

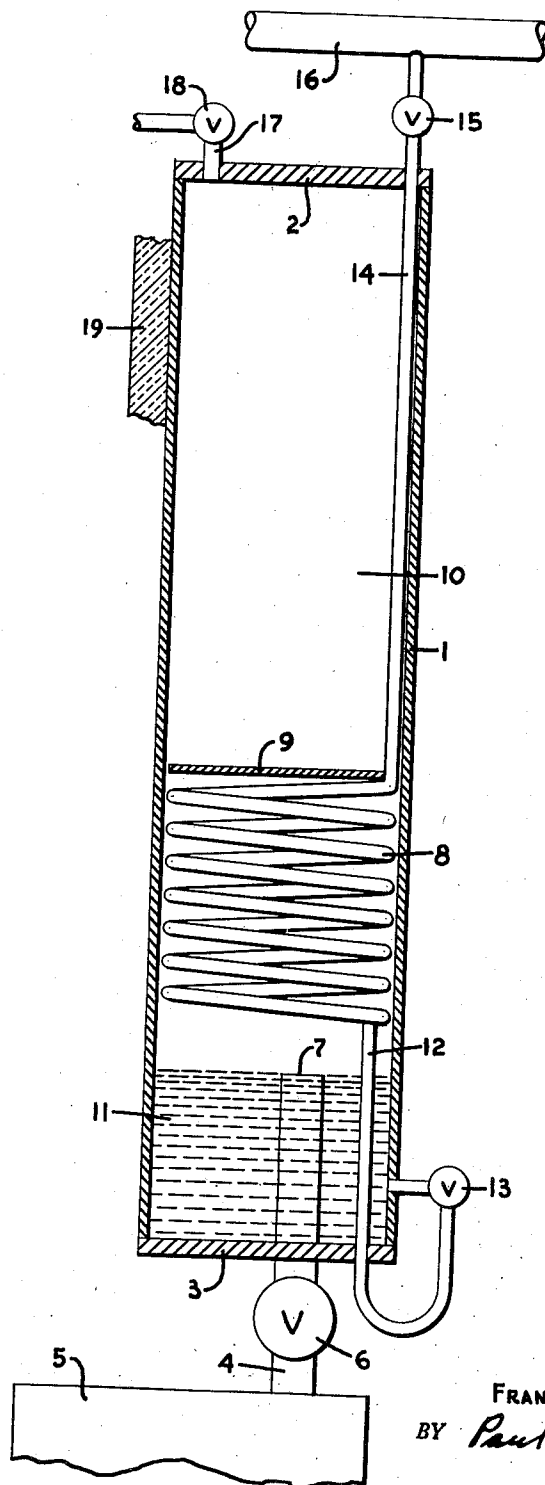
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PURGER FOR REFRIGERATION SYSTEM

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PURGER FOR REFRIGERATION SYSTEM

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1 Claim. (Cl. 62—117.85)

The present invention relates to purger for refrigeration system, and in more particular to a device for purging non-condensable gases from a refrigeration system, those gases which condense at much higher temperatures than the refrigerant gas used in the system. Such non-condensable gases are usually those constituent of air but may contain dissociation products of the refrigerant gas as well as water and oil vapors.

There have been many and various processes and apparatuses used in removing, purging, these non-condensable gases from a refrigeration system. The present invention is an improvement on those purging devices which employ a refrigerated surface within a container into which is introduced a mixture of refrigerant vapor and non-condensable gases. The refrigerated surface condenses a great amount of the refrigerant, and the remaining mixture is allowed to escape to the atmosphere.

These prior systems have required much piping and equipment, and have not always been efficient in operation. Further, they have required much of an operator's time for their use.

Having in mind these defects of the prior art, it is an object of the present invention to devise and perform a purge process that has but few steps and lends itself to use in apparatus which is simple and efficient in operation.

A further object of the present invention is the processing of refrigerant vapor containing non-condensable gases, in a manner so that the heat of evaporation of such refrigerant will be used to effect the separation of such vapor and gases.

A further object of the present invention is the construction of a purging device employing only two pipe connections to the refrigeration system.

Another object of the present invention is the construction of a purge device that may be regulated for operation so as to require a minimum of an operator's attention.

The above mentioned defects of the prior art and others are remedied, and these objects achieved in the device hereinafter described and shown in the accompanying drawings, in which:

The drawing shows an elevational sectional view partly in section of a device embodying the present invention and parts of the refrigeration system with which it may be connected.

The principal part of the device shown in the drawing is an upright cylindrical shell 1. This shell may vary in diameter and length with the capacity of the system in which it is to be used and with the conditions of the system that determine the rate at which the amount of unremoved non-condensable gases must be removed therefrom. Also, the amount of unremoved non-condensable gases to be tolerated in the system may have a bearing on the size. A shell three feet long and one-half foot in diameter, inside, will be ample for most systems between 100 and 250 tons of refrigeration capacity. Heads 2, 3 are secured to and close the ends of the shell. Passing thru the bottom end 3 is a receiver connection

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pipe 4 that provides communication between the shell and the top of a receiver 5 such as is usually found in a refrigeration system.

The receiver is the place in a system that non-condensable gases usually collect. If in a particular system they collect at another place, then the purger may be connected to such place also. A shut-off valve 6 may be placed in the receiver connection pipe 4, but this connection should not be trapped. The receiver connection pipe extends into the purger shell 1 a distance of about five inches. Above and adjacent the upper end, the purger inlet 7, of the receiver connection pipe 4 is placed a helical coil 8 or other heat exchanging means. This coil extends upwardly to about the middle of the shell, and above the coil is placed a baffle 9 that divides the shell into a lower part, the condensing and liquid sections, and the upper part, the non-condensable gas section 10. The liquid section 11 is that part of the inside of the shell which lies below the upper end of the receiver connection pipe, the shell inlet 7. The inlet 12 for the coil 8 opens into the liquid section 11 of the shell below the purger inlet 7 and slightly above the bottom 3. Placed in the inlet section of the coil is an expansion or needle valve 13. The outlet 14 for the coil 8 extends upwardly from the coil, past the baffle 9, and thru the top head 2. Exterior of the shell and in the coil outlet is placed a coil shut-off valve 15. The coil outlet 14 is connected to some part of the low pressure side of the system such as the suction line 16. Placed in the top head 2 is a non-condensable gases outlet pipe 17 having therein a purge or needle valve 18. This outlet communicates with the atmosphere or as otherwise desired. The exterior of the shell should be insulated 19 for the best performance.

In the operation of this device, non-condensable gases and refrigerant vapor collect in the top of the receiver 5 and pass upward thru the connection pipe 4, thru the purger inlet to the coil section, and thence into contact with the coil 8. The refrigerant is condensed on the coil and falls into the liquid section 11 from which it is drawn off thru the coil inlet, and expanded thru the expansion or needle valve 13. Expansion of the refrigerant into the coil 8 furnishes the refrigeration to condense the refrigerant in contact with the exterior of the coil. From the coil the expanded refrigerant passes to the low side of the system thru the coil outlet 14 and suction line 16. In the shell the condensed refrigerant collects in the liquid section 11 until it reaches the purge inlet 7 at which time the excess over that required for the coil, returns to the receiver 5. The non-condensable gases pass upwardly thru the coil, past the baffle 9, thru the non-condensable gases section 10, and out of the shell thru the purge outlet pipe 17 and valve 18, and, thus, out of the system. Proper design in the coil area and operation in the passage of sufficient refrigerant thru the coil will cause the refrigerant to be separated from the non-condensable gases. The baffle 9 reduces turbulence and by-passing of the coil which might result in refrigerant vapor being carried to the outlet. Installation of the shell reduces re-evaporation of the refrigerant and increases the efficiency of the device.

The purger requires only two connections to the refrigeration system and is otherwise simple in design and operation. After the expansion valve 13 is properly adjusted and the purge valve 7 regulated, the device will operate without attention. If the system has but negligible air leaks and refrigerant dissociation, the purger may be operated intermittently. In such a condition, the expansion valve 13 may be left open at all times and the purge valve 18 opened only occasionally.

Having thus described my process and a preferred device for use in the performance of such process, I claim:

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In a refrigeration system, a purger, comprising: a tubular shell having a height at least four times its width, and top and bottom end closures for said shell, an inlet pipe adapted to communicate with the receiver of such system and said shell and to extend into the interior of said shell above said bottom a distance substantially the width of said shell, the portion of said shell below said communication opening forming a condensate trap and said pipe acting as a supply line for the flow of a mixture of non-condensable gases and refrigerant vapors from said receiver, and acting as an overflow for said trap for the flow to said receiver of condensate counter to such mixture, a heat exchange coil in said shell above said inlet pipe, said coil having an inlet in communication with the interior of said shell below the top of said inlet pipe,

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an expansion valve in said heat exchange coil adjacent said inlet, said coil lying below the half height of said shell, a baffle above and adjacent said coil, the outlet of said coil adapted to be in communication with the low pressure side of said system, and a purge valve and line connected to and in communication with said shell thru the top of said shell.

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