GAS PURGER FOR REFRIGERATING SYSTEMS

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The object of the invention is to provide an apparatus for inclusion between the condenser and fluid tank of a refrigerating system so as to effectively separate and drive out all noncondensable gases from the system; to provide a construction of this nature in which the condensation from the refrigerating medium is employed directly, after condensation in the device, as a means for effecting the condensation of the additional gases entering; to provide a construction in which admission to the condensing chamber is controlled by a temperature actuating valve operable to open the intake to the condensing chamber when the temperature therein has been reduced to the desired point; to provide a construction which makes for the ready return to the system of the useful gases after the noncondensable gases have been separated therefrom, and to provide generally an apparatus of the character indicated which is of simple form and susceptible of cheap manufacture.

With this object in view, the invention consists in a construction and combination of parts of which a preferred embodiment is illustrated in the accompanying drawing, wherein:

Figure 1 is a longitudinal vertical sectional view through an apparatus constructed in accordance with the invention.

Figure 2 is a transverse sectional view on the plane indicated by the line 2–2 of Figure 1.

Disposed with an outer tank 10 is an inner tank 11 having one end wall in common with the end wall of the tank 10 but the other end wall spaced from the adjacent end wall of the tank 10. Being cross-sectionally circular, the circular wall of the tank 11 is spaced from the corresponding wall of the tank 10 and is bounded with a series of spaced annular fins 12, the edges of which are spaced from the circular wall of the tank 10. In addition to the annular fins 12, the tank 11 is provided with longitudinally extending fins 14 disposed on diametrically opposite sides and at intermediate points in the vertical diameter of the tanks.

The space between the walls of the tanks 10 and 11 constitutes a condensing chamber which extends into the drum 16 with which the tank 10 is formed, the tank 11 being a smaller drum 16 disposed within but spaced from the drum 15 and similarly bounded with annular fins 17.

The gases of the refrigerating medium are admitted to the condensing chamber through an inlet pipe 18 in which is disposed a manually controlled valve 19, as well as a temperature controlled valve 20, the latter being actuated through the medium of a thermostat 21 positioned in the wall of the tank 10 but exposed to the content of the condensing chamber. There is also positioned in the intake pipe 18 a pressure reducing valve 22.

Drain pipes 23 and 24, each valve controlled as indicated at 25 and 26, are connected to the tanks 10 and 11 at the bottom thereof. These pipes are merely intended as drains for drawing off oil or sediment dropped from the passing gases or liquids.

For the ascertaining of the temperature in the condensing chamber, a thermometer 27 is provided, this being mounted in the end wall of the tank 10.

Since the condensing chamber will be partially filled with the condensation of the passing gases, a liquid gauge 28 is also provided, this being in communication with the condensing chamber by its connections with the latter through the top and at the bottom as shown.

Since the invention contemplates transferring the condensation of the condensing chamber to the interior of the tank 11, a pipe 29 is provided connected with the condensing chamber at the bottom and also connecting with the float chamber 30, carrying a hand operable valve 31 between the two. Within the float chamber there is disposed a float 32 for actuating a valve 33 controlling the communication between the float chamber and a pipe 34 which communicates with the interior of the tank 11 through the end wall common to the two tanks. This pipe 34 also carries a manually operable valve 35.

As the condensation rises in the condensing chamber, the liquid will pass through the pipe 29 to the float chamber and, raising the float, will unseat the valve 33 and pass thence into the interior of the tank 11.

To provide for the contingency of failure of the float valve to operate, as by damage or sticking, the pipes 29 and 34 are by-passed with a pipe 36 carrying a hand operated valve 37. Thus where communication between the condensing chamber and the interior of the tank 11 may be cut off through the float chamber by reason of failure of the float, such communication can be re-established by opening of the valve in the by-pass 36.

The float chamber 30 is connected with the condensing chamber at the top by means of a pipe 38 which carries a hand operated valve 39, so that gas pressure in the float chamber may be
equalized with that in the condensing chamber.
Since the liquid received in the interior of the tank 11 is the condensation from the passing gases, conditions may arise which will make it impossible to supply the tank 11 with a sufficient quantity of liquid. To meet such a contingency a float chamber 40 is provided in communication at its upper and lower ends by means of tube legs 41 and 42 with the interior of the tank 11. The float 43 in the float chamber controls a valve 44 which, when the float drops, is moved to open position, so that communication between the float chamber and the pipe 45 is established, this pipe 45 being connected in on the liquid line of the refrigerating system, so that liquid may be supplied therefrom to the tank 11 if the valve 46 which is included in the pipe 45 be open.

At the top of the drum 15 there is disposed a blow-off valve 47 between which and the drum is disposed a manually controlled valve 48. A low pressure gauge 49 is also mounted on the drum and is subject to pressure within the condensing chamber of which the upper part is defined by the spaced walls of the two drums 15 and 16. To the compressor of the refrigerating system, there is connected a pipe 50, this pipe being in communication with the interior of the drum 16 and carrying a manually operable valve 51 as well as back pressure gauge 52.

In the operation of the invention, the gases in the refrigerating medium pass through the pipe 18 into the condensing chamber defined by the spaced walls of the two tanks and are condensed therein, all noncondensable gases passing to the upper part of the condensing chamber and into that section thereof defined by the two drums, when they are discharged through the blow-off valve 47. The condensation from those gases which are condensable then passes through the pipe 29, the float chamber 30 and pipe 34 to the interior of the tank 11, thus producing a low temperature therein which is transferred to the walls of the tank 11 with the result that the new gases entering the condensing chamber are condensed.

The gases rising from the liquid in the tank 11 are carried off through the pipe 50 to the suction side of the refrigerating compressor. If the condensation does not supply enough liquid to fill the tank 11 to the mid-point, the float 43 functions to supply the deficiency by opening communication between the interior of the tank 11 and the supply pipe 45.

In first starting the apparatus in operation, the valve 37 is opened, when liquid flows into the condensing chamber. After it has been permitted to flow until the condensing chamber is half full, the valve 37 is then closed and the valve 51 opened. When the temperature of the condensing chamber has dropped to its lowest point as indicated by the thermometer 37, the valve 48 is opened to permit the discharge of the non-condensable gases which shall have at this time risen into that part of the condensing chamber defined by the two drums from which they will be expelled by the valve 48. The axial and circumferential fins on the exterior wall of the inner tank function as baffles to make passage of the gases through the condensing chamber more or less sinuous; so that only those which are noncondensable will pass. Further, the fins provide a large area of contact with the gases, so that the latter may be more effectively subjected to the condensing action of the contents of the inner tank.

The invention having been described, what is claimed as new and useful is:

1. Apparatus for the purpose indicated comprising a duality of tanks of which one is disposed within the other with its walls separated from the wall of the first to define a condensing chamber, each tank being provided on the upper side with an standing drum of which that on the inner tank enters that on the outer tank, the walls of the two drums being in spaced relation to continue the condensing chamber into the space between the two drums, an inlet to the condensing chamber at the bottom of the outer tank, a blow-off valve for the condensing chamber at the top of the outer drum, the inner tank being interiorly in communication with the condensing chamber and being exteriorly provided with spaced annular fins constituting baffles and with longitudinal fins on diametrically opposite sides also constituting baffles, the drum of the inner tank being likewise provided with spaced annular fins constituting baffles, and a lead-off pipe for connection to the compressor of a refrigerating system, said lead-off pipe being in communication with the inner tank through the upper end of the drum thereof.

2. Apparatus for the purpose indicated comprising a duality of tanks of which one is disposed within the other with its walls separated from the walls of the first to define a condensing chamber, each tank being provided on the upper side with an standing drum of which that on the inner tank enters that on the outer tank, the walls of the two drums being in spaced relation to continue the condensing chamber into the space between the two drums, an inlet to the condensing chamber at the bottom of the outer tank, a blow-off valve for the condensing chamber at the top of the outer drum, the inner tank being interiorly in communication with the condensing chamber and being exteriorly provided with spaced annular fins constituting baffles and with longitudinal fins on diametrically opposite sides also constituting baffles, the drum of the inner tank being likewise provided with spaced annular fins constituting baffles, a lead-off pipe for connection to the compressor of a refrigerating system, said lead-off pipe being in communication with the inner tank through the upper end of the drum thereof, and a temperature controlled valve for the inlet, said valve having a thermostatic actuating means responsive to the temperature in the condensing chamber.

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