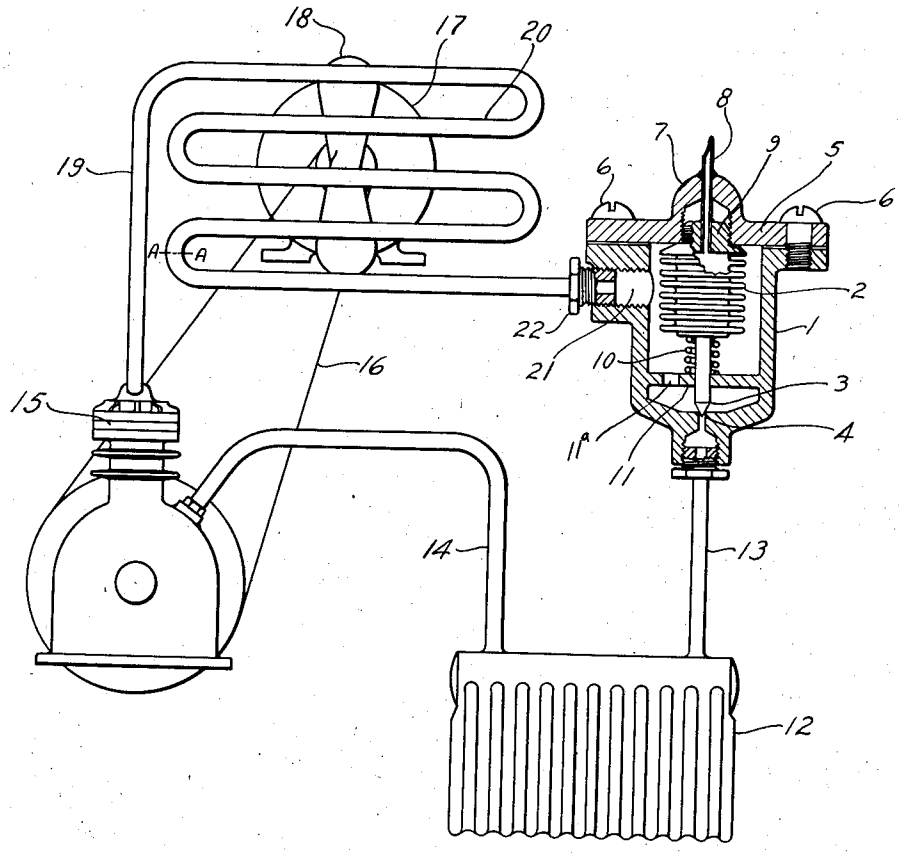
Dec. 18, 1934. C. B. YOUNT 1,985,134

LIQUID TRAP FOR REFRIGERATING SYSTEMS

Filed April 10, 1933



INVENTOR,
Clarence B. Yount,
BY Yonan & Smith,
His ATTORNEY.

Patented Dec. 18, 1934 1,985,134

UNITED STATES PATENT OFFICE

1,985,134

LIQUID TRAP FOR REFRIGERATING SYSTEMS

Clarence B. Yount, near Dayton, Ohio

Application April 10, 1933, Serial No. 665,286

1 Claim. (Cl. 62—3)

This invention relates to new and useful improvements in liquid traps for refrigerating systems.

It is the principal object of my invention to provide a simple, positive and efficient pressure control valve that can be used with the flooded type of evaporator in refrigerating systems in place of the conventional float valve. In the main, float valves are not satisfactory for this purpose because if the needle valve sticks, the float, being small, has not sufficient power to dislodge it. On the other hand, my liquid trap, due to the building up of condenser pressure, is strong enough to dislodge the needle when it sticks upon its seat.

In the event of an air leak on the low side of the refrigerating system, my liquid trap will prevent the entrance of an excess amount of air into the system. This is due to the fact that after sufficient air has entered the system to cause an increase of approximately ten pounds above normal condensing pressure, it will unbalance the liquid trap and allow the gas to bypass from the high to the low side of the system.

It is another object of my invention to prevent the accumulation of oil in the high side of the system, because the space required for the liquid trap is so small that there is no place for the oil to collect.

Other important and incidental objects will be brought out in the following specification and particularly set forth in the subjoined claim.

The figure in the drawing is a side elevational view, partly in section, of a flooded evaporator type of refrigerating system including my improved liquid trap.

Referring to the drawing illustrating one form of embodiment of my invention, the numeral 1 designates a pressure valve body containing a sylphon bellows 2. Projecting downwardly from this bellows is a needle valve member 3 which co-operates with a seat 4 in the lower part of the body 1.

The valve body 1 is closed at its upper end by a head or cover 5 which is removably secured to the valve body by screws 6. The head 5 is provided at its middle portion with a dome-shaped part 7 formed with an axial hole to receive a charging tube 8. The latter communicates at its lower end with the upper threaded stem 9 of the bellows 2 which is screwed into a tapped hole in the middle lower portion of the valve head.

Through the tube 8 the bellows is charged with a volatile liquid such as methyl chloride, which will create a higher pressure at the same temperature than the refrigerant such as sulphur di-oxide that is used in the refrigerating system which includes the pressure valve body 1. Therefore, I employ a spring 10, which surrounds the needle member between the bellows 2 and a partition 11 in the valve body, to force the needle member off its seat 4 in the event the bellows becomes ruptured. This prevents the system building up an excessive condensing pressure. The partition 11 is formed with a hole 11a through which the liquid refrigerant passes from the space above the partition into the space below it.

The numeral 12 designates a conventional flooded type evaporator with which the valve body 1 is in communication through a liquid line 13. A suction line 14 leads from the evaporator 12 to a conventional type compressor 15 which is driven through a belt 16 by an electric motor 17 carrying a fan 18 which it also rotates.

Connected between the compressor 15 and the valve body 1 is a gaseous refrigerant conducting tube 19 which is formed into a condenser coil 20 in front of the fan 18 and is secured to a lateral inlet passage 21 in the valve body 1 by a threaded connection 22.

In operation, the bellows 2 is charged with a volatile liquid such as methyl chloride through the tube 8 until it is approximately one-third full, after which the charging tube is sealed by solder to prevent the escape of this liquid. The latter will exert a pressure on the needle valve member 3, due to vaporization which is proportional to the surrounding temperature. For instance, if the temperature around the bellows 2 is 70 degrees, there will be a thrust of 41 pounds exerted on the needle valve member; and if the temperature around the bellows is increased to 100 degrees, there will be a thrust of 76 pounds on the needle valve member. This thrust is governed by the area of bellows.

When the compressor 15 starts at the beginning of the "on" cycle, it will draw vapor from the top of the evaporator 12 and compress it in the condenser 20. If, as stated, we have a temperature of 70 degrees, there will be a thrust of 41 pounds, holding valve 3 on valve seat 4 causing a compression, and consequent heating, of the gas in the condenser 20. This warm gas enters the valve body 1 through the inlet passage 21, and passing around the bellows 2, further increases the pressure on the needle valve member 3 by raising the temperature of the liquid in the bellows.

This action will continue until the pressure is sufficient to cause the gas surrounding bellows 2 to condense and entirely fill the interior of the valve body 1. At this point the liquefied gas starts to back up in the condenser 20 to a point designated by the line A—A. This will reduce the condensing space and cause an increase of pressure of approximately three pounds.

With this increase in pressure there is an increase in temperature in the condenser which has no further effect upon the liquid in the bellows 2 due to the fact that there is now a solid column of liquid from the needle valve seat 4 to the line A—A in the condenser 20.

It will now be readily seen that if the pressure is increased on the exterior of the bellows 2, and there is no increase of pressure within it, the needle valve member 3 will be raised from its seat 4 to permit the condensed refrigerant to pass into the evaporator 12 through the line 13, the valve 3 closing when the pressure on both sides of the bellows 2 is again balanced.

Having described my invention, I claim:

A pressure valve for a refrigerating system including an evaporator, a compressor and a condenser, comprising a valve body formed with a refrigerant inlet port, bellows in said valve body to receive a liquid of different volatility than the refrigerant, a needle valve member projecting downwardly from said bellows, a seat in said valve body against which said needle valve member is adapted to be pressed by the expansion of the liquid within the bellows, a partition in the valve body between the bellows and the seat and formed with holes through which the needle valve member and the refrigerant passes, and a helical spring on the needle valve member between the bellows and the partition, for the purpose specified.

CLARENCE B. YOUNT.