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EQUALIZING LOW PRESSURE REFRIGERATING SYSTEMS

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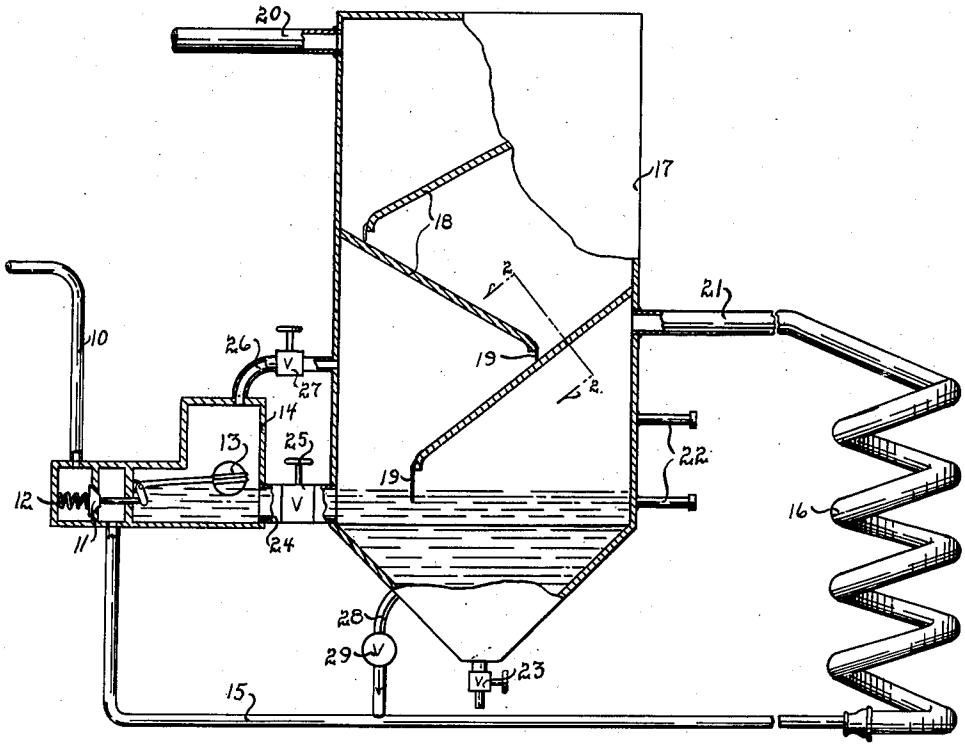


Fig. 1.

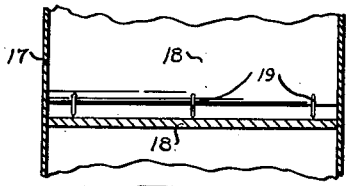


Fig. 2.

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EQUALIZING LOW PRESSURE REFRIGERATING SYSTEMS

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5 Claims. (Cl. 62—126)

The principal object of this invention is to provide an accumulator and equalizer for low pressure fluid cooling or refrigerating systems that is self regulatory relative to the fluid circuit.

A further object of our invention is to provide a fluid accumulating and equalizing system that force-fills the expansion or cooling coil in order to attain high efficiency of the cooling circuit.

A still further object of this invention is to provide an accumulating and equalizing system for cooling plants that prevents the entrance of the fluid cooling agent into the compressor head.

A still further object of our invention is to provide an accumulator and equalizer of low pressure suction cooling systems that traps the oil present in the fluid and automatically keeps the fluid in circulation through the cooling coil or coils.

A still further object of this invention is to provide an accumulator and equalizer for low pressure refrigerating units economical in manufacture, durable and efficient in use.

These and other objects will be apparent to those skilled in the art.

Our invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in our claims and illustrated in the accompanying drawing, in which:

Fig. 1 is a side, cross-sectional view of our complete device ready for use.

Fig. 2 is a sectional view of a portion of our device showing the baffle system and is taken on the line 2—2 of Fig. 1.

Heretofore, it has been necessary in the regulation of fluid cooling agents, to use an intricate and complicated system of automatic regulating valves and expansion chambers for the control of fluid through the system. The use of automatic valves in these systems has been very unsatisfactory, due to the accumulation of oil and similar extraneous material on the points of the valves, causing a cessation of the flow of fluid through the cooling system. This deposit on the valves made necessary, the frequent changing and adjustment of these valves and did not provide for the uniform circulation of the fluid. Furthermore, these automatic regulators did not efficiently equalize all of the heat absorption powers of the cooling fluid, also it is frequently the case that some of the fluid reaches the compressor unit, thereby damaging the compressor unit by permitting the cold fluid to contact the piston within the compressor, cracking the piston head and offering other serious complications.

None of the devices now in use provide for the automatic equalizing of the circuit, the efficient closing of the fluid circuit, the trapping of the oil and separation of the oil from the cooling agent. We have overcome such disadvantages as will be appreciated and as will be hereinafter more fully set forth.

Referring to the drawing, we have used the numeral 10 to designate the pressure inlet of our device having one end in communication with an ordinary compressing unit. The numeral 11 designates a valve imposed in this fluid inlet, held in place by the ordinary spring 12, and actuated by a common float 13. The numeral 14 designates a chamber surrounding and enclosing the float 13 and valve assembly 11 and 12. We have used the numeral 15 to designate a pressure pipe having one end in communication with the other side of the valve 11 and its other end in communication with the lower end of an ordinary expansion or cooling coil 16 as shown in the drawing. We have used the numeral 17 to indicate the accumulator tank of our device having therein a plurality of downwardly and inwardly extending baffle elements 18. These baffle elements provide for increased travel of gases within the tank 17 for relieving these gases of their moisture content. We have used the numeral 19 to designate a plurality of bleeder elements secured to the lower edge of each of the baffle elements and extending downwardly to a point adjacent or touching the next succeeding baffle element for the purpose of drawing the accumulated moisture from the baffle elements 18 and by capillary attraction drawing the condensed fluid to the next succeeding baffle element and thence into the lower portion of the tank 17, as shown in Fig. 1 of the drawing.

The numeral 21 designates a pipe having one end in communication with the upper end of the coil 16 and its other end in communication with the accumulator tank 17. The inlet of this pipe 21 into this tank, 17, is separated from the inlet of the pipe 20 by the baffle elements 18 as shown in the drawing. Numeral 22 designates a plurality of indicators or tell-tales spaced apart and in contact with the inner portion of the chamber 17 in the usual manner. As is generally known, these tell-tales are for the purpose of gauging the level of the fluid level within the tank by the amount of frosting of the indicator elements. As the tanks are generally heavily insulated, these tell-tales are necessary for fluid

level indication. As will be noted, the lower end portion of the tank 17 slopes downwardly and inwardly toward its center and has on its lower end portion the manually operated valve 23 for draining extraneous matter such as oil or sediment from the lower end portion of the tank 17. We have used the numeral 24 to designate a conduit having one end in communication with the inside of the tank 17 at a point a distance above the bottom of the tank 17, and its other end in communication with the float chamber 14. The numeral 25 designates a manually operated valve imposed in the conduit 24. We have used the numeral 26 to designate an equalizing pipe having one end in communication with the upper portion of this housing or chamber 14 and its other end in communication with the inside of the tank 17 at a point above the entrance of the conduit 24 into the tank 17. The numeral 27 indicates a manually operated valve imposed in the equalizer pipe 26. We have used the numeral 28 to indicate a gravity flow pipe in communication between the tank 17, adjacent its lower end portion, and pressure pipe 15.

The numeral 29 indicates a one way check valve imposed in the gravity pipe 28 for allowing fluid to flow only from the tank 17.

The practical operation of our device is as follows: The pipes 10 and 20 are connected to the pressure and suction sides of an ordinary compressing unit respectively, and the cooling fluid such as ammonia is introduced into the tank 17. When the fluid level is up to the approximate position shown in the drawing, the float 13 will rise, allowing the valve 11 to close, cutting off the pressure from the line 10. The fluid will then flow from the tank 17 by gravity through the pipe 28 and into the line 15 where it will equalize in the coil 16 to a predetermined level. The lowering of the fluid level within the tank 17 allows the float 13 to drop, thereby opening the valve 11 against the pressure of the spring 12, permitting pressure from the line 10, to enter the line 15, thereby forcing the fluid through the coil 16 and through the pipe 21 back into the tank 17 where the fluid will settle to the bottom of the tank 17 and the gases will be forced to pass around the baffle 18 and thence into the suction line 20 of the compressing unit. Should moisture accumulate in the gases, this moisture content of the gas will pass out of the gases as they pass about the baffle elements 18. Ordinarily, some of the moisture in the gases will condense on the upper surface of the baffle 18 and will run down these baffles where it will bleed on to the next succeeding lower baffle by the bleeding elements 19 and thence down into the body of the fluid, which has settled to the lower portion of the tank. The rising of the fluid level in the tank, causes the float 13 to rise. Thus it will be seen that the fluid circuit is confined to that portion of the system comprising the pipe 15, the coil 16, the lower portion of the tank 17 and the gravity flow pipe 28.

The pipe 26 serves as an equalizer between the upper end of the float chamber 13 and the inner portion of the tank 17 to prevent an air pocket being formed to hamper the action of the float 13. As the cooling fluid used is lighter than oil, any oil accumulating in the system will settle to the bottom of the tank 17 and may be drained therefrom through the valve 23 at intervals. By having the float control valve actuated by the fluid level within the tank, the gravity flow of the fluid into the line 15 and lower end of the coil 16 operates the valve 11 to permit a spontaneous entrance of pressure from the line 10, forcing the cooling fluid through the coil 16 very rapidly and keeping the system operating at its highest efficiency at all times. A check valve 29 in the line 28 prevents this pressure from traveling up the gravity flow 28 into the tank 17.

The valves 25 and 27 imposed in the lines leading to the float chamber 14, can be shut off when it is desired to boil out or repair for any reason whatsoever, the chamber 14. When this float chamber is shut off by the valves 25 and 27, the pressure from the line 10 will expand into the coil 16 and be picked up by the compressor through the conduit 20. Thus we have provided a means for and method of automatically equalizing low pressure refrigerating systems that provide a self regulating system for cooling fluids, prevents fluid from entering the suction line of the compressor which is self equalizing, provides an oil trap for trapping out undesirable oil and which force-fills the cooling or expansion coil of a refrigerating unit.

Furthermore, our means and method for accumulating and equalizing low pressure cooling fluids, provides a closed circuit for the fluid, forcing the fluid through the coils by pressure and then allowing the fluid to flow back into the line from the accumulator tank before pressure is again applied to the circuit.

Obviously, our device may be used with any type of low pressure fluid refrigerating systems, either as a remote control or for use in conjunction with and adjacent the cooling units. By adjusting or building up the suction or back pressure of the pipe 20, constant regulation of the coil temperature can be maintained.

Some changes may be made in the construction and arrangement of the component parts and specific method for automatically equalizing low pressure refrigerating systems, without departing from the real spirit and purpose of our invention, and it is our intention to cover by our claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

We claim:

1. In a device of the class described, an accumulator tank, a plurality of baffle elements in said tank, a suction line in the upper end of said tank, an inlet in said accumulator tank separated from said suction line by said baffles, an expansion coil having its upper end in communication with said inlet, a float controlled valve chamber in communication with the inside of said accumulator tank, a pressure line in communication with one side of said float control valve chamber, a second pressure line having one end in communication with the other side of said float controlled valve chamber and its other end in communication with a lower portion of said expansion coil, a gravity flow pipe in communication with the lower end portion of said accumulator tank and said second mentioned pressure pipe and a check valve in said gravity flow pipe permitting flow from the tank to said second mentioned pressure line.

2. In an equalizer for refrigerating circuits having a compressor unit, a tank having its upper end in communication with the suction side of the compressor, a cooling coil having its upper end in communication with the inside of said tank, a pressure pipe in communication with the pressure side of the compressing unit, a valve in the other end of said pressure pipe, a second

pressure pipe connecting the other side of said valve to the lower portion of said coil, a float chamber in communication with said tank, a float in said chamber for actuating said valve, a gravity flow pipe connecting said tank to said second mentioned pressure pipe, and a one way valve in said gravity flow pipe permitting the flow of a liquid from said tank into said second mentioned pressure pipe at times.

3. In an equalizer for refrigerating circuits having a compressor unit, a tank having its upper end portion in communication with a suction means, a cooling coil having one of its ends in communication with the inside of said tank, a pressure pipe having one end in communication with the other end of said coil and its other end in communication with a suitable source of pressure, a valve in said pressure pipe, a return pipe between said tank and the lower side of said coil, a means for actuating said valve relative to the fluid level within said tank, a one way valve in said return pipe, a plurality of baffle elements in said tank between said suction means and the inlet from said coil into said tank, and a plurality of bleeder elements on the lower marginal edges of each of the said baffle elements.

4. In an equalizer for refrigerating circuits having a compressor unit, an accumulator tank having its upper end in communication with the suction side of the compressor, a cooling coil having its upper end in communication with the inside of said tank, a plurality of baffle plates in said tank between its upper end and the inlet forming said cooling coil, a pressure pipe in communication between the pressure side of the compressing unit and the other end of said cooling coil, a float actuated valve in said pressure pipe, a gravity flow pipe in communication between said accumulator tank and said pressure pipe and a check valve in said gravity flow pipe.

5. In an accumulating tank structure for refrigerating circuits having a compressor unit, a tank having its upper inside portion in communication with the suction side of the compressor, a cooling coil having its upper end in communication with the upper inside portion of said tank and its lower end operatively communicating with the bottom inside portion of said tank, a float control valve chamber in communication with the inside central portion of said tank, and a one-way valve for permitting the flow of a liquid from said tank into the bottom portion of said coil at times and for preventing the flow of a liquid from the lower portion of said coil into the lower portion of said tank at all times.

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