July 29, 1941. G. A. BRACE 2,250,944

REFRIGERATION

Filed July 20, 1938 2 Sheets-Sheet 1

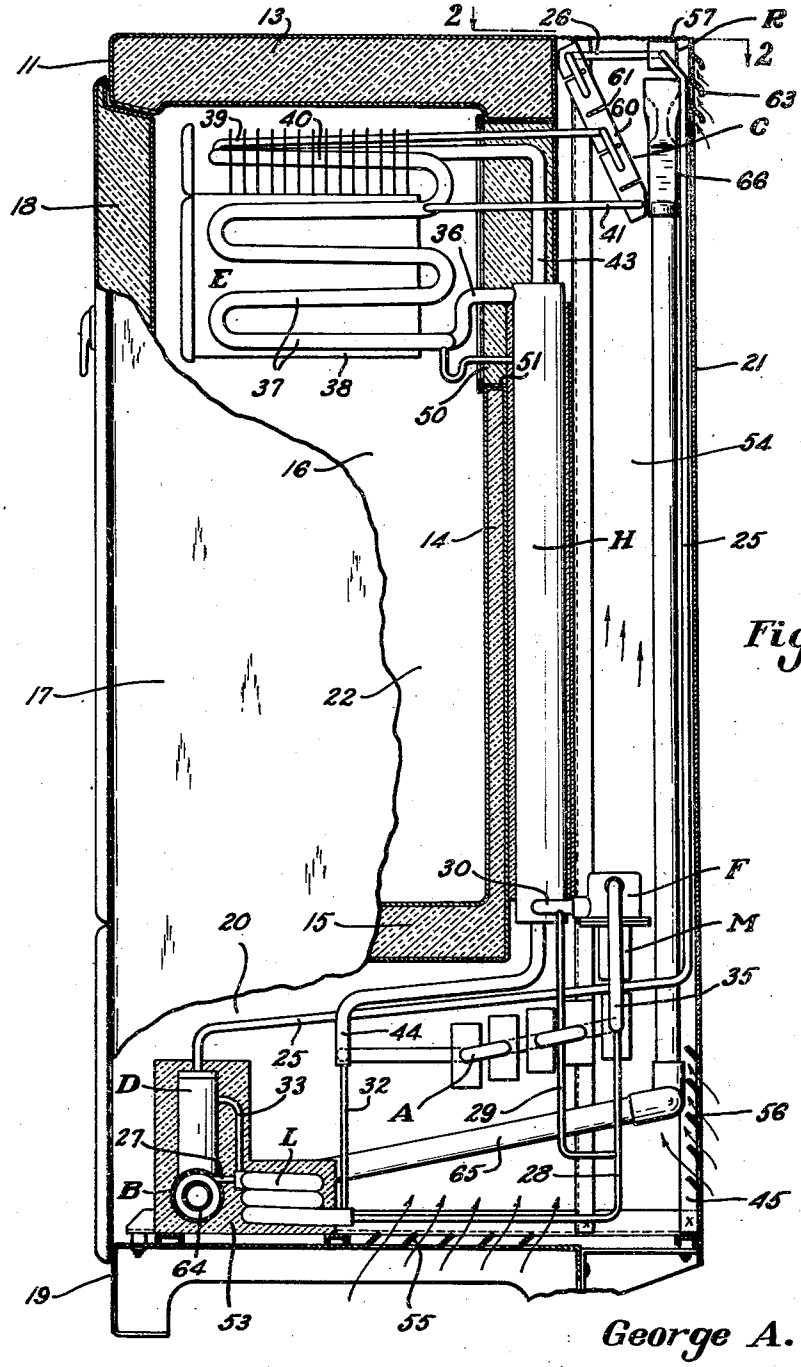


Fig. 1

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REFRIGERATION

Filed July 20, 1938 2 Sheets-Sheet 2

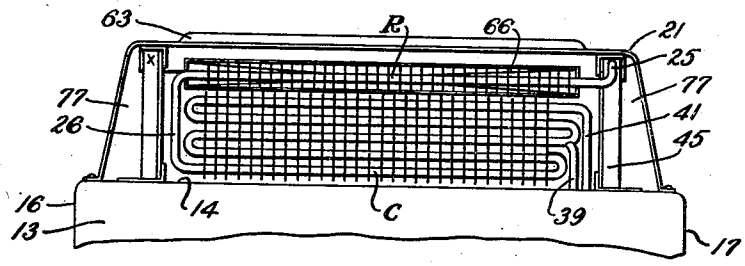


Fig. 2

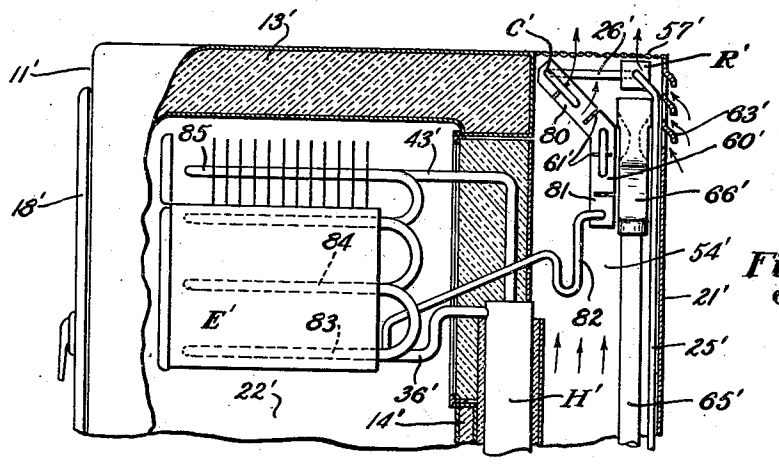


Fig. 3

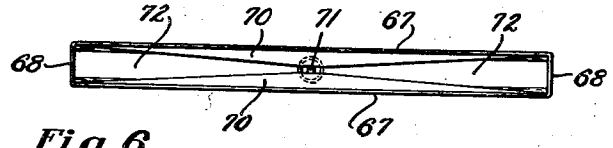


Fig. 6

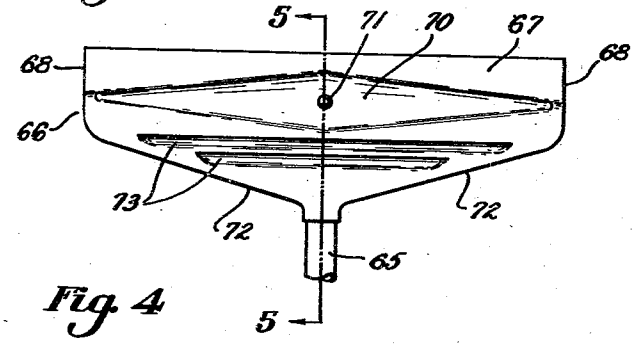


Fig. 4

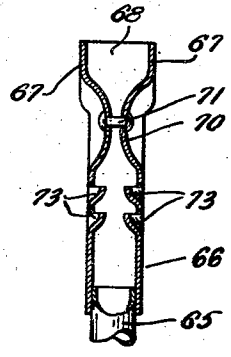


Fig. 5

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Patented July 29, 1941

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UNITED STATES PATENT OFFICE

2,250,944

REFRIGERATION

George A. Brace, Winnetka, Ill., assignor to The Hoover Company, North Canton, Ohio, a corporation of Ohio

Application July 20, 1938, Serial No. 220,194

21 Claims. (Cl. 62—119.5)

This invention relates to absorption refrigerating systems and more particularly to a novel arrangement of certain air cooled portions of such systems.

Previous air cooled refrigerating systems have the disadvantage that the condenser and rectifier are positioned in such fashion that the cooling air flowing over the hot rectifier will later contact the condenser which should be cooler than the rectifier, the condenser and rectifier are positioned so that they tend to increase the refrigerating load by heating the food compartment walls, the flue gases are discharged in a concentrated hot stream from the top rear portion of the refrigerator cabinet, and the rectifier cooling system has not been designed to pemit that element to operate properly under normal operating conditions.

Accordingly, it is an object of this invention to provide an air cooled refrigerating system having the cooling system thereof so arranged that cooling air does not pass successively over a plurality of portions of the condenser or over the rectifier and condenser serially.

It is another object of this invention to arrange the condenser and rectifier in such fashion that the heating effects thereof will be highly efficiently utilized to produce cooling air flow without increasing the refrigerating load by heating the food storage compartment.

It is another object of the invention to minimize heating of the refrigerating compartment walls by cooling air which has been heated by passage over warm parts of the refrigerating system.

It is a further object of the invention to shield the walls of the refrigerating chamber from radiant heat emanating from the warm elements of the refrigerating apparatus.

It is a further object of this invention to provide means whereby the gases of combustion discharged from the boiler of the refrigerating system are discharged over a wide area at the top portion of the refrigerating cabinet, or at a temperature low enough not to be objectionable, and are utilized to regulate the operation of a rectifier which is positioned as remotely as possible from the insulated wall of the storage compartment.

Other objects and advantages of the invention will become apparent as the description proceeds when taken in connection with the accompanying drawings in which:

Figure 1 is a partial cross-sectional view of an absorption refrigerating system embodying the invention.

Figure 2 is a top plan view of Figure 1 taken along the line 2—2 thereof.

Figure 3 is a partial sectional elevation of a modified form of the invention.

Figure 4 is an elevational view of a flue distributing mechanism.

Figure 5 is a sectional view taken substantially on the line 5—5 of Figure 4, and

Figure 6 is a plan view of Figure 4.

Referring now to the drawings in detail and first to Figure 1 thereof, there is illustrated a refrigerator comprising a cabinet 11 having insulated top, rear and bottom walls 13, 14 and 15, respectively, which cooperate with insulated side walls 16 and 17 to form an insulated storage compartment 22 which is closed at its front by an insulated door 18. The cabinet 11 is mounted upon a supporting base element 19 and in spaced relation thereto to form a mechanism compartment 20 beneath the insulated wall 15. A rear channel-shaped element 21 is attached to the end portion of the wall 14 and extends downwardly to the level of the top portion of the base plate 19 to form a cooling air duct with the rear wall 14.

The refrigerating system illustrated is the three fluid continuous absorption type, but the invention may be applied to other types of refrigerating systems. The refrigerating system comprises a boiler B, an analyzer D, a tubular finned air cooled rectifier R, a tubular finned air cooled condenser C, an evaporator E, a gas heat exchanger H, a tubular finned air cooled absorber A, a liquid heat exchanger L, and a circulating fan F which is driven by an electrical motor M. These elements are suitably connected by various conduits to form a complete refrigerating system including a number of gas and liquid circuits which will be referred to in detail hereinafter.

The refrigerating system just described will be charged with a suitable refrigerant, such as ammonia, a suitable absorbent, such as water, and an inert pressure equalizing medium, such as nitrogen.

The boiler B is heated in any suitable manner, for example, by means of a gas burner. The heater for the boiler and the circulating motor M may be controlled in any desired manner to maintain proper refrigerating conditions in the evaporator and within the storage compartment 22.

The boiler B normally contains a solution of the refrigerant in an absorbent which liberates refrigerant vapor when subjected to heat. The

refrigerant vapor liberated in the boiler passes upwardly through the analyzer D in counterflow relationship to strong solution flowing downwardly therethrough. Additional refrigerant vapor is liberated from the strong solution by the heat of condensation of absorption solution vapor generated in the boiler. The refrigerant vapor then passes upwardly through a conduit 25 to the rectifier R in which any absorption solution vapor which may pass through the analyzer is condensed and is returned through the conduit 25 to the analyzer. The purified refrigerant vapor is conveyed from the rectifier to the top portion of the air cooled condenser C by a conduit 26.

The weak solution formed in the boiler by the generation of refrigerant vapor is conveyed therefrom to the upper portion of the tubular air cooled absorber A by a conduit 27, the inner pass of the liquid heat exchanger L, and a conduit 28. It is apparent that the upper portion of the absorber is at an elevation above the free surface of the liquid in the boiler-analyzer system, wherefore the weak solution must be pumped upwardly to the absorber. For this purpose, a gas bleed-off conduit 29 is connected between the discharge conduit 30 of the circulating fan F and the weak solution conduit 28 below the free surface of the liquid therein, whereby the liquid is elevated into the absorber by gas lift action.

The weak absorption solution flows downwardly through the absorber in counterflow relationship to rich pressure equalizing medium which passes upwardly therethrough and absorbs the refrigerant vapor content therefrom. The heat of absorption is rejected to the air flowing over the absorber and the resulting strong solution is returned to the upper portion of the analyzer D through a conduit 32, the outer pass of the liquid heat exchanger L, and a conduit 33.

The lean pressure equalizing medium formed in the absorber is conveyed therefrom to the suction inlet of the fan F by a conduit 35. The pressure equalizing medium is placed under pressure by the circulating fan and is conveyed therefrom through a conduit 30, the gas heat exchanger H and a conduit 36 to the ice freezing coil 37 of the evaporator E. The refrigerant vapor supplied to the condenser is liquified therein by heat exchange with the cooling air. That portion of the liquid formed in the upper portion of the condenser is discharged therefrom through a conduit 39 to the finned box cooling section 40 of the evaporator. The refrigerant vapor liquified in the lower portion of the condenser is conveyed therefrom to the upper portion of the evaporator section 37 by a conduit 41. The pressure equalizing medium discharged through the conduit 36 flows upwardly through the coil 37 counter to the liquid refrigerant which is flowing downwardly therethrough as it evaporates into the gas stream to produce refrigeration. The pressure equalizing medium then flows through the evaporator conduit 40 in counterflow relationship to liquid refrigerant supplied thereto through the conduit 39 which evaporates to cool the box-cooling element 40. The rich pressure equalizing medium formed in the evaporator is returned therefrom to the absorber through the conduit 43, the gas heat exchanger H, and a conduit 44 which enters the lower portion of the absorber adjacent its point of connection with the rich solution return 32. The rich pressure equalizing medium flows upwardly through the absorber counter to the absorption solution in the manner previously described.

The evaporator E is diagrammatically illustrated and may be of any desired type, for example, it may be of the type disclosed in the patent to Hainsworth 1,958,573 of May 15, 1934. Any suitable casing and ice tray supporting structure, designated generally at 38, may be attached to the ice freezing coils 37.

All elements of the refrigerating apparatus are mounted upon a suitable L-shaped frame, designated generally at 45, which rests on the base support 19 and extends upwardly at the sides of the flue formed by the element 21. All elements of the refrigerating system are suitably attached to this frame by means not shown. Also mounted upon this frame is a panel element 50 positioned directly behind the evaporator and through which the conduits 36, 39, 41 and 43 extend. The panel 50 is designed to be inserted in a window opening 51 formed in the rear wall 14 of the refrigerating compartment. The arrangement is such that the entire refrigerating system is inserted into the cabinet structure from the rear. The boiler absorber structure enters the compartment 20 and the evaporator passes through the opening 51. When the apparatus is sufficiently inserted the panel 50 closes the opening 51, thereby forming a continuation of the wall 14 and completing the rear wall of the compartment 22.

The arrangement of the various elements of the refrigerating system will now be described. The boiler-analyzer and liquid heat exchanger structure is totally encased in a body of insulating material 53 which is positioned at the forward portion of the compartment 20. The air cooled absorber is inclined slightly downwardly towards the front of the compartment 20 and is positioned with its rear end projecting beneath the air cooling flue 54 which is formed by the wall 14 and the panel 21. The gas heat exchanger H is suitably insulated and is partially received in a channel formed in the insulation of the wall 14 and the window 50.

Cooling air is admitted through louvres 55 formed in the top portion of the base element 19 and through louvres 56 formed in the rear bottom portion of the panel 21. This cooling air sweeps upwardly through the rear portion of the compartment 20 into the cooling flue 54 through which it travels in contact with the condenser C after first cooling the absorber A.

The condenser C is positioned as high as possible within the flue 54 without contacting the reticulated top plate 57 thereof. The top portion of the condenser, which is the warmest part thereof, is positioned adjacent the top inner corner of the flue 54 and the condenser is inclined downwardly and outwardly therefrom whereby those portions of the condenser directly in the rear of the compartment 22 are spaced from the rear wall thereof to minimize heating of that wall by the condenser. Also by this arrangement cooling air passing over one portion of the condenser does not thereafter travel over another portion thereof, all portions of the condenser are swept by relatively cool air which has not undergone any heating effect except that produced by the absorber, and heating of the wall 14 by cooling air is minimized.

The rectifier, which is the hottest portion of the cooling system, is positioned in the top outer corner of the flue 54; that is, the rectifier is positioned as remotely as possible from the rear wall of the refrigerating compartment, whereby that compartment is not heated by the rectifier.

It will be noted that the condenser forms a shield for any radiant heat which might be discharged by the rectifier in the direction of the refrigerating compartment and any cooling fluid which is passed over the rectifier is immediately discharged through the reticulated plate 57 into the room housing the refrigerator.

The condenser is preferably of the finned tubular air cooled type and, as shown, all condenser tubes pierce continuous fins 60, which are provided with deep slots 61 between adjacent condenser tubes to prevent heat transfer from hotter to colder portions of the condenser through the fins.

The double condenser construction illustrated permits the use of a relatively deep condenser without lowering the evaporator unduly in the compartment 22, whereby ample heat transfer area is provided without interfering with proper positioning of the evaporator in the cabinet.

Additional cooling air may be introduced into the flue 54 through louvres 63 formed in the top rear wall thereof just beneath the rectifier R if necessary to cool the rectifier and to cool down the warm gases discharging through the plate 57.

The waste products of combustion in the boiler B pass through the central tube 64 thereof and are conveyed through the mechanism compartment and up the flue 54 through a conduit 65 which terminates in a flue gas distributor 66 extending the full width of the flue 54 beneath the rectifier R.

The structure of the flue gas distributor is illustrated in detail in Figures 4 to 6. The distributor comprises an elongated sheet metal receptacle 66 provided with side walls 67 and end walls 68. The side walls are bulged inwardly as indicated at 70 and are secured by a rivet or other suitable fastening means 71 at the center of the element 66. The bulges 70 taper outwardly from the center of each of the walls 67 to the ends thereof, thereby presenting a gas flow path of progressively increasing unit cross-sectional area away from the central portion of the distributor 66 which is directly above the conduit 65 to which flue gases are supplied. The bottom walls 72 of the distributor 66 are tapered downwardly to the junction between the conduit 65 and the distributor 66. Additionally, the walls 67 may be provided with louvres 73 to permit cooling air to flow into the distributor 66 and to there dilute and reduce the temperature of the flue gases. Due to the structure of the flue gas distributor, there is a substantially uniform gas discharge from the upper end thereof.

The necessity for the louvres 73 will depend largely upon individual conditions and the nature of the fuel utilized to heat the boiler. Under some conditions, the gas discharges from the flue gas distributor at too high a temperature to permit proper operation of the rectifier; also some fuels produce very large quantities of water vapor in the flue gases which will condense unless its concentration is reduced or the temperature is maintained at very high value. If either of these conditions prevail, it is desirable to introduce air into the flue gas distributor to mix with the products of combustion to regulate the temperature thereof and to reduce the vapor pressure of water contained in such product.

The arrangement of the flue gas distributor beneath the rectifier is highly advantageous for the reason that it provides a means whereby proper quantities of heat may be removed from the rectifier without causing condensation of ammonia vapor therein which results in waste of heat. It has been found that it is advantageous to have an elongated finned conduit and to reject heat from all portions of this conduit, but if the ordinary cooling air in the flue 54 were allowed to flow over this rectifier there would be too much cooling and consequent condensation of ammonia. For these reasons the present invention provides a structure whereby the temperature of the rectifier is maintained substantially constant by the gases discharging from the flue gas distributor 66, but the temperature of the rectifier is maintained sufficiently high to prevent condensation of ammonia vapor without interferring with proper condensation of absorption solution vapor. This is highly desirable because even small quantities of absorption solution vapor in the refrigerant vapor discharged into the condenser introduce serious difficulties into the condenser and the evaporator.

As illustrated, the condenser stops a considerable distance short of the panel 21; however, the inclination of the condenser may be increased or the depth of the flue 54 may be decreased to position the bottom portion of the flue gas distributor 66 above the bottom portion of the condenser without interfering with proper operation of the apparatus. With these constructions it would be necessary to carry the conduit 65 upwardly through the corner section 77 of the flue 54 to the level of the flue gas distributor and to then divert that conduit laterally to the bottom central portion of the distributor 66.

A considerable quantity of heat is radiated from the boiler-analyzer, absorber, rectifier, condenser, flue and conduit structures despite the insulation provided for some of these elements. This heat is largely absorbed by the bottom and rear walls 14 and 15, respectively, of the cabinet and forms an appreciable part of the refrigerating load. In order to relieve the refrigerating system of this undesirable load, the rear plate 90 of the insulated wall 14 and the bottom plate 91 of the insulated wall 15 are constructed of material which will reflect radiant heat. The panels 90 and 91 may be constructed of polished stainless steel, for example. By this construction the panels 90 and 91 function as structural elements of the cabinet, as insulation retaining walls and as radiant heat reflecting shields whereby they effectively prevent absorption of radiant heat by the walls of the refrigerated chamber.

A modification of the invention is disclosed in Figure 3. Certain portions of this structure are identical with elements previously described in connection with Figure 1 and are given the same reference characters primed. This apparatus is designed to be utilized with the refrigerating system disclosed in connection with Figure 1 except in respects to be noted below, and for this reason complete duplicate illustration has not been resorted to.

The condenser C' is of the tubular air cooled finned type but it is a single element having an inclined portion 80 and a vertically extending portion 81. Refrigerant vapor liquefied in the condenser is conveyed therefrom through a conduit 82 to the bottom portion 83 of the ice freezing evaporator section 84. In this evaporator the propelled stream of inert gas circulating upwardly therethrough conveys the liquid refrigerant from the bottom to the top thereof as it is evaporating into the inert gas stream to produce refrigeration. A full explanation of this

phenomena will be found in the co-pending application of William H. Kitto and Curtis C. Coons, Serial No. 220,189 filed July 20th, 1938. The inert gas and liquid refrigerant circulates through the evaporator section 84 into the box cooling section 85 which is provided with suitable air cooling fins. From the evaporator section 85 the rich pressure equalizing medium is returned to the absorber through the conduit 43'.

The fins 60' for the condenser are identical with the fins 60 previously described except that they are formed with an angle bend to conform to the shape of the condenser.

In this form of the invention the inclination of the inclined part of the condenser is very steep and a greater space is provided between the condenser C' as a whole and the rear wall of the compartment 22' than is provided between the condenser C and the rear wall of the compartment 22.

If desired, the flue gas distributor may be placed in the bottom portion of the air flue 54 whereby the hot gases discharged therefrom will increase the chimney effect of the flue with consequent increase in air flow over the absorber and condenser. Such a construction is particularly desirable under conditions such that absorber cooling is difficult. The flue gases increase the flow of cooling air over the absorber without increasing the temperature thereof and the waste heat from the boiler heating system is utilized to increase the system efficiency. The cooling air flowing over the condenser is increased in temperature and volume by this construction but the operation of the system is not impaired thereby because the increased volume of cooling medium tends to offset the increased temperature thereof and the condenser is not as difficult to cool as the absorber.

The flue gas temperature rises with rising air temperature, but this automatically regulates the rectifier as rising air temperatures cause the system pressure to increase which raises the condensing temperature of the absorbent vapor and refrigerant vapor in the rectifier. Consequently, the flue gas distributor regulates the rectification for prevailing conditions.

A further advantage of the present invention results from the fact that the temperature of the flue gases are not affected by sudden drafts of cold air which may find their way into the cooling system of the refrigerator. Such drafts are not objectionable from the standpoint of condenser or absorber cooling but they cause loss of heat by condensation of refrigerant vapor if they are permitted to strike the rectifier and to lower the temperature thereof. Thus the flue gas distributor tends to maintain the rectifier temperature above that of the cooling air and at a substantially constant value.

The invention herein disclosed provides an arrangement whereby efficient cooling of all air cooled parts of the refrigerator is provided without increasing the load on the refrigerating system due to heat applied to the rear wall of the storage compartment from the condenser, rectifier, air stream or flue gases, and additionally, the hottest portions of the cooling system are positioned most remotely from the refrigerating compartment. In addition to these desirable features, provision is made for simultaneously tempering the flue gases to prevent concentrated discharge of hot products, to prevent condensation of water vapor within the flue distributing system, and to regulate the temperature of the rectifier so that the same operates under substantially constant conditions with consequent improvement in efficiency, ease of design, and thorough elimination of objectionable absorption solution vapor from the refrigerant vapor stream enroute to the condenser.

While the invention has been disclosed in considerable detail, it is not limited to the details of construction shown or described but may be embodied in other constructional forms and variations without departing from the spirit thereof or the scope of the appended claims.

I claim:

1. Refrigerating apparatus comprising a cabinet, means forming a cooling air duct with one wall of said cabinet, a condenser positioned in said air duct and extending substantially to the top wall of said cabinet, a rectifier mounted in the top rear portion of said air duct and connected to said condenser, means for supplying refrigerant vapor to said rectifier, an evaporator in said cabinet, and means for conveying refrigerant liquid from said condenser to said evaporator.

2. Refrigerating apparatus comprising a cabinet, means forming a cooling air duct with one wall of said cabinet, a condenser positioned in the top portion of said air duct, a rectifier mounted in the top rear portion of said air duct and connected to said condenser, means for supplying refrigerant vapor to said rectifier, an evaporator in said cabinet, and means for conveying refrigerant liquid from said condenser to said evaporator, said condenser being inclined downwardly from the top to the bottom portion thereof and in a direction away from the wall of said compartment.

3. Refrigerating apparatus comprising a cabinet, means forming a cooling air duct with one wall of said cabinet, a condenser positioned in the top portion of said air duct, a rectifier mounted in the top rear portion of said air duct and connected to said condenser, means for supplying refrigerant vapor to said rectifier, an evaporator in said cabinet, and means for conveying refrigerant liquid from said condenser to said evaporator, said condenser comprising an upper portion inclined downwardly and outwardly away from the rear wall of said compartment and a depending lower portion which is positioned in spaced relationship to the rear wall of said compartment, and means for conveying liquid refrigerant from the lower portion of said condenser to the lower portion of said evaporator.

4. Refrigerating apparatus comprising a cabinet, means forming a cooling air duct with one wall of said cabinet, a condenser positioned in the top portion of said air duct, a rectifier connected to said condenser mounted in the upper portion of said air duct and rearwardly of said condenser, and means for supplying refrigerant vapor to said rectifier, an evaporator in said cabinet, and means for conveying refrigerant liquid from said condenser to said evaporator, said apparatus also including a tubular air cooled absorber having a portion thereof extending beneath the bottom portion of said cooling duct, a mechanism compartment beneath said refrigerating compartment housing said absorber, means for admitting cooling air into said mechanism compartment beneath said absorber, and means for admitting cooling air into said duct from the outside wall thereof and beneath the level of said absorber.

5. Refrigerating apparatus comprising a cab-

inet, means forming a cooling air duct with one wall of said cabinet, a condenser positioned in the top portion of said air duct, a rectifier mounted in said air duct and connected to said condenser, means for supplying refrigerant vapor to said rectifier, an evaporator in said cabinet, and means for conveying refrigerant liquid from said condenser to said evaporator, said means for supplying refrigerant vapor to said rectifier including a boiler, means for conveying products of combustion from said boiler through said duct and out of contact with air flowing therethrough, said products of combustion discharge means including an elongated discharge element positioned directly beneath said rectifier and shaped to discharge flue gases substantially uniformly over the entire area thereof.

6. Refrigerating apparatus comprising a cabinet, means forming a cooling air duct with one wall of said cabinet, a condenser positioned in the top portion of said air duct, a rectifier mounted in the upper portion of said air duct and connected to said condenser, means for supplying refrigerant vapor to said rectifier, an evaporator in said cabinet, and means for conveying refrigerant liquid from said condenser to said evaporator, said means for supplying refrigerant vapor to said rectifier including a boiler, means for conveying products of combustion from said boiler through said duct and out of contact with air flowing therethrough, said products of combustion discharge means including an elongated discharge element positioned directly beneath said rectifier and shaped to discharge flue gases substantially uniformly over the entire area thereof, and means for introducing cooling air into said products of combustion prior to the discharge thereof over said rectifier.

7. A flue gas distributing apparatus adapted for use in absorption refrigerating systems comprising an elongated shallow sheet metal receptacle, means for introducing gases to be distributed into the bottom central portion of said receptacle, a tapering indentation formed in opposite side walls of said receptacle and tapering away from each other from the central portion of said receptacle to the end portions thereof, and elongated slots formed in the side walls of said receptacle.

8. That improvement in the art of refrigeration which includes the step of burning fuel in heat exchange relationship to a solution of refrigerant in an absorbent to liberate refrigerant vapor therefrom, directing the waste products of combustion of the fuel and a cooling medium into heat transfer relation with the liberated vapor to condense absorbent vapors from said refrigerant vapor, liquifying the purified refrigerant vapor in heat exchange relationship with cooling air, and evaporating the liquid to produce refrigeration.

9. Absorption refrigerating apparatus including a boiler, a burner for heating said boiler, a distributing device connected to receive waste products of combustion from said burner, a rectifier connected to receive vapor from said boiler and mounted to be swept by gases discharged by said distributor, cooling fins on said rectifier, and means for introducing air into said products of combustion.

10. That improvement in absorption refrigeration apparatus of the type utilizing an air-cooled rectifier between the boiler and the condenser of such apparatus for the purpose of condensing absorbent fluid vapors present in refrigerant vapors passing through the rectifier on the way from the boiler to the condenser, which improvement comprises maintaining a uniform temperature condition at said rectifier by directing a gaseous stream having a substantially uniform temperature slightly higher than the prevailing ambient temperature over and in heat transfer relationship with the rectifier for the purpose of absorbing the heat of condensation of the absorbent vapor.

11. In combination with an absorption refrigerating apparatus including a boiler, a combustible fuel burner arranged to heat said boiler and a waste products of combustion offtake conduit, a flue gas distributing apparatus including an elongated receptacle connected to receive waste products in its lower portion from said conduit, a tapering indentation formed in opposite side walls of said receptacle and tapering away from each other from the central portion of said receptacle to the end portions thereof, and elongated slots formed in the side walls of said receptacle.

12. In combination with an absorption refrigerating apparatus including a boiler, a combustible fuel burner arranged to heat said boiler, a cabinet including a cooling air passageway and a waste products of combustion offtake conduit, a flue gas distributing apparatus mounted in the upper portion of said passageway including an elongated receptacle connected to receive waste products in its lower portion from said conduit, a tapering indentation formed in opposite side walls of said receptacle and tapering away from each other from the central portion of said receptacle to the end portions thereof, and elongated slots formed in the side walls of said receptacle.

13. In combination with an absorption refrigerating apparatus including a boiler, a combustible fuel burner arranged to heat said boiler, a cabinet including a cooling air passageway and a waste products of combustion offtake conduit, a flue gas distributing apparatus mounted in the upper portion of said passageway including an elongated receptacle connected to receive waste products in its lower portion from said conduit, a tapering indentation formed in opposite side walls of said receptacle and tapering away from each other from the central portion of said receptacle to the end portions thereof, elongated slots formed in the side walls of said receptacle, said absorption refrigerating apparatus including a heat rejecting portion mounted in said passageway above said flue distributor to be swept with the gases discharged therefrom.

14. Absorption refrigerating apparatus including a boiler, an evaporator, a plurality of heat rejecting elements, means connecting said boiler, evaporator and heat rejecting elements in circuit to form a refrigerating system, fuel burning means for heating said boiler, means for directing waste products of combustion from said boiler into contact with one of said heat rejecting elements, and means for introducing cooling air into said waste products prior to contact with said one heat rejecting element.

15. That improvement in the art of refrigeration which includes the steps of expelling vapor from a solution of refrigerant in an absorbent, directing a cooling medium in heat transfer relationship with said vapor to condense absorbent vapor from refrigerant vapor, directing another cooling medium into heat exchange relationship with the so purified vapor to liquefy the same,

evaporating the liquid to produce refrigeration and maintaining the temperature of the first cooling medium substantially constant independently of sudden changes in the temperature of the second cooling medium.

16. Absorption refrigerating apparatus comprising a boiler, a rectifier, a condenser, an evaporator and an absorber connected in circuit, means for cooling said rectifier and means for tempering said cooling means with waste heat from said boiler to maintain the temperature of said rectifier between the condensing temperatures of the refrigerant and the absorbent.

17. In an absorption refrigerating apparatus including a boiler, and an air-cooled rectifier, means for heating the boiler by means of a combustible fuel and means for leading the products of combustion away from said boiler and for directing the same into heat exchange relation with said air-cooled rectifier.

18. An absorption refrigerating apparatus comprising a cabinet having an apparatus compartment and a food storage compartment, a boiler, an absorber, a rectifier and a condenser in said apparatus compartment, a cooling unit in said food storage compartment, said rectifier and condenser being connected serially between said boiler and said cooling unit, means providing for the circulation of air over the absorber, rectifier and condenser to cool the same, means for heating the boiler by means of a combustible fuel and means for conducting products of combustion into heat exchange relation with said rectifier to vary the cooling effects of said air.

19. In an absorption refrigerating apparatus including a boiler, an absorber, a rectifier, a condenser and an evaporator, means for circulating an inert medium in a closed circuit between the evaporator and absorber, means for circulating absorption solution in a closed circuit between the boiler and absorber, means for heating said boiler, said rectifier and said condenser being connected serially between said boiler and said evaporator, means providing for the circulation of room air over said rectifier, and means utilizing waste heat from the boiler for compensating for changes in room temperature so as to maintain the temperature of the rectifier independently of room temperature.

20. The process of distilling and rectifying a solution of a solute in a solvent in which the solute has a lower boiling temperature than the solvent, said process comprising applying heat to said solution in a distillation zone to liberate the solute in vapor form, conducting said vapor and any vapor of the solvent which may be liberated to a rectification zone, cooling said vapor by flowing a cooling medium in heat exchange relation therewith in said rectification zone to condense the vapor of the solvent and utilize the heat of condensation of the solvent to re-evaporate any vapor of the solute which may be condensed and leading waste heat from said distillation zone to said rectification zone to maintain its temperature between the boiling temperatures of the solute and solvent.

21. That improvement in the art of absorption refrigeration which includes the steps of applying heat to a solution of a refrigerant in an absorbent having a higher boiling temperature to liberate the refrigerant in vapor phase, removing absorbent vapor from the refrigerant vapor by conducting the vapor mixture into heat transfer relation with a cooling medium, and maintaining the temperature of the vapor mixture undergoing cooling at a value between the boiling points of the refrigerant and the absorbent by subjecting such vapors to heat wasted in the vaporizing step.

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