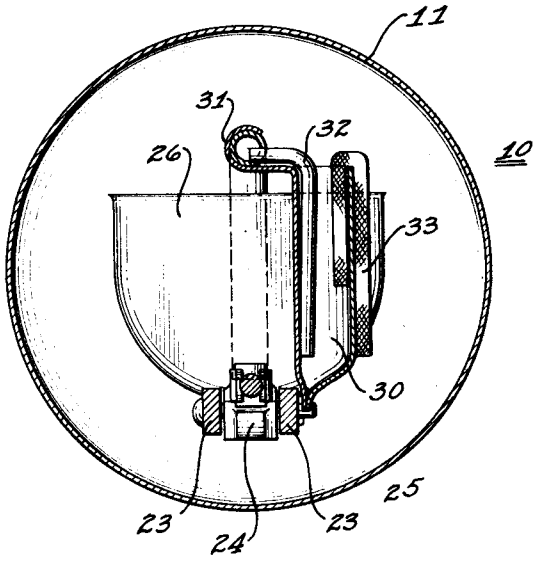

FIG. 2

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CONTROL MECHANISM FOR EVAPORATORS

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This invention relates to refrigerating systems, and more particularly to fluid control in evaporators.

There are several methods now employed for maintaining a constant fluid body in evaporators consisting of a predetermined ratio of refrigerant and oil. With such systems, the control of the oil quantity takes the form of gravity overflow or suction removal of oil rising to the level of the fluid body as the refrigerant evaporates. Such systems however are useless where an oil is employed which is heavier than the refrigerant, or when the oil is entirely soluble with the refrigerant.

An object of this invention is to provide a control system within the evaporator of a refrigerating system, for moving oil from the evaporator in the same proportion as it is admitted.

Another object of this invention is to provide a control system for maintaining a constant oil quantity in a flooded evaporator which utilizes capillary attraction to remove excess oil from the body of the fluid.

A further object of the invention is to provide a refrigerating system, utilizing a body of fluid in the evaporator consisting of either completely soluble oil and refrigerant or refrigerant and an oil of greater specific gravity, in which a wick is employed to elevate sufficient oil from the body to a point where it is removed by suction whereby maintaining a substantially constant quantity of oil in the evaporator.

Other objects of the invention will appear from the following description taken in connection with the drawing, which forms a part of the specification, and in which:

Fig. 1 is a side elevation of an evaporator partially broken away to illustrate the control.

Fig. 2 is a sectional view of the same taken on line 2—2 of Fig. 1.

Referring to the drawing by characters of reference, 10 represents generally an evaporator unit which is connected in circuit with a condenser and a compressor (not shown) of a mechanical refrigerating system. The evaporator vessel 11 is preferably cylindrical in form, and has an open end which is sealed by the end plate 12. A union 13 is fixed to the upper portion of the end plate by the cap screws 14 providing a connection for the refrigerant return conduit leading back to the compressor, the end plate having an outlet opening therein communicating with the union and receiving the outlet tube 16. Another union 17 is secured to the lower portion of the end plate by cap screws 18 and provides a connection for the refrigerant conduit leading from the condenser, the end plate having a passage 19 therethrough communicating with the union.

Within the vessel is provided mechanism for automatically admitting fluid therein consisting of oil and refrigerant. The interior face of the end plate is formed with a boss 21 through which the inlet passage 19 also extends and opens into the vessel. A pair of spaced arms 23 project from the end plate adjacent the sides of the boss, and a float bracket 24 extends between the arms, and is pivotally carried on the pin 25 extending through the bracket and the arms. An open float 26 is secured to the bracket 24 and is arranged to be partially submerged in the liquid refrigerant body in the vessel. The outlet tube 16 is bent downwardly so that an open end thereof extends into and adjacent the bottom of the float. A valve 27 is carried by the float bracket and extends into the inlet passage 19 where it seats or unseats to control passage of refrigerant and oil passing into the evaporator from the condenser.

The float moves up and down with the level of the fluid body in the vessel, so that the flow of refrigerant and oil will flow past the valve when the float is below a predetermined level. This control is automatic as can readily be seen and will maintain substantially a uniform quantity of fluid in the vessel.

Various types of refrigerant and oil can be employed as the circulating fluid, the refrigerant and oil can be entirely soluble, or the oil can be partially soluble with the

refrigerant and of either a more or less specific gravity. Under any of these conditions, vaporization of the liquid refrigerant caused by the absorbing of heat will leave the same ratio of oil in the vessel and such oil must be removed to maintain a constant ratio of oil and liquid refrigerant in the liquid body. Several methods of removing oil have been proposed, for example it has been removed by gravity overflow and by suction when it is of a specific gravity to rise to the top of the liquid body. When the oil is entirely soluble with the refrigerant, or when of a greater specific gravity than the refrigerant, then neither of the methods mentioned are useful.

The present invention provides for the removal of oil from the evaporator regardless of the solubility with the refrigerant or the relative specific gravity of the oil and refrigerant used. To this end I provide an open cup 30 having an arm 31 which is bent around the outlet pipe 16 and secured thereto in any suitable manner. A tube 32 extends into the cup and passes into the outlet or suction tube 16, thus providing a conduit between the suction outlet and the lower portion of the cup which is of sufficient length to depend well into the liquid body in the evaporator. Oil from the liquid body is moved into the cup through means of a wick 33 which in this instance is formed of a folded copper screen. The screen is bent over the open edge of the cup and is preferably welded thereto as is the tube 32, thus forming a compact unitary structure.

Oil will move along the wick, from the liquid body into the cup, through capillary action, and the wick is of a character such that the oil movement can be arranged for to suit predetermined refrigerant vaporizing conditions. Oil collecting in the cup will be moved into the return tube 16 through the tube 32 by suction created by the compressor, such suction also removing vaporized refrigerant from the evaporator.

It will be seen that the incoming fluid is controlled by the float and valve to automatically maintain a constant body in the evaporator, and that the entering refrigerant and oil are in a definite proportion. The described manner of removing the oil will cause the oil to pass from the evaporator in the same ratio to the vaporized refrigerant as admitted, so that a constant proportion of liquid refrigerant and oil are maintained in the evaporator. The invention applies to any kind of oil and refrigerant regardless of the solubility and specific gravity.

Although this invention has been described in connection with a certain specific embodiment, the principle involved is susceptible of numerous other applications which will readily occur to persons skilled in the art, and the invention is therefore to be limited only as indicated by the scope of the appended claims.

What I claim is:—

1. In a refrigerating system, an evaporator, means for automatically admitting refrigerant and oil in solution into the evaporator to maintain a substantially constant liquid body therein, a suction outlet conduit leading from the vapor space in the evaporator to the exterior, a cup in the evaporator, a wick depending into the liquid body and extending into the cup, and means establishing a conduit connection between the cup and the suction outlet.

2. In a refrigerating system, an evaporator, means for admitting refrigerant and oil in solution into the evaporator to maintain a substantially constant liquid body therein, a suction outlet conduit leading from the vapor space in the evaporator to the exterior, wick means in the evaporator for collecting oil from the liquid body, and a tube communicating with the suction outlet conduit and the collected oil.

3. In a refrigerating system, an evaporator, means including an open float for admitting refrigerant and oil in solution into the evaporator to maintain a substantially constant liquid body therein, a suction outlet conduit leading from the open float to the exterior of the evaporator, an open cup in the evaporator partially submerged in the liquid body, a tube extending from the suction tube to the interior bottom portion of the cup, and a wick extending over the open end of the cup into the liquid body.

4. In a refrigerating system, an evaporator, means including an open float for admitting refrigerant and oil in solution into the evaporator to maintain a substantially constant liquid body therein, a suction outlet conduit leading from the interior of the float to the exterior of the evaporator, an open cup in the evaporator supported by the suction outlet conduit, a wick extending into the cup and depending into the liquid body, and a tube establishing communication between the interior of the cup and the suction conduit.

In testimony whereof I affix my signature.

FRANKLIN G. SLAGEL.