

May 21, 1946.

J. R. ZWICKL

2,400,620

PURGING SYSTEM FOR REFRIGERATING SYSTEMS

Filed Jan. 18, 1945

5 Sheets-Sheet 1

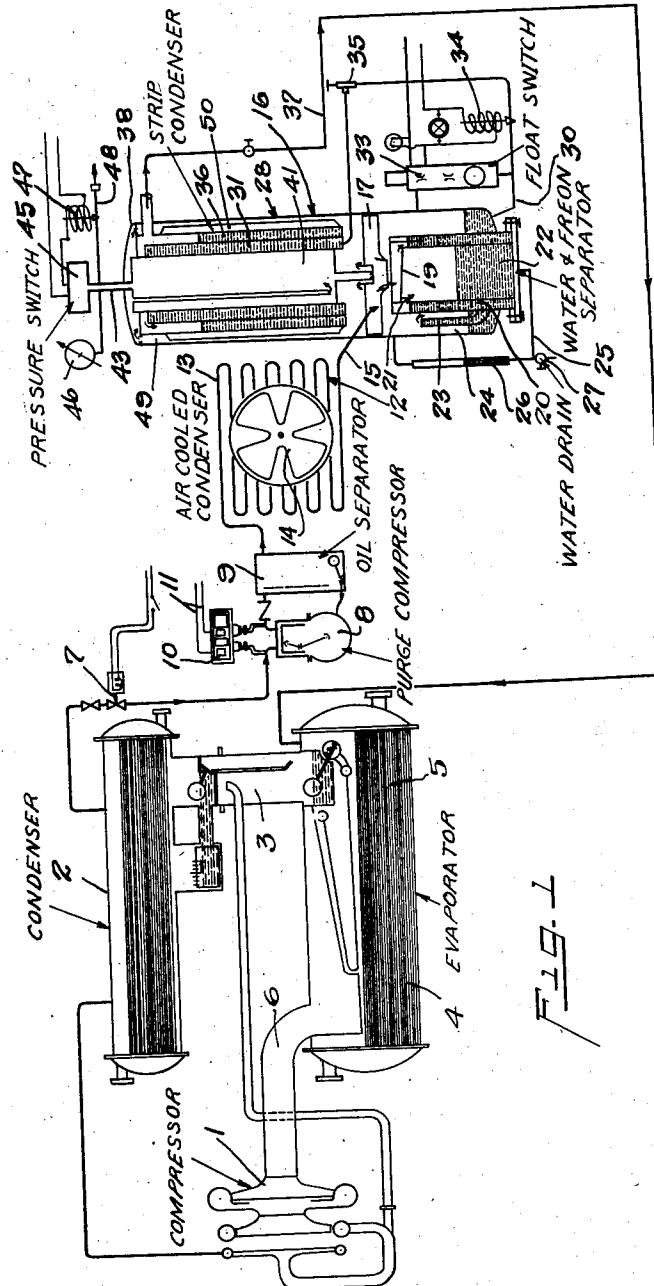


FIG. 1

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5 Sheets-Sheet 2

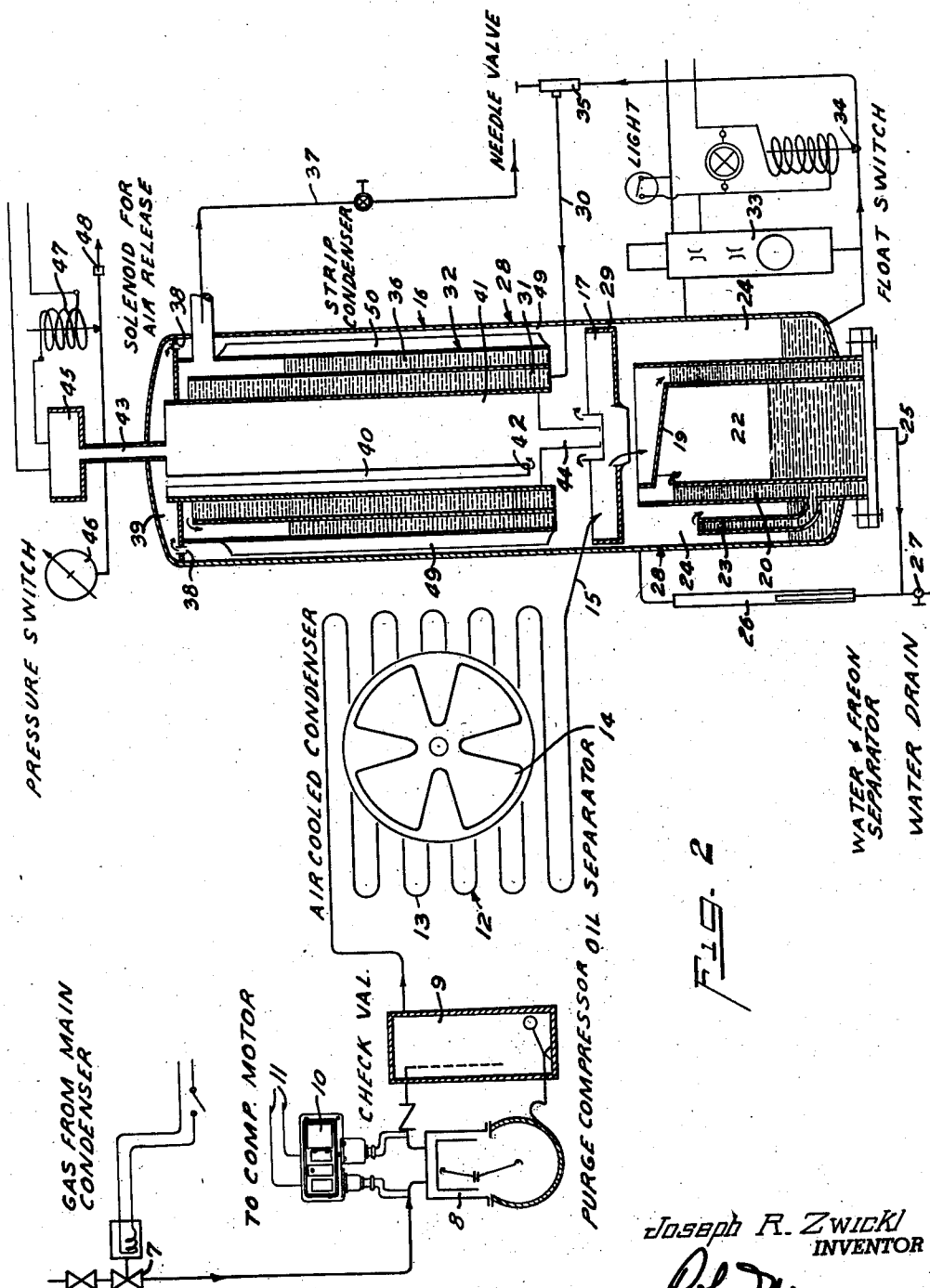


FIG. 2

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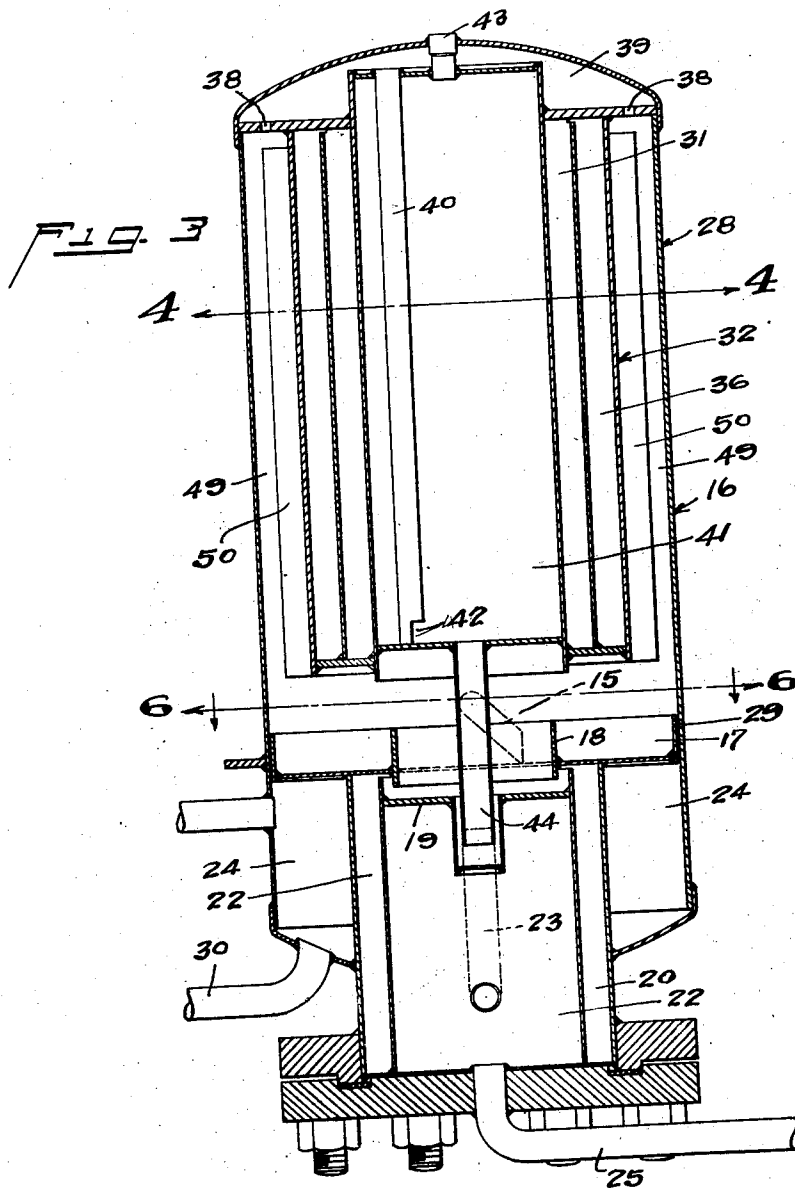
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PURGING SYSTEM FOR REFRIGERATING SYSTEMS

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5 Sheets-Sheet 3



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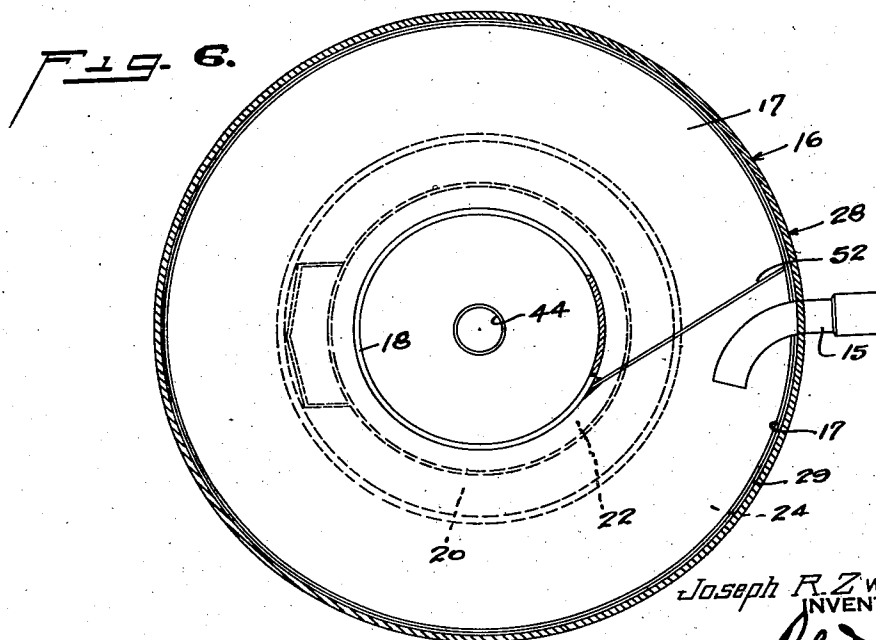
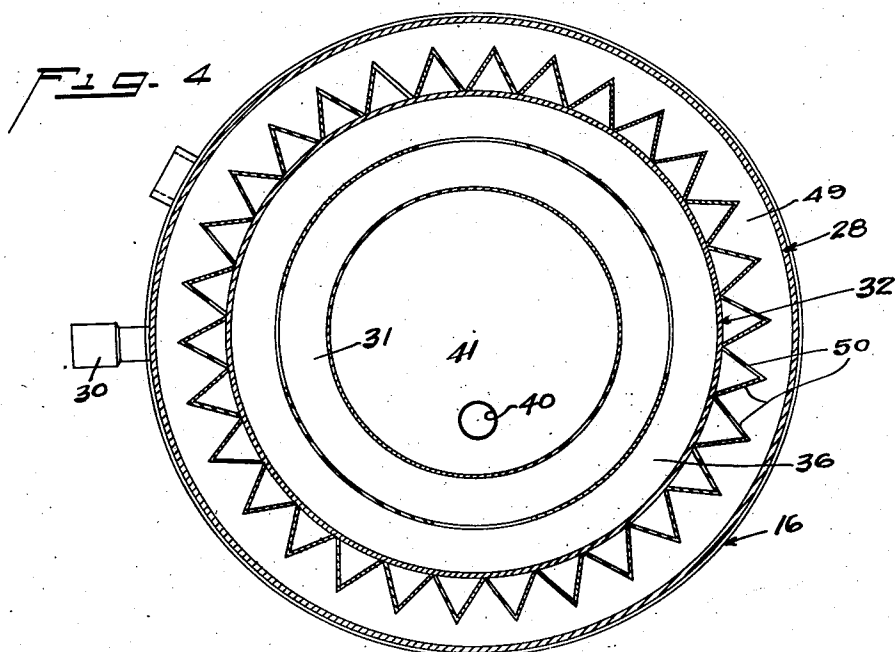
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PURGING SYSTEM FOR REFRIGERATING SYSTEMS

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5 Sheets-Sheet 4



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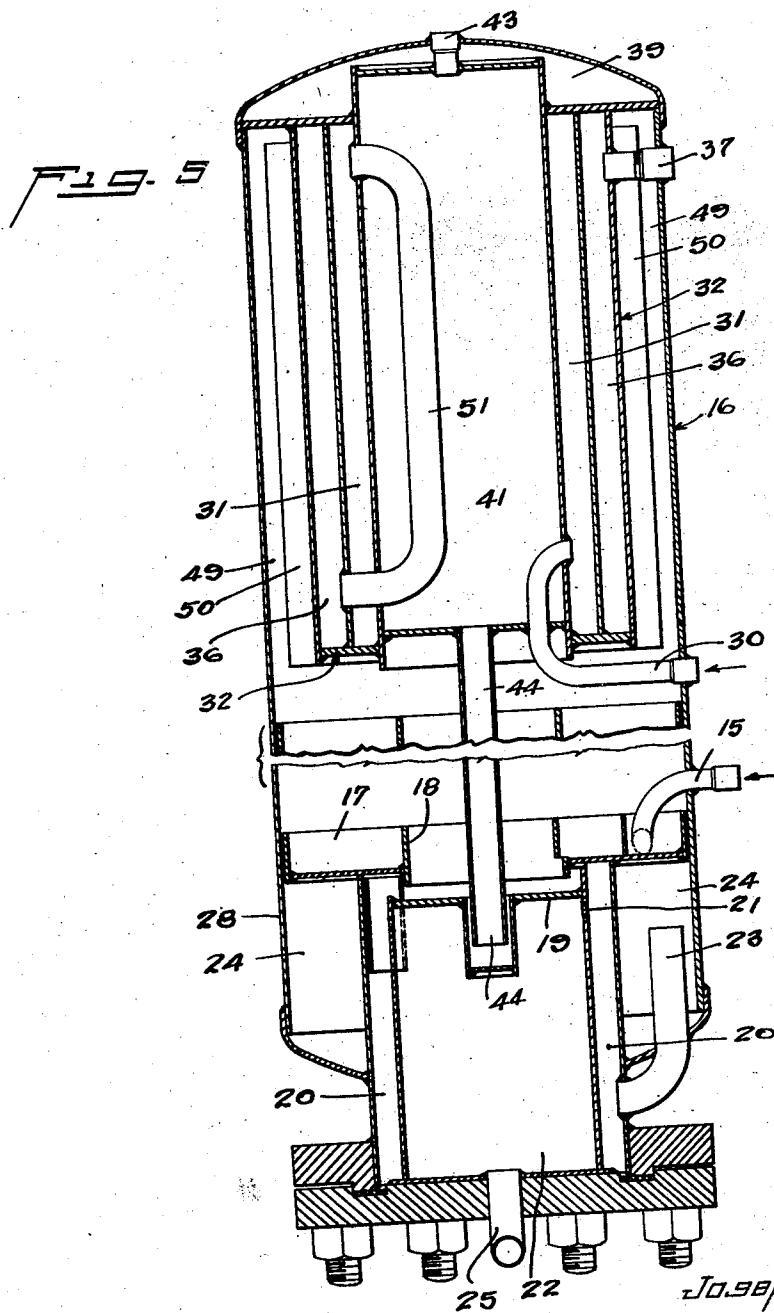
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PURGING SYSTEM FOR REFRIGERATING SYSTEMS

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,400,620

PURGING SYSTEM FOR REFRIGERATING SYSTEMS

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Application January 18, 1945, Serial No. 573,388

23 Claims. (Cl. 62-115)

This invention relates to refrigeration, and more particularly to purging systems and apparatus for use in refrigerating systems.

The present invention is particularly adapted for use in closed refrigeration systems wherein a refrigerant, such as those of the Freon class, is circulated through a closed system embodying an evaporator or cooler, a compressor and a condenser. If such systems operate below atmospheric pressure, they are subject to in-leakage of air with its contained water vapor which causes pollution or fouling of the refrigerant. Such pollution or fouling of the refrigerant interferes with the effectiveness of the system, and hence it is desirable, even necessary, to remove these polluting agents from the refrigerant in the system and maintain the refrigerant in as great a degree of purity as is possible so as to insure maximum effectiveness of the operation of the system.

The present invention comprehends a purge system for use in such closed refrigerating systems, including, first, means for separating from the refrigerant the oil that is picked up by the refrigerant as it passes through the compressor of the purger. It includes further preliminary and final strip means for separating practically all the condensible refrigerant vapor from the non-condensable air and foul gases. Finally, it includes means for separating the water from the liquified refrigerant. Automatic means are provided for allowing or permitting the escape of the non-condensable gases at a predetermined pressure which is maintained practically uniform in the whole purge system after the compressor.

With these and other objects in view, as may appear from the accompanying specification, the invention consists of various features of construction and combination of parts, which will be first described in connection with the accompanying drawings, showing a purging system for refrigerating systems of a preferred form embodying the invention, and the features forming the invention will be specifically pointed out in the claims.

In the drawings:

Figure 1 is a diagrammatic view partly in section of a refrigerating system embodying the improved purge system.

Figure 2 is an enlarged diagrammatic view of the improved purge system.

Figure 3 is a vertical section through the preliminary and final strip condenser of the purge system.

Figure 4 is a cross section on the line 4-4 of Figure 3.

Figure 5 is a fragmentary vertical section through the preliminary and final strip condenser taken at right angles to the section shown in Figure 3.

Figure 6 is a cross section taken on the line 6-6 of Figure 3.

Referring more particularly to the drawings, the purge system is shown in a refrigeration system which comprises a centrifugal compressor 1 which raises the pressure of the vaporized refrigerant so high that it will liquify in the condenser 2. The condensed refrigerant passes through an inter-stage flash chamber 3 into the evaporator or cooler 4 where the liquid refrigerant is evaporated in cooling the fluid to be cooled which flows through the tubes, indicated at 5 of the evaporator; the refrigerant vaporized in the evaporator or cooler 4 passes to the suction inlet of the compressor 1 through a suitable connection 6.

The type of flash-chamber shown at 3 is the subject matter of my prior Patent No. 2,274,391, dated February 24, 1942, and the system just described is the usual type of closed refrigeration system. While in Figure 1 the system is shown as embodying a centrifugal compressor, it is to be understood that the invention is not to be limited to a system embodying a centrifugal compressor or the particular type of flash chamber shown, but may be used with other types of compressor and with or without an inter-strip flash chamber without departing from the spirit of the present invention.

In such closed refrigerating systems, various polluting agents, such as air with its contained water vapor and other foul gases, picked up by the refrigerant during its circulation through the system, etc., can pollute the refrigerant, and unless they are removed will, in time, seriously interfere with the effectiveness of operation of the system. The present invention relates to an auxiliary system for removing such polluting agents, purifying the liquid refrigerant and returning the purified liquid refrigerant to the system.

Refrigerant vapor containing air, water vapor and other foul gases that may exist in the system is drawn from the condenser 2 through a solenoid operated valve 7 by the purge compressor 8, which compresses this vapor-gas mixture and discharges it in compressed state through an oil separator 9 which removes any oil which may have been picked up by these vapors and gases during their passage through the compressor 8. The oil separator 9 is of any approved construction which may be purchased upon the open market. Operation of the compressor 8 is controlled by a

pressure actuated switch structure 10 of any approved construction which may be purchased upon the open market. The pressure actuated switch structure 10 is connected to the inlet and discharge lines of the compressor 8, as clearly shown in Figures 1 and 2 of the drawings, and it is connected by suitable wiring indicated at 11 with the operating motor (not shown) of the purge compressor 8 so that the purge compressor 8 will operate only when the pressure in the inlet line to and outlet line from the compressor is within predetermined limits. The oil which is separated from the vapors and gases in the oil separator 9 is returned to the purge compressor 8 for re-use.

From the purge compressor 8 the Freon vapor containing air, water vapor, and other foul gases is passed through a condenser 12 which is shown in the drawings as an air cooled condenser comprising a series of coils 13 through which the Freon vapor, etc., passes and which are cooled by a fan 14. It is to be understood, however, that the present invention is not limited to the use of an air cooled condenser at this point but any suitable type of condenser may be employed without departing from the spirit of the present invention.

In the air cooled condenser, the Freon vapor and the water vapor are condensed, and this condensate together with the non-condensable gases passes through a suitable connection or piping indicated at 15 into the separator drum or preliminary means of the final strip condenser structure 16.

The separator drum 16 is divided substantially into lower and upper halves; the lower half contains the functional elements for separating out the water from the Freon condensate; whereas, the separating of the non-condensable gases is done in the upper half which contains the preliminary and final strip condenser which completes the removal of any condensibles such as Freon and water vapor from the non-condensable gases as they slowly drift along the cold surfaces of the preliminary and final strip condenser toward the venting outlet 43.

The condensate and the non-condensable gases from the condenser 12 pass through the connection 15 into the flash pan 17, and when the pan 17 becomes filled with liquid it spills over the annular partition 18 upon the guide plate 19 from which it descends into the annular separation compartment 20 where the Freon liquid, being heavier than the water, settles, while the water rises to the top and overflows through a suitable outlet 21 into the central water compartment 22 and the liquid Freon passes through a stand pipe 23 into the annular liquid Freon-containing chamber 24. Under normal operating conditions, the annular separating chamber 20 is full of liquid so that any additional liquid Freon flowing therein causes an overflow of liquid Freon into the outer space 24; whereas, any water falling into the annular chamber 20 causes an overflow of water into the inner space 22.

A drain pipe 25 is connected to the bottom of the central water-containing compartment 22, and a sight glass 26 is connected to this drain pipe 25 to indicate whether any water has collected in the space 22. The valve 27 serves to drain any water from this central space.

The flash pan 17 serves also as the element for the separation of the non-condensable gases from the liquid; these non-condensable gases rise from the lower separating section into the upper

strip condenser section of the separator drum 16.

The Freon-containing compartment 24 is intermittently emptied through an outlet pipe connection 30 into the inner annular compartment 31 of a substantially drum-shaped container structure 32 which is placed within the shell 28 of the structure 16. A float switch structure 33 of any approved type, which may be purchased upon the open market, is connected in the outlet pipe 30, and this float switch 33 controls the electrical energizing of a solenoid valve 34 of any approved construction, which may be purchased upon the open market, and which is also connected in the outlet pipe 30. Finally, a manually adjustable needle valve 35 is positioned in the outlet line 30, and this needle valve acts as an expansion means. The needle valve 35 serves to regulate the time interval required to empty the liquid refrigerant containing chamber 24 so as to maintain a fairly even flow of the expanded cold liquid refrigerant through the strip condenser.

The inner annular liquid refrigerant receiving chamber 31 is connected, as will be hereinafter more fully set out, with the evaporator 4 of the refrigerating system, and is, therefore, at substantially the same temperature as that prevailing in the evaporator 4, and as a consequence its cold surface provides the refrigeration required for the final condensation of any Freon vapor that is carried along by the non-condensable gases.

The liquid Freon overflows from the inner annular chamber 31 into an outer annular chamber 36 from which it passes through a suitable connection 37 into the evaporator 4 and thus back into the refrigeration system.

The non-condensable gases as they rise from the flash pan 17 and drift toward the venting outlet 43 carry along Freon and water vapor. On their way they come into intimate contact with the cold surface of the outlet (preliminary) strip condenser which takes out the greater part of the condensibles. What vapor is still left passes with the non-condensibles through a plurality of orifices 38 into the space 39 formed in the top of the shell 28 by the top cover of the shell and the top of the drum 32. From the space 39, the non-condensibles together with any still un-condensed refrigerant vapor pass downwardly through a suitable pipe 40 into the bottom of the innermost chamber 41 formed in the drum structure 32. This innermost chamber 41 is the final strip condenser; all of its wall is continuously surrounded by cold liquid refrigerant so that any left-over refrigerant vapor which passes into this inner chamber 41 will be condensed out from the foul or non-condensable gases as they move slowly from the inlet 42 at or near the bottom of the chamber 41 to the vent 43 at the top of the chamber. The vertical narrow form of the chamber 41 facilitates stratification of the non-condensable gas weight to the refrigerant vapor weight. The condensate from the chamber 41 flows through a suitable liquid seal structure 44 into the annular separating chamber 20 and joins with the liquid refrigerant flowing into the liquid refrigerant chamber 24.

Under normal operating conditions the separator drum 16, that is, both its lower section and its upper strip condenser section, is filled with a mixture of non-condensable gases, refrigerant vapor, and water vapor. The total pressure of this gas mixture is fixed by the setting of a pressure switch 45 which is connected to the vent 43. The pressure switch 45 may be of any

approved type of pressure switch, which may be purchased upon the open market, and it may have a pressure indicator 46 connected therewith to permit visual determination of the pressure in the vent 43 and consequently the pressure within the shell 28. The pressure switch 45 controls the energizing of a solenoid actuated valve 47 which controls the flow of the non-condensable gases from the chamber 41 to the final outlet 48. The pressure switch 45 is set to maintain the pressure inside the shell 28 within narrow limits; furthermore, the venting from the chamber 41 is done through a small orifice in 48 as slowly as possible in order to avoid any turbulence in the strip condenser section of the structure 13 which might upset any possible gas stratification in the chamber 41.

Since not much condensation is carried on in the final strip condenser, that is, since only a small quantity of refrigerant vapor passes into the chamber 41, not much of the liquid refrigerant in the chamber 31 will vaporize, thus the greater part of the cold liquid refrigerant will overflow into the outer annular compartment 36 and supply through its outer wall refrigeration for the preliminary stripping action, that is, the refrigerant in the outer annular chamber 36 will, owing to its low temperature, cause preliminary condensation of almost all the refrigerant vapor or water vapor passing upwardly through the annular space 49 surrounding the drum 32, to the orifices 38 and thus into the space 39. Such refrigerant and water vapors as are condensed during their passage through this annular space 49 fall downwardly into the collecting pan 17 and thence into the separating section of the structure 16. To facilitate the condensing of refrigerant and water vapors passing upwardly through the space 49, the outer surface of the drum 32 has a plurality of longitudinal fins 50 attached to it. The fins not only promote or increase the heat transfer and the condensing action but also stiffen the outer surface of the drum 32 against collapsing, since the pressure inside the drum is relatively low in comparison to the pressure outside of the drum. The liquid refrigerant passes from the inner annular chamber 31 to the outer annular chamber 36 through a suitable connection 51, clearly shown in Figure 5 of the drawings, so that it passes from a point near the top of the annular chamber 31 into the annular chamber 36 at a point near its bottom.

If it is so desired, a partition 52 may be placed in the pan 17 so as to cause the incoming fluids to pass completely around the pan instead of having a short-circuited flow therein.

It will be understood that the invention is not to be limited to the specific construction or arrangement of parts shown, but that they may be widely modified within the invention defined by the claims.

What is claimed is:

1. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting condensibles including a separator, means connecting said separator to said condenser to deliver mixed refrigerant and water vapor and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and water, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, and a connection

between said separator and strip condenser for delivering the separated refrigerant condensate from the separator to the strip condenser.

2. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting condensibles including a separator, means connecting said separator to said condenser to deliver mixed refrigerant and water vapor and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and water, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, and pressure actuated means for controlling the discharge of non-condensable gases from the strip condenser.

3. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting condensibles including a separator, means connecting said separator to said condenser to deliver mixed refrigerant and water vapor and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and water, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, said separator and strip condenser connected in a closed circuit, and a pressure actuated means for regulating the pressure within the separator and strip condenser and controlling the discharge of non-condensable gases from the strip condenser and consequently regulating the flow of vapor from the separator into and through the strip condenser.

4. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting condensibles including a separator, means connecting said separator to said condenser to deliver mixed refrigerant and water vapor and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and water, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, pressure actuated means for controlling the discharge of non-condensable gases from the strip condenser, and a connection between said separator and strip condenser for delivering the separated out refrigerant condensate from the separator to the strip condenser.

5. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting condensibles including a separator, means connecting said separator to said condenser to deliver mixed refrigerant and water vapor and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and water, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, said separator and strip condenser connection in a closed circuit, a pressure actuated means for regulating the pressure within the

separator and strip condenser and controlling the discharge of non-condensable gases from the strip condenser and consequently regulating the flow of vapor from the separator into and through the strip condenser, and a connection between said separator and strip condenser for delivering the separated out refrigerant condensate from the separator to the strip condenser, said separated out refrigerant condensate acting as a cooling medium to condense condensable vapors in the strip condenser.

6. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting liquids including a purge compressor connected to said condenser for withdrawing mixed refrigerant and water vapor and non-condensable gases from the condenser, a separator, means connecting said separator and purge compressor, means in said separator for separating condensed refrigerant and water, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, and a connection between said separator and strip condenser for delivering the separated out condensate from the separator to the strip condenser.

7. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting liquid including a purge compressor connected to said condenser for withdrawing mixed refrigerant and water vapor and non-condensable gases from the condenser, a second condenser for receiving the vapor and gases from said purge compressor, a separator, means connecting said separator and said second condenser for delivering mixed condensed refrigerant and water vapors and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and condensed water vapor and separating non-condensibles and uncondensed refrigerant and water vapor from the condensed refrigerant and condensed water vapor, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, and a connection between said separator and strip condenser for delivering the separated out refrigerant condensate from the separator to the strip condenser where it acts as a refrigerating medium to condense the non-condensed refrigerant and water vapor.

8. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensable and polluting liquid including a purge compressor connected to said condenser for withdrawing mixed refrigerant and water vapor and non-condensable gases from the condenser, a second condenser for receiving the vapor and gases from said purge compressor, a separator, means connecting said separator and said second condenser for delivering mixed condensed refrigerant and water vapors and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and condensed water vapor and separating non-condensibles, and uncondensed refrigerant and water vapor from the condensed refrigerant and condensed water vapor, a strip condenser

having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, a connection between said separator and strip condenser for delivering the separated out refrigerant condensate from the separator to the strip condenser where it acts as a refrigerating medium to condense the non-condensed refrigerant and water vapor, said separator and strip condenser connected in a closed circuit, and pressure actuated means for controlling the pressure within the strip condenser and separator and for controlling the discharge of non-condensable gases from the strip condenser.

9. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting liquid including a purge compressor connected to said condenser for withdrawing mixed refrigerant and water vapor and non-condensable gases from the condenser, a second condenser for receiving the vapor and gases from said purge compressor, a separator, means connecting said separator and said second condenser for delivering mixed condensed refrigerant and water vapors and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and condensed water vapor and separating non-condensibles and uncondensed refrigerant and water vapor from the condensed refrigerant and condensed water vapor, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, a connection between said separator and strip condenser for delivering the separated out refrigerant condensate from the separator to the strip condenser where it acts as a refrigerating medium to condense the non-condensed refrigerant and water vapor, said separator and strip condenser connected in a closed circuit, pressure actuated means for controlling the pressure within the strip condenser and separator and for controlling the discharge of non-condensable gases from the strip condenser, and means operated by variance of the level of separated-out condensed refrigerant in the separator for controlling delivery of the condensed refrigerant to said strip condenser.

10. In a refrigerating system containing a volatile refrigerant and including a condenser and an evaporator, means for purging the refrigerant system of non-condensibles and polluting condensibles including a separator, means connecting said separator to said condenser to deliver mixed refrigerant and water vapor and non-condensable gases to said separator, means in said separator for separating condensed refrigerant and water vapor, a strip condenser having communication with said separator and receiving non-condensed refrigerant and water vapor together with non-condensable gases from said separator, a connection between said separator and strip condenser for delivering the separated refrigerant condensate from the separator to the strip condenser, and means operated by the variance of the level of separated-out condensed refrigerant in the separator for controlling the delivery of the condensed refrigerant to said strip condenser.

11. In a refrigerating system containing a condenser and an evaporator and a compressor through which a volatile refrigerant is circulated the method of purging the circulating system of

impurities which comprises, withdrawing non-condensed vapors and non-condensable gases from the condenser, compressing the withdrawn vapor and gases, partially condensing the vapors, separating from the condensed vapors the condensed refrigerant and condensed water vapors, passing the non-condensed vapors and non-condensable gases through a final stage of strip condensation, removing the non-condensable gases, and returning the condensed refrigerant to the system.

12. In a refrigerating system containing a condenser and an evaporator and a compressor through which a volatile refrigerant is circulated the method of purging the circulating system of impurities which comprises, withdrawing non-condensed vapors and non-condensable gases from the condenser, compressing the withdrawn vapor and gases, partially condensing the vapors, separating from the condensed vapors the condensed refrigerant and condensed water vapors, passing the non-condensed vapors and non-condensable gases through a final stage of strip condensation, utilizing the separated out refrigerant from the separating stage as a coolant to condense the condensable vapors in the final strip condensing stage.

13. In a refrigerating system containing a condenser and an evaporator and a compressor through which a volatile refrigerant is circulated the method of purging the circulating system of impurities which comprises, withdrawing non-condensed vapors and non-condensable gases from the condenser, compressing the withdrawn vapor and gases, partially condensing the vapors, separating from the condensed vapors the condensed refrigerant and condensed water vapors, passing the non-condensed vapors and non-condensable gases through a final stage of strip condensation, removing the non-condensable gases, and controlling the rate of vapor flow to the final strip condensing stage by the rate of release of non-condensable gases from the strip condenser and returning the condensed refrigerant to the system.

14. In a refrigerating system containing a condenser and an evaporator and a compressor through which a volatile refrigerant is circulated the method of purging the circulating system of impurities which comprises, withdrawing non-condensed vapors and non-condensable gases from the condenser, compressing the withdrawn vapor and gases, partially condensing the vapors, separating from the condensed vapors the condensed refrigerant and condensed water vapors, passing the non-condensed vapors and non-condensable gases through a final stage of strip condensation, removing the non-condensable gases, controlling the rate of vapor flow to the final strip condensing stage by the rate of release of non-condensable gases from the strip condenser and returning the condensed refrigerant to the system, and utilizing the separated out refrigerant from the separating stage as a coolant to condense the condensable vapors in the final strip condensing stage.

15. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a separator embodying means for separating water and liquid refrigerant, a strip condenser having a condensing space and a cooling space, means for delivering refrigerant vapor and non-condensable gases from said separator to the condensing space in said strip condenser, and

means for delivering liquid refrigerant from said separator to the cooling space in said strip condenser.

16. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a separator embodying means for separating water and liquid refrigerant, a strip condenser having a condensing space and a cooling space, means for delivering refrigerant vapor and non-condensable gases from said separator to the condensing space in said strip condenser, means for delivering liquid refrigerant from said separator to the cooling space in said strip condenser, and pressure actuated means for controlling the discharge of non-condensable gases from said strip condenser.

17. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a separator embodying means for separating water and liquid refrigerant, a strip condenser having a condensing space and a cooling space, means for delivering refrigerant vapor and non-condensable gases from said separator to the condensing space in said strip condenser, means for delivering liquid refrigerant from said separator to the cooling space in said strip condenser, and means for returning condensate from the strip condenser to said separator.

18. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a separator embodying means for separating water and liquid refrigerant, a strip condenser having a condensing space and a cooling space, means for delivering refrigerant vapor and non-condensable gases from said separator to the condensing space in said strip condenser, means for delivering liquid refrigerant from said separator to the cooling space in said strip condenser, and float actuated means for controlling the delivery of liquid refrigerant from said separator to the cooling space in said strip condenser.

19. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a separator embodying means for separating water and liquid refrigerant, a strip condenser having a condensing space and a cooling space, means for delivering refrigerant vapor and non-condensable gases from said separator to the condensing space in said strip condenser, means for delivering liquid refrigerant from said separator to the cooling space in said strip condenser, pressure actuated means for controlling the discharge of non-condensable gases from said strip condenser, and means for returning condensate from the strip condenser to said separator.

20. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a separator embodying means for separating water and liquid refrigerant, a strip condenser having a condensing space and a cooling space, means for delivering refrigerant vapor and non-condensable gases from said separator to the condensing space in said strip condenser, means for delivering liquid refrigerant from said separator to the cooling space in said strip condenser, pressure actuated means for controlling the discharge of non-condensable gases from said strip condenser, and float actuated means for controlling the delivery of liquid refrigerant from said

separator to the cooling space in said strip condenser.

21. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a shell, a separator in the bottom of said shell embodying means for separating water and liquid refrigerant, a strip condenser in the upper portion of said shell and open to the separator to receive vapor and non-condensable gases from the separator, means in said condenser forming a space for the circulation of a condensing medium through the condenser, and means connecting said separator and condensing medium circulating space for delivering liquid refrigerant from the separator to the condensing medium circulating space.

22. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a shell, a separator in the bottom of said shell embodying means for separating water and liquid refrigerant, a strip condenser in the upper portion of said shell and open to the separator to receive vapor and non-condensable gases from the separator, means in said condenser forming a space for the circulation of a condensing me-

dium through the condenser, means connecting said separator and condensing medium circulating space for delivering liquid refrigerant from the separator to the condensing medium circulating space, and means actuated by variance of the level of liquid refrigerant in the separator for controlling the delivery of liquid refrigerant from the separator to the condenser.

23. In a refrigerating system, a combined separator and strip condenser for removing water and non-condensable gases from the system including a shell, a separator in the bottom of said shell embodying means for separating water and liquid refrigerant, a strip condenser in the upper portion of said shell and open to the separator to receive vapor and non-condensable gases from the separator, a partition in said condenser forming a space for the circulation of the condensing medium through the condenser, means connecting said separator and condensing medium circulating space for delivering liquid refrigerant from the separator to the condensing medium circulating space, and radiating fins formed on said partition to strengthen the partition and increase the heat transfer from the condensing medium to the vapors in the vapor space.

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