

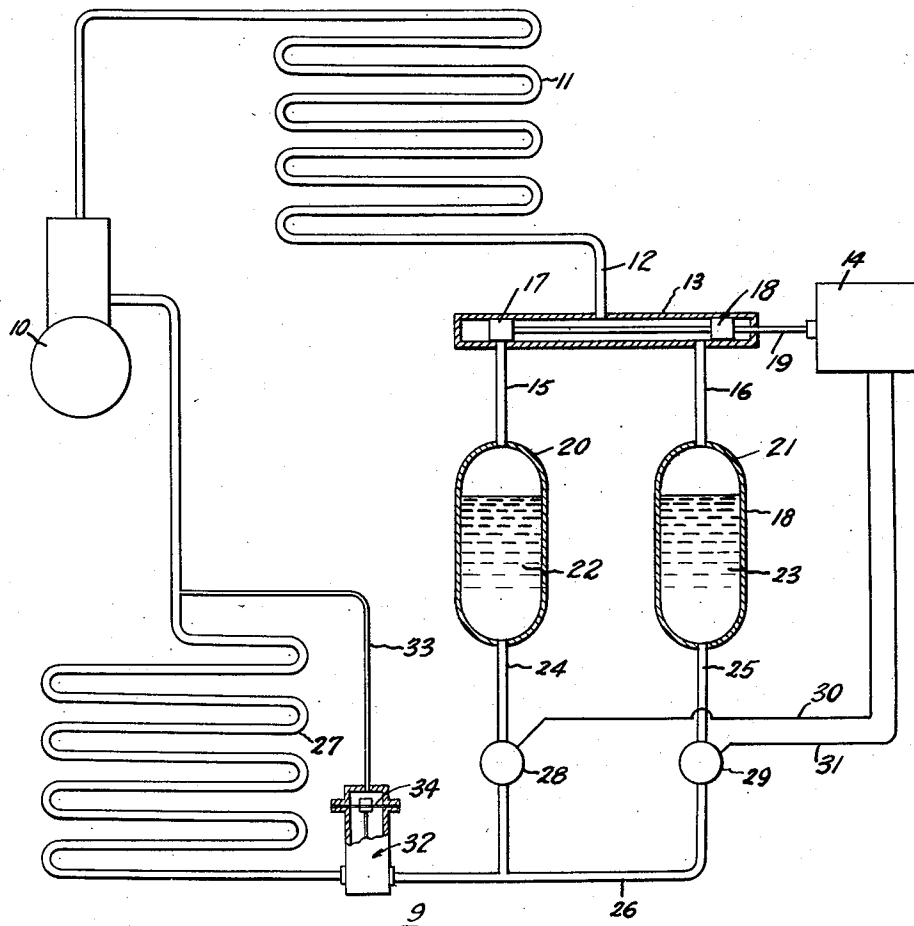
Jan. 6, 1959

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2,867,099

DUAL TEMPERATURE REFRIGERATION

Filed June 29, 1954



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DUAL TEMPERATURE REFRIGERATION

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Application June 29, 1954, Serial No. 440,026

3 Claims. (Cl. 62—502)

This invention relates to refrigeration systems and specifically to a method and apparatus to secure dual temperature levels in such systems.

Refrigeration systems, which are capable of providing dual temperature levels, are desirable in heat pump construction and in commercial and domestic refrigerators. It is desirable to vary the temperature of a heat pump evaporator while reasonably constant suction pressure conditions are maintained at the compressor. Such temperature variance is not possible in a refrigeration system which employs only a single refrigerant.

Accordingly, it is an object of my invention to provide a new and improved refrigeration system in which a pair of different refrigerants are employed.

It is another object of the invention to provide a dual temperature refrigeration system which selectively circulates a particular refrigerant in response to the load upon the system.

It is another object of the invention to provide a refrigeration system in which there are two liquid receivers.

It is a further object of the invention to provide a novel method of refrigeration in which a pair of different refrigerants are selectively circulated to produce dual temperature level refrigeration.

In carrying out my invention in one form, a pair of different refrigerants are selectively circulated in a refrigeration system to provide dual temperature levels of refrigeration.

These and various other objects, features and advantages of the invention will be better understood from the following description taken in connection with the accompanying drawing in which the single figure is a schematic view of one form of a refrigeration system which embodies my invention.

In the single figure of the drawing, a refrigeration system, which may be used in heat pump construction or in commercial or domestic refrigerators and which is indicated generally at 9, comprises a compressor 10 to communicate on its high pressure side with a condenser 11. The condenser 11 is connected by means of an inlet tube 12 to a three-way valve 13. Valve 13 is actuated by control means 14 and includes, in addition to inlet 12, a pair of outlets 15 and 16. The outlets are controlled by a pair of pistons 17 and 18 respectively, which are fixed on a shaft 19 for reciprocal movement therewith and simultaneously close one outlet while opening the other. Outlets 15 and 16 communicate with a pair of liquid receivers 20 and 21 which contain different refrigerants 22 and 23. Receivers 20 and 21 are further connected by means of outlets 24 and 25 to a tube 26 which connects to an evaporator 27 to complete the refrigeration circuit. In order to selectively circulate the refrigerants 22 and 23 through the system, a valve 28 is placed in the outlet 24 of receiver 20 and a second valve 29 is positioned in the outlet 25 of receiver 21. Valves 28 and 29 are preferably of the solenoid type to be electrically energized through conductors 30 and 31 in a manner to be hereinafter described. The flow of either refrigerant 22

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or 23 into the evaporator 27 is controlled by means of an expansion valve 32 in tube 26.

The desired sequence of operation of the refrigeration system thus described is as follows. Refrigerant 23 circulates in the system for a first range of temperature operation. When the load on the system increases to a predetermined point where it is more desirable and efficient for operation with refrigerant 22, the valve 29 is closed and continued operation of the compressor serves to substantially purge the system of refrigerant 23. After a predetermined lapse of time, shaft 19 is moved to position piston 18 over outlet 16 and piston 17 to open outlet 15. At the same time, valve 28 is opened to permit refrigerant 22 to circulate through the system.

The control apparatus for this system is preferably of the electromechanical type and comprises, in general, the well known timing motor operated cam switch mechanism. This type of control gives good results and has found wide application in the control art, particularly as applied to domestic appliances such as stoves and automatic washing machine timers. In a preferred form of this invention control 14 represents a motor actuated set of cam switches suitably arranged to perform the sequence of operation as heretofore described, and deriving electrical power from the normal domestic source (not shown). The cam switches of control 14 are then sequentially operated to energize, for example, solenoid, valve 29 to close, after which the compressor purges the system of refrigerant 23. After a suitable time delay incorporated in the cam switches, solenoid valve 28 is energized to open, while at the same time solenoid valve 13 is energized to open outlet 15 and close outlet 16, and refrigerant 22 is circulated through the system. For a return to operation with refrigerant 23, solenoid valve 28 is closed, while the compressor purges the system, and after a suitable delay, solenoid valve 29 is opened and solenoid valve 13 is energized to close outlet 15 and open outlet 16. Control 14 is accordingly shown to be a well known motor operated set of cam switches, the particular arrangement for the switch and the time delay periods being merely a matter of choice and expediency for the operation desired. There is no real problem of contamination of the refrigerants which are used in the system since the system will be substantially purged of the circulating refrigerant before the admission of the other refrigerant.

As will be apparent to those skilled in the art, the objects of my invention are attained by the use of a pair of different refrigerants which are selectively circulated in the refrigeration system to provide dual temperature levels of refrigeration.

While other modifications of this invention and variations of apparatus which may be employed within the scope of the invention have not been described, the invention is intended to include all such as may be embraced in the following claims.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A refrigeration system comprising an evaporator, a pair of liquid receivers connected parallel with each other and to the inlet side of said evaporator, a different refrigerant in each of said receivers, valve means positioned between said receivers and said evaporator to selectively circulate one of said refrigerants through the evaporator, a compressor connected to the outlet side of said evaporator, a condenser connected to the outlet side of said compressor, and valve means connecting said receivers with said condenser, said valve means returning the circulating refrigerant to its associated liquid receiver.

2. In a refrigeration system including a compressor, a condenser, and an evaporator, a pair of refrigerants, storage means for each of said refrigerants, and valve

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means to selectively circulate one of said refrigerants from its associated storage means through the evaporator, second valve means between said condenser and said storage means, said second valve means selectively returning each refrigerant to its respective receiver.

3. In a refrigeration system utilizing two refrigerants, a compressor, a condenser, an evaporator, means connecting the outlet of the compressor and the inlet of the condenser, a pair of liquid receivers connected in parallel relation with each other, and connected to the condenser, valve means positioned between the outlet of the condenser and the inlet of the receivers, means including non-

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mixing valve means to separately conduct said refrigerants from said receivers to the inlet of the evaporator, and means to control the non-mixing valve means.

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