

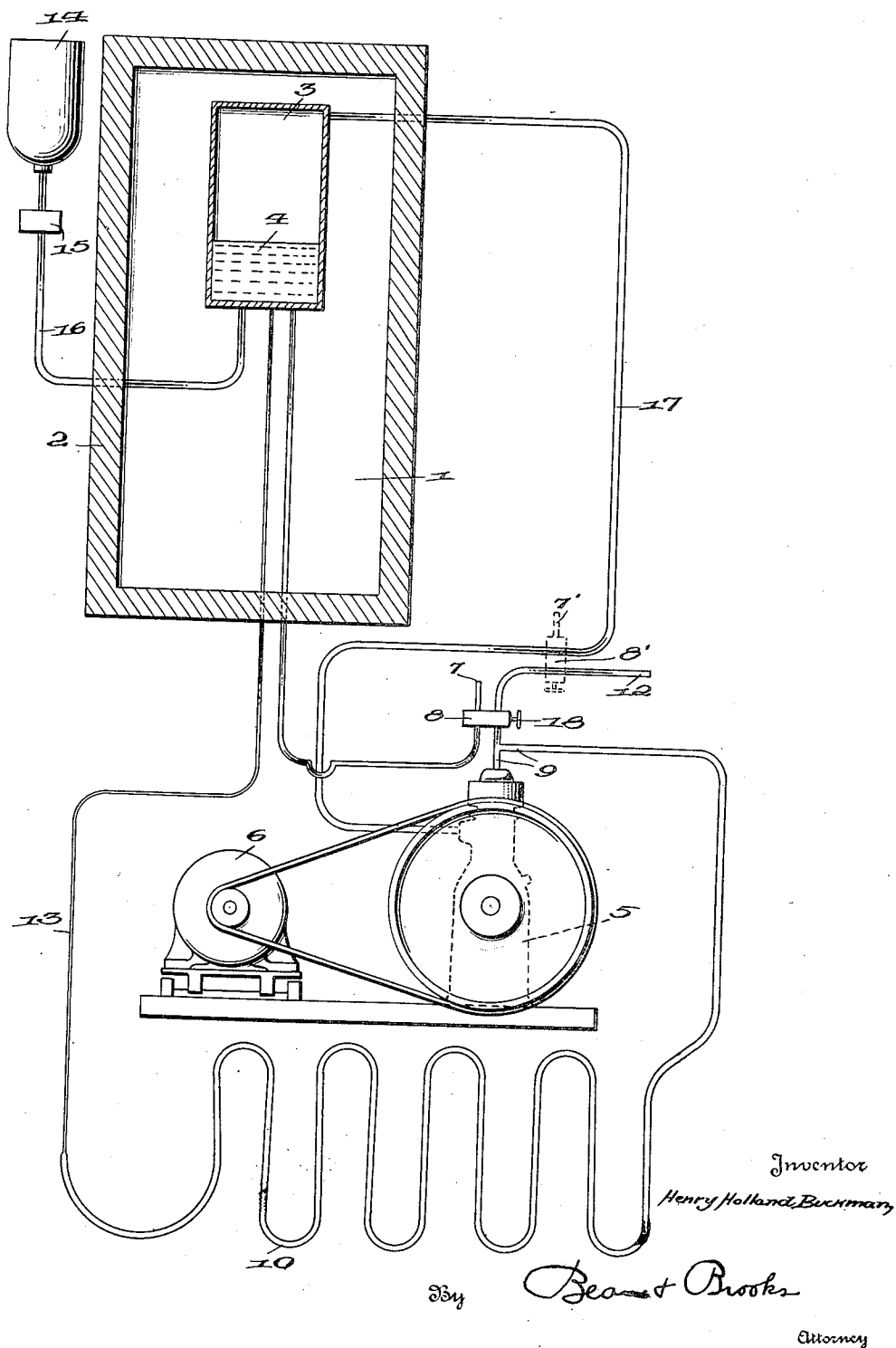
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SYSTEM FOR TEMPERATURE CONTROL

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SYSTEM FOR TEMPERATURE CONTROL

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This invention relates to improvements in refrigeration and gas making. The object of my improvement is primarily to provide in one system for the utilization of the temperature-lowering effect of the evaporation of an inflammable liquid and the utilization of the resultant vapor as a fuel. In systems heretofore employed, either the system is devoted to the production of comparatively low temperatures in a given enclosed space, and the vapor of the refrigerant is recondensed and returned to the main body of the refrigerant, or, an inflammable liquid is caused to evaporate, the consequent temperature-lowering effect wasted, and the resultant vapor made available as fuel. The former type of system is exemplified by several well known commercial and domestic refrigerating machines, while the latter is exemplified by the equally well known so-called "cold process" gas machines. Both of these types of systems have one step in common, i. e., the evaporation of a liquid. The former provides for the utilization of the temperature-lowering effect of the evaporation, but, being a closed cycle, does not provide for the discharge of vapor from the system. The latter does not comprise the utilization of the temperature-lowering effect, but comprises the withdrawal of the vapor to be used as fuel. My novel system comprises both the utilization of the temperature-lowering effect of the evaporation, and the withdrawal of vapor from the system as fuel. In my system it is desirable to provide means for optionally making available all the vapor as fuel, returning it all as condensate to the main body of the refrigerant; or, making available a part of the vapor as fuel and returning part as condensate to the main body of the refrigerant.

I attain the principal objects of my invention by combining in one system a heat-insulated space, an evaporating vessel therein, an inflammable liquid within said vessel, means for causing the liquid to evaporate, and means for permitting the resulting vapor to be usefully discharged. Sometimes I prefer to operate my system as intermittently cyclic, or partially cyclic, in which case I provide means for condensing the vapor or such part of it as I do not wish to discharge, radiating the latent heat of condensation, and returning the condensate to the evaporating vessel. It will be understood by those skilled in the art that I can practice my invention by use of a large number of different suitable mechanical assemblies, and that my invention is not limited in any way to any one type or form of mechanical assembly. In order to more

clearly describe my novel system, and to enable others skilled in the art to practice the same, I have illustrated one suitable mechanical assembly in the accompanying drawing.

The enclosed space 1 is provided with heat-insulated walls 2. The evaporating vessel 3 is partially filled with an inflammable liquid 4. In this instance the inflammable liquid is a petroleum fraction composed largely of normal pentane. The evaporating vessel 3 is connected with the suction end of the pump 5 driven by the electric motor 6. As I sometimes prefer to introduce air into my system for the purpose of assisting in the evaporation of the liquid and for furnishing a mixture of air and vapor as a fuel which will not be liable to condense in transit, I have shown an air inlet 7 controlled by the double valve 8 which also controls the flow through the pipe 11 and automatically proportions the air let into the system at 7 to the discharge at 12. The vapor from the liquid, either alone or mixed with air from the inlet 7, as I may prefer, is drawn into the pump 5 and discharged into the pipe 9. From the pipe 9, the vapor or mixture of air and vapor, may be, either wholly or partially discharged for use as fuel, as I prefer, by adjustment of the double valve 8, through the pipe 11 and the outlet 12. In the form shown this adjustment is accomplished by manipulating the knob 18. The vapor, or mixture of air and vapor, which is not discharged through the valve 8 is forced by the pump 5 through the pipe 9 and the radiator 10 and the smaller pipe 13 back to the evaporating vessel 3. The back pressure caused by the friction in the smaller pipe 13 causes the condensation of the vapor in the radiator 10 with consequent radiation of the latent heat of condensation, so that condensed vapor returns to the evaporating vessel 3 along with the air, if any. If air is present, the bubbling of this through the liquid in the evaporating vessel 3 assists in the evaporation. The storage tank 14 contains a reserve supply of the liquid from which the liquid in the evaporating vessel 3 is replenished automatically through the float valve 15 and the pipe 16.

It will be noted that in my system as practiced in the above illustration one of the advantages gained by the provision of the optional discharge or return of the vapor is that the amount of vapor or vapor mixed with air withdrawn from the system may be varied at will from minimum to maximum capacity of the pump 5 at normal working speed without interrupting or modifying the speed of the pump. I sometimes prefer to use

one double valve 8 as shown for the purpose of automatically proportioning the air let into the system to the vapor and air mixture discharged.

I sometimes prefer to employ in my system a compressed inflammable gas, instead of a liquid, utilizing the temperature-lowering effect of the simple expansion of the gas, instead of the latent heat of vaporization.

I sometimes prefer to place the several elements of my system under automatic control, such as may be attained, for examples, by the use of thermostatic devices, pressure-activated controls, etc.

I may also prefer to avoid the introduction of air into my system, and may, in this case, interpose a float valve between the return pipe 13 and the evaporating vessel 3, in order to attain a greater difference in pressure between the compression side and the suction side of the system.

It will be understood that I may vary the point at which I admit air into the system so as to cause all or part of the air admitted to be blown through the liquid by the pressure of the pump, instead of "sucked" through the liquid. To this end the pipe 7 will be eliminated and the proportioning valve will be located as indicated in dotted lines at 8', with a duct 7' for admitting air into the suction line 17 leading from the evaporating vessel 3 to the suction side of the pump. As in the principal showing, the valve 8' will admit air to the line 17 in direct proportion to the discharge of fluid at the outlet 12. I may also make provision for varying automatically or at will the routing of the air through the system.

I may also make provision for automatically or at will wholly or partially shunting or suspending the utilization of the temperature-lowering effect while withdrawing gas from the system.

I may also make provision for automatically or at will replenishing the system, continuously or intermittently, with liquid to be evaporated.

I may cause any assembly of apparatus comprising my system to include means for substantially removing the moisture from the air before the air is allowed to come in contact with the liquid to be evaporated. I may also provide any such assembly with means for removing water which may collect in the system.

I claim:

1. In a combined refrigerator and gas generator, a refrigerating unit, a gas generator unit, a common fluid supply means for operating both units, and means for varying the supply of fluid to one of said units independently of the operation of the other of said units.

2. A refrigerator circuit of the compressor-expander type, a gas generator, and means for diverting a variable quantity of the refrigerant vapor from the high pressure side of said circuit for operating said gas generator.

3. A combined refrigerator and gas generator system having a common fluid supply, means for admixing air with the fluid in the system and means for directly proportioning the quantity of air admitted to the quantity of fluid being consumed by the gas generator.

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