

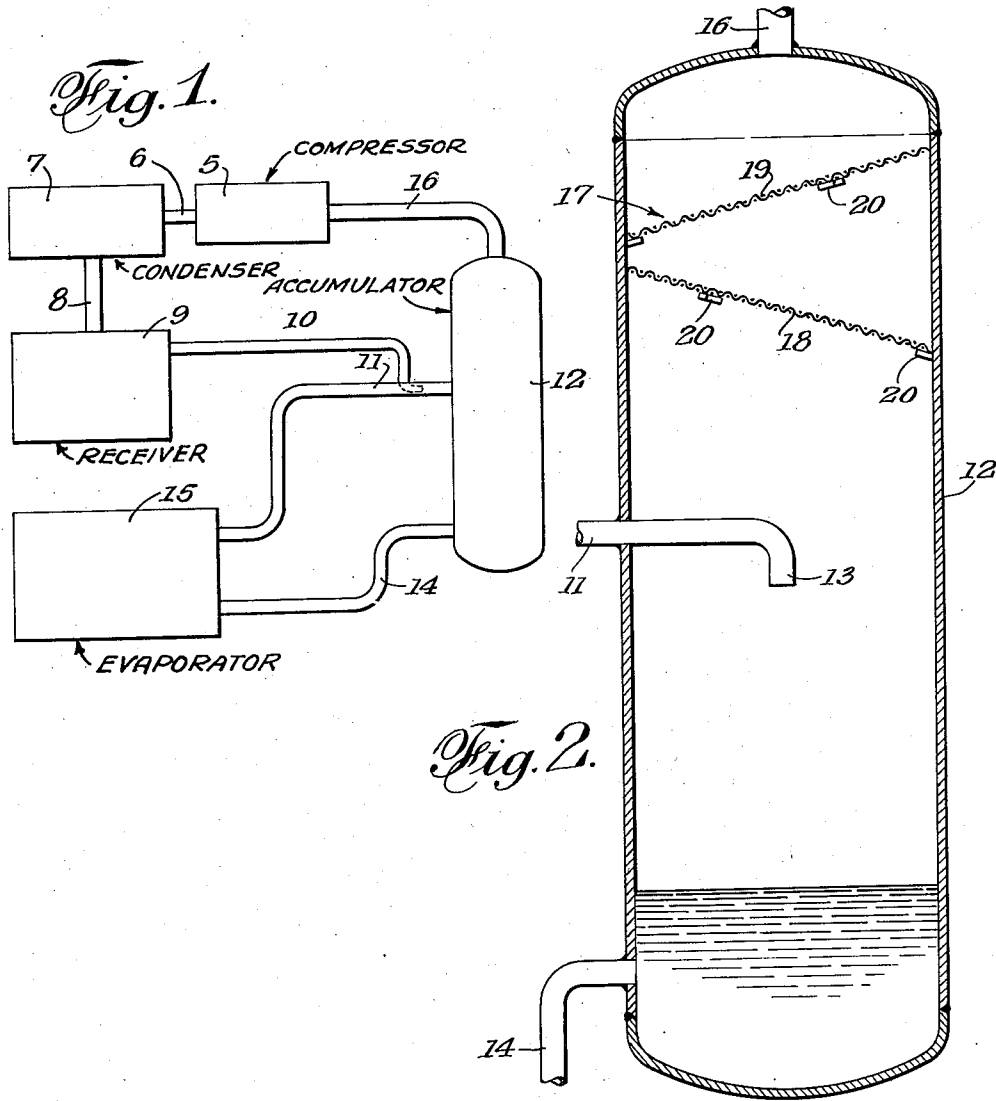
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MEANS FOR INTERCEPTING LIQUID REFRIGERANT

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MEANS FOR INTERCEPTING LIQUID REFRIGERANT

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This invention relates to means for the disintegration, interception, and recirculation to the evaporator of a refrigerating system of such liquid that is in the form of globules carried in the stream of vaporized refrigerant moving to the compressor of said system.

The compressor of a conventional refrigerating system receives vaporized refrigerant, as, for instance, ammonia, compresses the same and forces said refrigerant to a condenser where it is cooled and returned as a liquid to an evaporator where heat exchange again vaporizes the refrigerant, whence it passes to an accumulator. The refrigerant used is usually a powerful solvent that is capable of dissolving oil. Since conventional compressors embody moving parts that are oiled or otherwise lubricated, it is undesirable to pass liquid refrigerant therethrough with a consequent removal of lubricant and resultant galling of the compressor mechanism. However, the refrigerant when gasified, does not dissolve or otherwise attack the lubricant. In conventional systems, the vaporized refrigerant travels at high velocities, and tends to carry with it globules of liquid refrigerant to the compressor.

An object of the present invention, therefore, is to provide means, in an otherwise conventional refrigerating system, without adversely restricting the flow of refrigerant in the system, that insures that no liquid refrigerant enters the compressor of the system.

Another object of the invention is to provide a refrigerant accumulator, in a refrigerating system, from which vaporized refrigerant is drawn into a compressor and to embody in said accumulator means that, without adversely restricting the flow of refrigerant in the system, will break up or disintegrate such globules of liquid refrigerant that may deleteriously affect said compressor.

Another object of the invention is to provide the means above indicated that will not only break up the globules but will also cause the resultant liquid to drain to the bottom of the accumulator for recirculation to the evaporator.

Another object of the invention is to provide the means above indicated that will break up the globules without adversely restricting the high velocity flow of refrigerant in the system.

My invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position, and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

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The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description.

However, the drawings merely show and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

In the drawings, like reference characters designate similar parts in the several views.

Fig. 1 is a semi-schematic view of a typical refrigerating system embodying the novel liquid disintegrating and intercepting accumulator means herein contemplated.

Fig. 2 is an enlarged longitudinal section view of said means.

The conventional system shown in Fig. 1 embodies a compressor 5 that discharges refrigerant through a pipe 6 to a cooled condensing tower 7. After a heat exchange operation in said unit, the liquid refrigerant passes through pipe 8 into a liquid refrigerant reservoir 9. From said reservoir 9, the liquid refrigerant is forced through the pipe 10 into the interior of a pipe 11, said pipe 10 projecting a short distance within the pipe 11 in a direction toward an accumulator 12. A downwardly directed end 13 of pipe 11 discharges said refrigerant into the accumulator. The liquid refrigerant is then forced through the pipe 14 to an evaporator 15, where heat exchange, in the coils thereof, takes place and the refrigerant is vaporized and returned to the accumulator 12 by the pipe 11. The vaporized refrigerant in the accumulator 12 is then drawn through the pipe 16 to the compressor 5.

The accumulator 12 comprises a closed elongated tank that is preferably vertically arranged with its vapor outlet pipe 16 at the top, its inlet pipe 11 for mixed vapor and liquid refrigerant entering the tank intermediate its top and bottom, and said bottom serving to receive the liquid refrigerant discharged from the downwardly directed end 13 of inlet pipe 11. A liquid outlet pipe 14 conveys liquid refrigerant back to the evaporator 15.

The refrigerant, vaporized in the evaporator 15, passes through pipe 11 to the accumulator 12. However, the pull of the compressor exerted on the vapor, frequently draws relatively large globules or "slugs" of moisture into pipe 16 with the deleterious effects above noted. Novel screen means 17 are placed in the path of such globules for the purposes of breaking them up and draining them back into the bottom of tank 12.

The accumulator 12 and the evaporator 15 are

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disposed vertically in relation one to the other in such a fashion that the liquid level in the accumulator 12 is always maintained below the end 13 of vapor and liquid inlet pipe 11, and the liquid refrigerant in the evaporator 15 fills said evaporator to a level sufficient to maintain the most efficient heat exchange. These liquid levels are maintained by an automatic liquid level control switch (not shown) which actuates a shut-off valve in pipe 10 should the liquid level in accumulator 12 rise above the desired level.

The means 17, that is shown, comprises two sloped or angled screens 18 and 19, one above the other and mounted in tank 12 between inlet pipe 11 and vapor outlet pipe 16. The screens 18 and 19 are placed at such an angle as to facilitate the flow of liquid, collected on the low sides of the screens, and return said flow to the bottom of the tank 12. Suitable support lugs 20 are provided on which said screens may rest or to which they may be secured by bolts or welds.

The screens, in this illustration, are of the type that are known as No. 4 mesh, that is, $\frac{1}{4}$ " spacing of wires. Thus, vapor is free to pass through the screen interstices, whereas globules encountering the screen wires are disintegrated, flow down the slope of the screen and fall back to the bottom of the tank. The screens are made of corrosion resistant wire and are advantageously made of stainless steel or tinned iron wire. While the screens, as described, are of No. 4 mesh, which has proved to be of optimum size for the average commercial refrigerating system, variations in the mesh size may be advisable for different systems. The object is to use a mesh size which is small enough to intercept the globules but not too small to restrict the flow of vapor refrigerant in the system.

While other forms of foraminous members may be used, it is preferable to use wire screen because liquid will flow along the wires or strands without interruption and the resultant accumulations of liquid which may clog the interstices. Thus, the screen openings are free to pass vapors or gases to the compressor.

Although I consider the installation of a vertical tank 12 to be preferable, it is possible to construct a satisfactory installation containing means 17 in an horizontally disposed tank.

While I have illustrated and described what I now regard as the preferred embodiment of my invention, the construction is, of course, subject to modifications without departing from the spirit and scope of my invention. I, therefore, do not wish to restrict myself to the particular form of construction illustrated and described, but desire to avail myself of all modifications that may fall within the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a refrigerating system having a compressor, a condenser, an evaporator and an accumulator, a refrigerant vapor flow connection from the upper end of the accumulator to the compressor, a series flow connection between the former and the evaporator comprising a connection for flow of liquid refrigerant from the bottom of the accumulator to the bottom of the evaporator and a connection for flow of vaporized refrigerant from the top of the evaporator to an intermediate point of the accumulator, said latter connection extending into the interior of the accumulator and being downwardly directed, a connection from the compressor through the condenser and into said latter connection where-

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by the same conducts condensed refrigerant from the condenser in addition to the vaporized refrigerant from the evaporator into the accumulator to fall from the downwardly directed connection extension into the bottom of the accumulator, and mesh screen means extending completely across the accumulator between said downwardly directed extension and the connection to the compressor for unrestrictedly passing refrigerant vapors to the compressor and for intercepting globules of liquid refrigerant contained in said vapors.

2. In a refrigerating system having a compressor, a condenser, an evaporator and an accumulator, a refrigerant vapor flow connection from the upper end of the accumulator to the compressor, a series flow connection between the former and the evaporator comprising a connection for flow of liquid refrigerant from the bottom of the accumulator to the bottom of the evaporator and a connection for flow of vaporized refrigerant from the top of the evaporator to an intermediate point of the accumulator, said latter connection extending into the interior of the accumulator and being downwardly directed, a connection from the compressor through the condenser and into said latter connection whereby the same conducts condensed refrigerant from the condenser in addition to the vaporized refrigerant from the evaporator into the accumulator to fall from the downwardly directed connection extension into the bottom of the accumulator, and mesh screen means extending completely across the accumulator between said downwardly directed extension and the connection to the compressor for unrestrictedly passing refrigerant vapors to the compressor, and for intercepting globules of liquid refrigerant contained in said vapors, said mesh screen means comprising at least two oppositely sloping screens, one set of strands of each being arranged to drain the liquid of the intercepted globules back into the bottom of the accumulator.

3. In a refrigerating system having a compressor, a condenser, an evaporator and an accumulator, a refrigerant vapor flow connection from the upper end of the accumulator to the compressor, a series flow connection between the former and the evaporator comprising a connection for flow of liquid refrigerant from the bottom of the accumulator to the bottom of the evaporator and a connection for flow of vaporized refrigerant from the top of the evaporator to an intermediate point of the accumulator, said latter connection extending into the interior of the accumulator above the bottom thereof, a connection from the compressor through the condenser and into said latter connection whereby the same conducts condensed refrigerant from the condenser in addition to the vaporized refrigerant from the evaporator into the accumulator to fall into the bottom of the accumulator, and means in the accumulator between the vaporized refrigerant connection and the connection to the compressor for unrestrictedly passing refrigerant vapors to the compressor and for intercepting and disintegrating globules of liquid refrigerant contained in said vapors.

4. In a refrigerating system having a compressor, a condenser, an evaporator and an accumulator, a refrigerant vapor flow connection from the upper end of the accumulator to the compressor, a series flow connection between the former and the evaporator comprising a connection for a flow of liquid refrigerant from the bot-

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tom of the accumulator to the bottom of the evaporator and a connection for flow of vaporized refrigerant from the top of the evaporator to an intermediate point of the accumulator, said latter connection extending into the interior of the accumulator and being downwardly directed, a connection from the compressor through the condenser and into said latter connection whereby the same conducts condensed refrigerant from the condenser in addition to the vaporized refrigerant from the evaporator into the accumulator to fall from the downwardly directed connection extension into the bottom of the accumulator, and means in the accumulator between the vaporized refrigerant connection and the connection to the compressor for unrestrictedly passing refrigerant vapors to the compressor

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and for intercepting and disintegrating globules of liquid refrigerant contained in said vapors.
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