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ABSORPTION REFRIGERATING APPARATUS

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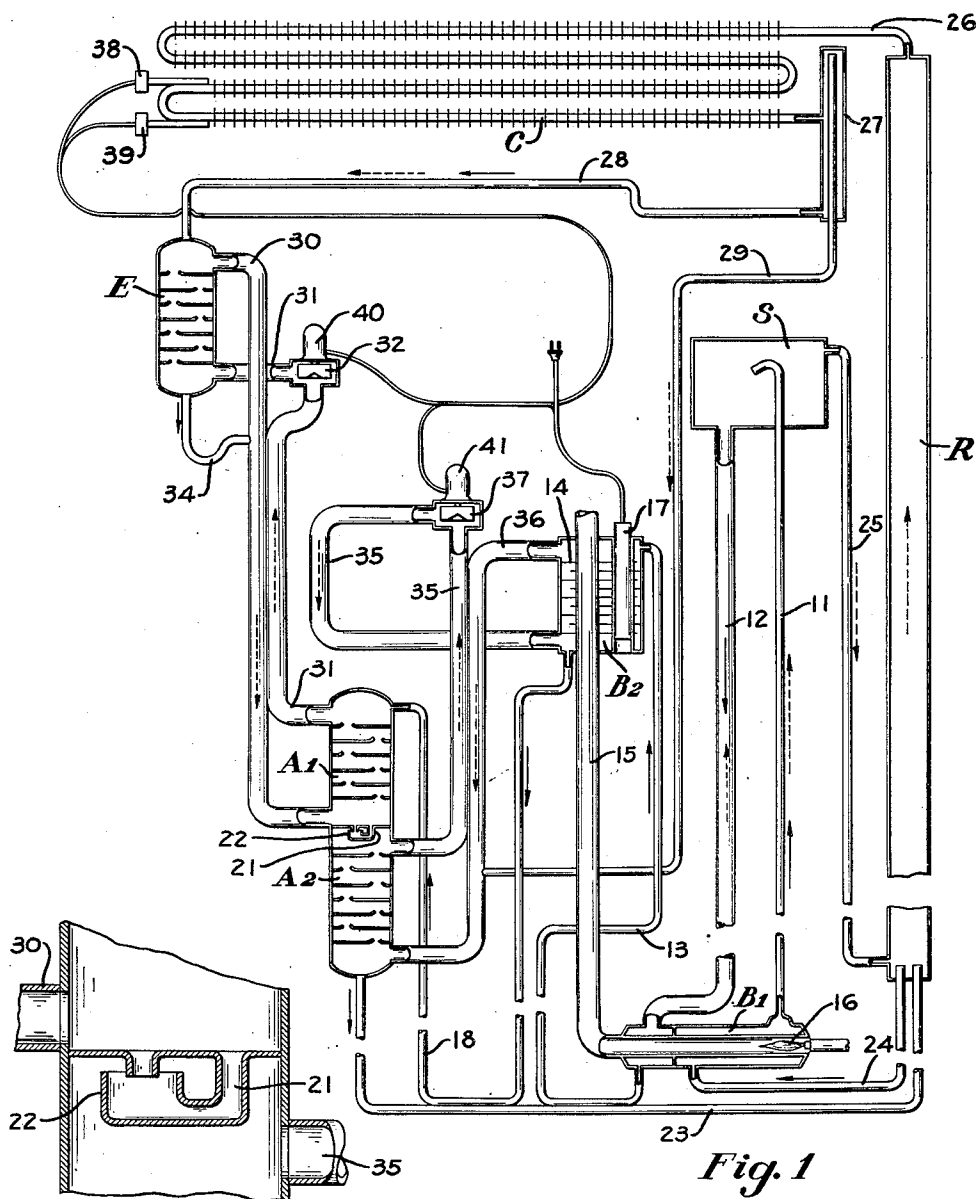


Fig. 1

Fig. 2

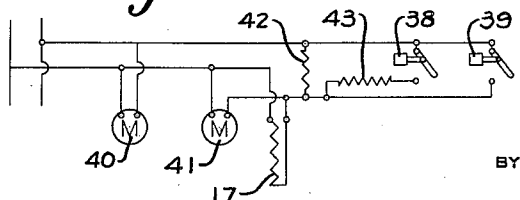


Fig. 3

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## ABSORPTION REFRIGERATING APPARATUS

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This invention relates to continuous absorption refrigerating apparatus and more particularly to that type in which an inert gas is employed and in which a compound or two-stage boiler is employed.

Absorption refrigeration systems of the type using inert gas as heretofore proposed do not operate at high efficiencies over a wide range of cooling medium temperatures. This is due to the adverse effects on the internal conditions of the system produced by temperature changes in the cooling medium for the heat dissipating elements of the system such as the condenser, rectifier and absorber. For example, an increase in the cooling medium temperature causes the rectifier, condenser and absorber to operate at higher temperatures. Under these conditions the absorbent vapor will not be condensed in the rectifier and will pass over into the evaporator and there dilute the refrigerant liquid thus rendering a considerable portion of the refrigerant useless for the purpose of producing refrigeration. Furthermore, the higher temperatures of the condenser and absorber makes it impossible to condense a portion or all of the refrigerant vapor in the condenser and absorb refrigerant vapor in the absorber. As a result, the partial vapor pressure of the refrigerant remains so high in the evaporator that no more liquid refrigerant can evaporate to produce a cooling effect, and the system becomes inoperative.

Previous attempts to overcome the above difficulties have dealt largely with the removal of a portion of the refrigerant from the normally active circuits of the system. These solutions are only partially successful in that they enable the system to continue to produce refrigeration at high cooling medium temperatures at the sacrifice of capacity. Thus at the time when an increased refrigeration capacity is desirable, the system is only capable of operating at a greatly reduced capacity.

According to the present invention I have provided a continuous absorption refrigeration system incorporating a very simple means for adjusting the internal conditions in response to changes in external conditions so as to maintain the system in operation at maximum efficiency and substantially full capacity over a much wider range of temperature for the cooling medium than has been possible heretofore.

This result is achieved by simultaneously varying the total internal pressure and the concentration of the absorption solution in the absorber, but not in the main boiler, in accordance with

variations in the temperature of the cooling medium for the heat dissipating portions of the system. More specifically, my novel system operates to vary the total pressure as the cooling medium temperature varies with the result that the condenser and rectifier operate at maximum efficiency regardless of the external temperature. The system is also so arranged that the main refrigerant generator or boiler operates at maximum efficiency and under substantially constant conditions of input and output over the entire range of cooling medium temperatures encountered in the uses for which the refrigerator is intended. By reason of the novel absorber arrangement and the auxiliary devices associated therewith, the concentration of the absorption solution flowing thereto is varied so that the absorber is enabled to absorb the refrigerant vapor flowing through this vessel irrespective of variations in the total pressure and the temperature of the cooling medium for the absorber.

It is therefore an object to provide an absorption refrigeration system which automatically compensates for changes in external conditions affecting the internal conditions of the system. More specifically, it is an object to provide a system capable of operating at full capacity and maximum efficiency over the entire range of cooling medium temperatures encountered in use.

A further object is to provide a refrigeration system which is so constructed and arranged that the total internal pressure and the concentration of the solution flowing to the absorber can be varied without affecting the concentration of the solution flowing to the main generator assembly.

Another object of the invention is the provision of a novel compound boiler arrangement in combination with a novel absorber assembly. More particularly, it is an object to provide a construction of this nature in which the temperature of the auxiliary boiler is varied in accordance with external temperature conditions to regulate the total pressure and the concentration of the solution delivered to the absorber.

Still another object is the provision of a novel control for an absorption refrigeration apparatus capable of so regulating the apparatus as to compensate for changes in external conditions.

It will also be appreciated that, by reason of the controlled heat input to the auxiliary boiler, the concentration of the aqua solution is varied simultaneously with the temperature of the auxiliary boiler. Moreover, the very great advantage is realized of having more highly deconcentrated solution delivered to the main absorber at high

ambient temperatures without affecting the concentration of the aqua solution in the analyzer or the boiler. It will therefore be apparent that by means of the system herein disclosed, I am able to not only increase the total pressure within the system at high room temperatures to condense the refrigerant vapor, but I am also able to continue absorbing all of the refrigerant vapor notwithstanding the higher room and absorber temperature due to the fact that more highly de-concentrated absorbent is supplied to the main absorber. I am accordingly enabled to obtain superior result without resorting to the use of a pressure vessel.

It is another object of the invention to provide means for accurately regulating the flow of inert gas between the auxiliary boiler and the auxiliary absorber of a continuous absorption refrigerating system employing a compound boiler.

It is still another object to provide novel means for heating both the main boiler and the auxiliary boiler of a compound boiler system.

It is still another object to provide novel control means for operating a continuous absorption refrigerating system.

Still another object resides in the provision of a novel compound continuous absorption refrigerating system.

Other objects and advantages reside in certain novel features of the arrangement and construction of parts as will be apparent from the following description taken in connection with the accompanying drawing, in which:

Figure 1 is a diagrammatic illustration of a continuous absorption refrigerating system constructed in accordance with the principles of the invention;

Figure 2 is a vertical cross-sectional view of a fragment of the absorber which may be employed in the arrangement of Figure 1; and

Figure 3 is a diagram of the electrical connection used in the arrangement illustrated in Figure 1.

Referring to the drawing in detail and first to the arrangement of Figure 1, it will be seen that a continuous absorption refrigerating system has been diagrammatically illustrated.

The system includes a compound boiler comprising a main boiler B, and an auxiliary boiler B<sub>2</sub>, a gas separation chamber S, a combined rectifier and analyzer assembly indicated at R, a condenser C, an evaporator E, and an absorber having two parts or sections illustrated at A<sub>1</sub> and A<sub>2</sub>, respectively. These elements are connected by means of various conduits as illustrated to form the complete refrigerating system. In accordance with known practices, the system may use water as absorbent, ammonia as refrigerant and air, hydrogen, or the like, as inert gas.

Main boiler B<sub>1</sub> is divided into two chambers by means of a partition and a small conduit 11 is connected to the right-hand chamber, as viewed in Figure 1, this conduit 11 acting as a vapor lift pump to elevate lean absorption liquid into the gas separation chamber S by refrigerant gas. The absorption solution lifted into the chamber S flows downwardly through the conduit 12 into the lefthand chamber of boiler B<sub>1</sub> where it is again heated. Refrigerant gas evolved in this chamber passes back into the gas separation chamber S through the conduit 12. The lefthand chamber of the boiler B<sub>1</sub> is connected by a conduit 13 to the upper part of the auxiliary boiler B<sub>2</sub>.

The auxiliary boiler B<sub>2</sub> is provided with a number of baffle plates therein as illustrated at 14. As

shown, this vessel has two vertical heating tubes passing therethrough, one of which may serve as part of the chimney 15 from the heater for the main boiler B<sub>1</sub>, while the other is provided with an electric cartridge heater 17.

The gas flame illustrated at 16 used to heat the main boiler B<sub>1</sub>, may be located in the horizontal flue extending through the main boiler. The heat generated by this flame thus serves to heat main boiler B<sub>1</sub> directly and auxiliary boiler B<sub>2</sub> indirectly. Boiler B<sub>1</sub> is accordingly maintained at the higher temperature.

The manner of heating the auxiliary boiler B<sub>2</sub> may be so arranged that the heat carried to it from the main boiler heater would maintain it at a comparatively low temperature which might be the minimum temperature required for normal low room temperature operating conditions, while the heater 17 would supply any additional heat which might be required at high room temperatures.

Obviously a gas flame could also be used for this additional heater 17 but the electric heating means is preferred for purposes of illustration since it is easier to show how the temperature of the boiler B<sub>2</sub> can be varied in response to operating conditions in other parts of the system.

The lower portion of the auxiliary boiler B<sub>2</sub> is connected by means of the U-shaped conduit 18 to the top of the absorber section A<sub>1</sub>. The lower portion of this absorber section A<sub>1</sub> is connected to the top of the section A<sub>2</sub> by means of liquid seal device 21, 22. This arrangement permits the absorption liquid to flow freely; and gas to pass from one section of the absorber to the other upon the existence of a slight difference in total pressure between the two, however.

The lower section of the absorber A<sub>2</sub> is connected to the lower part or analyzer section of assembly R by means of the conduit 23, portions of which may be in heat exchange relation with conduits 13 and 18 as illustrated. The lower section of column R is also connected to the right-hand portion of the boiler B<sub>1</sub> by means of the conduit 24.

The refrigerant gas evolved in either chamber of boiler B<sub>1</sub>, the conduit 11 or the gas separation chamber S is conveyed through a conduit 25 connecting the gas separation chamber S to the lower or analyzer portion of column R. The refrigerant gas may, and preferably the system is so arranged that the gas bubbles through warm rich absorption solution in the analyzer with the result that much of the absorbent medium vapor present in the refrigerant gas is condensed by contact with the rich solution. The heat of condensation of this absorbent vapor suffices to pre-heat the rich solution further as well as to vaporize additional refrigerant gas. The level of the solution in the analyzer may be at a point somewhat above the connection of conduit 25 therewith. After passing through the analyzer, the refrigerant gas and the uncondensed portion of absorbent medium passes through the upper or rectifier portion of column R where substantially all of the absorbent vapor condenses and falls to the analyzer. The refrigerant gas then passes to condenser C through conduit 26. Column R may be provided in whole or in part with internal baffles or exterior heat radiating devices to facilitate the analyzing and rectifier actions in accordance with known practice.

The condenser C may consist of a reversely bent or coiled pipe provided with heat radiating fins

or with other means for cooling the same. The refrigerant gas supplied to the condenser changes to its liquid phase therein. The liquid refrigerant then passes into the evaporator E through the small vessel 27 and the conduit 28. The vessel 27 has its upper end connected to a portion of the inert gas circuit (described hereinafter) by means of the conduit 29 so as to bleed any inert gas which may have found its way into the condenser back into the part of the apparatus in which it belongs.

In the evaporator the refrigerant vaporizes to produce a cooling effect, an inert gas being employed within the system to enable the refrigerant to evaporate in the evaporator.

The main inert gas circuit includes the evaporator E and the absorber section A<sub>1</sub>. Thus an inert gas conduit 30 may be connected to the top of the evaporator and the lower portion of the absorber section A<sub>1</sub> while a second inert gas conduit 31 may be connected to the top of the absorber A<sub>1</sub> and to the bottom of the evaporator, portions of the conduits 30 and 31 being in heat exchange relation as illustrated and one or the other of these conduits including a fan 32 driven by a motor 40 for circulating the inert gas between the evaporator and the absorber section A<sub>1</sub>. Obviously the fan 32 may be located in the absorber section A<sub>1</sub> or in other parts of the circuit instead of in the pipe 31, as shown. A drain conduit 34 is provided at the lower portion of the evaporator to drain away any liquid which does not evaporate therein. This conduit may be connected to the conduit 30 of the gas heat exchanger as is illustrated.

A second inert gas circuit is provided between the lower section A<sub>2</sub> of the absorber and the auxiliary boiler B<sub>2</sub>. This circuit may consist of two inert gas conduits 35 and 36 portions of which may be in heat exchange relation as illustrated.

The gas conduit 35 is illustrated as connected to the top of the lower section A<sub>2</sub> and to the bottom of the auxiliary boiler B<sub>2</sub>, while the conduit 36 is illustrated as connected to the top of the auxiliary boiler B<sub>2</sub> and to the bottom of the absorber section A<sub>2</sub>.

The conduit 35 may include a fan 37 driven by a motor 41, for circulating the inert gas in this circuit. While in the drawing the fan 37 is located some distance above the auxiliary boiler B<sub>2</sub> it is obvious that it may be positioned in other parts of the circuit. It is usually best to locate the gas fan in the cold part of an inert gas circuit and therefore it would perhaps be preferable to locate the fan 37 below the point where the conduits 35 and 36 are in heat exchange relation. Thus the fan 37 might be positioned in the conduit 36 near the point of connection with the absorber. For convenience in illustration, however, it is shown located near the fan 32.

An important feature of the invention resides in the means for controlling the circulation of inert gas in the secondary or boiler-absorber circuit and for controlling the temperature of the auxiliary boiler B<sub>2</sub>. This may be accomplished in accordance with the invention in various ways only one of which is illustrated. In the arrangement shown, two thermostatic control switches represented by the numerals 38 and 39 are shown mounted upon the condenser C at any convenient place. These thermostatic switches are connected into the control circuit for the auxiliary heater 17 of the boiler B<sub>2</sub> and for the motor 41 which drives the fan 37.

Figure 3 is a diagram of connection used in the arrangement of Figure 1. As shown in Figure 3 the motor 40 which may be used to drive the fan 32 in the arrangement of Figure 1 may be connected directly across the supply lines so as to remain in continuous operation whenever the control circuit is energized, the operation of this motor being independent of the thermostatic switches 38 and 39. The electric motor 41 which controls the operation of the fan 37 may be connected in parallel with the electric heater 17 so that both of these elements 17 and 41 may be controlled by the thermostatic switches 38 and 39. Thus the speed of the motor 41 and, in turn, the amount of inert gas circulated between the auxiliary boiler B<sub>2</sub> and the lower section of the absorber A<sub>2</sub> as well as the amount of heat and the temperature of the auxiliary boiler B<sub>2</sub> may be regulated in response to conditions existing on the condenser.

The control circuit illustrated includes a rather high resistor 42 (shown in Figure 3 but not shown in Figure 1) and a low resistor 43 connected in series with the control switch 38. As shown in Figure 3 the switch 39 may be so connected as to shunt both the resistances 42 and 43. Thus the heater 17 may operate with three different amounts of current flowing therethrough and thus have three different heating values. Likewise the motor 41 has three different speeds in the arrangement illustrated.

With this arrangement marked advantages are obtained in the use of a compound boiler system over that which may be obtained in a single stage system. It is desirable to operate a continuous absorption system at different conditions when the temperature of the air or water used to cool the condenser and the absorber are at different temperatures. Thus when the temperature of the medium to which the heat is rejected is low the total pressure in the system should be low. As the temperature of the medium to which the heat is rejected is raised the pressure within the apparatus should preferably be raised in order to condense all of the refrigerant gas at the higher temperature, and the concentration of the weak absorption solution supplied to the absorber should be lowered in order to absorb the refrigerant gas at the higher temperature. This can be accomplished in accordance with the present invention by applying additional heat to the auxiliary boiler B<sub>2</sub> to raise its temperature as the temperature of the condenser becomes higher when the air in the room becomes warmer. As the temperature of the auxiliary boiler goes up the total pressure in the entire system becomes higher and the results sought are accomplished.

At the same time the fan 37 is controlled so as to provide means for removing the refrigerant expelled in the auxiliary boiler B<sub>2</sub> as the additional heat is supplied by the heater 17.

The volume of the auxiliary boiler B<sub>2</sub> may be so selected that the total pressure obtainable does not exceed a fixed maximum and a pressure control may be employed to limit the pressure in the system by cutting out the heater 17 when the pressure in the system is raised sufficiently high. Such safety measures are known and accordingly are not illustrated in the drawing.

It should be noted here further that the auxiliary boiler B<sub>2</sub> could be arranged to operate upon the sensible heat of the solution supplied from the gas separation chamber S or the boiler B<sub>1</sub> either wholly or in part without the provision of the chimney 15 for conveying heat to this vessel

from the burner 16. The heat exchanger located between the conduits 13 and 23 may be small or even eliminated if desired, under these conditions.

5 It should also be noted that while the control for the auxiliary boiler B<sub>2</sub> and the means for supplying heat thereto is illustrated as electrical, a gas burner could be employed for this purpose and a valve either of the modulating or of the  
10 "on" and "off" type might be used for controlling the heat supplied to the auxiliary boiler B<sub>2</sub>. By suitable tests the proper location for the thermostatic control switches 38 and 39 on the condenser can be determined. If desired these  
15 switches may be operated in response to temperatures other than the condenser. The principal requirement of course is that thermostatic switches 38 and 39 be so located that at normal room temperatures the switches are both open  
20 and motor 41 is operating at a minimum speed and heater 17 is operating at a minimum temperature. As the room temperature rises so that a higher total pressure is required in the system, switch 38 should be so positioned as to respond  
25 to the higher temperature and close to increase the speed of the motor and the temperature of heater 17. At still higher room temperatures, switch 39 should be so positioned as to close and cause motor 41 and heater 17 to operate at maximum capacity.  
30

Under normal operation, that is when the condenser is at a relatively low temperature the system may be operated as follows:

Assuming heat is supplied to the main boiler  
35 B<sub>1</sub> absorption solution flows from this vessel through the conduit 11 the gas separation chamber S, the conduit 12, the lefthand chamber of the boiler B<sub>1</sub> the conduit 13, the auxiliary boiler B<sub>2</sub> the conduit 18, the absorber sections A<sub>1</sub> and A<sub>2</sub>  
40 and the conduit 23, the column R and the conduit 24, back to the righthand chamber of the boiler B<sub>1</sub>. At the same time refrigerant gas passes from the boiler B<sub>1</sub> into the gas separation chamber S, from there through the conduit 25, the analyzer rectifier R, the conduit 26, the condenser C, the  
45 conduit 28, the evaporator E, the conduit 31, and the absorber A<sub>1</sub>, where it is absorbed and flows back to the boiler with the solution through the conduit 23, the analyzer rectifier R and the conduit 24. As the weak solution passes the auxiliary boiler B<sub>2</sub> it is further weakened by the  
50 expulsion of refrigerant therefrom, this refrigerant passing through the conduit 36 in the absorber section A<sub>2</sub> where it is absorbed and returned to the boiler B<sub>1</sub>. Because of the presence of inert gas in the auxiliary boiler B<sub>2</sub>, this vessel operates  
55 at a lower refrigerant pressure than the boiler B<sub>1</sub>. Hence refrigerant can be expelled from the weaker solution therein at a lower temperature.

60 In addition to the absorption solution circuit and the refrigerant circuits mentioned above, two inert gas circuits are provided, the main circuit being between the evaporator E and the absorber A<sub>1</sub> through the conduits 30 and 31 and induced  
65 by the fan 32 while the secondary or auxiliary inert gas circuit is between the absorber section A<sub>2</sub> and the auxiliary boiler B<sub>2</sub> by means of the conduits 35 and 36, this secondary circuit being induced by the fan 37.

70 The small conduit 21 and the cup 22 located between the two absorber sections provide means for balancing the pressure between the absorber sections A<sub>1</sub> and A<sub>2</sub>. In addition to this a small gas conduit might be connected between the two inert gas systems to equalize the pressure, al-

though this is not shown in the drawing. The purpose of conduit 21, cup 22, and the small gas conduit, not shown, is three-fold. Normally, the enriched absorbent from the main absorber passes through conduit 21 into cup 22 from which it  
5 overflows into absorber A<sub>2</sub>. At the same time the main inert gas circuit is substantially cut-off from the auxiliary gas circuit. And finally, these devices permit inert gas to pass from the auxiliary circuit to the main circuit whenever it is desirable to increase the total pressure in the system,  
10 and to flow back to the auxiliary circuit when the necessity for the higher pressure no longer exists. Note that by means of the device 21 and 22, the resistance to the flow of inert gas between the two gas circuits may be made as small as desired, and that a gas flow between the two circuits takes place without affecting the normal  
15 flow of absorption fluid.

Under normal operating conditions, or at least  
20 when the ambient temperature is low, both of the thermostatic switches 38 and 39 will be open, and hence a minimum amount of current will be supplied to heater 17 and motor 41. However, if the ambient temperature increases to a value where  
25 it is desirable to increase the total pressure of the system slightly, as well as to decrease the concentration of the absorbent being supplied to the main absorber, thermal switch 38 closes and increases the current supplied to heater 17 and  
30 motor 41. Almost immediately additional ammonia is liberated in boiler B<sub>2</sub>. This additional vapor increases the system pressure and forces some of the inert gas in the auxiliary gas circuit into the main gas circuit through the liquid seal  
35 device 21, 22. The liberation of ammonia vapor in boiler B<sub>2</sub> also results in leaner absorbent being delivered to absorber A<sub>1</sub> through conduit 18. Therefore, the main absorber is able to absorb ammonia vapor carried by the inert gas flowing  
40 from the evaporator as readily as at lower room temperatures in spite of the fact the absorber is operating at a higher temperature due to the increased ambient temperature. The ammonia vapor produced by boiler B<sub>2</sub> is absorbed in absorber A<sub>2</sub>, and thus the absorbent returned to  
45 the main boiler is substantially as rich as it would be at lower room temperatures.

If the ambient temperature continues to rise, thermal switch 39 closes to increase the current  
50 to heater 17 and motor 41. Under these conditions, the system operates at a maximum total pressure, and with a maximum difference between the concentration of the liquor supplied to the main absorber and the liquor delivered to the boiler analyzer assembly, as will be readily understood from the foregoing.  
55

When the ambient temperature decreases, thermal switches 38 and 39 operate in the reverse  
60 order to that just described, and the internal pressure decreases, this latter action being accompanied with a transfer of inert gas from the main gas circuit to the auxiliary circuit.

While the control circuits for the system have been illustrated as being automatic and in response to temperatures, it is obvious that pressure operated or manually operable means might be substituted for the automatic devices shown. The system might be operated in response to observations made on thermometers, pressure  
70 gauges or other devices.

While only one embodiment of the invention has been shown and described herein, it is obvious that many changes may be made in the arrangement and construction of parts without depart-

ing from the spirit of the invention or the scope of the annexed claims.

What is claimed is:

1. In an absorption refrigerating system, a compound boiler means for heating said boiler and independent heating means for varying the temperature of a part of said compound boiler to regulate the total pressure in the system.
2. In an absorption refrigerating system, a compound boiler and means for varying the temperature of a part of said compound boiler to regulate the total pressure in the system, the means for regulating the temperature of said part being responsive to operating conditions of said system.
3. In an absorption refrigerating apparatus, a compound boiler system comprising a main boiler and an auxiliary boiler, means for causing the auxiliary boiler to operate at a lower refrigerant pressure than said main boiler, and means for heating said boilers, said heating means including a heat source located near the main boiler and means for transferring heat from said source to said auxiliary boiler, the arrangement being such that said auxiliary boiler may operate at a lower temperature than said main boiler, said heating means also including an independent heater for said auxiliary boiler.
4. In an absorption refrigerating apparatus, a compound boiler system comprising a main boiler and an auxiliary boiler, means for causing the auxiliary boiler to operate at a lower refrigerant pressure than said main boiler, and means for heating said boilers, said heating means including a heat source located near the main boiler and means for transferring heat from said source to said auxiliary boiler, the arrangement being such that said auxiliary boiler may operate at a lower temperature than said main boiler, said heating means also including an independent heater for said auxiliary boiler, said independent heater having means associated therewith for varying the temperature of the auxiliary boiler in response to operating conditions of said apparatus.
5. In an absorption refrigerating system, a main boiler, an auxiliary boiler, means for heating said auxiliary boiler, means for circulating an inert gas through said auxiliary boiler and means for regulating said heating means and said gas circulating means in response to operating conditions of said system.
6. In an absorption refrigerating system, a vessel, power driven means for circulating an inert gas through said vessel and means for regulating the flow of inert gas through said vessel in response to operating conditions of said system.
7. In an absorption refrigerating apparatus, a compound boiler system including a main boiler and an auxiliary boiler, an absorber having a plurality of sections, power driven means for circulating an inert gas between one of said absorber sections and the auxiliary boiler, and means for regulating the flow of inert gas over said circuit in response to operating conditions of said apparatus.
8. In an absorption refrigerating apparatus, a compound boiler system including a main boiler and an auxiliary boiler, an absorber having a plurality of sections, power driven means for circulating an inert gas between one of said absorber sections and the auxiliary boiler, means for heating said boilers, and means for regulating the flow of inert gas over said circuit and for regulating the temperature of said auxiliary

boiler in response to operating conditions of said apparatus.

9. That method of producing refrigeration by the aid of an air cooled absorption system charged with a refrigerant, an absorbent therefor, and a pressure equalizing medium which includes increasing the total pressure of the system in response to increased ambient temperature, and simultaneously decreasing the concentration of the refrigerant-absorbent solution in a refrigerant absorbing zone thereof without materially affecting the concentration in a refrigerant vaporizing zone.

10. That improvement in the absorption refrigeration art by means of air cooled system having a boiler assembly, a condenser, an evaporator and an absorber connected in circuit and charged with a refrigerant, an absorbent therefor, and a pressure equalizing medium, which improvement comprises providing means operable to decrease the concentration of the weak absorption solution delivered to the absorber when the temperature of the cooling medium for the heat dissipating portions of the system increases without materially varying the concentration of the rich absorption solution returned to the boiler assembly.

11. An absorption refrigeration system comprising an evaporator and absorber interconnected by an inert gas circuit, a boiler assembly connected in circuit with said absorber, and air cooled condenser means connected between said boiler and evaporator, said system containing a refrigerant, an absorbent and an inert gas, and means operable in response to increases in room temperature to increase the total internal pressure of the system by decreasing the concentration of the weak absorption solution flowing to the absorber while maintaining the concentration of the rich absorption solution being returned to the boiler assembly.

12. That method of controlling an air cooled absorption refrigeration apparatus in response to changes in the temperature of a cooling medium therefor, said apparatus being of the type having a distillation zone, a refrigerant liquefying zone, an evaporation zone, and an absorption zone and containing a refrigerant, an absorbent therefor and a pressure equalizing medium, said method comprising regulating the total internal pressure in response to cooling medium temperature change, and simultaneously regulating the concentration gradient of the absorption solution between the distillation zone and the absorption zone while maintaining the concentration of the solution entering the distillation zone.

13. An absorption refrigeration system including an evaporator, an absorber, a main inert gas circuit therebetween, an auxiliary inert gas circuit normally functioning independently of said main gas circuit but at the same pressure, means providing for the passage of inert gas between said circuits upon a change in pressure in either circuit, and means operable upon an increase in the ambient temperature to increase the pressure in said auxiliary circuit whereby inert gas flows from said auxiliary circuit to said main circuit to increase the pressure therein.

14. An absorption refrigeration system including a main absorber vessel, an auxiliary absorber vessel, a main inert gas circuit including an evaporator and said main absorber, an auxiliary inert gas circuit including a vessel for lean absorption fluid and said auxiliary absorber, means

interconnecting said main and auxiliary absorbers operable to permit liquid to flow from one absorber to the other, but normally preventing the flow of gas therebetween, and means for liberating a gas into said auxiliary gas circuit when it is desired to increase the pressure in said main inert gas circuit whereby inert gas passes from said auxiliary to said main circuit to raise the pressure therein.

15. That method of producing refrigeration by means of a system utilizing a refrigerant fluid, an absorption medium therefore, and an inert gas, which comprises applying heat to rich absorbent to liberate refrigerant vapor, condensing said vapor, conducting the liquefied refrigerant into the presence of a first body of inert gas to produce refrigeration, conducting the mixture of refrigerant vapor and inert gas into the presence of weak absorbent solution whereby the solution is enriched, returning the inert gas into the presence of more liquid refrigerant and the enriched solution to the heating zone, and diverting a part of the refrigerant vapor from said heating upon an increase in the room temperature above a predetermined value into a second body of inert gas in restricted communication with said first body whereby the pressure increase in said second body of gas drives some of the gas into said first body to increase the total internal pressure of the system.

16. The method of producing refrigeration defined in the preceding claim characterized by the fact that the amount of refrigerant vapor which is diverted into said second body of inert gas is regulated in accordance with changes in the room temperature.

17. The method of producing refrigeration defined in claim 15 characterized by the fact that as the room temperature increases the concentration of the lean absorbent solution delivered into the presence of the gaseous mixture is made weaker whereby it is enabled to more readily absorb the refrigerant vapor from said gaseous mixture.

18. An air cooled absorption refrigeration system having a boiler assembly, a condenser, an absorber and an evaporator connected in circuit and charged with a refrigerant, an absorbent therefor and a pressure equalizing medium, said system having means including thermally responsive means subject to changing temperature conditions of a heat rejecting portion of said system due to fluctuating cooling air temperature and operable to regulate the total internal pressure and the concentration of the absorbent in the absorber independently of the concentration of the rich solution discharged by the absorber in accordance with the changing temperature of said heat rejecting portion of the system.

19. An absorber assembly for an absorption refrigeration system comprising means dividing the same into a main absorber and an auxiliary absorber chamber, means providing for liquid flow between the two chambers while maintaining a liquid seal therebetween, means for supplying an absorption liquid to one chamber and withdrawing it from the other, means for supplying an absorbable fluid to each of said chambers, said means providing for liquid flow between the two

chambers including means for equalizing pressure differences between the main and auxiliary chambers without interfering with the liquid flow therebetween.

20. That improvement in the absorption refrigeration art by means of an air cooled system having a boiler assembly, a condenser, an evaporator and an absorber connected in circuit and charged with a refrigerant, an absorbent therefor, and a pressure equalizing medium, which improvement comprises providing means operable to vary the concentration of the weak absorption solution delivered to the absorber as the temperature of the cooling medium for the heat dissipating portions of the system varies without materially varying the concentration of the rich absorption solution returned to the boiler assembly, and simultaneously varying the internal total pressure over a wider range than the variation resultings solely because of the change in cooling medium temperature.

21. An absorption refrigeration system comprising a combustible fuel heated boiler assembly, a condenser, an evaporator and an absorber connected in circuit so as to provide a refrigerant medium circuit, an absorption solution circuit and a pressure equalizing medium circuit, said system containing a refrigerant, an absorbent medium therefor and a pressure equalizing medium, a fuel burner positioned to heat said boiler, said absorber and said condenser being constructed to be cooled by a cooling medium, and means, including thermally responsive means, for increasing the total internal pressure of said system over and above that caused by external temperature rises in response to increases in the temperature of the cooling medium, said first mentioned means being operable to increase the total pressure without substantially modifying the heat supplied to said boiler or the concentration of the absorption solution returning to said boiler.

22. An absorption refrigeration system of the type having a compound boiler, a condenser, an evaporator and an absorber connected in circuit and charged with a refrigerant, an absorbent medium and an inert gas, said absorber and said condenser being constructed to be cooled by a cooling medium, said compound boiler including a main boiler and an auxiliary boiler, separate heating means for each of said boilers, and means for controlling the heat supplied to said auxiliary boiler in response to changes in temperature conditions of said cooling medium.

23. An absorption refrigeration system of the type having a main boiler, an auxiliary boiler, a condenser, an evaporator and an absorber connected in circuit, and charged with a refrigerant, an absorbent medium and an inert gas, said circuit including an absorption solution circuit between said main boiler, auxiliary boiler and absorber, an inert gas circuit between said evaporator and absorber, an inert gas circuit between said auxiliary boiler and absorber, means for circulating the absorption solution in its circuit, and means for regulating the heat supplied to one of said boilers in response to changes in external temperatures affecting the internal conditions of said system.

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