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REFRIGERATING APPARATUS WITH DEFROSTING MECHANISM

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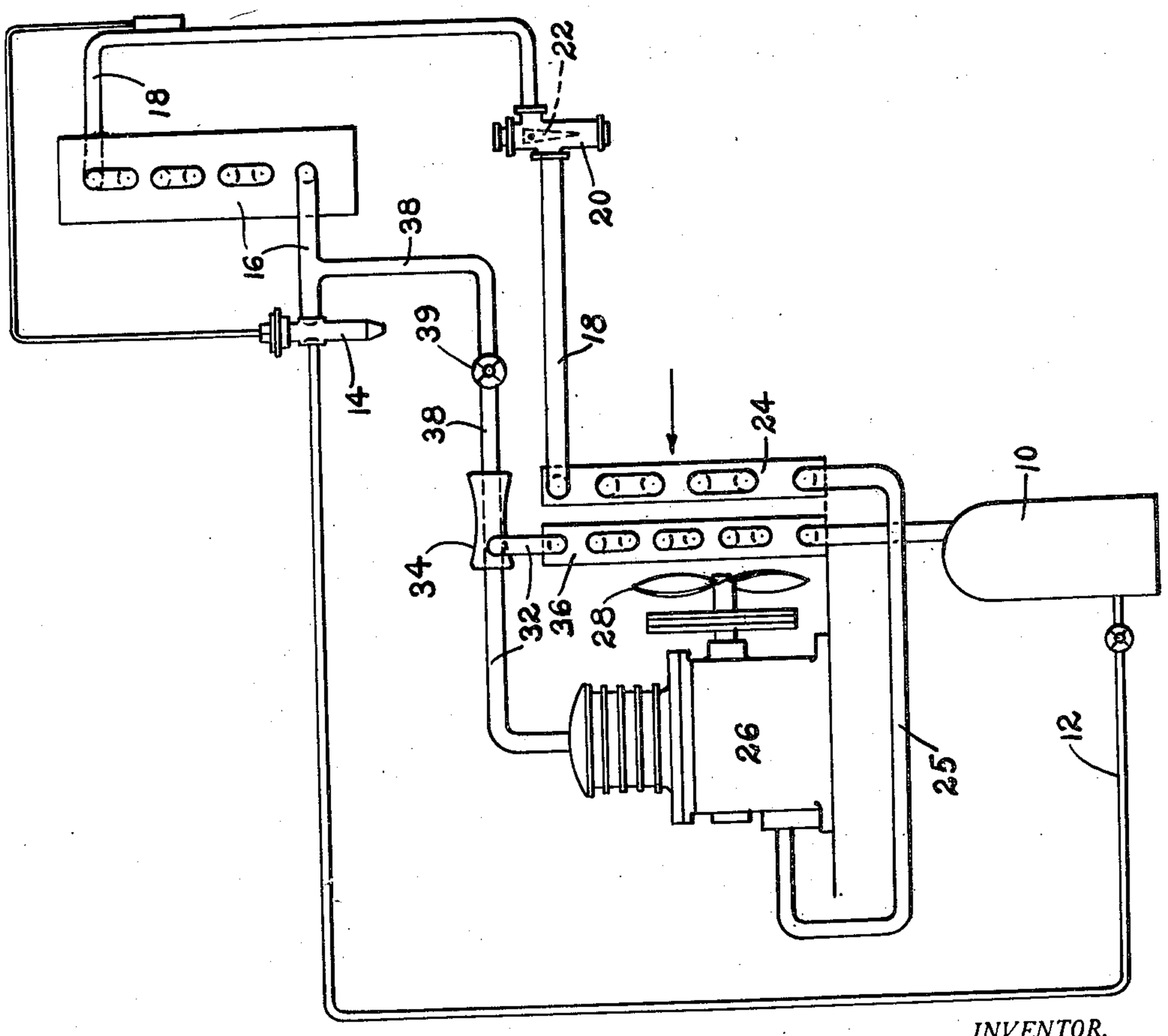


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## REFRIGERATING APPARATUS WITH DEFROSTING MECHANISM

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3 Claims. (Cl. 62—3)

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This invention relates to a refrigerating apparatus with defrosting mechanism.

The principal object of my invention is to provide mechanism that will rapidly defrost refrigerating apparatus, yet is simple in operation, and inexpensive to manufacture and incorporate in the refrigerating system of said apparatus.

Another object is to provide such mechanism that is compact and unitary so that it requires little or no extra space, nor extra materials for defrosting, and no preliminary accumulation of heat for later use in defrosting.

The foregoing and other objects which will appear as the nature of the invention is better understood, may be accomplished by a construction, combination and operative arrangement of parts such as is disclosed by the drawings and specification. The nature of the invention is such as to render it susceptible to various changes and modifications, and, therefore, I am not to be limited to said disclosure; but am entitled to all such changes therefrom as fall within the scope of my claims.

In the drawings:

The single figure represents a somewhat diagrammatic, elevational view of my refrigerating apparatus.

As illustrated, my apparatus has the usual receiver 10 that contains any well known liquid refrigerant which passes therefrom through a conduit 12 to a thermostatic expansion valve 14 such as normally is used in refrigerating systems and thence to an evaporator 16 of the usual type which may be the still air or forced air type. Various types of well known expansion valves may be used.

From the evaporator 16 the refrigerant enters a conduit 18 connected to which is a suction throttle valve 20 which normally limits the pressure on the suction or intake side of the compressor. This valve 20 sometimes is called a starting load regulator valve, and includes an auxiliary constrictor valve portion or by-pass 22 of the adjustable, needle type which ordinarily is formed within the valve housing, hence only one valve is here needed as constrictor valve portion 22 is always open. However, an external by-pass may be provided outside the housing of said suction throttle valve 20.

Said conduit 18 continues to a circulatory member in the form of an extension coil 24, preferably of the finned tube type, properly sized for minimum drop in pressure, which becomes part of the suction line and which is preferably directly opposite a condenser 36 later explained.

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A conduit 25 continues the system to a compressor 26 of the usual type for compressing refrigerant vapor, on which a fan 28 is shown mounted and that usually is electrically driven. This fan could be located elsewhere since it is at the exterior of the refrigerating system.

A conduit 32 extends from said compressor 26 to a well known Venturi 34, which acts as a siphon; hence is preferred but not indispensable in this refrigerating apparatus, and from there to the usual condenser 36 and thence to said receiver 10.

Connected to and extending beyond said conduit 32 and said Venturi 34, if used, is a conduit 38 having a well known valve 39 for control of hot gas that is normally closed. Said conduit 38 continues and communicates with said evaporator 16.

In the normal operation of this system said hot gas valve 39 is closed and the refrigerant, under pressure, passes from said receiver 10 through conduit 12 and expansion valve 14 to said evaporator 16 where the cold refrigerant normally withdraws some heat from and cools the surrounding air and thence passes through said conduit 18 to said suction throttle valve 20, including constrictor valve portion 22, thence through said coil 24 and conduit 25 to said compressor 26. From there it passes through said conduit 32 to said Venturi 34 and said condenser 36 where it is cooled by air drawn over said condenser by said fan 28, thereby ordinarily returning to said receiver 10 as a liquid.

To defrost said evaporator 16 said hot gas valve 39 is opened and being above said condenser, the refrigerant gas from said compressor 26 flows through Venturi 34 to conduit 38 to said evaporator 16 and since the gas is hot it causes melting or defrosting there. From there the refrigerant, which now may be partly liquid and partly gas, flows only through said by-pass valve 22 since the suction throttle valve portion has automatically closed due to the rise in pressure caused by the hot refrigerant, so it now is serving as an expansion valve. The refrigerant slowly passes through the constrictor or needle by-pass valve portion 22 and from there through conduit 18 to said extension coil 24 where the air is drawn by said fan 28 over said coil 24 to thereby evaporate large quantities of the refrigerant. From there it flows through conduit 25 to compressor 26 to complete the defrosting cycle. As long as said hot gas valve 39 is open the refrigerant hot gas from the compressor 26 will flow to said evaporator 16 which thereby functions as a condenser

because the hot gasses give up some of their heat to the frost or ice at the outside there.

To restore the normal refrigerating cycle said hot gas valve **39** is closed.

This refrigerating mechanism is adapted for large installations, and also is especially useful in retail market, delicatessen stores and other places where installations of moderate size are used with air-cooled condensers and where merchandise is kept at freezing temperature or below. It is applicable to both forced air and still air evaporators, and can be used on large central station plants.

What I claim is:

1. Refrigerating apparatus comprising a receiver for a refrigerant, an expansion valve, an evaporator, a suction throttle valve embodying an auxiliary constrictor valve portion, said suction throttle valve being adapted to be closed at a predetermined rise in pressure, while said constrictor valve portion remains open, an extension circulatory member outside the refrigerated space, a compressor, a Venturi, a condenser, conduits in communication respectively with said receiver, expansion valve, evaporator, suction throttle valve, auxiliary constrictor valve portion, extension circulatory member, compressor, Venturi and condenser, whereby a refrigerant may flow therethrough to make a complete refrigerating cycle, a valve to control the flow of gas closed normally, and a conduit extending between and in communication with said gas valve and said Venturi at one side and in communication with said gas valve and evaporator at the opposite side, said Venturi serving as a siphon to maintain flow of said refrigerant from said condenser and receiver to said evaporator and return when said gas valve is open during the defrosting operation.

2. Refrigerating apparatus comprising a receiver for a refrigerant, an expansion valve, an evaporator, a suction throttle valve embodying an auxiliary constrictor valve portion, said suction throttle valve being adapted to be closed at a predetermined rise in pressure, while said constrictor valve portion remains open, an extension coil outside the refrigerated space, a compressor, a Venturi above said compressor, a condenser, conduits in communication respectively with said receiver, expansion valve, evaporator, suction throttle valve and auxiliary constrictor valve portion, extension coil, compressor,



Venturi and condenser, whereby a refrigerant may flow therethrough to make a complete refrigerating cycle, a valve to control the flow of gas closed normally, and a conduit extending between and in communication with said gas valve and said Venturi at one side and in communication with said gas valve and evaporator at the opposite side, said latter-mentioned conduit and valve being above said condenser and said receiver, said Venturi serving as a siphon to maintain flow of said refrigerant from said condenser and receiver to said evaporator and return when said gas valve is open during the defrosting operation.

3. Refrigerating apparatus comprising a receiver for a refrigerant, an expansion valve, an evaporator, a suction throttle valve embodying an auxiliary constrictor valve portion, said suction throttle valve being adapted to be closed at a predetermined rise in pressure, while said constrictor valve portion remains open, a compressor, a Venturi, a condenser, conduits in communication respectively with said receiver, expansion valve, evaporator, suction throttle valve, auxiliary constrictor valve portion, compressor, Venturi and condenser, whereby a refrigerant may flow therethrough to make a complete refrigerating cycle, a valve to control the flow of gas closed normally, and a conduit extending between and in communication with said gas valve and said Venturi at one side and in communication with said gas valve and evaporator at the opposite side, said Venturi serving as a siphon to maintain flow of said refrigerant from said condenser and receiver to said evaporator and return when said gas valve is open during the defrosting operation.

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