Feb. 18, 1941. H. B. HULL 2,232,459

REFRIGERATING APPARATUS

Filed Oct. 24, 1934 2 Sheets-Sheet 1

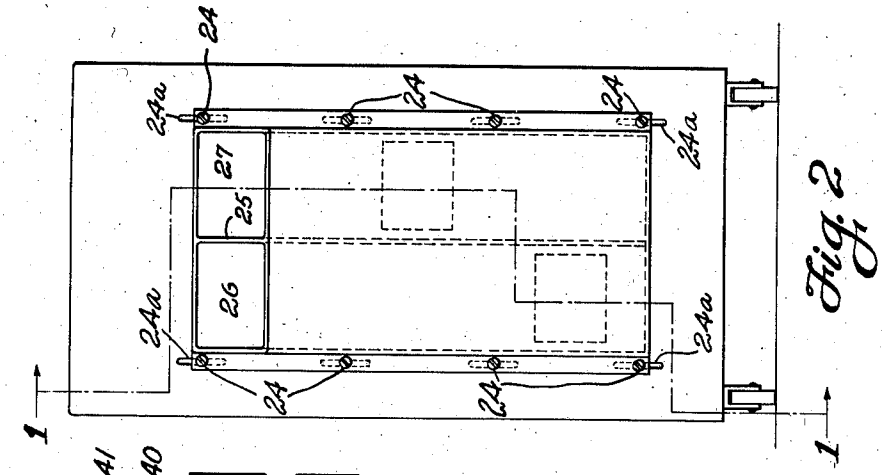


Fig. 2

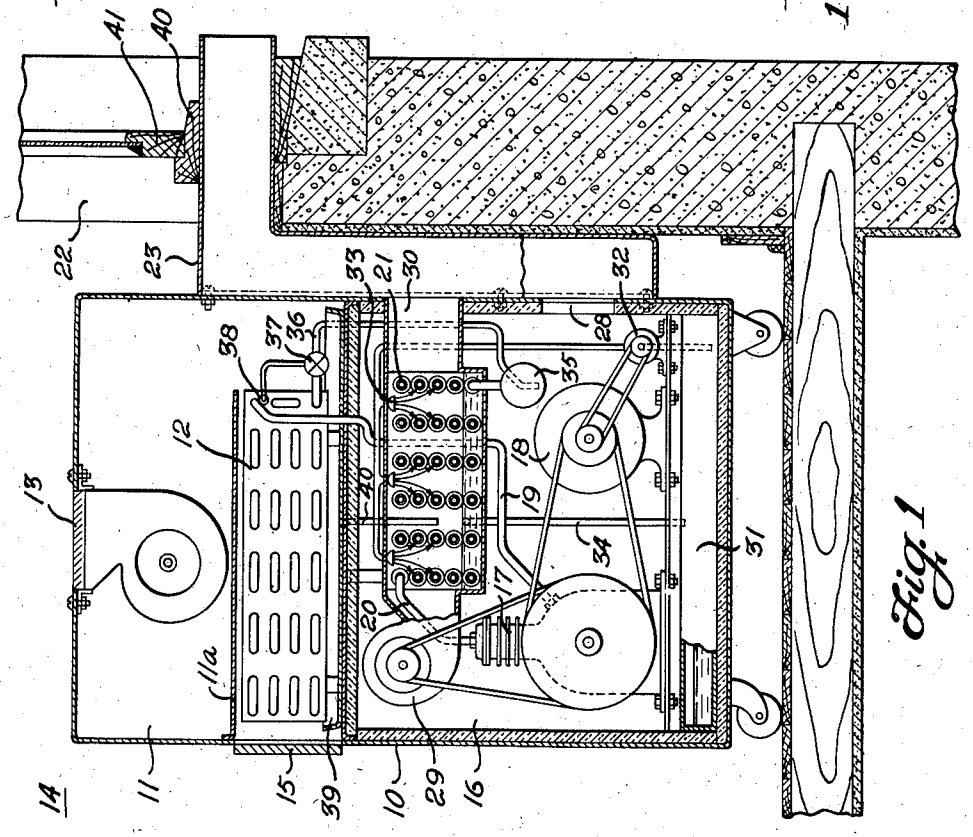


Fig. 1

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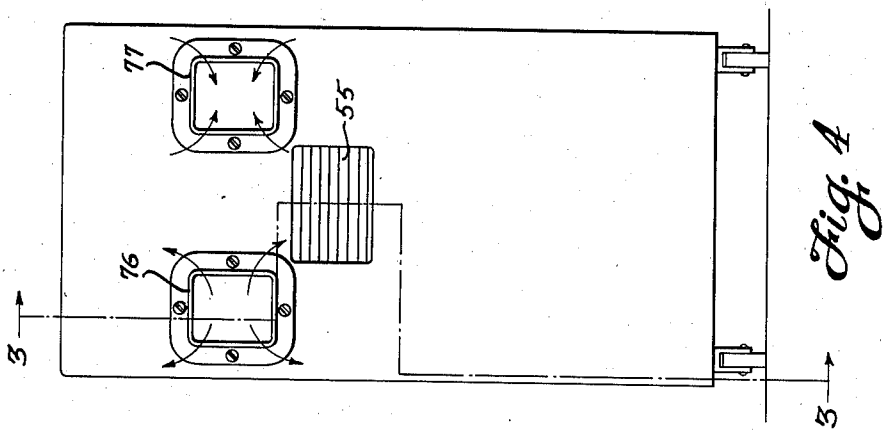


Fig. 4

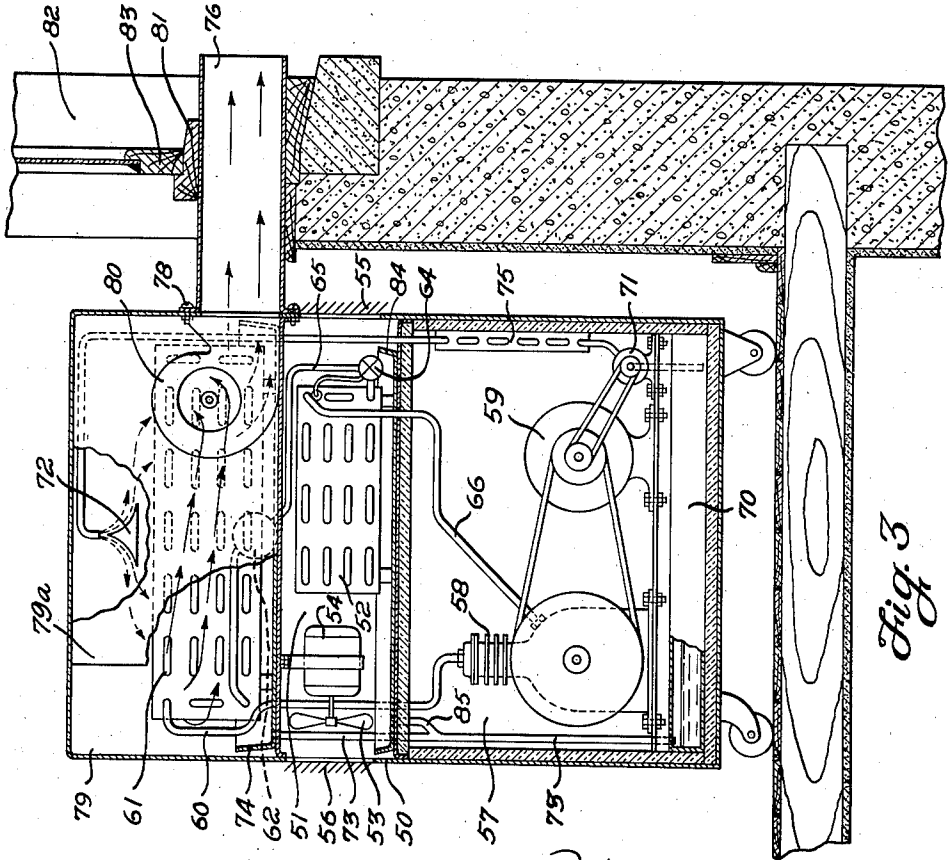


Fig. 3

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REFRIGERATING APPARATUS

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Application October 24, 1934, Serial No. 749,772

7 Claims. (Cl. 62—140)

This invention relates to refrigeration.

It is among the objects of this invention to provide an air conditioning apparatus for a room or the like in which the heat dissipating unit is cooled by the evaporation of moisture.

It is another object of this invention to provide a unitary room air conditioner in which the compressor heat is dissipated through the window of the room.

It is another object of this invention to provide a unitary room air conditioner with improved air conduit means to be connected to a window of the room.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a vertical cross-sectional view, somewhat diagrammatic, of an apparatus embodying features of my invention, and taken along the line 1—1 of Fig. 2;

Fig. 2 is an elevation of the apparatus shown in Fig. 1;

Fig. 3 is a vertical cross-sectional view, somewhat diagrammatic, of a slightly modified form of the invention, the section being taken along the line 3—3 of Fig. 4; and

Fig. 4 is an elevation of the apparatus shown in Fig. 3.

An air conditioning apparatus embodying features of my invention includes, in general, a cabinet 10 having an air cooling section 11 in said cabinet in which a heat absorber or evaporator 12 is located. Air is caused to circulate through the compartment 11 in heat exchange relationship with the evaporator 12, the cooled air being discharged at 13 into the room 14. Air to be circulated over the evaporator 12 may enter through inlet 15 which, in this case, is shown to be connected to the interior of the room 14. A baffle 11a is placed above the evaporator 12 so as to cause the air to flow the full length of the evaporator 12. It is to be understood, however, that the air could be derived from the outside of the room or partially from inside and outside of the room respectively.

The air conditioning apparatus is also provided with a heat dissipator. In this particular case, the cabinet is provided with an insulated compartment 16 in which there is a compressor 17 driven by a motor 18. The compressor 17 withdraws evaporated refrigerant from the evaporator 12 through the line 19 and discharges compressed refrigerant through the line 20 to the condenser 21. Means are provided for circulating air over the condenser and through the window 22. This may take the form of an adjustable conduit 23 which may include a rigid casing adjustably secured to the cabinet 10 by means of bolts 24 carried by the conduit 23 and passing through slots 24a in the cabinet 10. This casing may be divided by a vertical partition 25 to form air intake and air discharge passages 26 and 27 respectively. Air from outside the room enters through 26 and through the air-flow opening 28 into the compartment 16 and then enters the blower 29, which is driven from the compressor 17. The air then flows over the condenser 21 and from thence out through the opening 30 into the conduit 27 and out through the window.

Means are provided to circulate a fluid in heat exchange relationship with the air flowing through the window and at the same time reduce the effective temperature of the air. Thus a water receptacle 31 is provided and it has connections with a pump 32 whereby water is caused to be sprayed over the pipes of the condenser 21 by spray-heads 33. The water which is not evaporated on the condenser returns through the drain pipe 34 to the receptacle 31.

The refrigerant condensed in the condenser 21 flows into the receiver 35 and from thence through the pipe 36 to the expansion valve 37. This valve may be of the type which automatically introduces refrigerant into the evaporator 12 when the pressure therein is reduced below a predetermined limit. The valve may also be provided with a thermostatic bulb 38 which throttles the valves 37 whenever the refrigerating effect in the evaporator 12 reaches the outlet thereof.

The calibration of valve 37 is such that the temperature of the outer surface of the evaporator 12 is above the freezing point of water and thus any moisture condensed from the air flowing over the evaporator trickles into the pan 39 and drains through the pipe 40 into the passageway where the condenser is located. Here the water eventually is evaporated and is discharged through the conduit 27 outside the room.

The conduit structure 23 is provided with a false sill structure 40 which extends along the sides of the structure 23 and cooperates with

the sides of the window 22 so that the sash 41 is substantially in air-tight relationship with the sill 40 as is readily apparent.

In the modification shown in Figs. 3 and 4 the cabinet 50 is provided with an air cooling section 51 in which there is located an evaporator 52. Air is caused to flow through the section 51 by a fan 53 driven by a motor 54. Air may enter the section 51 through an air inlet 55 and may be discharged into the room through an outlet 56. The cabinet 50 is provided with a compressor compartment 57 in which a compressor 58 is located and is driven by a motor 59. The compressed refrigerant flows through a pipe 60 to a condenser 61. The condensed refrigerant flows into the receiver 62 and from thence through a pipe 65 to a valve 64 having the usual thermostatic bulb. The valve 64 and the thermostatic bulb are similar in action to valve 37 and bulb 38 respectively. The evaporated refrigerant flows through the pipe 66 to the compressor 58.

Means are provided for circulating water over the condenser 61 thus a water receptacle 70 is provided having flowing connections with a pump 71 which permit it to spray water over the condenser 61 through the spray-head 72, the water which is not evaporated being drained back to the receptacle 70 through the pipe 73 after the same is caught by the drip pan 74. The water-flow connections may include a heat absorbing water-flow section 75 in the form of a water coil which absorbs the heat generated by the compressor 58 and motor 59 in the compartment 57.

Air-flow conduits 76 and 77 are supported on the cabinet 50 at 78. These conduits permit the circulation of air into and out of the condenser compartment 79 through the medium of a motor-driven blower 80 which discharges through the conduit 76. As shown in Fig. 3 of the drawings, a baffle is placed between the condenser 61 and the inlet for the blower 80. Air entering through conduit 77 is, therefore, required to flow over the major portion of the condenser before being discharged through the conduit 76. With applicant's arrangement the air passing through the spray chamber cannot enter the outlet conduit 76 directly but must travel around the baffle as indicated by the arrows in Fig. 3. By virtue of this arrangement the air flowing out through conduit 76 will not carry with it any appreciable amount of water. The conduits 76 and 77 may be provided with a false sill structure 81 which may be made of a size to seal around the conduits 76 and 77 and against the sides of the window 82 so that when the sash 83 is lowered a substantially air-tight relationship ensues.

The moisture condensed on the surface of the evaporator 52 falls into the drain pan 84 from whence it drains through branch 85 into pipe 73 and receptacle 70. Eventually the water is evaporated on the surface of condenser 61 and is carried out of the room by the air circulating through the conduits 76 and 77.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. Air conditioning apparatus for a room or the like comprising a cabinet provided with a heat absorber and a heat dissipator therein, means to circulate air over said heat dissipator, a rigid conduit having an open side and being adjustably secured along its open side to said cabinet and adapted to pass through a window of said room, said conduit having air-flow connections with said heat dissipator, and means for discharging moisture removed from the air by said heat absorber into thermal exchange relationship with said heat dissipator.

2. Air conditioning apparatus for a room or the like comprising a cabinet provided with a heat absorber and a heat dissipator therein, a rigid conduit adjustably and slidably secured to said cabinet and adapted to pass through a window of said room, said conduit having a substantially flat upper surface and having air-flow connections with said heat dissipator, and means for discharging water into the air flowing through said conduit before said air leaves said heat dissipator.

3. Air conditioning apparatus for a room or the like comprising a cabinet provided with a heat absorber and a heat dissipator therein, a rigid conduit having an open side and having a partition to provide air intake and air discharge passages adjustably secured along its open side to said cabinet and adapted to pass through a window of said room, and means for forcibly spraying water removed from the air by said heat absorber into the air flowing through said conduit, said conduit having air-flow connections with said heat dissipator.

4. An air conditioning apparatus for a room or the like comprising a cabinet having a condenser compartment at the top, an evaporator compartment below said condenser compartment and a compressor compartment below said evaporator compartment, means to circulate air into said room, through said condenser compartment and out of said room, means to circulate air through said evaporator compartment and into said room, a motor drivingly connected to said compressor, said evaporator, condenser and compressor being in refrigerant flow relationship, and means in addition to said refrigerant for transferring heat from said compressor compartment to said condenser compartment.

5. An air conditioning apparatus for a room or the like comprising a cabinet having a condenser compartment in the upper part of said cabinet, an evaporator compartment below said condenser compartment and a compressor compartment, means to circulate air into said room, through said condenser compartment and out of said room and means to circulate air through said evaporator compartment and into said room, a motor drivingly connected to said compressor, said evaporator, condenser and compressor being in refrigerant flow relationship, a water pump, and water flow means connected to said pump and including means for spraying water over said condenser, and a heat absorber in said compressor compartment.

6. An air conditioning apparatus for a room or the like comprising a cabinet having a condenser compartment, an evaporator compartment and a compressor compartment, means to circulate air into and out of said room and through said condenser compartment, means to circulate air to be cooled through said evaporator compartment and into said room, a motor drivingly connected to said compressor, said evaporator, condenser and compressor being in refrigerant flow relationship, a water pump, and water flow means connected to said pump and including means

for spraying water over said condenser and a water coil in said compressor compartment.

7. In apparatus for conditioning the air in an enclosure having an opening in a wall thereof, the combination of a cabinet structure having a compartment therein and having an apertured vertical wall facing said wall opening, means arranged within said cabinet structure for conditioning the air in the enclosure and including a heat exchanger from which heat is to be abstracted and which is disposed within said compartment, inlet and outlet ducts for conveying air for cooling said heat exchanger and arranged for communication with the opening in said enclosure wall, said ducts being arranged in abutting relationship to said apertured vertical wall and being adjustably supported by said cabinet structure, whereby communication with wall openings of various elevations is provided, and means for discharging water into the cooling air before said cooling air leaves said heat exchanger whereby evaporative cooling of said heat exchanger is effective.

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