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FAN MOTOR MOUNTING STRUCTURE FOR ROOM AIR CONDITIONERS

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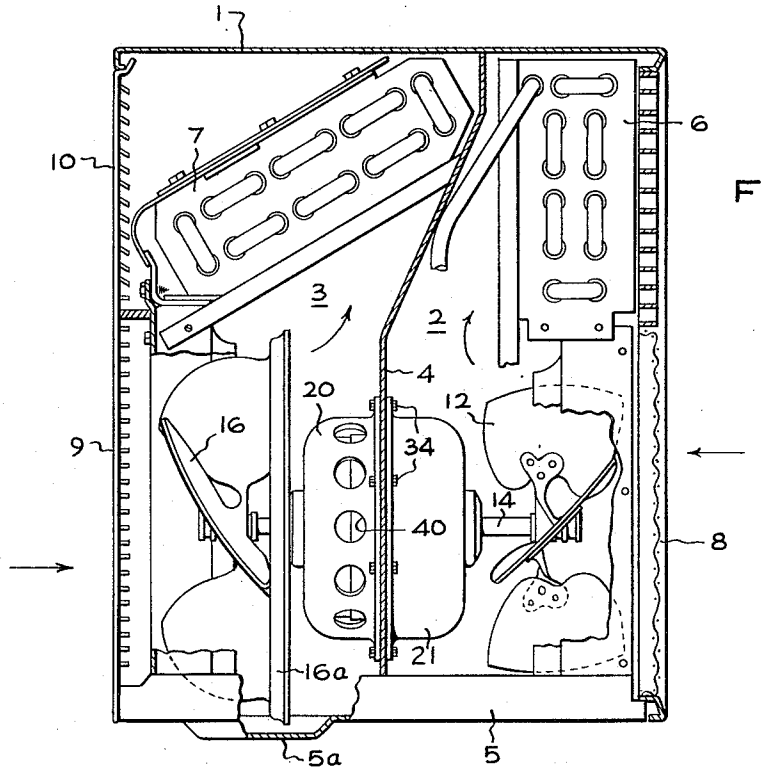

FIG. 1

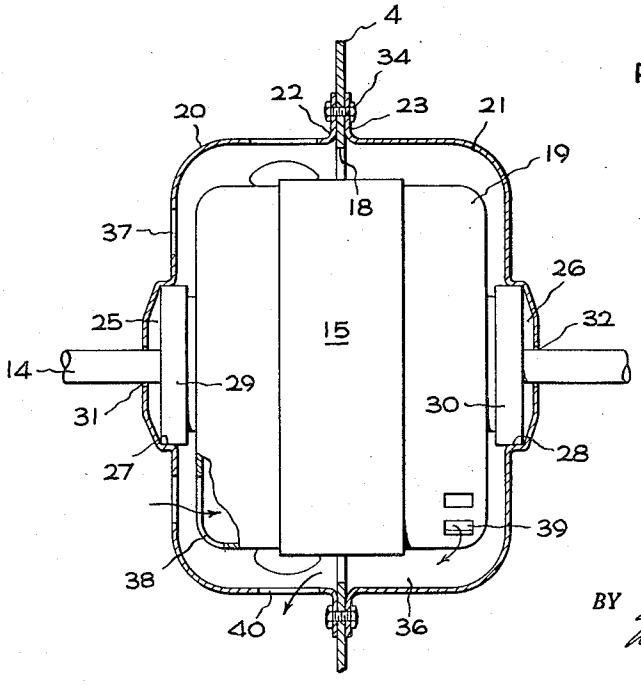

FIG. 2

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FAN MOTOR MOUNTING STRUCTURE FOR ROOM AIR CONDITIONERS

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2 Claims. (Cl. 62—129)

The present invention relates to room air conditioners and more particularly to a fan motor mounting and cooling arrangement for such apparatus.

Room air conditioners usually comprise a casing or housing, a partition or barrier dividing the casing into indoor and outdoor air compartments and a refrigerating apparatus including an indoor heat exchanger or coil disposed in the indoor compartment and an outdoor heat exchanger or coil disposed in the other compartment. A fan is provided in each compartment for circulating room air through the indoor air compartment and over the indoor heat exchanger and outdoor air over the other heat exchanger. In a typical arrangement, the air circulating means comprises a pair of fans mounted on a common shaft extending through the partition and driven by an electric motor which is usually disposed in the outdoor air compartment in such a position that its heat losses can be given up to the outdoor air circulated through that compartment.

As such units are designed to be mounted in the window or other wall opening of the enclosure being conditioned, it is desirable that the width and height of the units be such that the units can be received in such openings and that their length or depth be such as to provide minimum projection of the casing beyond the interior and exterior wall surfaces. Because of these dimension limitations, space within the casing is at a premium so that any arrangement or design of the various operating components such as the air circulating means which will conserve space is highly desirable. It is a primary object of the present invention to provide an improved means for mounting the drive motor for the air circulating means such that the length of the means and hence the affected dimension of the unit can be held to a minimum.

Another object of the invention is to provide a new and improved means for mounting the fan motor within the partition or barrier dividing the casing into two compartments.

A further object of the invention is to provide a fan motor mounting arrangement providing adequate cooling of the motor with minimum restriction to the flow of air through the compartments.

Another object of the invention is to provide means for mounting the fan motor on the partition or barrier of an air conditioner which serves not only to provide adequate cooling of the motor by the outdoor fan but in addition is of such construction as to protect the motor from harmful effects of any moisture present in the outdoor compartment.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty will be pointed out with particularity in the claims annexed to and forming part of this specification.

In carrying out the object of the invention, there is provided an air conditioning apparatus including a casing and a partition dividing the casing into separate indoor and outdoor compartments. Means for circulating room air over a heat exchanger disposed in the indoor compartment and outdoor air over a heat exchanger disposed in the outdoor compartment comprises a pair of fans mounted on opposite ends of a common drive shaft and driven by a motor positioned on the shaft between the fans and supported within an opening provided in the partition. Means for supporting the motor in this position comprises two opposed, symmetrical, cup-shaped members whose peripheral edges are secured to the partition adjacent the opening therein and which cooperate to form a hollow shell enclosing the motor. The opposed bottom walls of the cup-shaped members are provided with central openings for receiving the drive shaft and shoulder portions, provided on the bottom walls of the members, serve to support the motor in spaced relationship with the cup-shaped members. In order to ventilate and cool the motor, the cup-shaped member extending into the outdoor compartment contains a first series of openings in the bottom wall thereof for permitting cooling air from the outdoor fan to enter the shell and a second series of holes in its side walls through which the air leaves after first circulating through and around the motor.

For a more detailed description of the invention, reference is made to the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a vertical side view partially in section of an air conditioning apparatus incorporating my invention; and

Fig. 2 is a fragmentary enlarged elevation view, partially in section, of my improved motor mounting and cooling means.

Referring now to Fig. 1, I have shown therein an air conditioning unit of which my invention is a part. The air conditioning unit is arranged to be positioned within an enclosure and is used to condition the air within the enclosure. Part of the outer casing of the air conditioning unit has been removed in order to show the various arrangements of the parts of the unit.

The air conditioning unit consists of a casing 1, an indoor section 2 and an outdoor section 3 separated by a partition means 4 extending the width and height of the unit. The entire unit is supported on a base pan 5 containing a formed sump 5*a* within the outdoor section of the unit. The unit 1 contains a refrigeration system comprising a pair of heat exchangers 6, 7 arranged within the indoor section 2 and the outdoor section 3 respectively. The heat exchangers 6 and 7 are preferably of the coil and fin type generally used in refrigeration systems and are appropriately connected in refrigerant flow circuit with a compressor (not shown). The compressor may be of any desired type and the interconnecting conduits are omitted to simplify the circuit.

The heat exchange 6 is arranged within the indoor section 2 of the unit and is connected within the refrigeration system so as to act as an evaporating or cooling unit. Thus room air is drawn into the unit through an opening 8 and moved over the evaporator coil 6 where the heat within the room air is absorbed by the refrigerant flowing through the evaporator.

The heat exchanger 7, which is arranged within the outdoor section 3 of the unit, is connected into the refrigeration system as a condensing unit.

Outside air is drawn into the outdoor section 3 of the unit through the opening 9 and moved over the condenser coil 7 where the heat absorbed from the room air by the refrigerant flowing within the evaporator 6 is transferred to the outside air as it moves over the condenser 7 and is discharged through the opening 10.

During the operation of the unit, the cooling of the room air by the evaporating unit 6 results in a condensa-

tion on the surfaces of the evaporator coil. This condensate is collected by means not shown and transferred to base pan sump 5*a*.

In order to provide for the circulation of the room air over the evaporator 6, air moving means such as a propeller-type fan 12 is arranged within the indoor section 2 adjacent the air inlet 8. The fan 12 is mounted on one end of the shaft 14 of a motor 15. By means of a second air moving means such as a fan 16 arranged within the outdoor section 3 behind the opening 9, the outside air is moved over the condenser coil 7. This fan 16 is mounted on the outer end of motor shaft 14 and is arranged to be driven thereby. A slinger ring 16*a* on fan 16 picks up condensate in the sump 5*a* and throws it into the air stream passing through condenser 7.

Referring now to Fig. 2, I have shown therein an enlarged view of my new and novel arrangement for mounting the motor 15 on the partitioning means 4 of the unit 1. More specifically, the partitioning means 4 is provided with an opening 18 sufficiently large to freely receive the housing 19 of the motor 15. This opening 18 is preferably circular in shape to conform to the conventional circular motor housing but may be of any desired shape whereby a motor can be conveniently placed within the opening.

In order to support the motor within the opening 18 of the partitioning means 4, I provide a pair of complementary cupped members or half-shells 20 and 21. Each of the cupped members contains a flange 22 and 23 formed peripherally around the edge portions of each cup. Thus when the two cupped members or half-shells are brought together with their flanged edge portions 22 and 23 in opposing relationship a housing or shell is formed in which the motor may be enclosed.

In order to provide for positioning motor 15 within the enclosure formed by the half-shells 20 and 21, each of the half-shells contains integral recessed portions or wells 25 and 26 respectively. The recesses 25, 26 are so formed that their shoulder portions 27 and 28 will receive and support the outer peripheries of the resilient mounting rings 29 and 30. The recesses also contain centrally arranged openings 31 and 32 through which the motor shaft 14 projects when the motor is in the mounted position. As will be noted in Fig. 2, the openings 31 and 32 have a diameter only slightly larger that the outer diameter of the motor shaft to minimize the leakage of air through the openings.

The mounting of the motor 15 within the air conditioning unit 1 is accomplished by bringing the flanged edge portions 22 and 23 of the cupped members respectively against opposite sides of the partitioning means 4 with the resilient motor mounts 29 and 30 inserted within the corresponding recessed portions 25 and 26 and the motor shaft 14 extending through the openings 31 and 32. By means such as a plurality of bolts 34 the half-shells are brought together to form an enclosing shell or housing for the motor 15. Thus the motor 15 is securely positioned within an enclosing housing formed by the half-shells centrally arranged within the opening 18 of the partitioning means 4 and supported at each end by the cooperation between the motor mounts 29 and 30 and the recesses 27 and 28 respectively. The extensions of shaft 14 pass through the openings 31 and 32 and the fans 16 and 12 are suitably attached to opposite ends of the shaft 14 to be driven thereby.

It will be noted that the cupped members or half-shells are of such contours and size that in the assembled position, a space 36 is provided between the outer surface of the motor housing 19 and the inner surface of the shell. This shape of the shell thus provides clearance around the motor for the mechanical assembly in addition to providing for the circulation of cooling air through the space 36 around the motor 15.

For cooling the motor, there is a first series of holes or vents 37 provided in the bottom wall of the half-shell

20 in the outdoor compartment 3 in order to permit introduction of air into the shell. The air entering these vents from the fan 16 passes into the motor housing through apertures 38 adjacent the bottom of the housing 19 and after circulating through the housing is discharged through openings 39 in the opposite end of the motor housing. The cooling air stream then flows through space 36 and out of the housing through a second series of vents 40 provided in the side walls of the cup member 20.

Thus it will be seen that I have provided an improved mounting arrangement for the air circulation fan motor in an air conditioning unit which may be quickly and easily assembled within the unit and will occupy a minimum of space, an important factor in the design of a compact air conditioning apparatus. If desired, the shell flanges may first be brought together and the resultant assembly mounted on the partition 4. My mounting arrangement provides for positioning such a motor on a structural member which minimizes the vibration and noise common to air conditioning fan motors while at the same time providing a protective housing or shield for the motor which presents a smooth contour for the air flow from the fans, protects the motor from the access of water thereto and also includes means for air cooling the motor. My invention not only provides an inexpensive mounting arrangement for the fan motor by a construction which permits the fan motor to be securely mounted with a conservation of space in the partition within the air conditioning unit dividing the unit into indoor and outdoor chambers.

While in accordance with the patent statutes, I have described what at present is considered to be the preferred embodiment of my invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and it is therefore aimed in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A room air conditioner comprising a casing, a partition dividing said casing into separate indoor and outdoor compartments, said partition having an opening therein, air circulating means for circulating air through each of said compartments comprising a motor disposed in said opening, a motor drive shaft having the opposite ends thereof extending into said compartments, fan means mounted on the ends of said shaft and means for supporting said motor comprising a pair of opposed cup-shaped members having peripheral edge portions secured to said partition adjacent said opening with the respective bottoms of said members extending into said compartments whereby said members form a hollow shell enclosing said motor, each of said members having openings in the bottoms thereof for receiving said shaft, shoulder means within each of said members surrounding said openings and arranged to engage portions of said motor for supporting said motor in spaced relation with said members, said cup-shaped member extending into said outdoor compartment having a plurality of holes therein for receiving and returning cooling air from the fan disposed in said outdoor compartment.

2. A room air conditioner comprising a casing, a partition dividing said casing into separate indoor and outdoor compartments, said partition having an opening therein, air circulating means for circulating air through each of said compartments comprising a motor disposed in said opening, a motor drive shaft having the opposite end portions thereof extending into said compartments, fan means mounted on the extending portions of said shaft and means for supporting said motor comprising a pair of opposed cup-shaped members having peripheral edge portions secured to said portion adjacent said opening with the respective bottoms of said members extending into said

compartments whereby said members form a hollow shell enclosing said motor, each of said members having openings in the bottoms thereof for receiving said shaft, shoulder means within each of said cup-shaped members surrounding said openings arranged to clamp upon the end portions of said motor for supporting said motor in spaced relation with said members, said cup-shaped member extending into said outdoor compartment having a first series of holes in the bottom thereof for receiving air from the fan disposed in said outdoor compartment

and a second series of holes in the side walls thereof for discharging air from the interior of said shell.

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