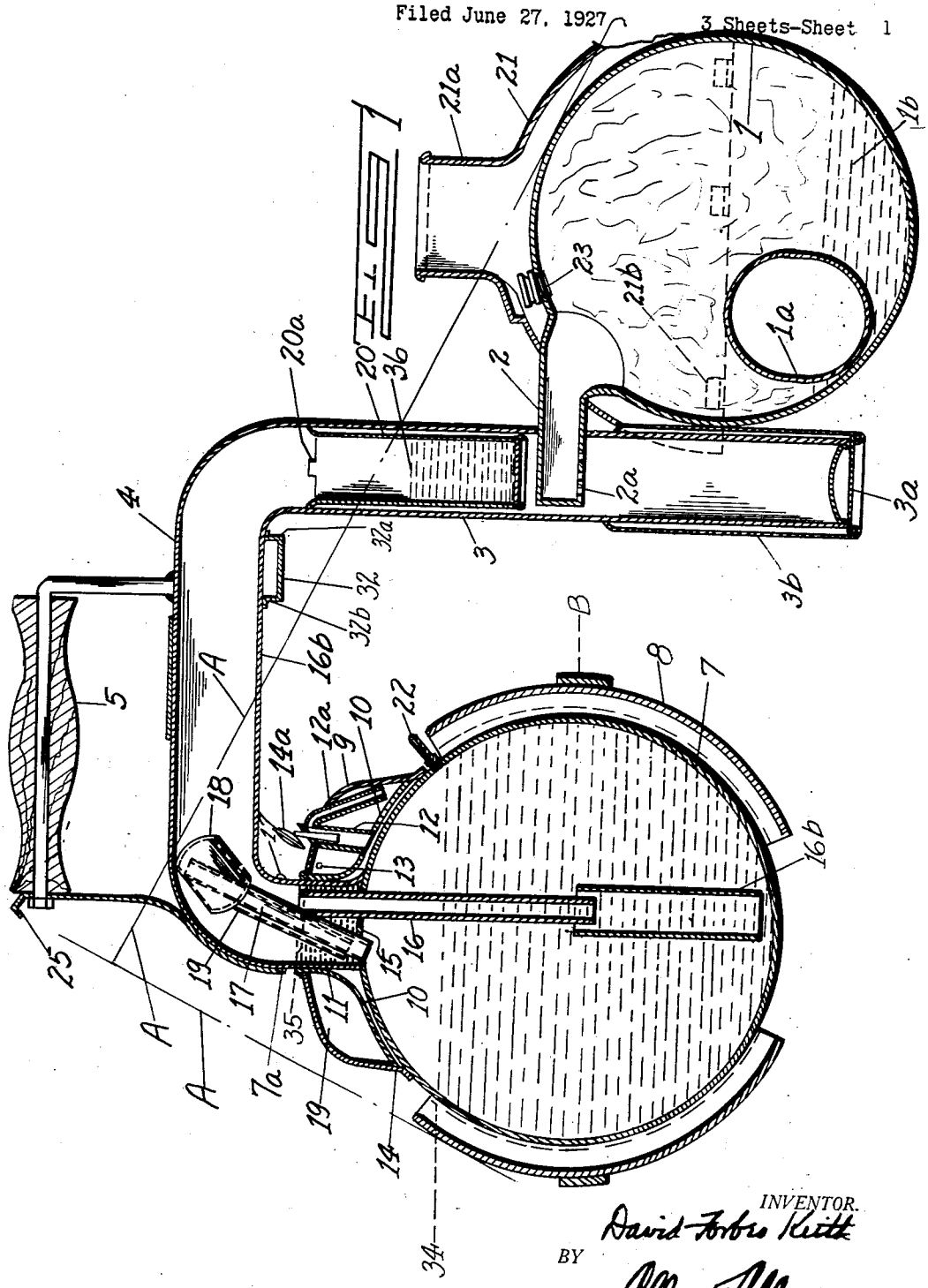
Dec. 24, 1929. D. F. KEITH 1,740,737

REFRIGERATING DEVICE

Filed June 27, 1927 3 Sheets-Sheet 1



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Dec. 24, 1929. D. F. KEITH 1,740,737

REFRIGERATING DEVICE

Filed June 27, 1927 3 Sheets-Sheet 2

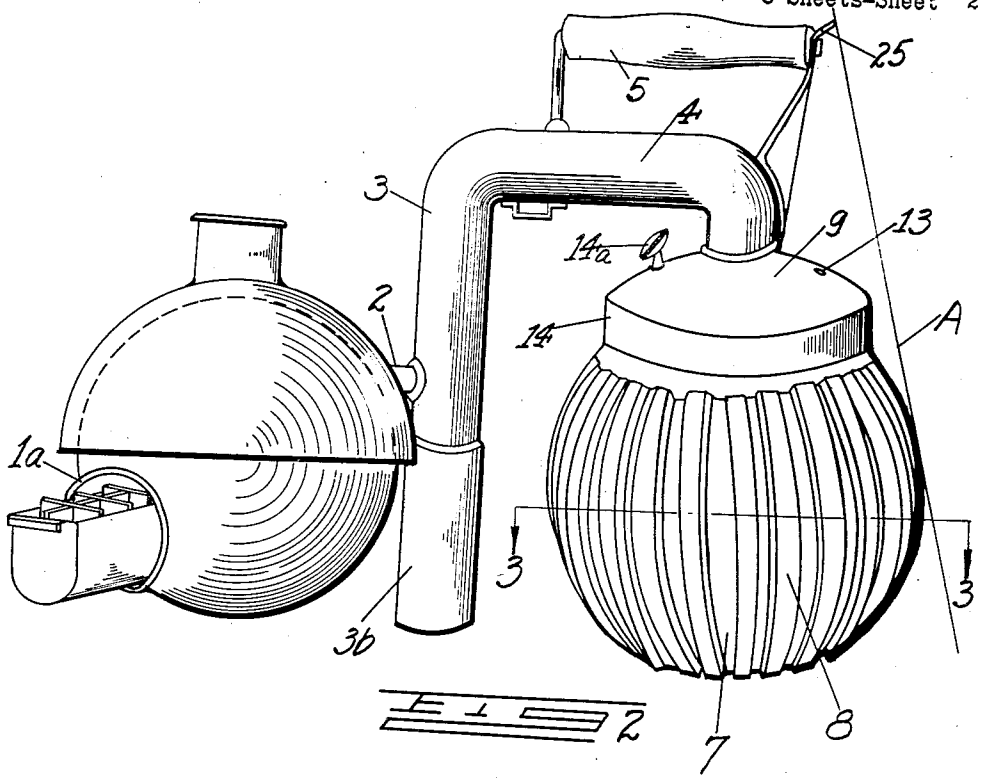

FIG 2

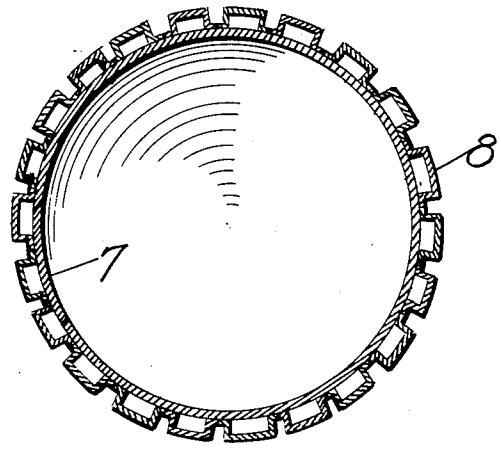

FIG 3

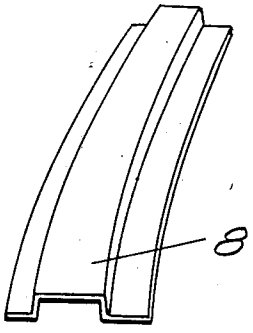

FIG 4

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REFRIGERATING DEVICE

Filed June 27, 1927 3 Sheets-Sheet 3

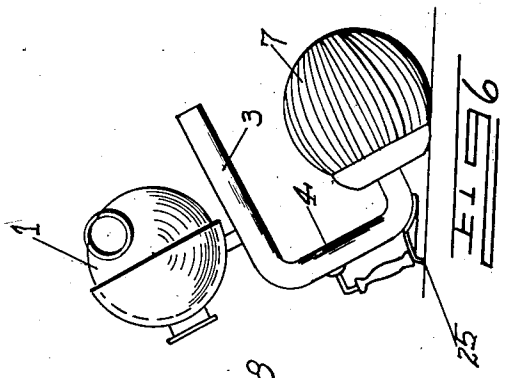

FIG 6

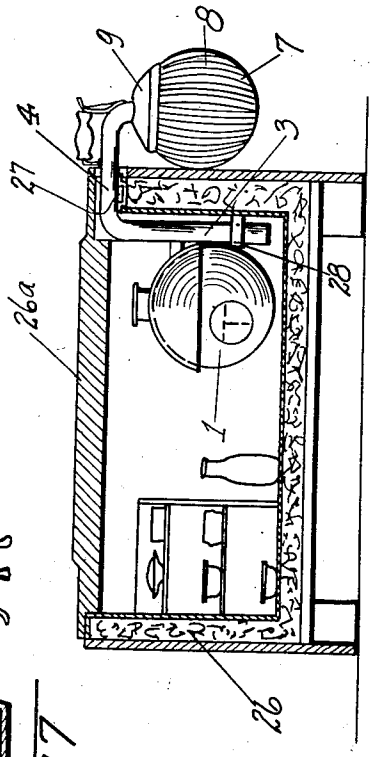

FIG 5

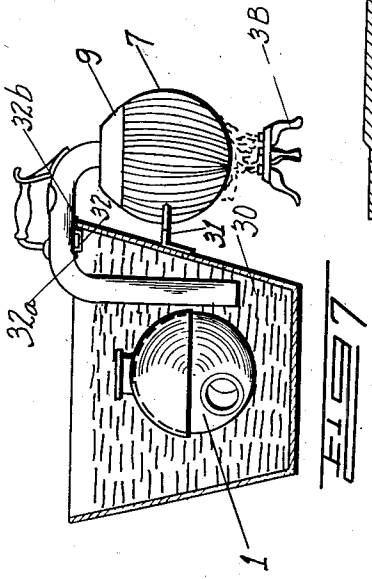

FIG 7

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Patented Dec. 24, 1929

1,740,737

UNITED STATES PATENT OFFICE

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REFRIGERATING DEVICE

Application filed June 27, 1927. Serial No. 201,904.

My invention relates to refrigerating devices operating upon the absorption system, and more particularly to units which are separable from the refrigerator boxes or other coolers in which they are intended to be employed.

While my device is a departure in some of its principles of operation from standard absorption systems, in that there are no check valves employed by me, it operates through a similar cycle to all intermittent absorption systems, that is to say, I provide two receptacles, one a generator-absorber, which contains a suitable liquid, such as water, and the other an evaporator-condenser, which contains a suitable refrigerant, such as ammonia, with suitable connecting paths between the two receptacles so that when the generator-absorber is heated, the gases will pass over into the evaporator-condenser receptacle, by one path, and when the generator-absorber is permitted to become cool, it will reabsorb the gases, as they volatilize in the evaporator-condenser receptacle, said gases pass back and are absorbed in the liquid in the generator-absorber, with the result of absorption of heat (production of cold), within and about the evaporator-condenser receptacle.

As intimated above, one of my objects is to provide a refrigerating unit of light weight. Another object is to provide means in connection with a novel arrangement which guides the user in locating the unit during the generation period, the refrigerating period, and in draining back the water of condensation into the generator-absorber, for the retention of sufficient liquid to serve the function of a seal when the device is in operation. Other objects are to provide a system of absorption which operates efficiently without the use of mechanical valves, to provide a method of dehydrating and cooling the gas passing from the generator, and to provide an efficient method of increasing the rate of heat exchange between the generator-absorber and its surroundings. It is also my object to provide a simple and effective method of attaching metal fins to the generator shell.

A general object of my invention is to provide a structure which will be simple to make, and fool-proof in operation, and which can be readily moved about during the respective periods of generation and absorption, so that the generator-absorber can be placed over a flame, during generation, and the evaporator-condenser receptacle be placed into a water vessel during condensation and a suitable box, vessel or receptacle during evaporation and absorption, with the generator-absorber on the outside of the said box, in the last instance.

In this connection, it is my object to make the two main receptacles of spherical shape and light in weight and to connect them by means of tubular means which will serve as a support for the device when in use, and to which a handle for moving it about may be applied.

It is my object to provide for an automatic warning which will indicate by sound or change in color, when the operation of generation has been completed.

It is my object to provide in connection with the evaporator-condenser element for a simple mode of freezing desired materials in a "tray."

It is my object to provide in connection with my device for a simple means of assuring a proper cooling action in the evaporator-condenser element during condensation, preferably by means of a suitable circulation device in the nature of a dome which sets up cooling currents of water about the evaporator-condenser shell, and a circulation throughout the entire water vessel.

The above and various other advantages, I provide by that certain construction and arrangement of parts, of which a typical example will be hereinafter more specifically pointed out and described, and the novelty of which will be set forth in the appended claims.

In the drawings:—

Figure 1 is a central longitudinal section taken through the selected example to be described, showing my invention.

Figure 2 is a perspective thereof.

Figure 3 is a section on the line 3—3 of Figure 2, showing only the generator-absorber shell.

Figure 4 is a detail perspective of one of the cooling fins on the said shell.

Figure 5 is a section illustrating the device in use in a food storage box or refrigerator in the act of evaporation and absorption.

Figure 6 is an elevation showing the device in the act of draining.

Figure 7 is a section showing the device in the act of generation and condensation.

Referring first to the evaporator-condenser, it is illustrated as a hollow spherical shell 1, having an outlet tube 2 which lets into the tube 3. The tube 3 is connected to a tube portion 4 which is bent around at each end, and is connected to the generator-absorber. The tube portion 4 is generally of U shape, as noted, but has a considerable portion of its length in what might be termed the base of the U shape. This tube portion 4 is to be used as a hanger for the device. It is also equipped with a handle 5 by means of which the device is manipulated, which handle is placed so that the two parts of the structure are substantially balanced at the point where the handle will be grasped. The shell has a chamber 1^a formed therein, same opening to the outside. Into this chamber an ice tray may be inserted.

The lower portion of the tube 3 is closed by a base plate 3^a and may be surrounded by an insulating shell in tubular form, as indicated at 3^b. This portion of the tube serves as a sump for condensed absorbent or overflow.

The generator-absorber is formed of a spherical shell portion 7, having heat exchange fins arranged about its surface, in vertical planes. These fins are a novel conception, and are formed of pieces of sheet metal 8, bent to form flanged channels, of which the flanges are soldered or otherwise attached to the shell.

The function of the fins is to exchange heat with their environment by both radiation and convection, more particularly the latter, because they form passages or flues for movement of air or other cooling fluid, up along the shell, within the channels. The passage of the air greatly increases the cooling effect, and the section strengthens the fins and reduces the cost. I find that the channel-like fins are a very decided advantage over the usual type of fin.

Mounted over the top of the generator-absorber shell is a device having a dome shaped body 9, which is soldered or otherwise attached to the shell 7. The device has a base plate 10, which is formed up centrally at 11 about the tubular end 7^a of the shell 7 somewhat similarly to a cake pan. The central portion 11 is secured at its upper end to the dome by crimping to form a substantially steam tight joint. The part 10 is spaced slightly from the dome, and a tube 12 is soldered to the top of the portion 9, and extends through the plate 10, communicating direct with the shell 7. A tube 12^a extends from the tube 12 to the interior of the dome.

Water is placed into the interior of the dome through a small hole 13, and a whistle 14^a is set into the dome to be operated from steam escaping through the whistle tube extending through the closed end of the tube 12. The water in the dome aids materially in dehydration or pre-cooling of the gas from the generator.

The result of the structure is that the water in the dome, when the generator-absorber is being heated, will rise in temperature, commence to boil, and at a predetermined stage in the generation period, the rate of formation of steam, balanced against the rate of passage of steam through the gauged opening 13, will cause a steam pressure sufficient to lift the water to a point where some of it will flow up through the tube 12^a, so that it falls through the tube 12 against the shell 7. This water, on reaching the hot generator shell 7, is flashed into steam which causes the whistle 14^a to blow, and stops the water coming up from the dome 9. When the first portion of water has all been evaporated, the whistle ceases to blow until the pressure has once more been sufficiently built up to send down another portion of water. In this way a repeated action of the whistle is secured.

The operator will be able to apply heat to the generator-absorber, and need do nothing more until the whistle begins to blow, after which he will wait such time as is required, which will be only a few minutes, before he takes the generator-absorber away from the heat. Some other signal of thermostatic, thermoplastic, or phosphorescent may be used instead of the one indicated.

The generation and absorption passages between the two receptacles are formed in the illustrated embodiment as follows:

The tubular upper end 7^a of the shell 7 is closed at the entrance to the shell 7 by a partition or plate 15. The plate 15 has a hole for passage of the absorption pipe 16, which extends down to a point below the level of absorbent in the shell 7. It is quite important to have the lower end of the pipe 16 open and to terminate near the surface of liquid in the shell 7 when the absorption begins to take place. This level is indicated by the line B in Fig. 1. For circulation, the tube 16^b may be set into the shell so as to surround the end of the tube 16, but not impede the efflux of gas from the mouth of the tube 16.

The closed lower end of the portion 7^a forms in this portion of the system a liquid seal, and the tube 16 defines the level of absorbent, be it water or whatever agent is used, so that normally the inflow into the shell 7 is through the tube 16, but the outflow passes through another set of passages, and bubbles up through the liquid seal.

To provide this structure I find a simple mechanism to be as follows:—A tube 17 ex-

tends from an opening through the plate 15, which permits generated gases to pass out of the shell 7 into a closed vessel or "can" 18. From this can a tube 19 extends down to a point near the plate 15, thus bringing the end of the tube 19 to the bottom of the liquid seal.

Located in the upper end of the tube portion 3 is a vessel 20, smaller than the tube 3, and closed at the bottom. The vessel is secured in the tube 3 by means of spaced lips 20^a, so that there is a passage for generated gases around the outside of the vessel. The outlet tube 2 from the shell 1 is closed at the end, and has a series of holes 2^a in its lower face. These holes provide the passage to and from the shell 1.

The sump lies below the end of the tube 2, and the vessel 20 is normally filled with the mixture of absorbent and refrigerant, usually water, and ammonia as stated. The hot gases passing down around vessel 20 are cooled by vaporizing the refrigerant from the mixture in the vessel 20 and also by the contact with the tube 3 which is submerged in water.

The shell 1 has a dome erected thereon in the shape of a spaced half spherical dome 21, having a neck and mouth 21^a, and held in place by means of spaced strips 21^b.

I have not described or shown in detail drain openings, and pressure relief valves, except that I have indicated at 23, a suitable pressure relief device, and at 22 a suitable charging opening and plug.

When the device is employed in a refrigerator box or cabinet, which is the typical use of the device, I provide a suitable box 26, having a lid 26^a hinged thereto, or otherwise removably set thereon, and leaving sufficient space at least for the insertion of the shell 1. The side wall of the box has a groove 27 therein which will fit the tube 4, and channeled to seat the bracket 32, or the lid and groove can be formed to co-operate in enclosing the box about the tube 4. The shell 1 is placed in the box, and the lid closed down leaving the shell 7 outside. Inside of the box a strap or loop 28 is secured on the lower inside of the box in such a position that the lower end of the tube 3 can be thrust therein, thus resisting the rocking tendency of the weight of the shell 7 and holding the device against tipping.

As a water cooling means used in the cycle of operations as will be described, I normally provide a water vessel or tub 30. This tub has a bracket 31 on the outside. I locate on the under side of the tube 4, so as to be near the point where the tube bends down to the tube 3, a bracket 32, in the form of a plate soldered in place, and presenting two shoulders 32^a and 32^b.

When the generator shell is being heated, the shell 1 is set into the tub of water, leaving the bracket 32 inside of the tub at its rim. The shell 7, which is full of absorbent and refrigerant at the beginning of this operation, rests against the bracket 31, and the nature of the support is such that the weight of the shell 7 and its content acts to overcome the buoyancy of and to submerge shell 1.

For defining a draining position for the device, in the cycle of operations which will be described, I locate at the end of the handle 5 a foot 25, which can be rested on the floor or a table or other supporting surface, and the location of the device in an inverted position supported by the foot and the shell 7, as shown in Figure 6 is thus defined.

As described, the device will be considered as filled with absorbent, usually water, together with dissolved refrigerant, for example ammonia, so that the shell 7 is filled to a level such as that noted at 34, the lower portion of 7^a is filled to the level noted at 35, and the vessel 20 to the level noted at 36. The water dome, where this form of signal is employed, will be considered as having water therein. At the start of the operation the level 34 is correct, but when the refrigerant is fully generated, the level is at B.

The shell 1 is set into a tub of water as preferably indicated in Figure 7, in which case the mouth of the dome neck is located below the level of water in the tub. The shell 7 is placed over a heater 3B.

The application of heat causes the refrigerant gases to pass up through the tube 17 into the small container 18, which is closed except for the tube 19. The container or vessel 18 acts to prevent the sudden movement of gas under pressure, from forcing the liquid in the seal in the portion 7^a to rise suddenly through the tube 19, thus destroying the seal. The part 18 acts as a trap, and its equivalent would be an enlargement located in the connection between the tubes 17 and 19. The part 18 also assists in maintaining the level of liquid in the seal.

The effect of the water in the dome around the portion 7^a of the structure tends to impart a preliminary cooling. The refrigerant under pressure passing through the tube 17 and compartment 18, and down through the tube 19 bubbles up through the liquid absorbent in the portion 7^a, and thence passes into the tube portion 4. A small proportion of the absorbent is usually gasified along with the refrigerant.

Condensation of the absorbent in the compartment 18 and the tube 19 results in a supply of liquid being kept up in the seal at 7^a.

The gas passes from the tube 4 into the tube 3, where it must follow the passage around the outside of the vessel 20. Here the refrigerant gives up heat in two ways: (1) to the water in the tub, in which a portion of the tube 3 is plunged at the time, and (2) to the vaporizing of such refrigerant as is contained in the mixture in the vessel 20. This

act of vaporizing the refrigerant absorbs considerable heat, and also returns the refrigerant to the system.

This cooling causes the absorbent to condense in the form of a mist contained in the still gasified refrigerant, which mist will be deposited upon surfaces with which it must contact. Some collects on the inside of the tube 3 and the outside of the vessel 20. The gases must pass down around the tube 2 and up through the holes 2^a. In doing so, practically all of the mist is deposited and runs down into the sump in the lower end of the tube 3.

The refrigerant fairly clear of absorbent medium by this time passes into the cold ball 1, where it is condensed to a liquid, as a result of its heat being given up to the walls of the cold ball, and thence to the water in the tub.

The condensation of the refrigerant starts to take place when the pressure resulting from the heating of the shell 7 builds up a sufficient heat within the shell 1 or cold shell.

The heating of the shell 7 is continued until the maximum desired amount of refrigerant in the system has been boiled out of the absorbent. At this period the warning whistle will begin to operate, and after it has operated for several periodic intervals, the hot shell is taken away from the heater, and the heat turned off. It should be noted that the liquid in the shell 1 Figure 1 at 1^b is not present when the shell 7 is filled to the level shown. The shell 1 is normally empty when the shell 7 is full.

Proceeding with the operation, the hot shell may then be cooled in the water tub for a short interval.

The action of the shell 1 or cold shell is much enhanced by the circulation dome 21. The mouth of the dome is held below the level of the cooling water in the tub by reason of the fact that the whole weight of the device is applied to holding it down. Thus the bracket shoulder 32^a provides a rib for hooking the tube portion 4 over the wall of the tub. The bracket 31 holds the hot shell away from the tub and prevents the device from tipping, so that the whole system weighs down the cold shell, and keeps it in the position indicated in Figure 7. The water flows up around the dome and out through the mouth thereof, causing a circulation through the whole tub. If the safety device in the cold shell should rupture, the refrigerant will be absorbed or dissolved in the water of the tub.

In placing the hot shell in the tub, the shoulder 32^b of the tube bracket is hooked over the edge of the tub, and the shell 1 abuts the bracket, or rather the lower end of the tube 3 abuts it, resulting in keeping the hot shell down, and incidentally in resupplying water in the steam dome on the hot shell, through the hole 13 therein.

The device is then placed into the refrigerator box, as explained, and the hot ball being partially cooled, and this cooling being much enhanced by the fins, as described, will continue to become lower in temperature. This lowers the pressure in the system, causes the refrigerant to slowly evaporate in the cold ball, and to pass back from the cold shell in the same way that it entered it. The gases pass down through the tube 16, since they cannot pass through the liquid seal, and set up an agitation as they bubble into the absorbent in the hot shell. This action results in the great reduction of temperature of the shell 1 and the tube 3. The absorbent is strongly avid for the refrigerant, and absorbs it as fast as it enters through the tube 16, this action being greatly enhanced by the bubbling and agitation of the absorbent by the influx of the gas. The bubbling and agitation results from the end of the tube 16 being near the surface of the liquid in the shell 7 and also from the end of the tube being open.

When the refrigerant medium has sufficiently passed back to the hot shell again, it is necessary before reheating to drain the system. This is so because what residue of the absorbent is left in the cold shell and the sump should be returned.

The device is set into the position as guided by the shoe on the handle, as described, and as shown in Figure 6, which establishes a level of liquid in the system, about as shown in the dotted line A of Figure 1. The drainage having taken place, the device is righted again, which results in all of the liquid in the system flowing into the shell 7 except sufficient to fill the vessel 20, and the liquid seal in the portion 7^a. Any excess will pass into the sump, but it will be difficult to even completely fill the vessel 20, upon righting the device, due to the proportions and shapes of the elements thereof.

Since there are no losses in the system, it will continue to function in the cycle noted, with intervals of absorption, drainage and generation.

I have not illustrated the seams formed in making up the two shells, and uniting the tubular portions and shell together, as this may be accomplished in any desired way.

Its inexpensiveness and easy operation, makes my device available for domestic refrigeration at a cost which is very much lower than present systems, and brings artificial refrigeration within the economical resources of those of moderate means.

It will be evident that modifications of the structural details of my device may readily be made without departing from the invention therein, and I do not wish to represent that the embodiment of my invention selected for purposes of illustration, is the only way in which my invention can be brought to practical use.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In combination, a refrigerator box, and a removable refrigerating unit therefor, said box having an opening therein, a groove in the upper edge of the wall about said opening, said unit having its portions connected together solely by means containing the passageways between the portions, said means arranged to fit in said groove, for the purpose described.

2. In a portable refrigerating unit, the combination of a generator-absorber, a condenser-evaporator, and passageways between them, to provide separate paths for flow of gases in opposing directions, said passageways including a liquid seal composed mainly of the liquid absorbent used, means for defining a redraining position for said unit, and means for retaining liquid for return to the seal upon righting the unit from redraining position.

3. In a refrigerating device, a generator-absorber, connections therefrom through two passages, a liquid seal composed mainly of the liquid absorbent used above which one of the passages terminates, and within the liquid of which the other passage terminates, a single passage from above the seal to an evaporator, a sump in said passage, and an evaporator to which said single passage is connected above said sump.

4. In a refrigerating device, a generator-absorber, connections therefrom through two passages, a liquid seal composed mainly of the liquid absorbent used above which one of the passages terminates, and within the liquid of which the other passage terminates, a single passage from above the seal to an evaporator, a sump in said passage, and an evaporator to which said single passage is connected above said sump, said parts being arranged so that all liquid will drain from the evaporator upon proper positioning of the device.

5. In a refrigerating device, a generator-absorber, connections therefrom through two passages, a liquid seal composed mainly of the liquid absorbent used above which one of the passages terminates, and within the liquid of which the other passage terminates, a single passage from above the seal to an evaporator, a sump in said passage, and an evaporator to which said single passage is connected above said sump, said parts being arranged so that all liquid will drain from the evaporator, upon proper positioning of the device, and the passages to the generator-absorber so arranged as to retain sufficient liquid to restore the liquid seal when the device is in normal position.

6. In a refrigerating device, a generator-absorber, and a freezing element connected thereto, including passageway forming means for refrigerant during boiling off and reabsorption, and a liquid seal composed mainly of the liquid absorbent used for one of said passages at least, and means whereby the freezing element can be drained into the generator absorber through said passages without destroying the liquid seal.

7. In a refrigerating device, a generator-absorber, and a freezing element connected thereto, including passageway forming means for refrigerant during boiling off and reabsorption, and a liquid seal composed mainly of the liquid absorbent used for one of said passages at least, and means whereby the freezing element can be drained into the generator-absorber through said passages without destroying the liquid seal, said structure having an overflow sump connected thereto.

8. In a refrigeration unit, a generator-absorber casing, a condenser-evaporator casing, tubular means connecting the same, and extending beyond the condenser-evaporator to form a sump, and a liquid container located within said tubular means and defining influx and efflux passages from the generator-absorber between it and the tubular means.

9. In a refrigeration unit, a generator-absorber casing, a condenser-evaporator casing, tubular means connecting the same, and extending beyond the condenser-evaporator to form a sump, and means located within said tubular means and defining influx and efflux passages from the generator-absorber, including a liquid container.

10. In a refrigeration unit, a generator-absorber casing, a condenser-evaporator casing, tubular means connecting the same, and extending beyond the condenser-evaporator to form a sump, and means located within said tubular means and defining influx and efflux passages from the generator-absorber, including a liquid container, said tubular means having a portion of its body arranged to serve as a support for both casings upon an intervening wall.

11. In a refrigerating unit a generator-absorber, and means mounted upon said absorber and operated by heat, said means having a sounding element arranged to give warning upon predetermined temperatures of the generator-absorber, and comprising a retainer for water having a steam bleed hole, and a discharge chamber of which the generator-absorber forms a wall, a sounding device in the wall of the discharge chamber, and a pressure operated overflow from the retained to the discharge chamber.

12. In a generator-absorber, a casing therefor, a dome mounted upon the top of said casing, and having a water receptacle therein, spaced from the casing, and a portion of which the casing forms a wall, having a sounding device therein, and steam pressure operated means for discharging water from

the receptacle to the portion having the sounding device.

13. In a generator-absorber, a casing therefor, and heat radiation fins upon the casing extending other than horizontally and formed of inverted channels open at the top and bottom, for the purpose described.

14. In a generator-absorber, a spherical shell therefor, and heat radiation fins thereon comprising inverted channel members open at the top and bottom secured to the casing, and extending other than parallel with the horizontal axis of the spherical shell.

15. In combination with a refrigerator cabinet, a refrigerating unit having a generator-absorber-element, and a condenser-evaporator element, means connecting them together, said cabinet having an opening of sufficient size to receive the condenser-evaporator, and a closure for said opening, and means within the cabinet for engaging the condenser-evaporator, when supported on the cabinet by the said connecting means.

16. In combination with a refrigerator cabinet, a refrigerating unit having a generator-absorber element, and a condenser-evaporator element, means connecting them together, said cabinet having an opening of sufficient size to receive the condenser-evaporator, and a closure for said opening, and means within the cabinet for engaging the condenser-evaporator, when supported on the cabinet by the said connecting means, said cabinet having a groove therein in the wall thereof about said closure for retaining the said connecting means.

17. In combination with a refrigerator cabinet, a refrigerating unit having a generator-absorber element, a condenser evaporator element, and means connecting them together, said condenser-evaporator element including a tubular sump, said cabinet having an opening of sufficient size to receive the condenser evaporator element, a closure for said opening, and a retainer located within the cabinet for engaging said tubular sump, when the device is supported on the cabinet by said connecting means.

18. In combination in a refrigeration unit, a generator-absorber of spherical shape, a condenser-evaporator likewise of spherical shape, a tubular passage extending between said absorber and evaporator devices, said tubular passage containing all connecting means between said devices, including a vessel for entrapping liquid therein to form a cooling element between said two devices for the flow of the refrigerant during the generation step of its cycle of operations.

19. In combination in a refrigeration unit, a generator-absorber of spherical shape, a condenser-evaporator likewise of spherical shape, a tubular passage extending between said absorber and evaporator devices, said tubuler passage containing all connecting means between said devices, including a series of vessels containing liquid therein, for the purpose described.

20. In combination in a refrigeration unit, a generator-absorber comprising a container portion for absorbent, an inlet therein in the form of a tube extending to a point below the level of absorbent therein, tubular means extending from above the level of absorbent in said container, a liquid seal applied about the exit end of said tubular means, and means for preventing a surge of the liquid of said seal through the said tubular means.

21. In combination in a refrigeration unit, a generator-absorber comprising a container, a vessel for containing liquid located adjacent thereto, a tube defining the level of liquid in said vessel and extending to a point below the level of liquid in the container, and tubular means extending from above the liquid level in said container to a point below the liquid in said vessel, whereby a seal is provided.

22. In combination in a refrigeration unit, a generator-absorber comprising a container, a vessel for containing liquid located adjacent thereto, a tube defining the level of liquid in said vessel and extending to a point below the level of liquid in the container, and tubular means extending from above the liquid level in said container to a point below the liquid in said vessel, whereby a seal is provided, and a passageway from above the level of liquid in said vessel to a condenser evaporator.

23. In a refrigeration unit, a condenser-evaporator element comprising a tubular passageway forming means, a liquid container located in said passageway and requiring flow of gases around it, a condenser shell connected to said tubular passageway means beyond the liquid container, and a sump located below the point of connection of the condenser shell.

24. In a refrigeration unit, a condenser-evaporator element comprising a tubular passageway forming means, a liquid container located in said passageway and requiring flow of gases around it, a condenser shell connected to said tubular passageway means beyond the liquid container, and a sump located below the point of connection of the condenser shell, said condenser shell having a closed tube extending from it into said passageway means having holes therein for passage of refrigerant gases.

25. In a refrigeration unit, the combination of a generator-absorber having separate inflow and outflow passages, the latter protected by a liquid seal composed mainly of the liquid absorbent used, a condenser-evaporator, and means for defining a drainage position of the unit, such that the liquid seal will not be destroyed in draining the con-

denser-evaporator back into the generator-absorber.

26. In a refrigeration unit, the combination of a generator-absorber having separate inflow and outflow passages, the latter protected by a liquid seal composed mainly of the liquid absorbent used, a condenser-evaporator, means for partially cooling the gases flowing from the generator before they reach the condenser-evaporator, baffling means for entrapping the mist of absorbent medium condensed by said partial cooling, and a sump to catch the entrapped particles, so that the refrigerating medium is substantially free of contained absorbent, when it reaches the condenser-evaporator.

27. In a refrigerating unit, the combination of a generator-absorber, a condenser-evaporator and passageways between them to provide separate paths for flow of gases in opposing directions, with the passageway for the generated gases having a seal, and the passageway for the gases to be absorbed ending in an open topped tubular member spaced from and located closely below the level of the absorbent liquid at the start of the absorption so as to set up surface agitation thereof and entering the absorber from above to avoid a static head of liquid in the passageway.

28. In a refrigerator unit, the combination of a generator-absorber, a condenser-evaporator, and passageways between them to provide separate paths for flow of gases out of and into the generator-absorber, the passageway into the generator-absorber having an unrestricted annular opening near the surface of the absorbent liquid at the start of absorption so as to set up surface agitation thereof and entering the absorber from above so as to avoid a static head of liquid in the passageway.

29. In a refrigeration unit, a generator-absorber having a sealed outlet therefrom, and an inlet thereinto, the latter being arranged to carry the gases to be absorbed, said inlet formed as a pipe which terminates in a spaced tubular member, open at the top, and forming an unrestricted opening near the surface of the absorbent at the period when absorption begins and enters the absorber from above so as to avoid a static head of liquid in the passageway.

30. In a refrigeration apparatus, a generator-absorber formed in the shape of a sphere, thereby providing the strongest shape for the required solid content thereof, said sphere provided externally with heat radiating fins, thereby compensating for the restricted surface of the spherical body proportionate to its solid contents.

31. In an absorption system refrigerating device, a generator-absorber shell having an outlet passage for products of evaporation and a casing located on and in direct contact with the generator-absorber shell adjacent the outlet passage adapted to retain a body of cooling liquid in place whereby an initial dehydration occurs at said outlet passage.

32. In combination with a vessel for containing cooling liquid, a portable refrigeration unit comprising a generator-absorber receptacle, and a condenser-evaporator receptacle, means extending between said receptacle joining them together as a unit, and means on said unit cooperating with the vessel for holding the condenser-evaporator submerged in the liquid therein when the condenser-evaporator, because of its empty condition would otherwise float on the surface of said liquid.

33. In combination with a vessel for containing cooling liquid, a portable refrigeration unit comprising a generator-absorber receptacle, and a condenser-evaporator receptacle, means extending between said receptacles joining them together as a unit, and means in connection with the vessel for holding the condenser-evaporator submerged in the liquid therein when the condenser-evaporator, because of its empty condition would otherwise float on the surface of said liquid, said means comprising an element exterior of the vessel for holding the unit in a vertical position, whereby the weight of the generator-absorber holds down the condenser-evaporator.

34. In combination with a vessel for containing cooling liquid, a portable refrigeration unit comprising a generator-absorber receptacle, and a condenser-evaporator receptacle, means extending between said receptacles joining them together as a unit, and means in connection with the vessel for holding the condenser-evaporator submerged in the liquid therein when the condenser-evaporator, because of its empty condition would otherwise float on the surface of said liquid, said means comprising a bracket against which the generator-absorber receptacle bears, thus preventing tipping of the device.

35. In combination with a vessel for containing cooling liquid, a portable refrigeration unit comprising a generator-absorber receptacle, and a condenser-evaporator receptacle, means extending between said receptacles joining them together as a unit, and means in connection with the vessel for holding the condenser-evaporator submerged in the liquid therein when the condenser-evaporator, because of its empty condition would otherwise float on the surface of said liquid, said means comprising a bracket against which the generator-absorber receptacle bears, thus preventing tipping of the device, and a member located on the joining means between the receptacles which engages the edge of the said vessel.

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