

June 1, 1943.

R. W. KRITZER
AIR CONDITIONING UNIT
Filed Aug. 6, 1941

2,320,525

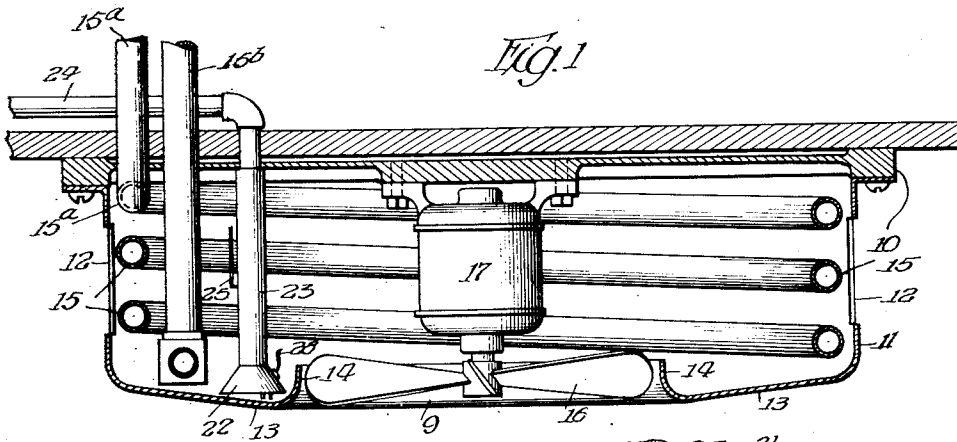


Fig. 2

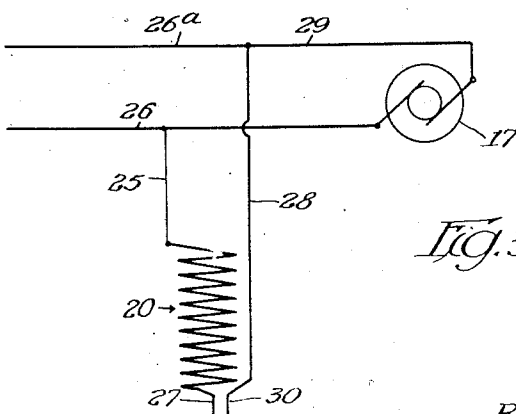
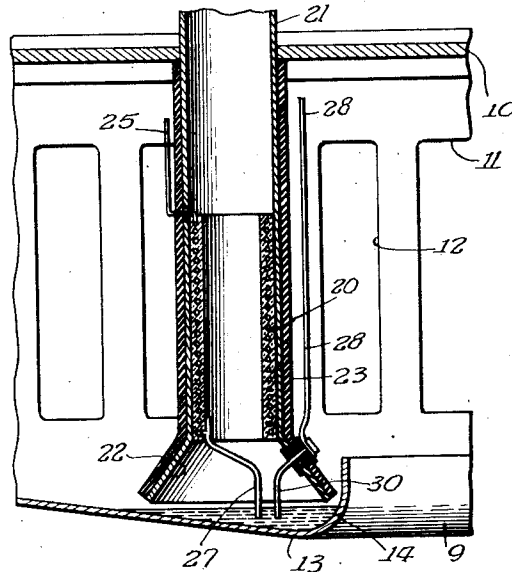


Fig. 3

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2,320,525

AIR CONDITIONING UNIT

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Application August 6, 1941, Serial No. 405,593

6 Claims. (Cl. 62-140)

The invention relates to air conditioning units. One object of the invention is to provide a unit which includes an evaporating or cooling coil and improved means for removing the condensate which drips from the coil, so that odors thereof and the moisture therein will not permeate the space or room in which the unit is used.

This object is attained primarily by providing an automatically controlled electric heating element for vaporizing the condensate and carrying off the steam through an exhaust pipe and discharging it outside of the building in which the air conditioning unit is used.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features which are hereinafter set forth and are more particularly defined by claims at the conclusion hereof.

In the drawing: Fig. 1 is a vertical section of an air conditioning unit embodying the invention. Fig. 2 is a section of the device for heating and vaporizing the condensate for discharge through the exhaust pipe. Fig. 3 is a diagram of the electrical connections for the electric heating element and for the electric motor which drives the fan.

The invention is exemplified in a unit in which the fan for circulating the air and the evaporating coil are contained in a housing which is adapted to be secured on a ceiling for conditioning the air in a room or other space.

The unit comprises a housing built up of a top-plate 10 and a depending shell 11 which is secured to the top-plate 10 by screws. The shell has a cylindrical portion provided with discharge openings 12 for the air and a bottom-wall 13 which has a central air inlet 9. The evaporator comprises a coil of pipe 15 which is connected by branchpipes 15^a, 15^b to a refrigerating unit in any manner as well understood in the art. A fan 16 disposed in opening 9 in the bottom 13 is driven by an electric motor 17 which is secured to the underside of and supported from the top-plate 10 of the housing. The fan 16 draws air through the central opening in the bottom of the housing and forces it into contact with the evaporator by which the air is removed. The cooled air is discharged through the openings 12 of the housing.

The bottom-wall 13 extends inwardly and is inclined downwardly from the side-wall 11 and has an upturned inner edge or flange 14 around the inlet-opening 9 to form a bowl or well in

the housing for catching and retaining the condensate from the coil 15. The deepest portion of the bowl is located adjacent the flange 14 so that the condensate will flow toward said flange and inwardly of the coil 15.

In practice it has been found that frost frequently accumulates on the evaporator coil and periodically melts so the condensate gravitates to the bottom 13 of the housing and flows to and accumulates in the annular pocket around the flange 14. If it is permitted to remain so it will be absorbed by the conditioned air, it fouls the air and produces an unpleasant odor. It also increases the humidity of the air. The invention provides for heating the condensate to form steam and carrying off the steam to the outside of the building or room in which the unit is used. An electric heater or resistance element 20 of any suitable construction is provided. This heater is in the form of a coil and disposed in a vertical pipe 21. The lower end of the pipe 21 has a flared or funicular portion 22 which extends to a point adjacent the bottom of the bowl and the level of the condensate when it accumulates on the bottom 13. Pipe 21 is surrounded by a sleeve of insulating material 23 to confine the heat produced by heater 20 to the pipe 21 and keep it away from the chamber within the housing through which the air is forced while it is being conditioned. Pipe 21 is extended through the ceiling and is connected by a horizontal pipe-section 24 to a suitable point of discharge for the vapor or steam usually outside of the building and away from the space to which the conditioned air is delivered. One end of the resistance-coil of the heater 20 is connected by a conductor 25 to one of the line-conductors 26 and its other end is connected to a contact-strip 27 which is supported from said coil. A conductor 28, which is connected to the other line conductor 26^a is connected to a contact-strip 30 which is insulated from and supported from the funicular portion 22 of pipe 21. The lower ends of contact-strips 27 and 30 terminate adjacent the lowest portion of bottom 13 of the housing where they will be submerged in the condensate when it accumulates. When any appreciable amount of condensate accumulates in the center of the housing and condensate will form an electrical path between contact-strips 27, 30 and close a circuit to energize the heating coil 20. The motor 17 is also connected to line conductor 26 and in parallel with the heating element.

In the operation of the unit the fan 16 will be driven by the motor 17, draw air into the

housing through inlet 9, force air around the evaporator-coil 15 and discharge the cooled air through the openings 12 of the housing. When a sufficient column of condensate accumulates to submerge the contact-strips 27, 30, a circuit through the heating coil 20 will be automatically closed through line conductor 26, conductor 25, coil 20 and contact-strip 27, the condensate, contact-strip 30, conductor 28, and line-conductor 26^a. The coil 20 will then be energized to produce sufficient heat in the pipe 21 and its extension 22 to vaporize the condensate. The steam produced will be directed by the extension 22 to flow upwardly through pipe 21 and so that it will be discharged through pipe-section 24 where desired. This construction functions as a flue for removing the foul vapor from the condensate from the housing so that it will not intermingle with the air which is circulated in the room around the housing. When the condensate has been reduced below the level of the lower end of contact-strips 27, 30, the circuit through the coil will be automatically interrupted at said strips. During the vaporization and removal of the condensate the insulating sleeve 23 will prevent heat transfer from the pipe 21 to the chamber in the housing. The circuit for the heating coil and the motor 17 are connected in parallel to the line conductors so that the heater will be operative through, and can be controlled by, the control device for the motor.

The invention exemplifies an air conditioning unit which is equipped with an automatically controlled electric heating unit for removal of the condensate.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

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

1. In an air conditioning unit, the combination with a housing provided with an inlet and an outlet for air, an evaporator for cooling the air in the housing, and a motor-driven fan associated with the housing and for forcing air there-through, of means for retaining condensate from the evaporator in the housing, an electric heating element for vaporizing the condensate in the retaining means, means for automatically controlling the actuation of the heating element by the condensate in the retaining means, a conduit for conducting the vapor through the housing, and means for insulating the conduit to prevent heat transfer to the air flowing through the housing.

2. In an air conditioning unit, the combination with a housing provided with an inlet and an outlet for air, an evaporator for cooling the air in the housing, and a motor-driven fan associated with the housing and for forcing air there-through, of means in the bottom of the housing for retaining condensate from the evaporator, an electric heating element for vaporizing the condensate in the retaining means, a pipe around the heating element for conducting the vapor through the housing provided with insulating means for preventing heat transfer from the element to the chamber in the housing containing the evaporator, an electric circuit for the heating element, contacts adapted to be submerged in the condensate in the retaining means, for controlling the actuation of the heating element,

and means for carrying the vapor from the pipe and away from the casing.

3. In an air conditioning unit, the combination with a housing provided with an inlet and an outlet for air, an evaporator for cooling the air in the housing, and a motor-driven fan associated with the housing and for forcing air there-through, of means in the bottom of the housing for retaining condensate from the evaporator, an electric heating element for vaporizing the condensate in the retaining means, a pipe around the heating element for carrying vapor through the housing, provided with an insulating sleeve for preventing heat transfer from the element to the chamber in the housing containing the evaporator, a flared terminal on the lower end of the pipe, an electric circuit for controlling the heating element, and contacts in the flared terminal, connected to the circuit, and adapted to be connected to close the circuit by the condensate in the retaining means.

4. In an air conditioning unit, the combination with a housing provided with an inlet and outlet for air, an evaporator in the housing for cooling the air, and a motor-driven fan associated with the housing for circulating air through the housing and around the evaporator, the housing being provided with a bottom adapted to retain condensate from the evaporator, of an electric heating element in the housing for vaporizing the condensate on the bottom of the housing, a flue for conducting the vaporized condensate from the bottom and through the housing and removing it separately from the air circulated around the evaporator, and means for automatically controlling the actuation of the heating by the condensate on the bottom of the housing.

5. In an air conditioning unit, the combination with a housing provided with an inlet and outlet for air, an evaporator in the housing for cooling the air, and a motor-driven fan associated with the housing for circulating air through the housing and around the evaporator, the housing being provided with a bottom adapted to retain condensate from the evaporator, of an electric heating coil in the housing for vaporizing the condensate on the bottom of the housing, a flue around the heating coil, for conducting the vaporized condensate from the bottom and through the housing and removing it separately from the air circulated around the evaporator, and means for automatically controlling the actuation of the heating by the condensate on the bottom of the housing.

6. In an air conditioning unit, the combination with a housing provided with an inlet and outlet for air, an evaporator in the housing for cooling the air, and a motor-driven fan associated with the housing for circulating air through the housing and around the evaporator, the housing being provided with a bottom adapted to retain condensate from the evaporator of an electric heating element in the housing for vaporizing the condensate on the bottom of the housing, an upwardly extending pipe having a flared intake at its lower end for conducting the vaporized condensate from the bottom and through the housing and removing it separately from the air circulated around the evaporator, and means for automatically controlling the actuation of the heating by the condensate on the bottom of the housing.

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