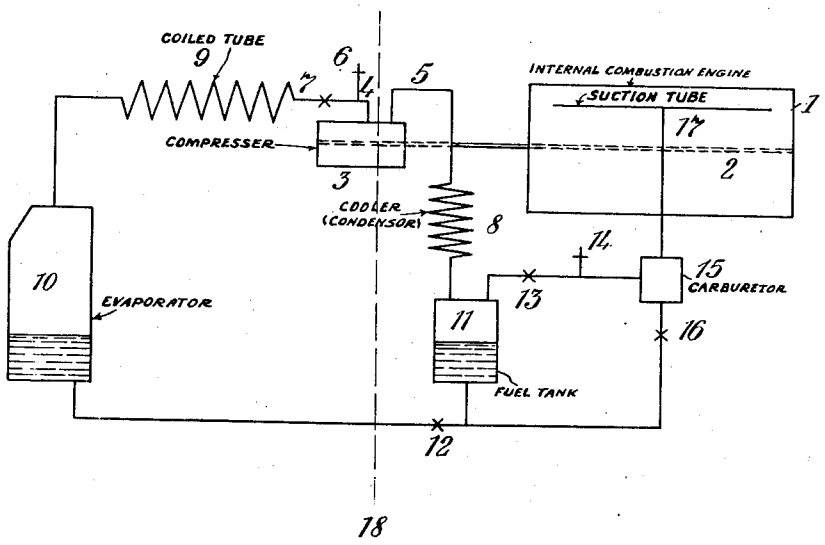
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VACUUM REFRIGERATING MACHINE

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VACUUM REFRIGERATING MACHINE

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3 Claims. (Cl. 62—115)

Generally speaking there are three different types of refrigerating machines, the so-called absorption type machine, the compression type machine and the machine of the vacuum type. The former two types are widely spread in common use, whereas machines of the third type, in which a fluid is to be evaporated in a vacuum are supposed to be of inadequate efficiency and objectionable for the reason, that the refrigerants hitherto employed or suggested for use in refrigerating machines of this type, such as alcohols, ethers and the like, are too unstable in chemical respects or, such as benzine and the like, are not of sufficient homogeneity, so that a machine or apparatus forming a system with a closed circuit, is practically impossible on account of the defects accumulating or increasing at each subsequent circuit operation.

My invention relates to the last-stated class of refrigerating machines and the object of my invention is to remedy the defects inherent in machines of this type as hitherto devised, and to provide a machinery in which the hereinbefore stated fluids can be used for and in a continuous refrigerating operation without running the risk of chemical disturbances.

With this object in view I substitute a limited circuit for the unlimited circuit as hitherto suggested or practised and accordingly I employ a power-engine for actuating the pump provided for producing the required vacuum while I utilize the sucked-off refrigerant vapors as a fuel in the said engine.

In this way part of this refrigerant only will be returned into the circuit and even this part will be removed after a few circuit courses from the circuit in order to be utilized as a fuel in the engine. In physical regards the process may be defined as one, in which the combustion heat of the substance supplies the power for the utilization of the evaporating heat of the same substance. It will thus be seen that, according to the present invention, a certain substance is caused to perform two functions in a highly economical manner. Further a second energy is taken from the engine-fuel, prior to the combustion thereof, without impairing the usefulness thereof as a fuel.

With the above recited and other objects in view reference is had to the following specification and drawing, in which the figure represents a diagrammatic example or embodiment of the invention, which is in no way intended as a limitation upon the scope of the appended claims, as it is to be clearly understood, that variations and modifications which properly fall within the true scope of the said claims may be resorted to when found expedient.

Referring to the drawing the diagrammatically shown apparatus or machinery comprises a power engine 1 which may be of a stationary type or else a portable or wheeled engine, and a pump 3 of any suitable construction operatively connected with the engine 1 as the driving member, by means of the power shaft 2 of the latter. The vacuum-pump 3 is provided with a suction conduit 4 and a compression conduit 5. The short pipe or conduit 4 communicates with two pipings 6 and 7 equipped each with a shut-off valve indicated in the drawing by a short cross-line. The piping 6 opens into the atmosphere and a suitable filter may be inserted into the compression conduit 5 for filtering purposes. The conduit 7 consists of a coiled tube 9 and an evaporator 10.

The compression conduit 5 including a coiled cooler 8 discharges into a fuel tank 11 which serves together with the cooler as a condenser communicating with the evaporator 10 by means of a suitable conduit provided with a valve 12. The condenser, on the other hand, is connected with the carburator 15 of the engine by means of two separate conduits, the one provided with a shut-off valve 16, discharging into the fuel inlet of the carburator and the other one provided with a shut-off valve 13, communicating with the suction pipe 14 of the air supply of the carburator. The suction pipe 14 is likewise equipped with a suitable shut-off valve. The carburator 15 is connected with the cylinder valves of the engine 1 in the usual manner by means of a suction tube 17.

In the drawing the dotted line 18 diagrammatically indicates the plane separating the refrigerating system on the left hand side thereof from the generating system on the right hand side of said line.

In starting the power engine the tank 11 half-filled with gasoline, benzine or the like acts like or in substitution for the usual fuel tank to supply fuel through the valve 16 to the carburator 15, while at the same time air is sucked in by the latter through the pipe 14 with its valve opened. Any standard or normal fuel tank is adaptable for use as a condenser together with the cooler 8 when conduits with valves 12 and 13 are provided and duly arranged for the purpose.

In operation that is when the engine is started to drive the pump 3, the valve 6 is closed while the valve 7 is left open, the valve 12 is to be set to allow fuel to enter the evaporator 10 in order to serve as a refrigerant. But if desired, the ma-

chinery may be run, especially in case of using methanol by providing from the beginning in the evaporator a certain quantity of the refrigerant, which however is not a homogeneous pure fuel but a mixture composed of a fuel and substances having a higher boiling point or capable of reducing the freezing point, the pump acting in this eventually so to say to distill out the fuel. In this manner the liability of larger amounts of fuel catching fire can be greatly reduced.

The valve 12 is automatically controlled by or in strict accordance with the level of the fluid in the condenser tank 11. The primary function of the upper conduit including the valve 13 and connecting the condenser with the carburator is to convey to the air-sucking pipe of the carburator those refrigerant gases or vapors, which have not condensed in the cooler 8 and to thereby prevent varying pressures or excessive pressures in the tank 11, while the said gases or vapors flow to the carburator and thence into the suction-tube 17 for combustion purposes.

A secondary function of the conduit including the valve 13 is to enable the pump to be used as a compressor with the refrigerating aggregate disconnected. Just in consideration of this possibility the interpolation of a vacuum pump is a valuable improvement for automobiles. By disconnecting from the shown apparatus or machinery the refrigerating system including the members 7, 9, 10 and 12 as a unit and by opening the valve of the piping or tube 6 to the atmosphere, it is only necessary to close the valve in the pipe 14 and to open the valves 13 and 16 in the conduits connecting the tank 11 with the carburator 15, in order to supply the latter with air under pressure through the conduit comprising the members 5, 8, 11 and 13 and with fuel under like excessive pressure through the conduit comprising the members 11 and 16.

What I claim is:

1. A refrigerating machine comprising a vacuum pump and means for driving the same, a refrigerating system connected to said pump including an evaporator, valve means for disconnecting said vacuum pump from said evaporator, a valved conduit for communicating said vacuum pump with the atmosphere, a condenser connected to said pump and said evaporator, other valve means for disconnecting said evaporator from said condenser, means forming a communication between said condenser and said driving means, an air intake provided with a valve for said communicating means.

2. An apparatus of the class described including a combustion engine and a refrigeration system mechanically connected to said engine to be driven thereby, said system including an evaporator, pump, condenser and fuel tank, said engine having a carburetor connected to the upper part of said tank to draw uncondensed fuel gas from said fuel tank.

3. The process of refrigeration which consists in evaporating, compressing and condensing a portion of a body of refrigerant, and utilizing another portion of said body of refrigerant to create motive power to effect said evaporation and compression.

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