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ABSORPTION REFRIGERATING SYSTEM

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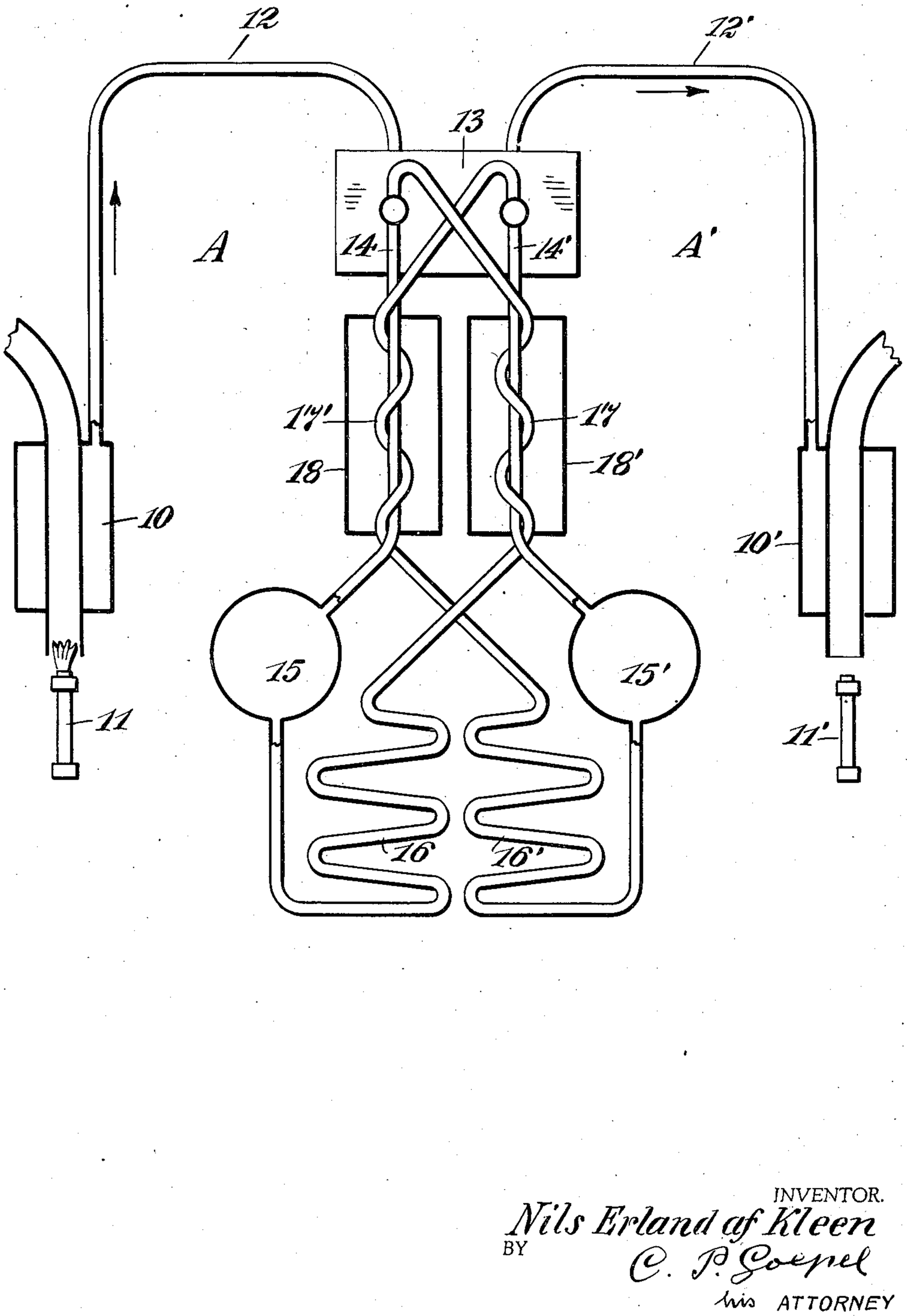

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ABSORPTION REFRIGERATING SYSTEM

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Original application February 1, 1938, Serial No. 188,153. Divided and this application November 1, 1940, Serial No. 363,864

4 Claims. (Cl. 62—118)

This invention relates to new and useful improvements in absorption refrigerating systems and more particularly to that type having two or more intermittently functioning units producing substantially continuous refrigeration, the present application being a division of my co-pending application, Serial Number 188,153, filed February 1, 1938, covering Absorption refrigerating systems.

In the following description and claims, the term "absorption" should be regarded as including also "adsorption" as the invention is equally applicable and effective in either absorption or adsorption refrigerating systems.

One of the primary objects of the present invention is to effect a heat exchange between the refrigerant in the respective units whereby a higher efficiency in the system is attained.

It is well known that in refrigerating systems of this type, the temperature of the liquid refrigerant delivered from the condenser to the evaporator during the generating period, rises gradually to a maximum and then falls relatively quickly. On the other hand, the temperature of the vapor refrigerant delivered from the evaporator during the absorbing period falls rapidly to a minimum and then gradually rises. Thus the period of maximum cold produced in one unit does not coincide with the period of maximum demand for cold in the other unit, and it is therefore another object of the present invention to effect not only a heat exchange between the vapor refrigerant flowing from the evaporator of one unit with the liquid refrigerant flowing from the condenser to the evaporator of the alternately operating unit, but to provide means for accumulating the cold produced by the evaporated refrigerant.

According to the invention, the low heat content of the refrigerant vapor flowing from the evaporator of one unit is utilized to pre-cool the liquid refrigerant flowing to the evaporator of the second unit. This is accomplished by placing the pipe connections through which the vapor refrigerant flows from the evaporator of one unit, in thermal contact with the pipe connections through which the liquid refrigerant flows from the condenser to the evaporator of the other unit, and providing separate accumulators for said pipes in heat exchange relationship so that the cold produced in one unit is stored up or accumulated to pre-cool the liquid refrigerant of the other unit during the period of maximum demand for cold in said second unit.

With the above and other objects in view which will appear as the description proceeds, my invention consists in the novel features hereinafter set forth, illustrated in the accompanying drawing and more particularly pointed out in the appended claims.

Referring to the drawing which illustrates diagrammatically a refrigerating system, A and A' represent generally two intermittently operating units, each including the usual generator-absorber 10 and 10', respectively, adapted to be heated by any suitable means 11 and 11' during the generating period of the respective units. Refrigerant vapors are driven off or expelled from the generator-absorbers 10 and 10' and pass through the outlet conduits 12, 12' to a condenser 13 where the refrigerant in each unit is condensed. From the condenser 13, the condensed liquid refrigerant passes through pipe connections 14, 14' to collecting vessels or tanks 15, 15' from whence it flows through the respective evaporator coils 16, 16' where the liquid refrigerant vaporizes to produce a low temperature.

From the evaporator coil 16 of unit A, the vaporized refrigerant passes through pipe 17 in thermal contact with pipe connection 14' of unit A' and back to condenser 13 to return to the generator-absorber 10 by means of the conduit 12. On the other hand, from the evaporator coil 16' of unit A', the vapor refrigerant passes through pipe 17' in thermal contact with pipe connection 14 of unit A back to the condenser 13 and into the conduit 12' to return to the generator-absorber 10'.

There is thus provided by this arrangement two heat exchangers so that when one unit, for example unit A, is operating in the generating phase, the liquid refrigerant flowing to the collecting tank 15 from the condenser 13, will be cooled by the refrigerant vaporized in the evaporator coil 16' of the alternately operating unit A'.

Due to the fact that the period of maximum supply of cold produced by the vaporized refrigerant in the evaporator coil of the unit operating in the absorption phase does not coincide with the period of maximum demand for cold for the liquid refrigerant flowing to the collecting tank from the condenser of the other unit operating in a generating phase, each of the heat exchangers is provided with an accumulator 18 and 18', respectively, which may be either in the form of solid metal blocks in which the corresponding heat exchanger is embedded, or in the form of brine tanks.

It will thus be seen that the low temperature produced by the evaporated vapors passing through pipes 17, 17' will be stored in the corre-

sponding accumulators 18, 18' so that when the period of maximum demand for low temperature for the condensed refrigerant flowing through pipe connections 14, 14' is reached in the respective units, the low heat content in the corresponding accumulator will take up the heat from the condensed refrigerant to pre-cool the latter prior to entering the evaporator system. Furthermore, with the use of the accumulators, the heat losses in the respective heat exchangers are greatly reduced, thereby increasing the efficiency of the refrigerating units.

While I have shown and described a refrigerating system as including collecting vessels 15, 15' intermediate the condenser 13 and the evaporator coils 16, 16', it is to be understood that I do not intend to confine the invention in this respect as the heat exchangers and accumulators therefor may be applied to systems wherein the refrigerant flows directly from the condenser to the evaporator coils.

From the foregoing, it is believed that the construction and advantages of the present invention may be readily understood by those skilled in the art without further description, it being borne in mind that numerous changes may be made in the details disclosed without departing from the spirit of the invention as set out in the following claims:

What I claim and desire to secure by Letters Patent is:

1. An absorption refrigerating system of the type described comprising two intermittently operating units providing substantially continuous refrigeration at a common refrigerating region and each comprising a generator-absorber, condenser and evaporator, there being in each unit a conduit through which evaporated refrigerant passed out from the evaporator, and a separate conduit through which liquid refrigerant returns to the evaporator, wherein a separate heat accumulator is provided for exchanging heat between the liquid conduit of each unit and the vapor conduit of the other.

2. In absorption refrigerating systems of the type having two or more intermittently functioning units producing substantially continuous cold at a common refrigerating region, each unit including a generator-absorber, condenser, collecting vessel, and evaporator, all coupled together and forming separate closed circulating systems for a refrigerant; means for effecting heat exchange between the evaporated refrigerant in one unit with the condensed refrigerant in the other unit, and an accumulator associated with each of said means.

3. An absorption refrigerating system comprising at least two intermittently and alternately functioning units producing substantially continuous cold at a common refrigerating region, each unit including a generator-absorber, condenser, and evaporator coupled together to form separate closed circulating systems for a refrigerant, each of said units having a conduit for the passage of condensed refrigerant from the condenser to the evaporator, and a separate conduit for the return of vapor refrigerant from the evaporator to the condenser, the vapor conduit of one unit being in thermal contact with the liquid conduit of the alternate unit to form a heat exchanger for each unit, and separate means cooperating with said heat exchangers to store the cold produced by the vapor refrigerant in said vapor conduit to pre-cool the condensed refrigerant flowing through said liquid conduit.

4. An absorption refrigerating system comprising at least two intermittently and alternately functioning units producing substantially continuous cold at a comomn refrigerating region, each unit including a generator-absorber, condenser, and evaporator coupled together to form separate closed circulating systems for a refrigerant, each of said units having a conduit for the passage of condensed refrigerant from the condenser to the evaporator, and a separate conduit for the return of vapor refrigerant from the evaporator to the condenser, the vapor conduit of one unit being in thermal contact with the liquid conduit of the alternate unit to form a heat exchanger for each unit, and separate solid blocks of metal cooperating with said heat exchangers to store the cold produced by the vapor refrigerant in said vapor conduit to pre-cool the condensed refrigerant flowing through said liquid conduit.

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