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AIR CONDITIONING DEVICES

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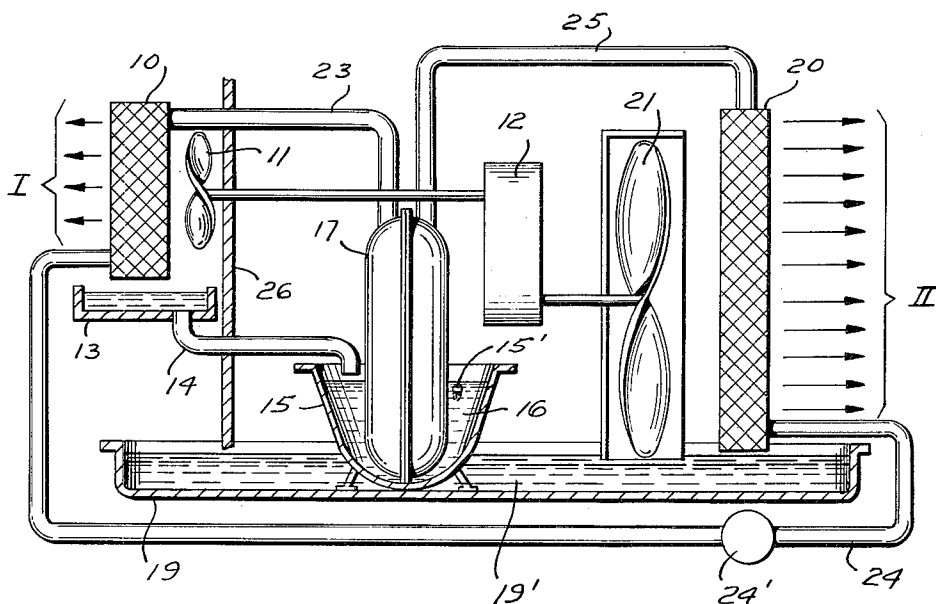


FIG. 1

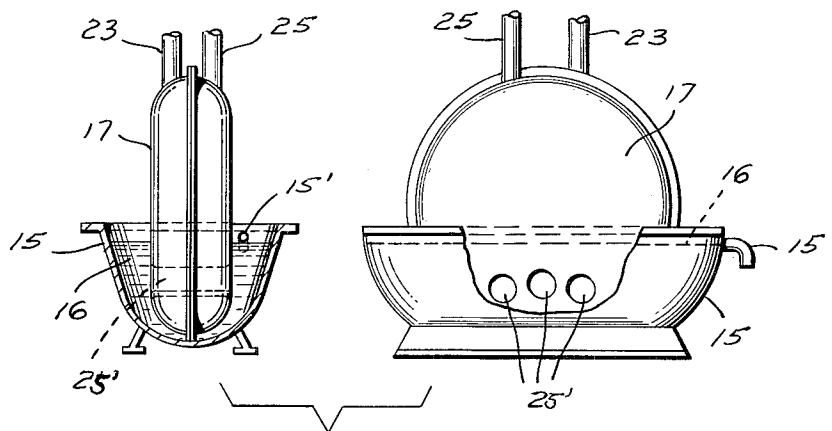


FIG. 2

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AIR CONDITIONING DEVICES

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4 Claims. (Cl. 62-277)

This invention relates generally to air cooling devices, and particularly to air conditioning devices of superior efficiency.

As is well known in the art, the motor compressor unit operating in oil is encased within a hermetically sealed envelope or shell, which becomes hot, especially at its bottom area, due to insufficient cooling provision, especially during high humidity, thereby entailing what is known as an overload condition. As stated, the motor-compressor unit operates in oil, and in present day devices is supposed to be cooled by air circulation about the sealed shell.

The heretofore employed air cooling devices operate in about the following manner: Air and hot, compressed gas is directed through the condenser at the outer end of the device. The condenser is usually located outside of the building. The condenser is intended to become cool and the gas is supposed to liquify. The liquid coolant is passed through a strainer and a capillary tube to the evaporator, the part of the device within the place to be cooled by absorbing heat from the surrounding air within the place. The gas is then returned to the motor compressor unit, consequently in a rather warm condition.

Condensed water is usually caused to drip onto the chassis of the device, from where it is sprayed onto the outer body of the condenser, while a large portion of the condensed water flows out into the open, dripping down to the pavement or any place beneath the device.

In the present invention the temperature of the hermetically sealed shell, containing the motor-compressor unit, is caused to perceptibly drop, thereby cooling the refrigerant gas. Consequently the gas is materially reduced in volume, whereby the volumetric efficiency of the compressor unit is substantially increased. This efficiency increase directly serves as operational increase in the motor operation, in proportion to the drop in temperature of the shell as its temperature becomes substantially lowered. In other words, less power is required for operating the motor-compressor unit, since the compressor load decreases.

This feature is especially important during high humidity (say 75% to 95% relative humidity), since in present-day air conditioning devices, such high humidity often causes failure or what is known as "cutting off" of the device; this will never be the case in the present air conditioner which continues to operate smoothly even at high humidity, while retaining most of its cooling capacity. This remarkable phenomenon is due to what is called "the increased circulation of condensed water," by raising the latter's temperature for more ready evaporation, as will be presently apparent.

The prime object, therefore, of the present invention, is to provide a rather inexpensive change in air conditioning devices, whereby the usually hot, lower portion of a hermetically sealed shell, housing the compressor unit becomes cooled by what is to be known as increased circulation of condensed water, by heating the water.

Another object of this invention is the provision of means for effecting the passage of condensed water from the evaporator of the device to a vessel containing cooling means for the unit and from there to a collector of condensed water, in the form of a chassis pan, from

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which the water is lifted and thrown onto the surface of the condenser of the device at a very reduced volume, and without permitting water to drip off from the chassis pan to the outside.

Another object of the present invention is the method of reducing the ratio between the effective cooling effect (B.t.u.) of the device and the power requirement, that is the wattage, for efficiently operating the device.

A further object is the method of reducing to a minimum or to practically a full stoppage of the drip of condensed water from the condenser of the device (which water is permitted in present-day devices to drip to without) especially due to the raising of the temperature of the condensed water, as it cools the hot shell, housing the motor and compressor unit, since the thus heated condensed water evaporates much faster than it would when cool.

A further object of this invention is the rapidly increased and constant circulation of condensed water throughout the device.

Another object of this invention is the provision of first heating condensed water and then feeding the heated water onto the condenser, which heated water will more readily evaporate as it passes over the condenser body.

A further object of the present invention is the provision of a vessel containing condensed water, which water completely surrounds the hottest lower portion of the hermetically sealed shell, containing the motor-compressor unit, and cools the latter, while the temperature of the water is raised.

Another important object of this invention is the provision of means to effect an uninterrupted circulation of condensed water throughout the device, thereby providing a large increment in its efficiency.

A still further object of this invention is the provision of means for effecting a great amount of cooling at a lesser cost in input energy.

The foregoing and still further objects and important advantages of the present invention will become more fully understood from the following description, in conjunction with the accompanying drawings, in which:

FIGURE 1 is a diagrammatical illustration of a typical air-conditioning device, in accordance with the present invention, and

FIGURE 2 is a detail illustration in elevation and side view of the shell, containing the motor and compressor unit, as used in the device illustrated in FIGURE 1.

As seen from FIGURE 1, the device comprises an evaporator 10, at left, adapted to cool the air in a room by passing air through the evaporator by means of a fan 11 powered by motor unit 12. The passage of cool air is indicated by Roman arrows "I" at the left of the evaporator.

Below evaporator 10 is a drip pan 13 provided with an outlet 14. That outlet directs condensed water into vessel 15, partly filled with a relatively large body of condensed water 16, which water surrounds the lower, hottest area of the shell 17, obviously the temperature of the water is raised. Vessel 15 is provided with an overflow conduit 15' directed toward a collector for condensed water in the form of a chassis pan 19.

At the right side of the illustration there will be seen condenser 20. A large fan 21, powered by motor unit 12, is intended to force air and a small amount of water through condenser 20, since the blades of fan 21 dip into the warmed condensed water 19' of chassis pan 19. Fan 21 moves both air and an extremely small, readily evaporating amount of heated condensed water to the outer atmosphere, as indicated by Roman arrow II at right.

Due to the fact that the condensed water 19' in the

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chassis pan 19 is warm, it evaporates readily, and only a very small amount of water will thus pass through condenser 20, and practically no water is permitted to drip out from chassis pan 19.

It will be noted from FIGURE 1, that a conduit 23 leads from shell 17 to the upper end of evaporator 10, and that from the lower end of the evaporator 10 extends a capillary conduit 24 to the lower end of condenser 20. In capillary tube 24 is provided a strainer 24'. From shell 17 extends discharge conduit 25 to the upper end of condenser 20.

In FIGURE 1 it will be noted, that the left portion of the device, containing the evaporator 10, is shielded from the right portion of the device, containing condenser 20, by insulating wall or partition 26.

Referring now to FIGURE 2, the left illustration thereof denotes the end view of shell 17 submerged in the condensed cooling water 16 within vessel 15. There will be seen the end of conduit 25 from shell 17 (leading to the condenser 20 seen in FIGURE 1) and another end of conduit 23 is directed to the evaporator 10.

The right-hand illustration of FIGURE 2 denotes the side elevation of shell 17, immersed in condensed water 16 within vessel 15. There will be seen also several through-passages 25' in the body of shell 17, to provide more effective cooling of the shell. An overflow conduit 15' is indicated in both illustrations of FIGURE 2.

Shell 17 of FIGURE 2 is intended to be hermetically sealed and to contain a motorized compressor unit (not shown) operating in oil (not shown).

The illustrations in both figures are held purely diagrammatically, to permit the explanation of the principle of the present invention. These illustrations are by no means intended in a restricting sense, since the physical production of the device may undergo necessary alterations for efficient manufacture and I therefore reserve for myself the right to make necessary alterations in the construction of the device, as prudent manufacturing methods dictate, all within the broad scope of the following claims.

What is claimed as new is:

1. Apparatus for lowering the temperature and abstracting moisture from humid air comprising:

- (1) an evaporator, a sealed motor-compressor unit and a condenser with means for coupling them together in an operative air-conditioning unit,
- (2) collecting means for collecting condensate which drips from said evaporator,
- (3) a vessel enclosing at least a portion of said sealed motor-compressor unit,
- (4) conduit means for connecting said collecting means to said vessel for conducting condensate to said vessel and thereby to the outer surface of said sealed motor-compressor unit so that the temperature of the condensate is raised and the temperature

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of said sealed motor-compressor unit is simultaneously lowered,

- (5) and transfer means for transferring condensate from said vessel to said condenser for further raising the temperature of the condensate to enhance evaporation of the condensate and lower the temperature of said condenser.

2. The apparatus of claim 1 wherein said sealed motor-compressor unit is supported on the bottom of said vessel.

3. The apparatus of claim 1 wherein said transfer means comprises a pan positioned beneath said vessel for receiving condensate which may overflow from said vessel, and a fan of said air-conditioning unit positioned with its blades entering the upper portion of the inside of said pan so that a readily evaporating amount of overflow condensate in said pan may be discharged through said condenser.

4. In an air conditioner for lowering the temperature and abstracting moisture from humid air, the combination comprising: a heat-exchanger circuit including an evaporator, a motor-compressor, an hermetically-sealed housing for said motor-compressor, said motor-compressor being lubricated by an oil coolant which collects in a region of said housing, a condenser, conduit means for operatively interconnecting said evaporator, said motor-compressor and said condenser; refrigerant circulating in said heat-exchanger circuit; a first fan means for propelling humid air over said evaporator; means for collecting condensate which drips from said evaporator resulting from the chilling of the humid air circulating over said evaporator; a vessel conduity connected to said collecting means and surrounding at least said portion of said housing which includes the region in which the oil coolant collects so that condensate bathes said portion of said housing whereby, simultaneously, the temperature of the condensate is raised and the temperature of said motor-compressor is lowered; a condensate sump; a condensate overflow outlet in said vessel for transferring condensate from said vessel to said condensate sump; and second fan means for propelling condensate in said condensate sump against said condenser to further raise the temperature of said condensate and to lower the temperature of said condenser and refrigerant therein.

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