

CONTROL BOX MOUNTING FOR AN AIR CONDITIONER

Technical Field

The present invention is directed to air conditioners and, more particular, to an electrical control box and the mounting of such control box within an
5 air conditioner.

Background Art

Room air conditioners generally comprise an inside fan or blower, which is powered by a motor to draw air through an evaporator coil to be cooled and to direct the cooled air back into the room being cooled. Such air conditioners also
10 include a condenser coil for dissipating the heat picked up by the evaporator coil and a second fan which causes air flow of the condenser coil to increase the heat dissipation of that coil. The compressor is provided to increase the pressure of refrigerant which is then supplied to the evaporator coil for evaporation and thus cooling.

Due to the complexity of the numbers of parts associated with a room
15 air conditioner, assembly of such a device often times includes complicated and time intensive assembly steps and requires intricate manipulation of parts and tools. Such processes result in an increased cost of the room air conditioner due to increased manufacturing costs. One important component of a room air conditioner is the electrical control box which houses control knobs for controlling function, fan speed
20 and temperature. The electrical controls are connected to the fan motors as well as to the compressor and, further, are connected to a source of electrical power to the air conditioner. Grounding, and other safety requirements, must be met.

Various arrangements are known for mounting of sheet metal and plastic control boxes to air conditioner units. It is deemed desirable for the mounting
25 of a control box to be as simple as possible. This facilitates not only installation of the control box upon assembly of the air conditioning unit, but also facilitates removal of the control box for service as necessary during the life of the air conditioner.

Disclosure of the Invention

A control box for an air conditioner, which is mounted in an indoor
30 section of the air conditioner. The control box includes a rear wall having two vertical edges and a lower edge, first and second side walls each of which have a rear edge connected to one of the vertical edges of the rear wall and which extend forwardly therefrom. Each of the first and second side walls also has a lower edge. A bottom

wall having a rear edge and first and second side edges is connected respectively to the lower edge of the rear wall and the lower edges of the first and second side walls. The air conditioner is provided with a control box receiving structure in the indoor section. This structure includes a rear support, a bottom support, and first and second side supports. The rear, bottom, first and second side supports are configured to cooperate with one another to engage, respectively, the rear wall, the bottom wall and the first and second side walls of the control box in a manner to support and affix the control box in the inside section of the air conditioner.

Brief Description of the Drawings

The invention may be better understood and its objects and advantages will become apparent to those skilled in the art by reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a room air conditioner which embodies the features of this invention;

Figure 2 is a top elevational view of the air conditioner of Figure 1 with the upper housing, front grill and other components removed therefrom;

Figure 3 is a perspective view of the air conditioner as of Figure 2 illustrating the control box prior to installation in the air conditioner or following removal therefrom;

Figure 4 is an enlarged view of the control box and a portion of the air conditioner as indicated in Figure 3;

Figure 5 is an enlarged side view of the control box and indoor section mounting structure; and

Figure 6 is a view taken along the line 6-6 of Figure 5.

Best Mode For Carrying Out The Invention And Industrial Applicability

With reference initially to Figure 1, a room air conditioner 10 includes a substantially rectangular housing 12 which includes a lower housing section 14, an upper housing section 16, and an indoor grill section 18. The lower housing section 14 is mounted in a metal basepan 20, and the entire room air conditioner is adapted to be positioned in a rectangular opening in an exterior wall or on a windowsill in a room where cooling is desired, with the indoor grill section 18 facing into the room, as is conventional.

Figures 2 and 3 illustrate the air conditioner 10 with the upper housing 16 and the indoor grill section 18 removed. Again, as is conventional, the unit comprises an indoor refrigerant to air heat exchanger or evaporator coil 22 and an evaporator fan 24. Air from the space to be conditioned by the system is drawn by
5 action of the evaporator fan 24, through inlet louvers 26 formed in the indoor grill section 18, and is directed through the evaporator coil 22 where the air is cooled and is then directed back into the space to be cooled through an indoor conditioned air discharge assembly forming part of the grill 18.

As best seen in Figure 1, the right-hand side of the indoor grill 18 is
10 provided with an irregularly shaped region 22 in which control knobs 24 for the air conditioning unit 10 are mounted. The control knobs 24 are adapted to be attached to control shafts 26 of a function switch and thermostat switch for the air conditioning unit, which are mounted within the control box 28, as best seen in Figure 2. The details of the mounting of the thermostat and other components within the control box
15 as well as the wiring associated therewith do not form part of the present invention and accordingly are not shown in the drawing figures.

With reference to Figures 2 through 6, the control box 28 comprises a substantially rectangular box having a front section 30 and a rear section 32. As will be appreciated, the rear section 32 of the control box is provided with structure which
20 serves to align and support the control box in the front end of the lower housing 14 of the air conditioner 10 through cooperation with mating structure 34. It should be noted that the front and rear sections of the control box are connected to one another through a hinge structure 36 at the lower ends thereof and a snap-latch structure 38 at the upper ends thereof. This structure allows the latch 38 to be released to thereby
25 permit the front section 30 of the control box to pivot about the hinged structure 36 away from the fixed rear section 32 of the control box to allow ready access to the interior of the control box 28.

Figures 3 and 4 illustrate the control box in the position just prior to engagement, or after disengagement, with the mating support structure 34. It should
30 be appreciated that Figures 3 and 4 illustrate the control box 28 and mating support structure 34 from a rear perspective of the air conditioning unit. Reference to the sides of the control box will be made with respect to viewing the box from the front of the unit and, accordingly, the sides of the rear section 32 of the control box bear

reference numerals as follows: left wall 40, right wall 42, rear wall 44, and bottom wall 46.

As will be appreciated by reference to the various drawing figures, the mating support structure 34 for the control box includes wall sections interconnected with one another and adapted to receive mating wall sections of the control box in contiguous relationship therewith. The walls of the support structure 34 will be referred to as follows: left wall 48, right wall 50, rear wall 52 and a bottom wall 54. Each of the walls 40, 42, 44, and 46 of the control box 32 is provided with structure thereon which is adapted to engage mating structure in the walls 48, 50, 52 and 54 of the support structure 34.

Looking first at the left wall 40 of the control box, it will be noted that an outwardly extending rectangularly shaped protrusion 56 extends outwardly from the wall at a location a little less than half way up the side of the wall. The right-hand side wall 42 is provided with a similar protrusion 58 extending therefrom at a location spaced downwardly from the location of the protrusion 56 on the left-hand wall 40. As best seen in Figure 4, the left wall 48 of the mounting structure 34 and the right wall 50 of the mounting structure 34 are provided with U-shaped slots 60 and 62, respectively, at their upper ends. The slots 60 and 62 are sized to receive the protrusions 56 and 58 on the corresponding side walls of the control box. It will be noted that the upper ends of each of the slots 60 and 62 are outwardly flared at their upper ends thereof in order to facilitate receiving the mating protrusions therein during installation of the control box. The slots 60 and 62 are sized to receive the protrusions with a close tolerance fit in order to assure a rigid attachment between the components.

The bottom wall 46 of the control box is provided with a downwardly extending protrusion 64, which is adapted to be received in a mating opening 66 provided in the bottom wall 54 of the support structure 34.

The rear wall 44 of the control box is provided with a "outwardly extending protrusion 68 at approximately this midpoint of its height. The protrusion 68 defines a substantially horizontal upwardly facing surface 70 at the top thereof and an inclined surface 72 extending downwardly from the horizontal surface to the surface of the rear wall 44. As best seen in Figures 4 and 5, the rear wall 52 of the support structure 34 terminates at an upper end 74 which is located below the inclined

surface 72 of protrusion 68 on the rear wall 52 of the control box. Integrally formed on the horizontal surface 74 and extending upwardly thereof is a latch 76 having a latching head section defining a downwardly facing surface 78 and an inclined surface 80 above the horizontal surface. The inclined surface is at an angle substantially the same as that of the inclined surface 72 of the protrusion 68 on the rear wall 44. The latch 76 has a vertically extending linear section 82 which is adapted to allow the latching head to flex rearwardly when a force is exerted thereon either by the protrusion 68 or manually, as will be appreciated.

It is accordingly should be understood that installation of the control box 28 into the air conditioner unit is accomplished by simply sliding the control box downwardly from the position illustrated in Figure 4 to the installed position as illustrated in Figures 2, 5 and 6. When in the installed position, each of the control box alignment structures described above in the housing 14 will slide readily into engagement with the mating structures 34, as described in detail hereinabove. As the control box is moved downwardly, the inclined surface 72 on the rear wall protrusion 68 will engage the inclined surface 80 on the latch 76 thereby deflecting the latch rearwardly to allow movement of the control box and the protrusion 68 downwardly to the position illustrated in Figure 5 wherein the horizontal surface 70 of the protrusion 68 and the downwardly extending horizontal surface 78 of the latch are in latching engagement with one another.

As so installed, the control box is rigidly and fixedly supported within the air conditioning unit with no additional necessary fasteners and with a minimal amount of labor required. It should be further appreciated that the staggered positioning of the protrusions 56 and 58 on the left and right side walls 40 and 42, respectively, further contributes to the stability of the control box as installed and supported by the structure described. By locating the protrusions 56 and 58 at displaced elevations, the box is supported in a manner which resists a pivotal forward to back movement of the control box. Location of the protrusions at the same elevation would create an axis of rotation which is not desirable.

Further, with particular reference to Figure 5, it will be appreciated that access to the interior of both the front and rear sections 30 and 32 of the control box may be had by releasing the latch 38 interconnecting the control box sections at the upper end and pivoting the front section 30 of the control box forwardly and away

from the fixedly attached rear section about the hinge 36 at the lower end thereof. Finally, it should be appreciated that removal of the entire control box assembly may be readily achieved by flexing the latch 76 rearwardly to disengage the surfaces 70 and 78 and simply manually pulling the control box vertically upwardly out of engagement with the mating structure 34 in the housing 14.



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CLAIMS

1. An air conditioner of the type having an indoor section, which includes a housing, the improvement comprising:

a control box for the air conditioner, which includes:

- 5 a rear wall having two vertical edges and a lower edge,
first and second side walls, each of said side walls having a rear edge connected to one of said vertical edges of said rear wall and extending forwardly therefrom, each of said first and second side walls having a lower edge; and
a bottom wall having a rear edge and first and second side
10 edges connected to, respectively, said lower edge of said rear wall, and said lower edges of said first and second side walls;

a control box receiving structure in said indoor section comprising:

- a rear support, a bottom support, and first and second side supports, said rear, bottom, and first and second side supports being configured to
15 cooperate with one another to engage, respectively, said rear wall, said bottom wall, and said first and second side walls of said control box in a manner to support said control box in said inside section.

2. The apparatus of claim 1 wherein each of said rear support, said
20 bottom support, and said first and second side supports includes a wall section adapted to be in contiguous relationship with at least a portion of said wall of said control box, which each of said supports engages.

3. The apparatus of claim 2 wherein each of said rear wall, said
bottom wall, and said first and second side walls is provided with alignment and
25 retention structure thereon; and

wherein each of said wall sections of said rear, bottom, and first and second side supports is provided with alignment and retention structure adapted to interact with said alignment and retention structure of the respective control box wall, which it engages.

- 30 4. The apparatus of claim 3 wherein said alignment and retention structure of said first and second side walls comprises a protrusion extending outwardly from each of said walls, and said interacting alignment and retention



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structure on said first and second side supports comprise U-shaped slots open at their upper ends, said slots being sized to receive said protrusions therein.

5 5. The apparatus of claim 4 wherein said alignment and retention structure of said first and second side walls and said interacting alignment and retention structure on said first and second supports are located at an elevation on the
10 respective side wall and side support at elevations different from one another.

6. The apparatus of claim 3 wherein said alignment and retention structure of said rear wall of said control and said rear support of said control box receiving structure comprise interacting surfaces on said rear wall and said rear
10 support adapted to vertically fix said control box with respect to said control box receiving structure when interacting with one another, said interacting surfaces being adapted to readily disengage upon application of a force to one of said surfaces.

7. The apparatus of claim 3 wherein said alignment and retention structure of said bottom wall comprises a protrusion extending from said wall and
15 wherein said alignment and retention structure of said bottom wall comprises an opening adapted to receive said protrusion therein.