Abstract: A seal for an opening between sections of an air conditioner includes a wiring passage that is oriented in a vertical direction to gravitationally inhibit water from advancing through the wiring passage. For example, the seal is removable and re-attachable, and can be secured on the air conditioner in a variety of different orientations depending on the design of the air conditioner.
AIR CONDITIONER WIRING SEAL

BACKGROUND OF THE INVENTION

This invention relates to air conditioners and, more particularly, to a seal for inhibiting water penetration between different sections of the air conditioner.

Conventional air conditioners include a variety of different components that cooperate to provide temperature conditioned air. Typically, the air conditioner includes a controller that is hard-wired with the components to power and control the components.

One problem of using hard-wiring is that the wiring is routed through spaces that provide paths for water to move between the components. For example, some of the components are located in an indoor side of the air conditioner and other components are located in an outdoor side of the air conditioner. Water from rain, snow, or other source may follow the wiring from the outdoor side to the indoor side and short circuit the components.

One solution utilizes a sealant, such as caulking, to seal the indoor side from the outdoor side. However, one problem with the sealant is that it may adhere to the wiring, making removal for maintenance or other purpose difficult or requiring use of tools that may damage the wiring. Further, once the sealant is removed, it does not adequately reseal. The air conditioner therefore is unsealed, or new sealant must be installed.
Accordingly, there is a need for a removable and re-attachable seal that inhibits water from penetrating between sections of an air conditioner. This invention addresses those needs while avoiding the shortcomings and drawbacks of the prior art.

**SUMMARY OF THE INVENTION**

An example seal for an opening between sections of an air conditioner includes a wiring passage that is oriented in a vertical direction to gravitationally inhibit water from advancing through the wiring passage. For example, the seal is removable and re-attachable, and can be secured on the air conditioner in a variety of different orientations depending on the design of the air conditioner.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The various features and advantages of this invention will become apparent to those skilled in the art from the following detailed description of the currently preferred embodiment. The drawings that accompany the detailed description can be briefly described as follows.

Figure 1 is an example air conditioner.

Figure 2 is a sectional view of the example air conditioner of Figure 1.

Figure 3 is an example seal for use between sections of the air conditioner.
Figure 4 is a sectional view of the seal of Figure 3.

Figure 5 is a partial sectional view of the seal secured between sections of the air conditioner.

Figure 6 is a perspective view of the seal and a lip that the seal fits over.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figure 1 illustrates a partially exploded view of selected portions of an example air conditioner 10. Figure 1 is a schematic presentation for illustrative purposes only and is not a limitation on the disclosed examples. Additionally, there are various types of air conditioners, many of which could benefit from the examples disclosed herein, which are not limited to the design shown.

In the illustrated example, the air conditioner 10 includes an interior section 12 and an exterior section 14. Generally, the air conditioner 10 is installed in a structure such that the interior section 12 is indoors and the exterior section 14 is outdoors.

The interior section 12 includes a grill 16 and partition 18 (e.g., a wall) that generally enclose an evaporator 20 and heater 22 above a drain pan 24. Although the disclosed example air conditioner 10 includes a heater, it is to be understood that not all air conditioners include heaters. The grill 16 includes an access opening 25a and cover 25b. A blower 26 is located adjacent the heater 22 between the partition 18 and an evaporator
partition 28. Referring also to the sectional view of Figure 2, a control box 30 encloses various control components, such as a louver motor 32 (shown schematically hidden inside the control box 30) that engages a came 33 that fits within a slot 34 for moving louvers 35, a capacitor 36, a thermostat 38, a rotary switch 39, and knobs 40 for setting the operation of the air conditioner 10.

The exterior section 14 includes a compressor 50 for compressing and pumping a refrigerant through the air conditioner 10 in a known manner. A motor 52 drives the blower 26 and a fan 54, which is adjacent a condenser 56. A cover 58 includes an evaporator section 60 that generally covers the evaporator 20 and a condenser section 62 that generally covers the condenser 56. The interior section 12 and the exterior section 14 are enclosed in a wrapper 64, which includes louvers 66 on one or more sides of the wrapper 64.

The control box 30 serves to control the operation of the various components (e.g., heater 22, motor 52, compressor 50, a reversing valve, etc.) in the interior section 12 and the exterior section 14 to produce temperature conditioned air in a known manner. To this end, electrical wiring 68 connects the control box 30 with the components. The electrical wiring 68 extends from the control box 30, through a space 70 between the control box 30 and the partition 18, through an opening 72 in the partition 18 the various components. At a minimum, the electrical wiring 68 connects to the motor 52 and the compressor 50. A seal 74 is incorporated at the opening 72 to limit or prevent liquid or other debris from penetrating into the interior section 12.
In operation, the compressor 50 functions to compress the refrigerant and delivers it downstream to the condenser 56. The fan 54 moves air over the condenser 56, and cools refrigerant within the condenser 56. The refrigerant flows from the condenser 56 through an expansion device (not shown), to the evaporator 20. The motor 52 drives the fan 54 and the blower 26. As known, air is drawn in through a grill 16 over the evaporator 20, and into an outlet duct 73, where it is delivered through the louvers 35 and horizontal louvers 75 (Figure 1) into the environment to be conditioned.

Figures 3 and 4 show an example of the seal 74. In this example, the seal 74 is made of molded plastic walls 84 that define an internal wiring passage 86. In one example, the plastic is acrylonitrile butadiene styrene. It is noted that the present invention is not limited to acrylonitrile butadiene styrene.

The walls 84 form a flange section 88 having a sealing surface 90 for sealing against the partition 18. In this example, the flange section 88 includes tabs 92 that extend into an opening 94 (represented by dashed lines) formed by the flange section 88. The wiring passage 86 connects the opening 94 with an opening 96 formed by a lower portion of the walls 84.

In this example, the wiring passage 86 includes a first section 106 that extends in a generally horizontal direction and a second section 108 that extends in a generally vertical direction. The terms "horizontal" and "vertical" as used in the disclosed examples describe the orientations when the seal 74 is mounted on the partition 18. Furthermore, in some
examples, the directions are not strictly geometrically limited and may vary such that a geometric component of the respective direction is horizontal or vertical.

Referring to Figure 5, the seal 74 is secured over the opening 72 through the partition 18. In this example, the partition includes a Hp 118 around the opening 72 for mounting the seal 74. The tabs 92 snap into engagement with the lip 118 such that the lip 118 and tabs 92 interlock and the sealing surface 90 seals against the partition 18. In one example, the seal 74 snap fits onto the lip 118 without the use of tools such that a user can manually remove and reinstall the seal 74.

The wiring 68 is routed through the wiring passage 86. The seal 74 provides the benefit of inhibiting water from penetrating along the wiring 68 into the interior section 12. In this example, the vertical section 108 of the wiring passage 86 gravitationally inhibits water from advancing through the wiring passage 86 from the exterior section 14 to the interior section 12. For water to advance, it would have to overcome gravity and travel upwards through opening 96 and the vertical section 108 of the wiring passage 86.

Referring to Figure 6, the seal 74 and the lip 118 are shaped such that the seal 74 can only be installed on the lip 118 in a vertical orientation. The lip 118 is oval-shaped having a primary vertical axis 120 that is longer than a secondary horizontal axis 122. Likewise, the opening 94 (Figure 3) of the seal 74 is oval-shaped such that the seal 74 will not fit over the lip 118 in a non-vertical orientation. The oval shapes of the lip 118
and the opening 94 thereby provide the benefit of ensuring that the seal 74 is always installed in the vertical orientation to inhibit water from penetrating along the wiring 68 into the interior section 12. Given this description, one of ordinary skill in the art will recognize other lip 188 and opening 94 shapes that ensure vertical orientation.

Although a preferred embodiment of this invention has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.
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CLAIMS

1. A seal apparatus for use in an air conditioner, comprising:
   a seal for an opening between sections of an air conditioner, the seal having a wiring passage oriented in a vertical direction to gravitationally inhibit water from advancing through the wiring passage.

2. The seal apparatus as recited in claim 1, wherein the seal comprises a snap-fit attachment feature.

3. The seal apparatus as recited in claim 1, wherein the seal comprises a plurality of snap-fit attachment features.

4. The seal apparatus as recited in claim 1, wherein the seal comprises a first open face for attachment over the opening, and a second open face that opens in a downward direction.

5. The seal apparatus as recited in claim 1, wherein the seal comprises a flange having a seal surface.

6. The seal apparatus as recited in claim 5, wherein the flange extends at least partially about an opening of the seal and includes at least one tab that protrudes from the flange into the opening.

7. The seal apparatus as recited in claim 6, wherein the at least one tab includes three tabs that each protrude from the flange into the
8. The seal apparatus as recited in claim 1, wherein the seal comprises a first surface having a first opening and a second surface having a second opening, wherein the wiring passage connects the first opening and the second opening.

9. The seal apparatus as recited in claim 1, wherein the wiring passage comprises a first section and a second section, wherein the first section extends in the vertical direction and the second section extends in a direction transverse to the vertical direction.

10. The seal apparatus as recited in claim 1, wherein the seal comprises a plastic material.

11. An air conditioner assembly comprising:
   an exterior section having a compressor, a motor, a fan and a condenser;
   an interior section having a blower and an evaporator;
   a controller having wiring that extends between the interior section and the exterior section through an opening of a partition there between; and
   a seal associated with the opening, the seal having a wiring passage for routing the wiring, wherein the wiring passage is oriented in a vertical direction to gravitationally inhibit water from advancing through the wiring passage between the exterior section and the interior section.
12. The air conditioner assembly as recited in claim 11, wherein one of the partition or the seal comprises a lip and the other of the partition or the seal comprises at least one snap-fit attachment feature corresponding to the lip for securing the seal and the partition together.

13. The air conditioner assembly as recited in claim 12, wherein the lip is oval-shaped.

14. The air conditioner assembly as recited in claim 12, wherein the seal comprises the least one snap-fit attachment feature and the partition comprises the lip.

15. The air conditioner assembly as recited in claim 11, wherein the seal is removably attached to the partition such that the seal can be manually attached and detached without tools.

16. A method of inhibiting water penetration through an opening between an interior section and an exterior section of an air conditioner, comprising:

   connecting wiring between the interior section and the exterior section through a wiring passage of a seal for the opening; and

   orienting the wiring passage of the seal in a vertical direction such that the water is gravitationally inhibited from advancing through the wiring passage.