Jan. 11, 1944. N. ERLAND AF KLEEN 2,338,712

BOILER-ABSORBER ASSEMBLY

Filed Jan. 19, 1942 4 Sheets-Sheet 1

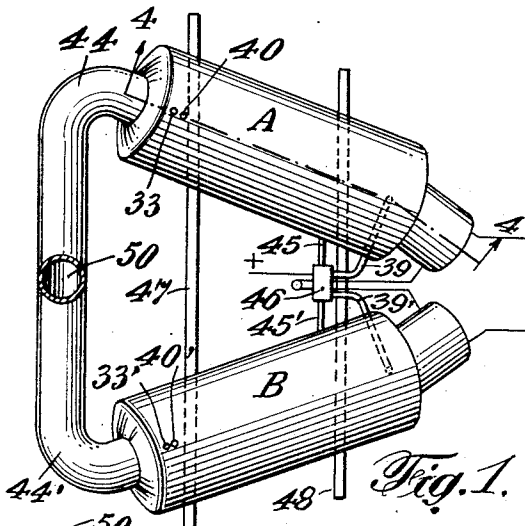

Fig. 1.

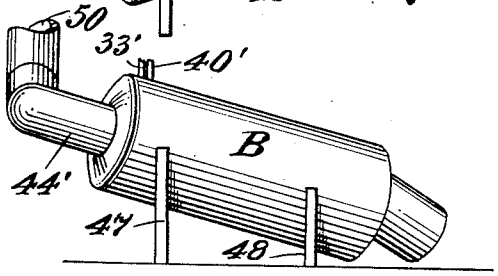

Fig. 2.

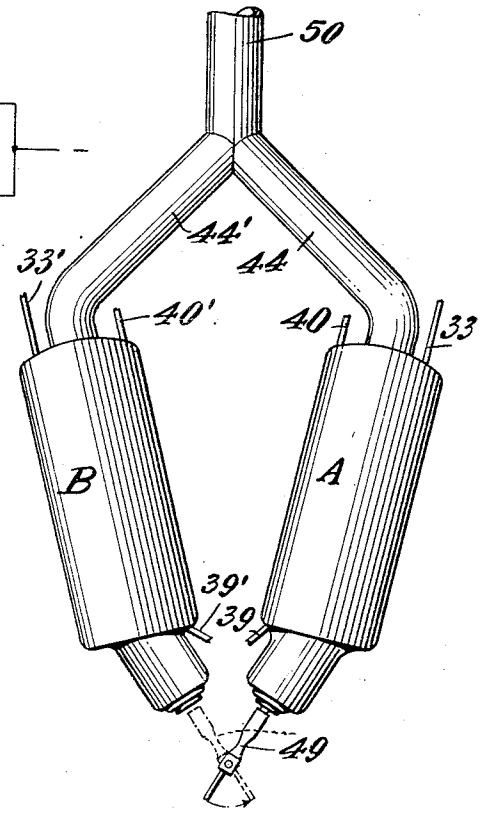

Fig. 8.

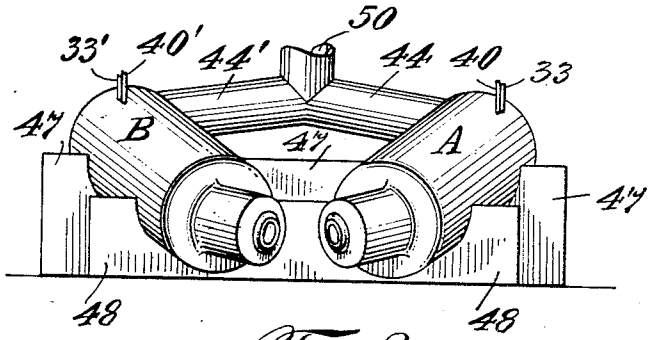

Fig. 3.

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BOILER-ABSORBER ASSEMBLY

Filed Jan. 19, 1942 4 Sheets-Sheet 2

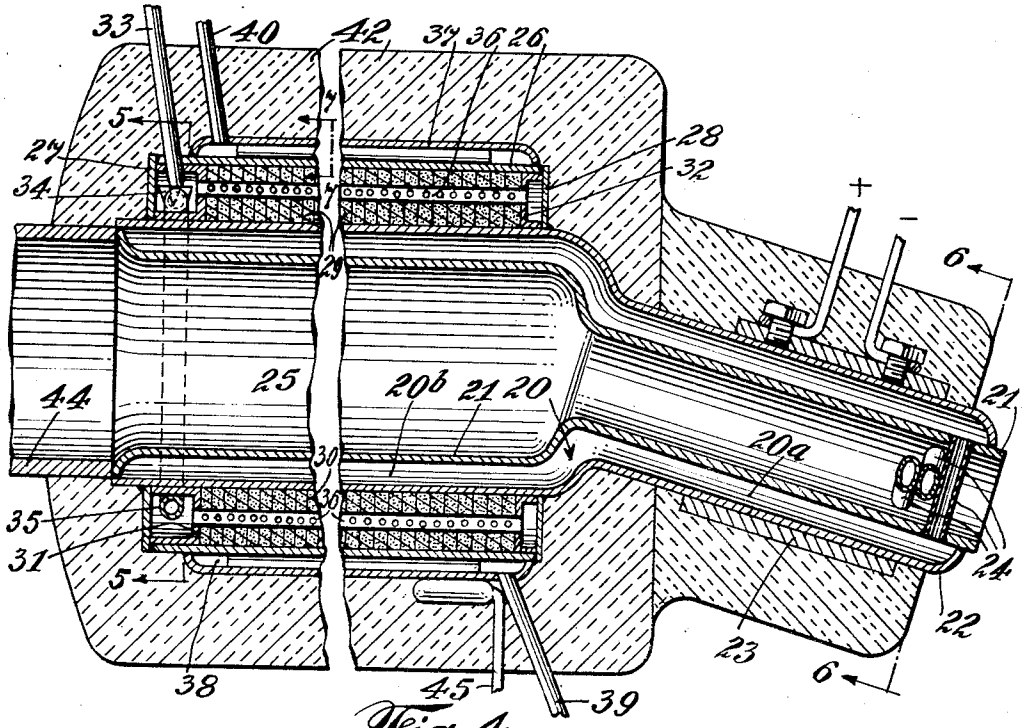

Fig. 4.

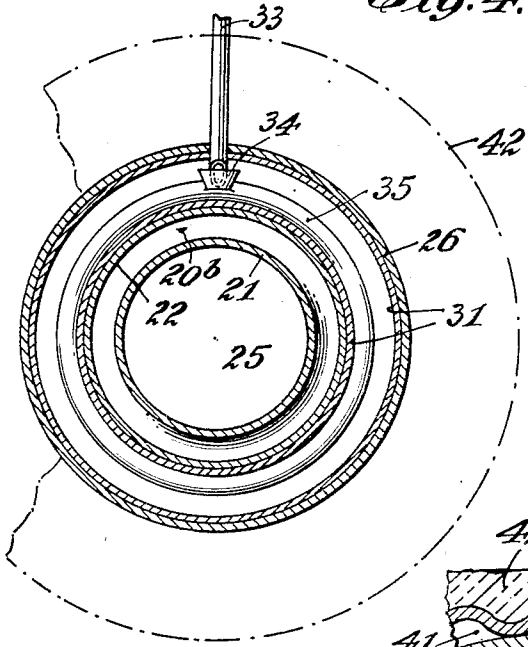

Fig. 5.

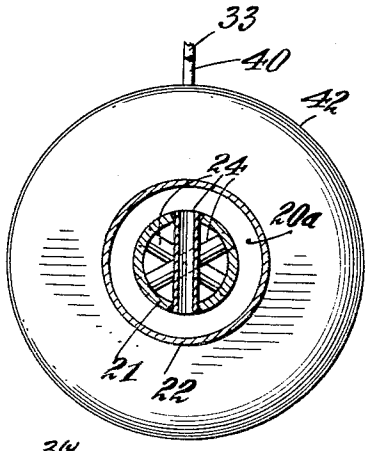

Fig. 6.

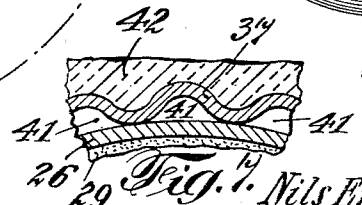

Fig. 7.

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BOILER-ABSORBER ASSEMBLY

Filed Jan. 19, 1942 4 Sheets-Sheet 3

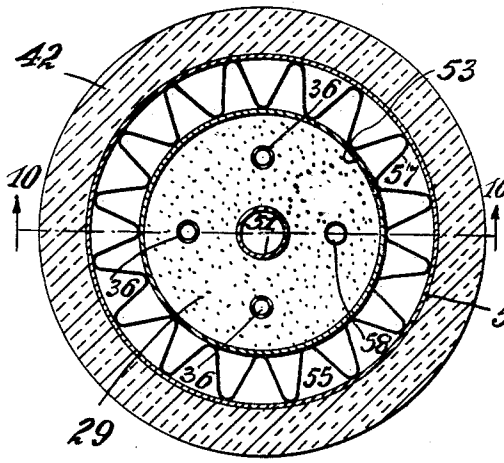

Fig. 9.

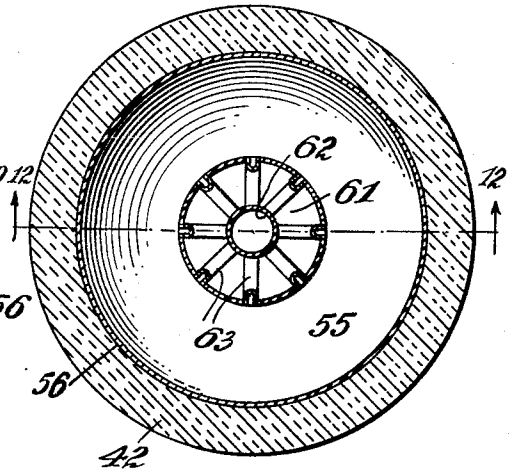

Fig. 11.

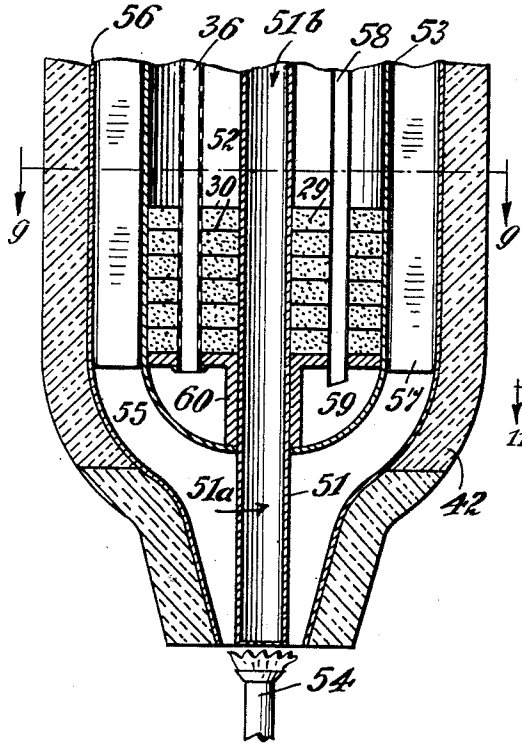

Fig. 10.

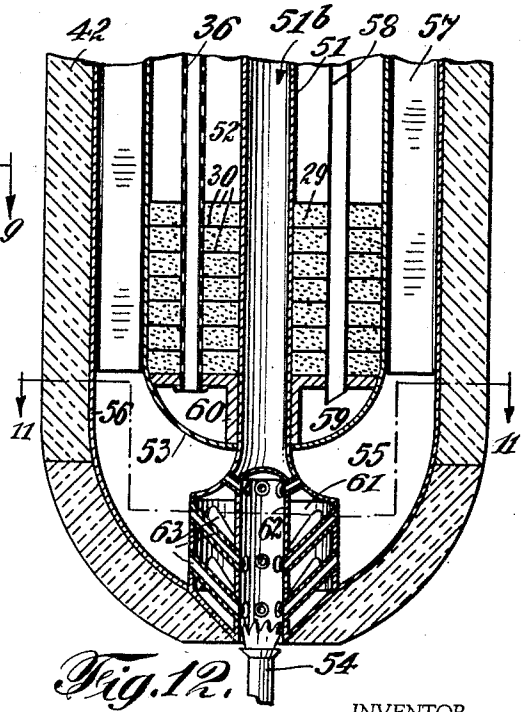

Fig. 12.

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BOILER-ABSORBER ASSEMBLY

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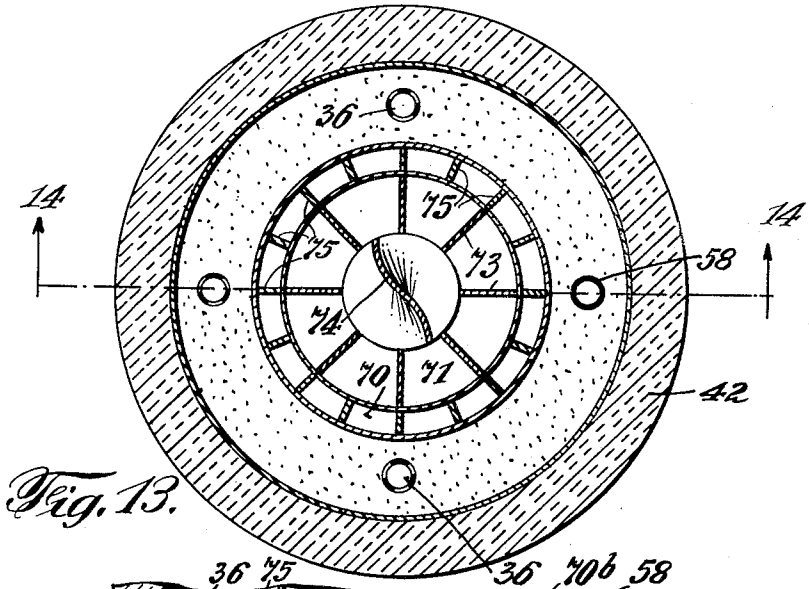

Fig. 13.

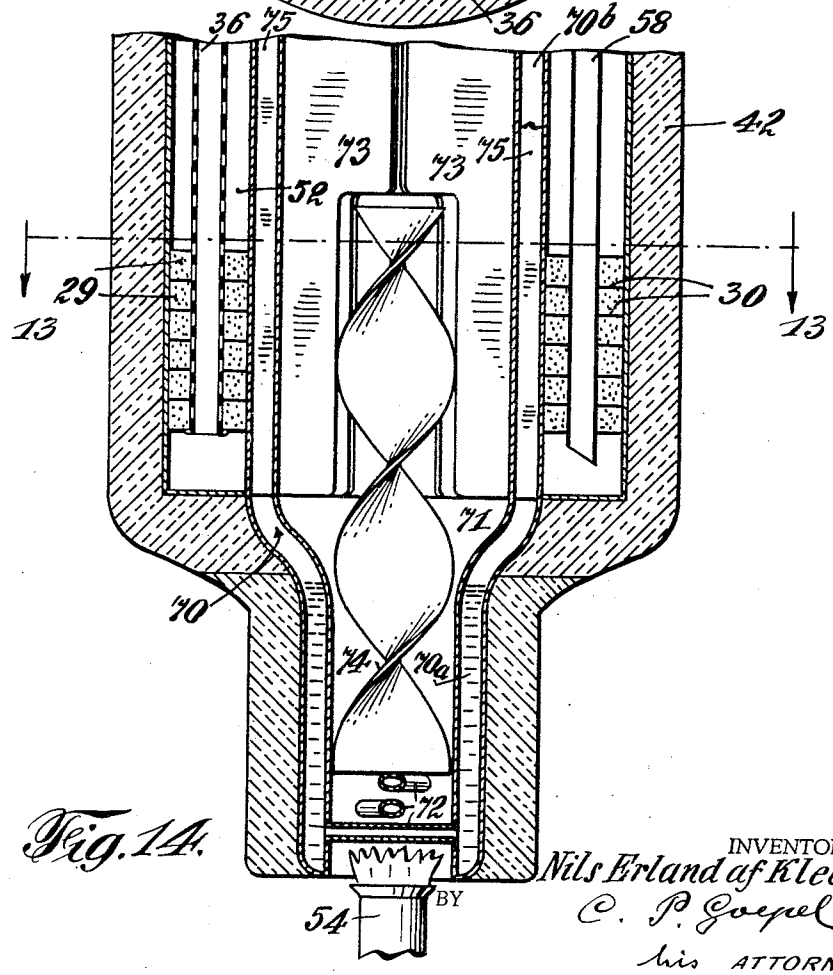

Fig. 14.

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Patented Jan. 11, 1944

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UNITED STATES PATENT OFFICE

2,338,712

BOILER-ABSORBER ASSEMBLY

Nils Erland af Kleen, Stockholm, Sweden

Application January 19, 1942, Serial No. 427,261

17 Claims. (Cl. 62—118)

This invention relates to new and useful improvements in the boiler-absorber of intermittent absorption refrigerant apparatus.

In this type of refrigerating apparatus, especially where two units are operating in phase relation to each other to produce substantially continuous refrigeration in a common cooling unit, in order to reach a low temperature in the cooling unit, it is important that at the beginning of the generating period of each unit, the boiler-absorber should not be heated up too rapidly as otherwise a relatively large quantity of refrigerant will be driven out and a correspondingly large amount of relatively warm liquid refrigerant will be delivered to the evaporating system of the generating unit before the boiler-absorber of the absorbing unit has had time to reabsorb a certain quantity of refrigerant evaporating in its evaporating system.

It is therefore one of the primary objects of the present invention to delay the heating up of each boiler-absorber at the beginning of the generating periods of the corresponding units and to this end, the invention consists in a boiler-absorber assembly embodying a heat transfer system containing a heat transferring medium adapted to take up the heat supplied at one portion of the system and deliver the same to the absorbent chamber of the boiler-absorber.

For the successful operation of the apparatus, especially one operating with solid absorbents, it is also important that during the generating period of each unit the temperature rise should be substantially uniform throughout the absorbent chamber of the boiler-absorber so that the refrigerant vapors will be liberated from the absorbent uniformly in the different portions of the boiler-absorber.

It is therefore another object of the invention to effect a uniform temperature rise throughout the boiler-absorber during the generating periods of each unit by a heat transfer system operating to transfer heat uniformly throughout the absorbent chamber of the boiler-absorber.

A further object of the invention is to utilize a large part of the heat generated by the heating element to heat up the absorbent chamber of the boiler-absorber, thereby enabling the boiler-absorber to be heated by a relatively small heating element with higher efficiency.

According to the invention, the boiler-absorber embodies a heat transfer system to form a unitary assembly adaptable to different kinds of heating sources and wherein the heat supplied to a relatively small portion of the boiler-absorber assembly is uniformly transferred by a heat transferring medium throughout the absorbent chamber.

Other novel features of the invention will appear in the following description, illustrated by way of examples in the accompanying drawings and more particularly pointed out in the appended claims.

Referring to the drawings in which numerals of like character designate similar parts throughout the several views—

Fig. 1 is a top plan view of a pair of horizontally mounted boiler-absorbers embodying the present invention and wherein electricity is employed as the source of heat;

Fig. 2 is a view in side elevation of the same;

Fig. 3 is an end view of the same;

Fig. 4 is a section taken on line 4—4 of Fig. 1;

Figs. 5, 6 and 7 are different sectional details taken on lines 5—5, 6—6 and 7—7, respectively, of Fig. 4;

Fig. 8 is a view in front elevation of a pair of vertically mounted boiler-absorbers embodying the present invention and wherein a swinging fuel burner is shown as the source of heat;

Fig. 9 is a sectional view taken on line 9—9 of Fig. 10 showing a modification;

Fig. 10 is a sectional view taken on line 10—10 of Fig. 9;

Fig. 11 is a section taken on line 11—11 of Fig. 12 of another modification;

Fig. 12 is a section taken along line 12—12 of Fig. 11;

Fig. 13 is a section taken on line 13—13 of Fig. 14, of still another modification, and

Fig. 14 is a section along line 14—14 of Fig. 13.

In the drawings, referring first to Figs. 4 to 7, inclusive, which illustrate the details of construction of a boiler-absorber embodying the present invention, 20 represents a hermetically sealed annular jacket formed by a pair of concentrically arranged tubular members 21 and 22 radially spaced from one another, the inner member 21 terminating at one end in a flaring portion welded to the outer member 22, and the latter terminating at its opposite extremity in an inwardly bent portion welded to the inner member 21.

The jacket 20 is adapted to contain water or other suitable heat transferring medium such as pyridine, phenylether, phenylamin and the like, to form a heat transfer system, the jacket preferably terminating at one end in a reduced neck forming the vaporizing portion 20a of the heat

transfer system and thereby presenting a relatively small area to be heated by any suitable heating means, such for example, as the electrical heating element 23 (Fig. 4) embracing the same. In order to render the heat transfer system adaptable to different kinds of heating means and to increase the efficiency thereof when a fuel burner is employed as the source of heat, the vaporizing portion 20*a* of the heat transfer system is provided with circulatory tubes 24 which extend across the reduced portion of the central flue 25 formed by the inner tubular member 21.

The condensing portion 20*b* of the heat transfer system is in heat exchange relation with an annular absorbent chamber formed between the outer tubular member 22 and a third concentrically arranged tubular member 26 radially spaced from member 22, the absorbent chamber being closed at its opposite extremities by annular cover plates 27 and 28, respectively, welded in place. Absorbent material 29 contained in a series of pockets formed by heat conducting members 30 is held in position in the absorbent chamber in inwardly spaced relation to the cover plates 27 and 28 by oppositely disposed stay plate member 31 and 32, respectively, constructed as annular channel members which serve to take up axial pressure stresses developed by the absorbent material when taking up the refrigerant as more fully set forth in my co-pending application, Serial No. 415,852, filed Oct. 21, 1941.

The refrigerant enters and leaves the absorbent chamber by way of conduit 33 extending upwardly from one end of the chamber and leading to the condenser and evaporator of the unit (not shown). The lower end of the conduit 33 terminates in open communication with a funnel 34 provided in the top of a tubular ring member 35 surrounding the inner flange of the channel member 31 to prevent any condensate formed in the conduit 33 during the operation of the unit from coming in contact with the absorbent material as more fully described in my co-pending application, Ser. No. 154,090, filed July 16, 1937, and which has become Patent No. 2,274,680. The absorbent chamber is also provided with the usual bleeder tubes 36 to permit the passage of refrigerant into and out of the pockets of absorbent material 29.

A fourth concentrically arranged tubular member 37 surrounds the absorbent chamber and is radially spaced outwardly from the tubular member 26 to provide an outer cooling jacket 38 forming part of a secondary cooling section (not shown) through which a cooling medium circulates, the medium entering one end of the jacket through conduit 39 and leaving the jacket through conduit 40. The tubular member 37 is preferably corrugated or fluted as clearly shown in Fig. 7 to form with member 26 a series of longitudinally extending passages 41 which serve to increase the normal circulation of the cooling medium.

Thus, the heat transfer system, the absorbent chamber and the cooling jacket form a compact unitary construction.

The boiler-absorber unit is surrounded by a sheath of insulating material 42, preferably made up in two sections as shown in Fig. 4 to permit access to the heating element 23 for removal of the latter or the electrical connections thereto when a fuel burner is employed as the source of heat. When electricity is employed as the heating source for the vaporizing portion 20*a* of the heat transfer system, the outlet end of the central flue 25 may be closed by any suitable plug (not shown). However, with a fuel burner as the source of heat, the plug is removed and a flue pipe 44 inserted in place for the escape of the waste gases.

It will thus be seen that the boiler-absorber unit is adaptable to different kinds of heating sources without requiring any alterations to any of the parts thereof.

In filling the jacket 20 with the heat transferring medium, air is first evacuated therefrom to as perfect a vacuum as possible, and the vacuum so created is utilized to draw in the necessary quantity of heat transferring medium. Consequently, after the jacket has been filled and hermetically sealed, there is practically no air in the system to interfere with the natural circulation of the medium when heat is applied to the vaporizing portion 20*a* thereof. The amount of medium introduced should bear a definite ratio to the total inside volume of the system and I have found that for best results the jacket 20 should be filled only between 5% to 30% of its volumetric dimensions with the heat transferring medium in the liquid state.

Moreover, the vaporizing portion 20*a* of the system should also bear a definite relation to the condensing portion 20*b* of the system and may be between one-third to one-tenth of the total inside volume of the system. However, for best results, I prefer to have the cubic capacity of the vaporizing portion about one-fifth of that of the entire system.

In instances where the heat transferring medium employed has a corrosive effect on the walls of the jacket with the attendant formation of scale or rust, the medium may be mixed with suitable preventative materials such as potassium bichromate and the like, which will not affect the heat transferring properties of the medium.

The boiler-absorber unit may be mounted for operation in either horizontal position (Figs. 1–3), or vertical position (Fig. 8). However, for proper circulation in the heat transfer system where the boiler-absorber unit is horizontally mounted, the latter is tilted to incline downwardly toward the vaporizing portion 20*a* so that the medium condensing in heat exchange relation with the absorbent chamber can return to the vaporizing portion 20*a*.

Where two horizontally mounted boiler-absorbers are used, such for example as shown in Figs. 1 and 2 for two units operating in phase relation to each other, the insulated boiler-absorber units generally indicated as A and B are not only tilted as above mentioned but are also arranged to converge toward the source of heat. By this arrangement the thermostat connections 45 and 45′ from the boiler-absorber units A and B, respectively, to the thermostat control device 46 which selectively controls the heating and cooling of the units, and the conduit connections 39 and 39′, of the secondary cooling system from the control device 46 to the respective boiler-absorber units A and B will be as short as possible. For this purpose, I have shown the boiler-absorber units mounted transversely across a pair of frame members 47 and 48 and nestled in suitable recesses provided in said members whereby they will occupy as little space as possible in a refrigerator cabinet.

As clearly shown in Figs. 1 to 3, the reduced ends of the boiler-absorber units A and B to which heat is supplied extend inwardly with re-

spect to one another and downwardly with respect to the longitudinal axes of the units whereby when a common swinging fuel burner such as shown at 49 in Fig. 8 is employed as the source of heat, the extent of movement of such burner from one boiler-absorber unit to the other will be as small as possible.

The flue pipes 44 and 44' from the diverging ends of the respective boiler-absorber units A and B are connected to a common outlet stack 50 so that when heat is supplied to one boiler-absorber unit by the fuel burner, the waste gases flowing through the stack 41 will create a suction of air through the central flue of the other boiler-absorber unit to aid in the cooling of the latter.

Thus, with the boiler-absorber units A and B forming parts of separate refrigerant circuits operating to produce substantially continuous refrigeration in a common cooling element, when the thermostat control device 46 responsive to the temperature in each of the boiler-absorber units and being operable at a predetermined temperature in the unit being heated, for example unit A, to shut off the supply of heat thereto and turn on the heat supply to unit B for the generating period of the latter, in view of the fact that the heat is not supplied directly to the absorbent chamber but instead to the vaporizing portion of the heat transfer system, the temperature rise in the absorbent chamber of unit B will be relatively slow at the beginning of the generating period until circulation of the heat transferring medium is established. This will permit unit A to reabsorb a sufficient quantity of refrigerant to enable the necessary low temperature to be reached in the cooling element. Thereafter, as more and more heat transferring medium is vaporized, the temperature in unit B will rise more rapidly and since the condensing portion of the heat transfer system extends throughout the length of the absorbent chamber, the latter will be evenly heated throughout and the refrigerant driven out of the absorbent uniformly in the different portions of the absorbent chamber.

Instead of being formed as an annular jacket, the heat transfer system may comprise a closed tube 51, as shown in Figs. 9 and 10, extending axially through the annular absorbent chamber 52 provided between said tube and a substantially cylindrical shell 53. The tube 51 projects beyond the lower end of the absorbent chamber 52 and forms the vaporizing portion 51*a* of the heat transfer system adapted to be heated by a burner or the like 54. In the embodiment illustrated, the hot gases from the burner 54 are conducted through an annular flue space 55 formed by an outer shell 56 surrounding the absorbent chamber 52 and the vaporizing portion 51*a* of the heat transfer system. By this arrangement, the absorbent chamber 52 is heated not only internally by means of the central tube 51 arranged in heat exchange relation therewith and forming the condensing portion 51*b* of the heat transfer system, but is also heated externally by the hot gases from the burner 54 passing through the flue space 55. For better transmission of heat from the hot gases to the absorbent chamber 52, a corrugated or fluted heat conducting element 57 or any other suitable heat conducting means may be provided in the flue space 55 extending from shell 53 to the outer shell 56 as clearly shown in Fig. 9. In this manner a large portion of the heat generated by the burner 54 is utilized to heat up the absorbent chamber 52 during the generating periods, thereby providing a highly efficient unit and enabling a relatively small burner to be employed to supply the necessary heat.

As in the previously described construction, the refrigerant passes into and out of the pockets of absorbent material 29 by way of the bleeder tubes 36 and suitable means are provided to prevent any condensate formed in the refrigerant outlet conduit (not shown) from coming in contact with the absorbent. For example, a downpipe 58 is shown extending through the absorbent pockets 29 and terminating in communication with an annular chamber 59 formed by one of the stay plates 60 in the bottom of the absorbent chamber 52.

In Figs. 11 and 12, the annular absorbent chamber 52 is heated internally and externally by an arrangement similar to that just described with the exception that the vaporizing portion of the heat transfer system comprises an enlarged annular chamber 61 in the lower end of the tube 51. In this embodiment the flame from the burner 54 is directed into the lower open end of a central tubular member 62 which is closed at its upper end and forms a heat distributor from which the hot gases pass into the flue space 55 by way of tubes 63 which extend through the vaporizing chamber 61 and in this manner the heat is supplied through the vaporizing chamber 61. During the absorbing periods when the burner 54 is turned off, the draft created in the flue stack draws fresh air into the open end of the tubular member 62, through the tubes 63 and into the flue space 55 to cool the absorbent chamber 52.

While I have shown the absorbent chamber 52 in Figs. 9 to 12, inclusive, as being internally heated by the heat transfer system and externally heated by the waste gases from the burner, obviously, the heat transfer system may be arranged to heat the absorbent chamber externally and the waste gases from the burner utilized to heat the absorbent chamber internally within the scope of the invention.

Moreover, the invention also contemplates a unitary boiler-absorber construction wherein the absorbent chamber may be heated either internally or externally by both a heat transfer system and the waste gases from the burner. For example, as shown in Figs. 13 and 14, the absorbent chamber 52 is heated internally by a heat transfer system comprising an annular jacket 70 generally similar to that heretofore described in connection with Fig. 4, providing a central flue space 71 for the waste gases from the burner 54 arranged to direct its flame against the transversely extending circulatory tubes 72 in the reduced vaporizing portion 70*a* of the heat transfer system. Adjacent the condensing portion 70*b* of the heat transfer system, I provide radial heat conducting fins 73 which extend inwardly in the flue 72 from the inner wall of the jacket 72 and serve to transfer the heat from the waste gases to the absorbent chamber 52 through the jacket 70. If desired, heat conducting members 75 may be provided in the jacket 70 for better transmission of heat from the fins 73 t_o the absorbent chamber 52 during the heating periods, and from the absorbent chamber to the fins during the cooling periods. In flowing upwardly through the flue 72, the hot gases pass about a flat member 74 twisted in the form of a spiral and are thereby uniformly distributed throughout the flue to pass in heat transfer relation with the fins 73. In like manner, the fresh air drawn through

the flue during the absorbing periods will be uniformly distributed.

It will thus be seen from the foregoing description of the invention that I have provided a unitary boiler-absorber assembly adaptable to different kinds of heating sources and one which will operate to uniformly transfer the heat throughout the absorbent chamber from a relatively small heat source. Moreover, by virtue of the fact that more of the heat generated from the source is utilized for heating the absorbent chamber than in previously known constructions, it is possible to employ a much smaller heater for an absorbent chamber of any given size.

It will also be observed that the boiler-absorber assembly provides air passages therethrough for cooling the absorbent chamber during the absorbing periods of the unit which, in certain instances, may be sufficient to furnish the necessary cooling without requiring the use of auxiliary cooling medium.

From the foregoing it is believed that the construction, operation and advantages of the 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 is:

1. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide a closed absorbent chamber and a hermetically sealed circuit conduit for a vaporization-condensation heat transfer system, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit projecting outwardly beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated for the transfer of heat uniformly to said absorbent chamber.

2. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide a closed absorbent chamber and a hermetically sealed annular circuit conduit for a vaporization-condensation heat transfer system, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit terminating in a reduced neck portion projecting beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated for the transfer of heat uniformly to said absorbent chamber.

3. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide a closed absorbent chamber and a closed annular circuit conduit for the heat transferring medium of a heat transfer system, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit terminating in a reduced neck portion projecting beyond one end of said absorbent chamber and adapted to be heated to form the vaporizing portion of the heat transfer system, and circulatory means in the reduced neck portion of said conduit for the heat transferring medium.

4. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide a closed absorbent chamber and a hermetically sealed annular circuit conduit for a vaporization-condensation heat transfer system, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit terminating in a reduced neck portion projecting beyond one end of said absorbent chamber adapted to be heated to form the vaporizing portion of the heat transfer system, said neck portion of the conduit extending angularly with respect to the condensing portion of the heat transfer system.

5. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide a closed absorbent chamber and a closed annular circuit conduit for the heat transferring medium of a heat transfer system, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit terminating in a reduced neck portion projecting beyond one end of said absorbent chamber, said reduced neck forming the vaporizing portion of the heat transfer system adapted to be heated for the circulation of the heat transferring medium through the heat transfer system, said neck portion of the conduit extending angularly with respect to the condensing portion of the heat transfer system, and circulatory means in the reduced neck portion of said conduit for the heat transferring medium.

6. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical shells radially spaced from one another and arranged to provide a closed annular absorbent chamber and a hermetically sealed annular jacket forming the circuit conduit of a vaporization-condensation heat-transfer system, said jacket extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said jacket terminating in a reduced annular neck portion projecting beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated for the transfer of heat to said absorbent chamber.

7. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide an outer closed annular absorbent chamber and an inner hermetically sealed circuit conduit for a vaporization-condensation heat transfer system, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of

the heat transfer system, said conduit projecting outwardly beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated for the transfer of heat uniformly to said absorbent chamber.

8. A unitary boiler-absorber assembly for refrigerating apparatus of the intermittent absorption type comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide a closed annular absorbent chamber, a flue space for the passage of a heating fluid in heat exchange relation with said absorbent chamber during the generating periods, and a closed circuit conduit for the heat transferring medium of a heat transfer system, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit projecting outwardly beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated during the generating periods for the circulation of the heat transferring medium through the system.

9. A unitary boiler-absorber assembly for refrigerating apparatus of the intermittent absorption type comprising, in combination, a plurality coaxial substantially cylindrical members radially spaced from one another and arranged to provide an outer closed annular absorbent chamber and an inner hermetically sealed annular jacket forming the circuit conduit of a vaporization-condensation heat transfer system, said jacket extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said jacket terminating in a reduced annular neck portion projecting beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated during the generating periods for the transfer of heat to said absorbent chamber, said annular jacket providing a central flue space for the passage of an auxiliary heating fluid during the generating periods and for the passage of a cooling fluid during the absorbing periods.

10. A unitary boiler-absorber assembly for refrigerating apparatus of the intermittent absorption type comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide an outer closed annular absorbent chamber and an inner closed annular jacket forming a circuit conduit for the heat transferring medium of a heat transfer system, said jacket extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said jacket terminating in a reduced annular neck portion projecting beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated during the generating periods for the circulation of the heat transferring medium through the system, said annular jacket providing a central flue space for the passage for a heating fluid during the generating periods and for the passage of a cooling fluid during the absorbing periods, and heat conducting means in said flue space.

11. A unitary boiler-absorber assembly for refrigerating apparatus of the intermittent absorption type comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide an inner closed circuit conduit for the heat transferring medium of a heat transfer system, an intermediate annular absorbent chamber, and an outer flue space for the passage of a heating fluid during the generating periods and for the passage of a cooling fluid during the absorbing periods, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit projecting outwardly beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated during the generating periods for the circulation of the heat transferring medium through the system, whereby said absorbent chamber is heated internally and externally during the generating periods.

12. A unitary boiler-absorber assembly for refrigerating apparatus of the intermittent absorption type comprising, in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide an inner closed circuit conduit for the heat transferring medium of a heat transfer system, an intermediate annular absorbent chamber, and an outer flue space in heat exchange relation with said absorbent chamber for the passage of a heating fluid during the generating periods and for the passage of a cooling fluid during the absorbing periods, said conduit extending from one end of said absorbent chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit projecting outwardly beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated during the generating periods for the circulation of the heat transferring medium through the system, and heat conducting members in said flue space in heat exchange relation with said absorbent chamber for the transfer of heat from the heating fluid to said absorbent chamber during the generating periods and for dissipation of heat from said absorbent chamber during the absorbing periods.

13. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical shells radially spaced from one another and arranged to provide a closed annular absorbent chamber and a hermetically sealed circuit conduit for a vaporization-condensation heat transfer system, said conduit extending from one end of said chamber to the other in heat exchange relation therewith and forming the condensing portion of the heat transfer system, said conduit projecting outwardly beyond one end of said absorbent chamber and terminating in an enlarged chamber adjacent one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated for the transfer of heat to said absorbent chamber.

14. A unitary boiler-absorber assembly for refrigerating apparatus of the intermittent absorption type comprising, in combination, a plurality of coaxial substantially cylindrical members radi-

ally spaced from one another and arranged to provide an inner closed circuit conduit for the heat transferring medium of a heat transfer system, an intermediate annular absorbent chamber in heat exchange relation with the condensing portion of said system, and an outer flue space in heat exchange with said absorbent chamber for the passage of a heating fluid during the generating periods and for the passage of a cooling fluid during the absorbing periods, said conduit projecting outwardly beyond one end of said absorbent chamber and terminating in an enlarged chamber adjacent said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated during the generating periods for the circulation of the heat transferring medium through the system, and heat conducting means in said flue space for the transfer of heat from the heating fluid to said absorbent chamber during the generating periods and for the dissipation of heat from said absorbent chamber during the absorbing periods.

15. A unitary boiler-absorber assembly for absorption refrigerating apparatus comprising in combination, a plurality of coaxial substantially cylindrical members radially spaced from one another and arranged to provide an inner closed circuit conduit for the heat transferring medium of a heat transfer system, an intermediate annular absorbent chamber in heat exchange relation with the condensing portion of said system, and an outer flue space in heat exchange relation with said absorbent chamber for the passage of a heating fluid during the generating periods and for the passage of a cooling fluid during the absorbing periods, said conduit projecting outwardly beyond one end of said absorbent chamber and terminating in an enlarged annular chamber adjacent said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated during the generating periods for the circulation of the heat transferring medium through the system, means forming a central heat distributing chamber coaxial with said enlarged annular chamber, said heat distributing chamber being closed at its inner end and open at its opposite end, and conduit means extending transversely through said enlarged annular chamber from said heat distributing chamber to said flue space.

16. A unitary boiler-absorber for absorption refrigerating apparatus comprising, in combination, a plurality of coaxial substantially cylindrical members arranged to provide a closed circuit conduit for the heat transferring medium of a heat transfer system, an absorbent chamber in heat exchange relation with the condensing portion of the heat transfer system, and a flue space in heat exchange relation with said absorbent chamber for the passage of a heating fluid, said circuit conduit projecting outwardly beyond one end of said absorbent chamber and forming the vaporizing portion of the heat transfer system adapted to be heated for the circulation of the heat transferring medium through the system, the inlet end of said flue space extending along the vaporizing portion of the heat transfer system, and heat distributing means in the inlet end of said flue space for the passage of the heating fluid uniformly throughout the said flue space.

17. A unitary boiler-absorber assembly for refrigerating apparatus of the intermittent absorption type comprising, in combination, a plurality of coaxial substantially cylindrical members arranged to provide a flue space for the passage of a heating fluid during the generating periods and for the passage of a cooling fluid during the absorbing periods, a closed circuit conduit in heat exchange relation with said flue space and adapted to contain a heat transferring medium to form a heat transfer system, and an absorbent chamber in heat exchange relation with the condensing portion of the heat transfer system, said conduit projecting beyond one end of said absorbent chamber and adapted to be heated during the generating periods to form the vaporizing portion of the heat transfer system, and heat conducting means in said conduit for the transfer of heat between the heating fluid and the absorbent chamber during the generating periods and between the absorbent chamber and the cooling fluid during the absorbing periods.

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