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G. FRIE
MEANS FOR EVACUATING DRIP WATER FROM EVAPORATING
UNITS OF REFRIGERATING EQUIPMENT

2,525,342

Filed Dec. 23, 1947

2 Sheets-Sheet 1

Fig. 1.

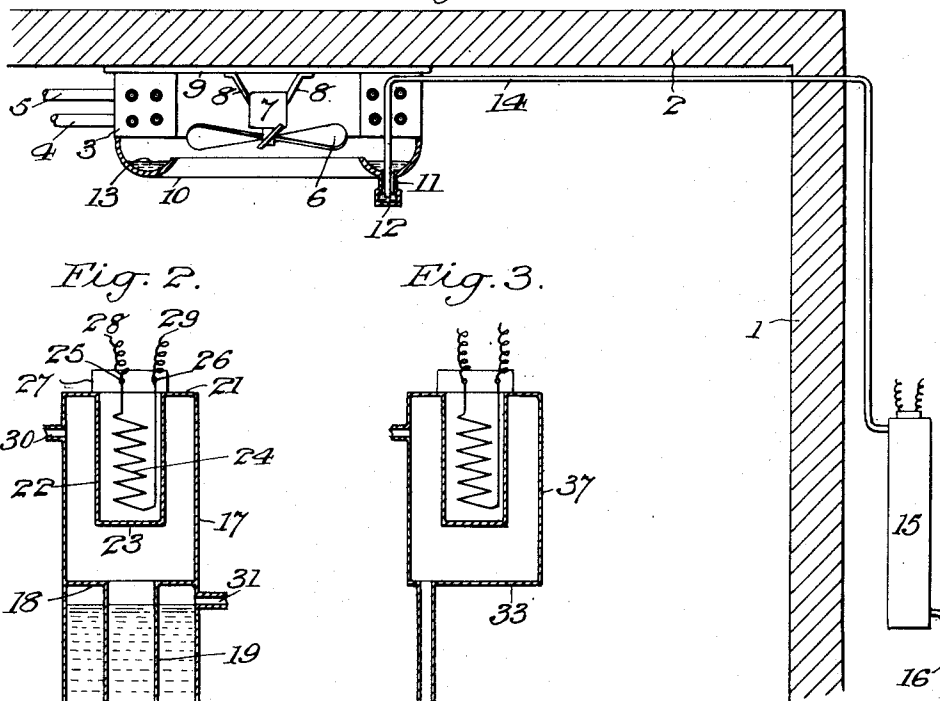


Fig. 2.

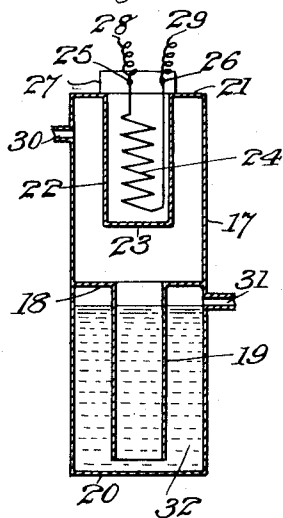
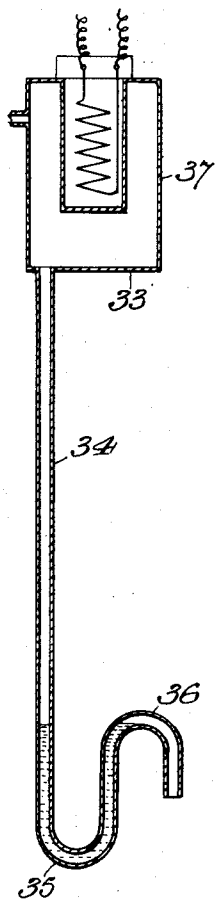


Fig. 3.



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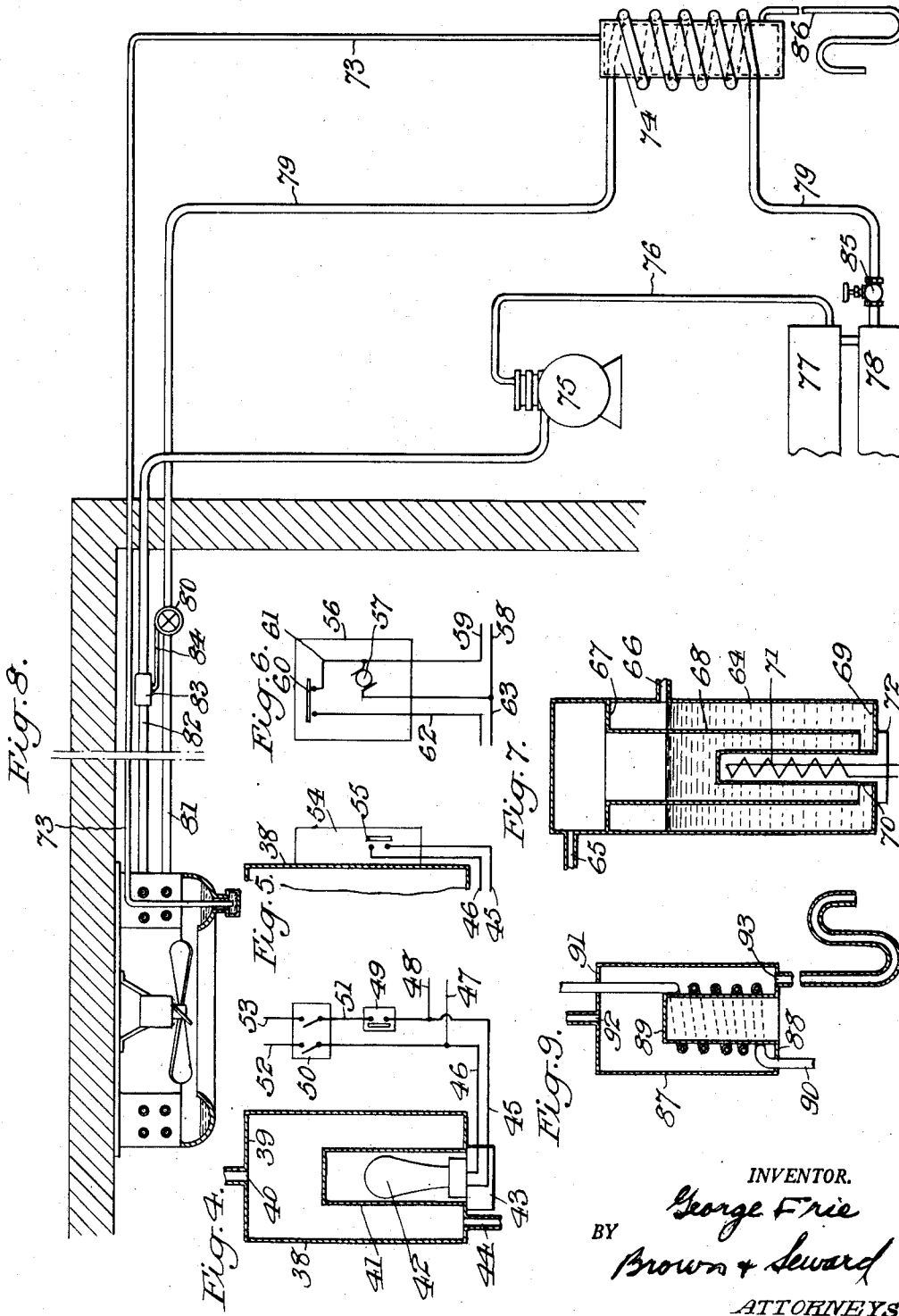
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UNITED STATES PATENT OFFICE

2,525,342

MEANS FOR EVACUATING DRIP WATER
FROM EVAPORATING UNITS OF RE-
FRIGERATING EQUIPMENTGeorge Frie, Trenton, N. J., assignor to Kramer
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29 Claims. (Cl. 62—140)

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This invention relates to means for evacuating drip water from evaporating units of refrigerating equipment, and has for an object to provide such means which acts upon the suction principle whereby the water being evacuated can be caused to pass through a course which is, at least in part, elevated with respect to the drip pan or sump of the evaporating unit, as contrasted with the usual practice of evacuating the water by gravity.

Another object is to provide such means which will permit of the installation of the evaporating unit against the ceiling of a refrigeration chamber and spaced from the vertical walls thereof and enable the drain pipe for the said water to extend from the unit to a point outside the chamber without traversing a course that lessens the effective head room within the chamber.

Another object is to provide such means which will permit the evaporating unit to be located at the center of the ceiling of the chamber, and the drain pipe for the said water to pass upwardly from the drip pan or sump of the unit to a point adjacent the ceiling and then substantially horizontally along the under side of the ceiling to a point without the chamber.

Another object is to provide such means in which the evacuation of the water is caused by a device which is actuated by variations in temperature.

Another object is to provide such means in which the evacuation device just mentioned operates upon the suction principle activated by expansion and contraction of a fluid within the device.

Another object is to provide such means in which the activation of the device that causes evacuation of the water is controlled by the on and off cycles of the compressor which supplies refrigerant to the evaporating unit.

A further object is to provide certain improvements in the form, construction and arrangement of the several parts whereby the above named and other objects inherent in the construction may be effectively attained.

Practical embodiments of the invention are diagrammatically represented in the accompanying drawings in which:

Fig. 1 represents a detail vertical section, partly in elevation, showing an evaporating unit fixed to the ceiling of a refrigeration chamber at a point spaced a distance from the vertical walls thereof, and a drain pipe for the drip water leading from the drip pan and sump upwardly to and along the under side of the ceiling, through

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a vertical side wall of the chamber and to the evacuation device;

Fig. 2 represents a vertical section on an enlarged scale, through the evacuation device;

Fig. 3 represents a vertical section, on the same scale as Fig. 2, of a modified form of the evacuation device;

Fig. 4 represents a vertical section, partly in elevation, of a second modified form of the evacuation device together with connections for controlling the activation of its heating element;

Fig. 5 represents a broken view showing a modified form of control for the evacuation device illustrated in Fig. 4.

Fig. 6 represents a view similar to Fig. 5 showing a second modified form of control for the evacuation device illustrated in Fig. 4;

Fig. 7 represents a vertical section through a third modified form of the evacuation device.

Fig. 8 represents a broken view similar to Fig. 1 in which the evaporating unit and its evacuation device are combined with refrigeration apparatus whereby the refrigerant is utilized to control the variations in temperature of the evacuation device; and

Fig. 9 represents a detail vertical section on an enlarged scale, showing a modified form of the evacuation device in Fig. 7.

In the present practice of constructing walk-in cooling or refrigeration chambers it is customary to use evaporating units which are either positioned upon the floor, positioned upon the ceiling with the propeller fan operating in a vertical plane, or positioned upon the ceiling with the propeller fan operating in a horizontal plane. The type of unit which is designed to be positioned upon the floor has the serious drawback of occupying floor space which is, of course, of value and importance and, chiefly for this reason, preference is shown for the type of units designed to be attached to the ceiling. However, that ceiling type in which the fan operates in a vertical plane involves the disadvantage of requiring that it be located near one of the vertical walls of the chamber in order that it will not interfere with the movement of operators who are carrying substances to be refrigerated into, around in, and out of the chamber. And even though this type of evaporating unit be located adjacent one of the walls of the chamber it does, to a certain extent, restrict free movement of operators within the chamber. Largely for the foregoing reasons, the type of evaporating unit which is fitted to be attached to the ceiling and has its air propelling fan operating in a horizontal plane has become to be

regarded as most desirable for use in these chambers since it can be located at the center of the ceiling, which is the least useful place in the chamber, and also because its reduced vertical dimension sharply lessens the extent to which it interferes with human movements in the chamber.

There is, however, a problem attendant upon the location of the evaporating unit at or near the center of the ceiling, because its drain pipe for evacuation from the unit of the inevitable drip water accumulating chiefly from defrosting of the evaporator coil needs to be passed from the evaporating unit to and through a vertical wall of the chamber and, as the said evacuation of the drip water is accomplished by gravity, the drain pipe must take a downward angular course from the drip pan of the evaporating unit to a vertical wall of the chamber. This causes the drain pipe to present a serious obstacle to free human movement within the chamber, in which the ceiling is usually quite low, and also presents a hazard with respect to injury to or breakage of the drain pipe by contact therewith of substances being moved into, around in, or out of the chamber.

The present invention is calculated to eliminate the drawbacks and disadvantages hereinabove recited, as well as others incidental to the present forms of installation of evaporating units in refrigeration chambers, by providing for the evacuation of the drip water from the above mentioned type of evaporating unit which is adapted to be positioned at or near the center of the ceiling of the chamber, without causing any restriction to free movement within the chamber and without presenting any liability to injury of the drain pipe by such movement.

Referring now to the form of the invention represented in Figs. 1 and 2, a side wall of a conventional refrigeration chamber is denoted by 1 and its ceiling by 2. At a point intended to be substantially central of the ceiling is secured an evaporating unit which may be of any well known or approved form or type having its air propelling fan rotating in a horizontal plane. As the particular construction of this unit forms no part of the present invention, it is deemed sufficient merely to identify its parts by noting that the evaporator coil is marked 3 and its inlet and outlet refrigerant conduits 4, 5; its fan is denoted by 6 and is driven by a motor 7 carried by suitable brackets 8, 8, which are properly secured to the base plate 9 of the unit, as by screws or the like, while the base plate itself may be similarly fastened to the ceiling 2. The drip pan of the unit is marked 10 and it is provided with a small depression or sump 11 which constitutes the lowest part of the pan and is fitted with a screw cap 12 for cleaning purposes. Drip water which has accumulated in pan 10 and sump 11 is indicated by 13.

A drain pipe of suitable size, which will be well understood by those skilled in this art, is marked 14 and it has an end projecting into but not contacting the bottom of sump 11, as clearly shown in Fig. 1. From this point the pipe 14 extends upwardly almost into contact with base plate 9 of the evaporating unit, which as hereinabove mentioned is fastened to ceiling 2 of the chamber, and thence the drain pipe travels horizontally in close parallelism with the ceiling of the chamber to and through the vertical wall 1. If the refrigeration chamber is large, or if it is desired for any other reason, this part of the

drain pipe which extends from the evaporating unit to the chamber wall may be supported by one or more brackets (not shown) of any suitable form affixed to the chamber ceiling. After passing through the vertical wall 1 of the chamber, the drain pipe 14 extends downwardly to and enters an evacuation device which is denoted generally by 15 and may be suitably mounted or supported in position in any appropriate manner as, for instance, by brackets (not shown) fastened to the outer face of the vertical wall 1 of the chamber. The evacuation device 15 should be located in such a vertical position that the portion of the pipe 14 which extends downwardly to it is longer than the portion of the said pipe which extends upwardly from the sump 11. A tail pipe 16 leads from a lower portion of the evacuation device 15 to the sewer or any other suitable disposal point for the drip water.

The construction of the evacuation device 15 is illustrated in Fig. 2, from which it will be observed that it has an outer cylindrical shell 17 within which, and about centrally thereof in respect to height, is fitted an annular partition 18 from which depends a tube 19 that extends downwardly to a point adjacent the bottom 20 of the evacuation device. The top of the said device is, like the partition 18, in the form of an annulus 21 and it supports a cylindrical housing 22 which depends therefrom and is closed at its lower end by a bottom 23. Within the housing 22 is positioned, in any suitable manner, a heating element such, for instance, as an electric resistance 24, which has its terminals connected, as indicated at 25, 26, to a junction box 27 which is mounted on the top 21 of the evacuation unit and from which lead electric wires 28, 29 to a means for periodically heating the resistance by a suitably controlled source of electric current, such, for instance, as any one of the forms represented in Figs. 4, 5 and 6 hereof, to be hereinafter described. The inlet to the evacuation device 15 for the drain pipe 14 is marked 30 and the outlet for the tail pipe 16 is marked 31.

The parts of the evacuation unit 15, other than the resistance 24, may conveniently be composed of suitable sheet metal, and they may be secured together in any well known or approved manner as by riveting, screwing, soldering, etc. In order to give a general conception of the approximate size of the evacuation unit it may be said that, for an evaporating unit operated by about one horse power and having a performance capacity of about twelve thousand B. t. u. per hour, the evacuation unit may be about three inches in diameter and about one foot in height.

In the operation of this form of the invention, the electric resistance 24 is periodically heated by the supplying of current thereto at times when drip water has accumulated in the pan 10 so as to call for its removal, and the resistance in turn heats the casing 22 which raises the temperature of the air contained within the evacuation device. This increase in temperature causes the said air to expand and some of it to be forced upwardly through the drain pipe 14 to and out of the end of the pipe which is immersed in drip water in the sump 11, thus completely filling the pipe 14 with air. At the expiration of the predetermined or automatically fixed period of heating the resistance, the electric current circuit thereto will be broken, the resistance will cool off, the casing 22 will cool off, and the temperature of the air contained within the evacuation unit 15 will fall. This reduction in air temperature will cause its

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volume to contract, thus establishing a partial vacuum or suction effect within the shell 17 which withdraws the air from drain pipe 14 and sucks the drip water from the sump 11 and pan 10 along therewith into the evacuation unit 15 where the water collects in the bottom thereof as indicated at 32. When sufficient water is thus collected to reach the outlet connection 31 of tail pipe 16, the water begins to drain off through the tail pipe to the sewer. Once the inflow of water through pipe 14 is started, the action is facilitated by a syphoning effect due to the fact that the length of that portion of pipe 14 which leads downwardly to evacuation unit 15 is greater than the length of that portion of the pipe which leads upwardly from sump 11. It may be noted that the water sucked through the drain pipe into the shell 17 passes down through tube 19 to reach the bottom of the evacuation unit and that, as the lower end of the tube 19 is spaced from the bottom 20 of the unit, the water as it collects may rise both in the tube 19 and in the shell 17 surrounding the tube 19 until it reaches the level of the outlet 31 and drains off. In this connection, attention should be directed to the fact that the evacuation unit should be of such construction that the length or height of the tube 19 and the spacing of outlet 31 from the bottom of shell 17 are both substantially greater than the distance from the bottom of the drip pan 10 to the highest part of the drain pipe 14 thereabove, while the diameter of tube 19 is much less than the diameter of shell 17; the proportions shown in Fig. 2 being satisfactory. The purpose of this is to maintain a water seal in the lower part of shell 17 during both the heating and chilling periods, so that the evacuation unit will function as described.

From the foregoing it will be seen that periodic heating of resistance 24 followed by the chilling thereof, which can be controlled in a number of ways as, for instance, a timer clock or by pressure or thermostatic switches related to the activity of the refrigeration compressor, will serve to cause sequential expansion and contraction of the volume of air within the evacuation unit resulting in corresponding periodic withdrawal of the drip water from the evaporating unit and its disposal to the sewer, in spite of the fact that the drain pipe 14 takes a course which is, in part, elevated above the sump 11 and drip pan 10 in order to avoid any obstruction of the refrigeration chamber by the drain pipe as well as liability of injury to the drain pipe itself.

Turning now to the modified form of evacuation unit represented in Fig. 3, the upper half of the said unit is the same as the form shown in Fig. 2, but the lower half is eliminated and, in place of the partition 18 of Fig. 2, a bottom 33 is provided. In lieu of the lower half of the unit as shown in Fig. 2 there is provided a tail pipe 34 which opens out of and extends downwardly from bottom 33, the lower portion of the said pipe being reversely bent as indicated at 35, 36 to form a gooseneck which serves as a trap for the water, while the lower extremity of the pipe leads to the sewer or other disposal point. The length or height of this extremity should be substantially less than the height of the gooseneck to avoid a siphonic effect which might drain off too much of the water and break the seal at this point.

The operation of this modified form of evacuation unit shown in Fig. 3 is the same as that described in connection with the form shown in Fig. 2, except that the drip water which is drawn into the cylindrical shell, here marked 37, by the

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vacuum or suction effect, instead of passing through a tube such as 19 and collecting in the bottom of the shell, passes downwardly through pipe 34 and into the gooseneck formation 35, 36. When a sufficient quantity of water has collected in this part of pipe 34 to rise to the top of bend 36, the water will start to drain off through the lower extremity or tail end of the pipe to the sewer. It should here be noted that the pipe 34 should be so proportioned and formed that the vertical length of the gooseneck is greater than the distance from the bottom of the drip pan 10 to the highest part of the drain pipe 14 thereabove. This is for the purpose of causing the water which collects in the gooseneck 35, 36 to maintain a height in that portion of pipe 34 leading down to bend 35 which is sufficient to maintain an air seal at this point during the heating as well as the chilling periods of the evacuation unit to insure its efficient functioning.

The second modified form of the evacuation unit, represented in Fig. 4, operates on the same principle as hereinbefore described but the construction is somewhat different. In this form the outer cylindrical shell of the unit is denoted by 38 and it has a top 39 into which the drain pipe 14 opens as indicated at 40. Within shell 38 is a cylindrical housing 41 for an electric bulb 42 which is mounted in a combined socket and junction box 43, that is fixed at the lower open end of housing 41. The bulb may be either a light bulb of, say, twenty-five watt power or a bulb of the heater type. The bottom of shell 38 is annular and a pipe, here marked 44, opens out of the bottom and projects downwardly, the said pipe being the same in form and function as pipe 34, 35, 36 of Fig. 3. In this form of evacuation unit represented in Fig. 4, the electric bulb 42 serves as the heating unit in place of resistance 24 in Figs. 2 and 3, the said bulb being periodically heated by electric current through wires 45 and 46, which said wires are connected by branch wires 47, 48 to the terminals of the compressor motor (not shown) of the refrigeration apparatus. Wire 45 is also connected to a switch 49, which may be of either the pressure or thermostatic type which is responsive to the temperature in the refrigerating chamber, through the usual connections (not shown) as is well understood in this art. Wire 46 is connected to a power current line switch 50, to which switch 49 is also connected by wire 51. Power wires 52, 53 lead from any suitable source of electric current, not shown.

In the operation of this form of evacuation unit, the switch 49 is closed and the bulb 42 is energized by current through wires 45, 46 while the compressor motor is operating. When the temperature in the refrigeration chamber reaches the desired degree as a result of the operation of the compressor, switch 49 will open and cause the compressor motor to stop, all as is known to those familiar with this industry, which actions will, due to the connections hereinabove described, open switch 49 and deenergize bulb 42. The energizing and deenergizing of bulb 42 has the same function and effect as the heating and chilling of resistance 24 in Figs. 2 and 3, and the evacuation of the drip water from the evaporating unit is accomplished in the same way. It will thus be evident that the form of evacuation unit represented in Fig. 4 is controlled by the operating cycles of the refrigerating apparatus as a whole.

Fig. 5 shows a modified control for the form of evacuation unit represented in Fig. 4. In the arrangement of Fig. 5, a surface thermostat 54

is secured by any suitable means in contact with the outer surface of shell 38, the said thermostat being of the wide differential type capable of activation by changes in temperature of the shell 38. This thermostat 54 includes a switch 55 to which wires 45, 46, which are connected with electric bulb 42 as already described in connection with Fig. 4, are also connected. The thermostat is intended to be adjusted so that switch 55 will open at a certain elevated temperature, such, for instance, as 150° F., and will close at a certain lower temperature, such, for instance, as 90° F. Thus the closing of the said switch 55 when the temperature of the shell 38 is comparatively low will energize electric bulb 42 and raise the temperature of the said shell, and of the air contained there within, to the desired point, at which time switch 55 will open, bulb 42 will be deenergized and the air within shell 38 will begin to cool. This electric heating and chilling of the shell 38 and air there within will function as hereinabove described in connection with the form of evacuation unit shown in Fig. 2, and the drip water will be removed from the evaporating unit as also previously described.

Figure 6 shows a second modified control for the form of evacuation unit represented in Fig. 4. This control is the same as that represented in Fig. 5 except that an electric timer 56 is substituted for the surface thermostat 54 and the timer is not mounted on the shell 38 but is suitably supported in any convenient position and in any appropriate manner. This timer 56 includes the usual motor 57, the brushes of which are connected by wires 58, 59 with any suitable source of electric current, not shown. The timer also includes the usual switch 60, which has one of its terminals connected by a wire 61 with a brush of the motor 57 and its other terminal connected by wire 62 with one terminal of bulb 42; the other terminal of the said bulb being connected by a wire 63 with the other brush of motor 57. The electric timer is of the well known type which may be set for periodic operation so that, for instance, switch 60 may be closed and bulb 42 energized for a period of, say, thirty minutes until the air within shell 38 reaches the desired elevated temperature of, say, 150° F. At this point, the timer mechanism will cause switch 60 to open and deenergize bulb 42. This deenergizing of the bulb 42 will permit the air within shell 38 to chill and bring about the evacuation of the drip water from the evaporating unit, as hereinabove described, with the predetermined frequency at which the timer may be set, say, every two hours.

In Fig. 7 is shown a third modified form of evacuation unit which operates on the principle of generating and condensing water vapor. In this form the cylindrical outer shell of the said unit is denoted by 64, and it is provided with an inlet connection 65 for drain pipe 14 and with an outlet connection 66 for tail pipe 16. Within the shell 64 is fixed an annular horizontal partition 67, which is similar to partition 18 of Fig. 2, and from the said partition depends a pipe or tube 68, which is similar to tube 19 of Fig. 2. The bottom 69 of shell 64 is annular and a centrally disposed cylindrical housing 70, which is closed at the top, arises from the inner periphery of the annular bottom 69 and projects upwardly into tube 68. This housing 70 is water tight and within it is positioned, in any suitable manner, an electric resistance 71, which is similar to resistance 24 of Fig. 2, and has its terminal

wires connected with a junction box 72 from which wires may lead to a suitable source of electric current (not shown), as described in connection with wires 28 and 29 of Fig. 2. The periodic energizing and deenergizing of this electric resistance 71 may be accomplished, for instance, in any of the ways hereinabove described in connection with electric resistance 24 and bulb 42.

In the operation of this form of evacuation unit represented in Fig. 7, a quantity of water is placed in the shell 64, preferably reaching a height approximating the lower portion of outlet connection 66, as indicated at 73. The energizing and consequent heating of resistance 71 will cause evaporation of the water so that the upper part of shell 64 will be filled with water vapor, which vapor will also completely fill drain pipe 14 as in the case of the warm air action described in connection with the form of the invention shown in Figs. 1 and 2. When the resistance 71 is deenergized, the following chilling effect will serve to condense the said water vapor and thereby create a partial vacuum or suction effect within the shell 64 which will suck the water vapor from drain pipe 14 into the said shell with the drip water from sump 11 and drip pan 10 following as in the operation described in connection with Figs. 1 and 2. As the water thus collected in shell 64 rises to the level of outlet connection 66, it will be drained off to the sewer through tail pipe 16 as hereinabove explained.

Fig. 8 of the drawings represents the invention as applied to a standard type of refrigeration system, the arrangement being such that the refrigerant passing from the compressor to the expansion valve occasions the periodic fluctuations in temperature of the drip water evacuation unit which causes it to function and accomplish the purpose hereinabove set forth. In this form of Fig. 8, the evaporating unit is shown as of the same type and mounted in the same way as in Fig. 1. From the drip pan and sump of the said evaporating unit a drain pipe, here marked 73, follows a course similar to that of Fig. 1 and enters at the top of the shell 74 of the evacuation unit.

As the particular construction and arrangement of the refrigeration system or apparatus shown in Fig. 8 per se forms no part of the present invention, it is deemed sufficient here to refer in a general way to the elements and their operative connections. The compressor is denoted by 75 and its discharge pipe or conduit 76 enters a condenser 77, which is, as usual, connected to a receiver 78 from which a refrigerant pipe or conduit 79 leads to an expansion valve 80 which is connected by a pipe 81 to the inlet of the evaporating coil in the evaporating unit. An outlet pipe 82 leads from the outlet of the said evaporating coil to the intake or suction port of the compressor 75. For controlling the operation of the expansion valve 80, the usual feeler bulb 83 and capillary tube 84 are provided, and a hand valve 85 may be fitted in pipe 79 if desired.

The refrigerant pipe 79 leading from the receiver is coiled tightly around the outer surface of the shell 74 of the evacuation unit, and may, if desired, be soldered thereto, with the result that, when the compressor 75 is in operation hot refrigerant will pass through the said coiled pipe 79 to heat the shell 74 and the air therewithin, which will cause the said air to expand and fill drain pipe 73 as hereinabove described in connection with the form of the invention shown in

Figs. 1 and 2. When the compressor stops, the refrigerant will cease to circulate through pipe 79 and the shell 74 and air therewithin will cool resulting in contraction of the volume of the air and causing the evacuation of drip water from the evaporating unit into the shell 74 and thence through a pipe, here marked 86, to the sewer, all as has been hereinbefore described in connection with Fig. 3. The on and off cycles of the compressor may be controlled in any suitable manner such, for instance, as by the usual pressure or thermostatic valve, or an electric timer connected with the compressor motor, as is well understood by those familiar with this industry.

In Fig. 9 is shown a modified form of the evacuation unit included in the embodiment of the invention represented in Fig. 8. In this modified form of Fig. 9, the shell of the said unit is marked 87 and it has an annular bottom 88 from which uprises an inner shell 89. The refrigerant pipe here marked 90, corresponding to pipe 79 of Fig. 8, passes through the bottom 88 of shell 87, is coiled tightly around the outer surface of inner shell 89, is soldered thereto if desired, and emerges through the top 91 of shell 87. The drain pipe 73 enters through the top 91, as indicated at 92, and the tail pipe 86 opens into the bottom 88 as indicated at 93. The operation of this form of evacuation unit represented in Fig. 9 is the same as that shown in Fig. 8 except that the heating effect of the refrigerant pipe is applied to the inner shell 89 instead of to the outer shell 87.

With reference to all forms of the invention, it may be observed that the pumping or pulsating effect of the evacuation unit is generated by periodic changes of temperature therewithin, and that the result can be obtained regardless of specific degrees of change and regardless of whether the temperature actively applied thereto is high or low. It is relative sequential changes in temperature that effect the cycles of operation and, indeed, the result could be accomplished by periodically applying a chilling medium to the evacuation unit and permitting warming of the latter therebetween. While I have shown a number of different ways in which a temperature affecting medium may be applied to the evacuation unit, it should be noted that this step could be accomplished in various other ways such, for instance, as by applying an electric heating element to the exterior of the outer shell of the evacuation unit, or by making use of changes in temperature derived from the refrigeration chamber or from the current of the evaporating unit fan.

From the foregoing it will be seen that this invention accomplishes all the objects hereinabove recited and that it does not serve in any substantial way to complicate the structure or operation of refrigeration systems or to materially increase the expense thereof. Once the operation is started, the evacuation of the drip water from the evaporating unit, chiefly the water resulting from defrostings of the evaporator coil, is periodically accomplished at either predetermined and set times or under control of the cycles of operation of the refrigerating system.

It will be understood that various changes may be resorted to in the form, construction, material and arrangement of the parts without departing from the spirit or scope of the invention, and hence I do not intend to be limited to details herein shown or described except as they may be

included in the claims or required by disclosures of the prior art.

What I claim is:

1. A device for drawing off water from a receptacle comprising, a fluid containing chamber provided with an inlet and an outlet for the water, the inlet being located higher than the outlet, a water seal for the inlet, and a water seal for the outlet, whereby expansion and contraction in the volume of the fluid in the chamber will produce a pulsating effect to draw water thereinto through the inlet.

2. A device for drawing off water from a receptacle comprising, a fluid containing chamber provided with an inlet and an outlet for the water, the inlet being located higher than the outlet, a water seal for the inlet, and a water seal for the outlet, whereby changes in the temperature of the fluid in the chamber causing it to expand and contract in volume will produce a pulsating effect to draw water thereinto through the inlet.

3. A device for drawing off water from a receptacle comprising, a fluid containing chamber provided with an inlet and an outlet for the water, the inlet being located higher than the outlet, a water seal for the inlet, and a water seal for the outlet, the outlet seal having a greater head than the inlet seal, whereby expansion and contraction in the volume of the fluid in the chamber will produce a pulsating effect to draw water thereinto through the inlet.

4. A device for drawing off water from the drip pan of an an evaporating unit of heat exchange apparatus, said device including a conduit having one end adapted for insertion in said drip pan, a fluid containing chamber connected to the other end of said conduit, and means for causing the said fluid to expand and contract in volume and thereby produce a pulsating suction effect within said chamber to cause the water to flow from the drip pan through said conduit into the chamber.

5. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device including a conduit having one end adapted for insertion in said drip pan, a fluid containing chamber connected to the other end of said conduit, and means for changing the temperature of said fluid to cause it to expand and contract in volume and thereby produce a pulsating suction effect within said chamber to cause the water to flow from the drip pan through said conduit into the chamber.

6. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device including a conduit having one end adapted for insertion in said drip pan, a fluid containing chamber connected to the other end of said conduit, and means for intermittently raising the temperature of said fluid to cause it to expand and contract in volume and thereby produce a pulsating suction effect within said chamber to cause the water to flow from the drip pan through said conduit into the chamber.

7. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device including a conduit having one end adapted for insertion in said drip pan, a fluid containing chamber connected to the other end of said conduit, and electric means for intermittently raising the temperature of said fluid to cause it to expand and contract in volume and thereby produce a pulsating suction ef-

fect within said chamber to cause the water to flow from the drip pan through said conduit into the chamber.

8. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device including a conduit having one end adapted for insertion in said drip pan, a fluid containing chamber connected to the other end of said conduit, and means activated by the flow of refrigerant in the apparatus for intermittently raising the temperature of said fluid to cause it to expand and contract in volume and thereby produce a pulsating suction effect within said chamber to cause the water to flow from the drip pan through said conduit into the chamber.

9. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, a conduit connecting the drip pan with said inlet, and an element associated with said shell for periodically changing its temperature to produce a suction effect therewithin and cause the water to flow from the drip pan through said conduit into the shell.

10. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, a conduit connecting the drip pan with said inlet, and an element associated with said shell for periodically raising its temperature to produce a suction effect therewithin and cause the water to flow from the drip pan through said conduit into the shell.

11. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, a housing within said shell, and a temperature changing element associated with said housing, said element being adapted to be periodically energized to effect its change in temperature.

12. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, a housing within said shell, and a temperature changing element located within said housing, said element being adapted to be periodically energized to effect its change in temperature.

13. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, a housing within said shell, and a heating element located within said housing, said element being adapted to be periodically energized to effect its change in temperature.

14. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, a housing within said shell, and an electric heating element located within said housing, said element being adapted to be periodically energized to effect its change in temperature.

15. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the

outlet, a transverse partition within said shell positioned intermediate said inlet and outlet, a tube depending from said partition toward the bottom of said shell and extending below said outlet, and a temperature changing element in said shell.

16. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the outlet, a transverse partition within said shell positioned intermediate said inlet and outlet, a tube depending from said partition toward the bottom of said shell and extending below said outlet, and a heating element in said shell.

17. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the outlet, a transverse partition within said shell positioned intermediate said inlet and outlet, a tube depending from said partition toward the bottom of said shell and extending below said outlet, and an electric heating element in said shell.

18. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the outlet, a transverse partition within said shell positioned intermediate said inlet and outlet, a tube depending from said partition toward the bottom of said shell and extending below said outlet, and a temperature changing element in said shell above said partition.

19. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the outlet, a transverse partition within said shell positioned intermediate said inlet and outlet, a tube depending from said partition toward the bottom of said shell and extending below said outlet, and a heating element in said shell above said partition.

20. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the outlet, a transverse partition within said shell positioned intermediate said inlet and outlet, a tube depending from said partition toward the bottom of said shell and extending below said outlet, and an electric heating element in said shell above said partition.

21. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the outlet, a transverse partition within said shell positioned intermediate said inlet and outlet, a tube depending from said partition toward the bottom of said shell and extending below said outlet, and an electric heating element within said tube below said outlet.

22. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said

water, the inlet being located higher than the outlet, a conduit connecting the drip pan with said inlet, a temperature changing element within said shell to produce a suction effect there-
within and cause the water to flow from the drip pan through said conduit into the shell, and a conduit leading downwardly from said outlet, said conduit having a portion thereof bent upwardly and downwardly to form a reverse curve in the shape of a gooseneck trap to constitute a water seal.

23. A device for drawing off water from the drip pan of an evaporating unit of heat exchange apparatus, said device comprising a hollow shell provided with an inlet and an outlet for said water, the inlet being located higher than the outlet, a conduit connecting the drip pan with said inlet, a heating element within said shell to produce a suction effect therewithin and cause the water to flow from the drip pan through said conduit into the shell, and a conduit leading downwardly from said outlet, said conduit having a portion thereof bent upwardly and downwardly to form a reverse curve in the shape of a gooseneck trap to constitute a water seal.

24. A refrigerating system comprising a walk-in cooling chamber, an evaporating unit fixed to its ceiling in a position spaced from its vertical walls, a conduit leading from the drip pan of the said unit upwardly toward the chamber ceiling and then extending substantially horizontally to and through a vertical wall thereof, and a device connected with said conduit outside said chamber for drawing off water from said drip pan through said conduit, said device being provided with means for causing temperature changes therein to activate it.

25. A refrigerating system comprising a walk-in cooling chamber, an evaporating unit fixed to its ceiling in a position spaced from its vertical walls, a conduit leading from the drip pan of the said unit upwardly toward the chamber ceiling and then extending substantially horizontally to

and through a vertical wall thereof, and a device connected with said conduit outside said chamber for drawing off water from said drip pan through said conduit, said device being provided with means for causing temperature changes therein to activate it and being positioned lower than the drip pan of the evaporating unit.

26. A device as defined in claim 9, in which the temperature changing element comprises a housing uprising from the bottom of the shell, and a heating element located within said housing.

27. A device as defined in claim 9, in which the temperature changing element comprises a housing uprising from the bottom of the shell, and a conduit for the flow of warm refrigerant arranged in heat exchange relation with the exterior of said housing.

28. A device as defined in claim 9, in which the temperature changing element comprises a conduit for the flow of warm refrigerant arranged in heat exchange relation with the exterior of said shell.

29. A device as defined in claim 9, in which the temperature changing element comprises a conduit for the flow of warm refrigerant arranged in heat exchange relation with the interior of said shell.

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