Aug. 17, 1948. R. F. ROPER 2,447,278

AIR CONDITIONING APPARATUS

Filed April 27, 1945 3 Sheets-Sheet 1

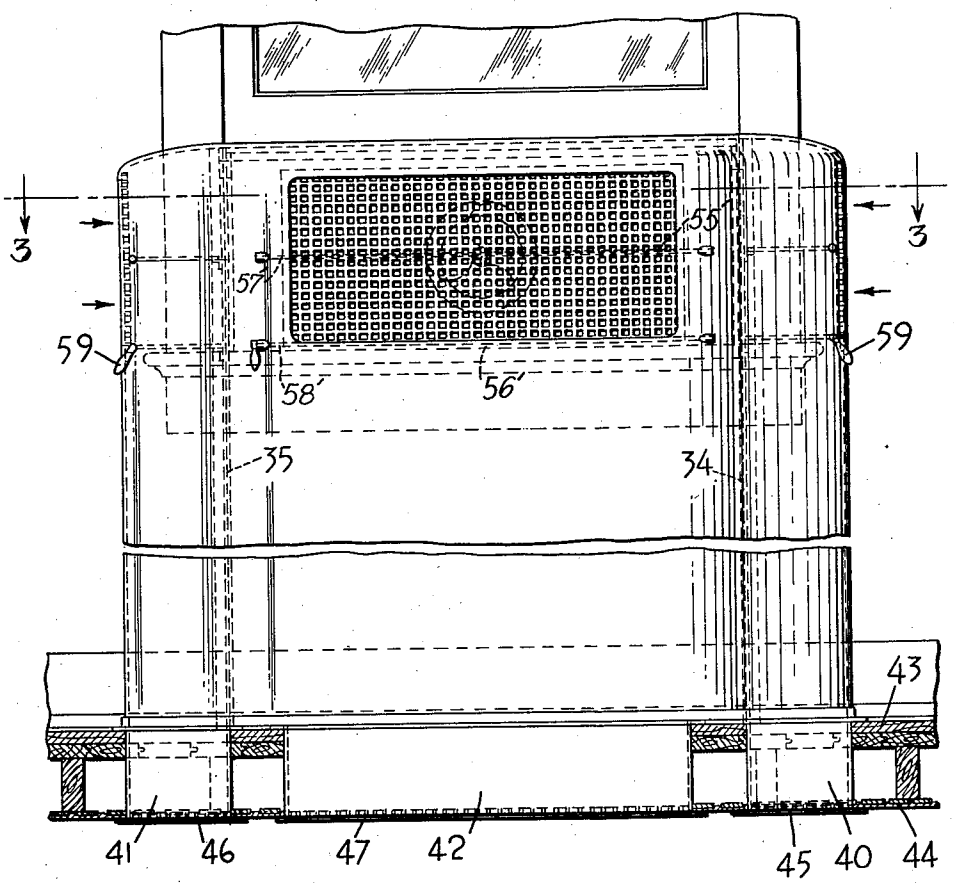


Fig. 1

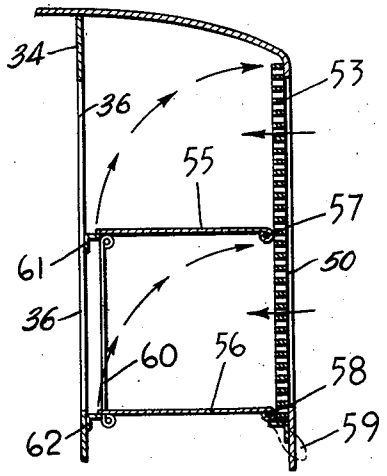


Fig. 4

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AIR CONDITIONING APPARATUS

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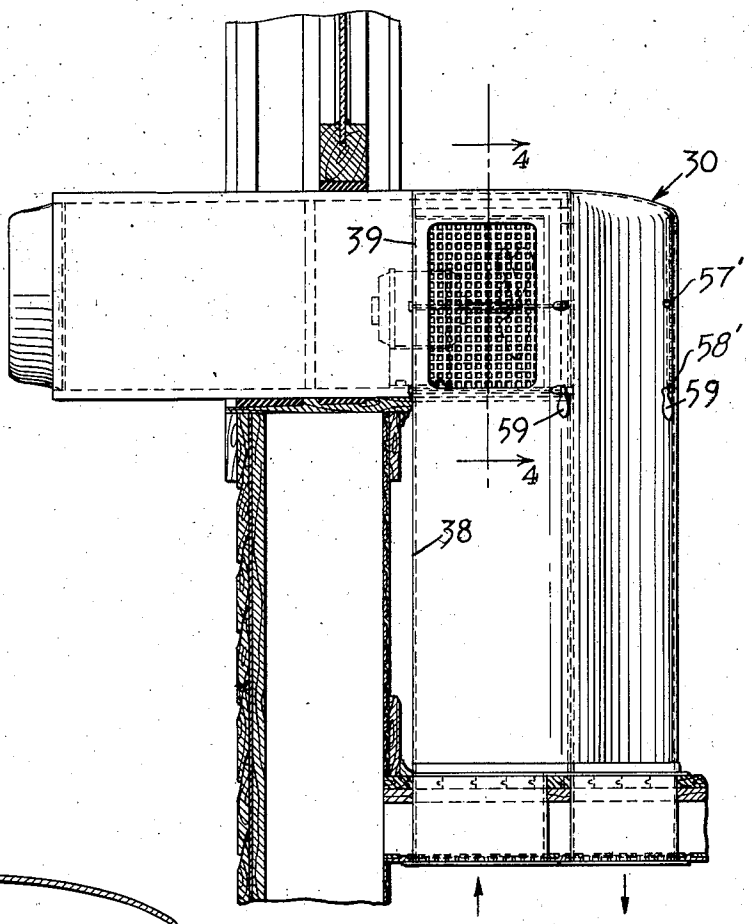


Fig. 2

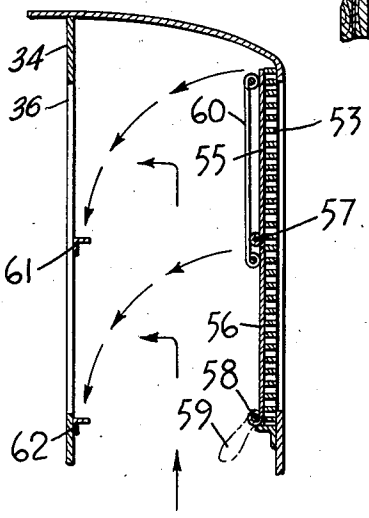


Fig. 5

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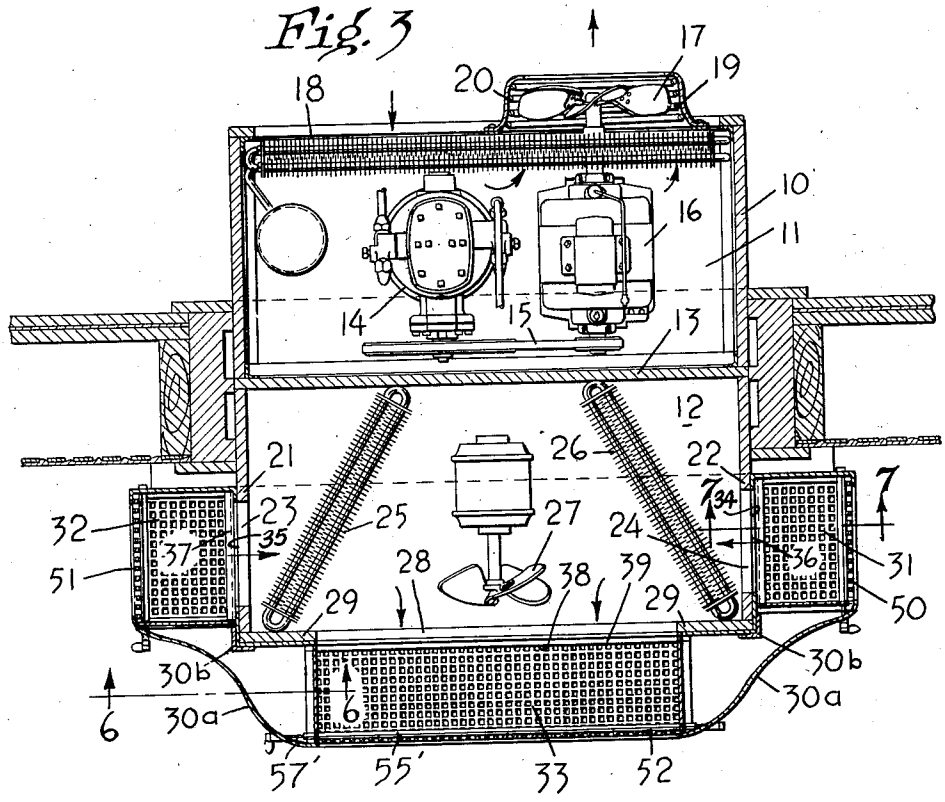
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AIR CONDITIONING APPARATUS

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Fig. 3



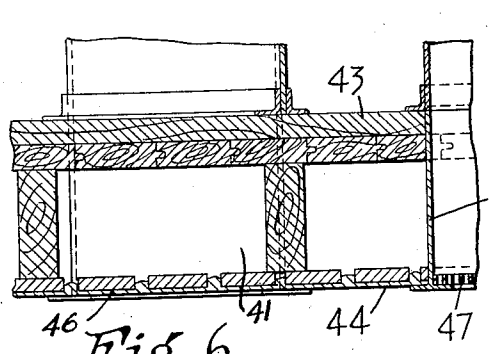


Fig. 6

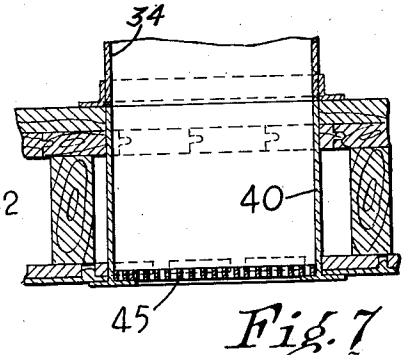


Fig. 7

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UNITED STATES PATENT OFFICE

2,447,278

AIR CONDITIONING APPARATUS

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Application April 27, 1945, Serial No. 590,697

10 Claims. (Cl. 62—129)

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The present invention relates to air conditioning apparatus and, more particularly, to unit air conditioners of the type adapted to be positioned in one room of a building, such as a private home, to cool and condition the air therein.

The primary object of the invention is to provide means cooperating with a unit air conditioner of this type, making it possible to employ the unit to cool and condition the air in another room of the building, when desired, without moving the unit from room to room, or otherwise encountering the inconvenience necessitated by constructions of previously known kinds.

A further object of the invention is to provide means associated with a unit air conditioner for selectively cooling and conditioning the air in a plurality of rooms of the building in which the unit is positioned. More particularly, the invention aims to provide means for cooling and conditioning the air in an upstairs room, such as a bedroom, nursery, or sewing room, during one portion of the day or night, and means for using the equipment to cool and condition the air in the room therebelow, such as a dining room or living room, during another portion of the day or night.

In many homes, air conditioning units are installed in bedrooms on the second floor, so as to make the rooms comfortable and livable during the night, when they are in use. During the major portion of the entire day, when the occupants of the house are downstairs, the units are turned off and are inoperative. The expense of providing air conditioning units for the rooms on the lower floor is often prohibitive, with the result that those rooms are unduly warm and humid, in warm weather. The primary purpose of the present invention is to make it possible to use one or more air conditioning units, positioned in the upstairs rooms, to cool and condition the air in those rooms at certain times and to cool and condition the air in the rooms therebelow at other times. In accordance with the invention, a unit may be employed during the night time to maintain a bedroom in a cool, comfortable condition for sleeping, and may be used throughout the day and the evening for cooling and conditioning the air in a dining room or living room, below the bedroom. Hence, the fullest use of the air conditioning unit is accomplished, and substantially twice the effectiveness is secured, as compared with conventional installations.

As is well understood in the art, unit air conditioners are conventionally provided with two chambers, one communicating with the outdoors

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and the other with the indoors. In the first mentioned chamber, there is positioned a refrigerant compresser, a condenser, and outdoor air circulating means for cooling the condenser and the compresser. In the other chamber evaporators are positioned, with means for circulating indoor air (sometimes mixed with outdoor, fresh air) over the evaporators and back into the room. The evaporators cool the air and remove substantial quantities of moisture therefrom by condensation. Typical examples of such units are shown in the patent to Paschal No. 2,120,208 and in my prior Patent No. 2,359,051.

In accordance with the present invention, casing means are provided, surrounding and embracing portions of the air conditioning unit housing, and including openings communicating with the room in which the unit is positioned, conduits communicating with the room therebelow, and dampers adapted to establish communication from the indoor air circulating means to the casing openings, and to the conduits leading to and from the room therebelow, alternately, depending upon the positions of the dampers.

In the accompanying drawings, a specific embodiment of the invention is shown, adapted to cooperate with a simple air conditioning unit, somewhat similar to those shown in the above patents, but it must be understood that the invention is not limited to the specific form shown, as many modifications may be made, to adapt the invention for use with other types of air conditioners.

In the drawings:

Figure 1 is a front elevation of an apparatus in accordance with the invention, showing the floor of a room in section,

Figure 2 is a side elevation, showing the wall and floor in section,

Figure 3 is a horizontal section on line 3—3 of Figure 1,

Figure 4 is a sectional detail showing a preferred damper construction, taken on line 4—4 of Figure 2,

Figure 5 is a similar view, taken on the same line as Figure 4, but showing the dampers in another position, and

Figures 6 and 7 are sectional views showing ducts leading through the floor of one room and the ceiling of the room therebelow, taken on lines 6—6 and 7—7 of Figure 3.

An air conditioning unit with which the apparatus of the present invention is adapted to be used is shown somewhat diagrammatically in the accompanying drawings. It comprises a casing

10, defining an outwardly projecting chamber 11 and an inwardly extending chamber 12, separated by a partition 13. In the outer chamber 11, there is a refrigerant compresser 14, driven through a belt 15 by an electric motor 16 having a fan 17 on its shaft, adapted to circulate outdoor air inwardly through one portion of a condenser 18 and outwardly through another portion thereof, immediately behind a shroud 19, carrying condenser tubes 20 on its inner surface, as explained in the patent last mentioned above.

The end walls 21, 22 of the inner chamber 12 are provided with indoor air intake openings 23, 24, communicating with evaporators 25, 26, through which air is drawn by a fan 27 and circulated, after being cooled and conditioned by the evaporators, out of the chamber 12 through a discharge opening 28 in the front wall 29 of the casing. If desired, the partition 13 and the openings may be modified and provided with dampers and supplemental conduits, so that outdoor, fresh air may be introduced into the indoor air stream, and stale, indoor air introduced into the outdoor air stream for ventilating purposes, as explained in the aforementioned patents. However, since those ventilating arrangements do not constitute a part of the invention of the present application, they are not shown herein. Water of condensation, collected in pans below the evaporators, may be led by suitable conduits to the shroud 19, for evaporation by the heat of the tubes 20, as is well understood in the art, in view of the patents mentioned above.

The apparatus of the present invention comprises a casing 30, adapted to embrace the front and end walls of the portion of the air conditioning unit which projects into the room, and to enclose the indoor air intake openings 23, 24 and the conditioned air discharge opening 28, leading back into the room. The casing includes end conduit sections 31, 32 and a front conduit section 33, isolated from each other, but preferably connected together as a unit by appropriately shaped connecting sections 30*a* and an internal frame 30*b*. The casing 30, including the conduit sections and the connecting webs is preferably constructed as a movable unit, so that it may be moved up against the air conditioning unit, in cooperative relation thereto, after the unit has been installed in a window, and after the ducts leading through the floor have been installed, as hereinafter explained.

The inner walls 34, 35 of the conduit sections 31, 32 are provided with openings 36, 37, communicating with the air inlet openings 23, 24, and the inner wall 38 of the front conduit 33 is similarly provided with an opening 39 communicating with the conditioned air discharge opening 28 in the front wall 29 of the air conditioning unit.

The lower open ends of the several conduits communicate with independent ducts 40, 41, 42, installed in and leading through the floor 43 of the upper room and the ceiling 44 of the lower room, the lower ends of the ducts being provided with grills 45, 46, 47, respectively.

The conduits 31, 32, 33, at their upper ends are provided with openings 50, 51, 52, preferably covered by appropriate grill work 53, communicating with the upstairs room.

Behind each grill, dampers are provided to direct the flow of air through the grills into and from the upstairs room, or through the conduits to and from the downstairs room. As shown in Figures 4 and 5, the dampers preferably comprise plates 55, 56, fast on shafts 57, 58, pivoted in the casing, one pair of each of which may be provided with a handle 59. The damper plates are interconnected by links 60, so that movement imparted to one will be transmitted to the other. Sealing strips 61, 62 in the conduit sections serve as seats for the damper plates when in their lowermost positions.

The dampers 55' and 56' for the front conduit 33 are fast on shafts 57', 58' and are substantially the same as the end dampers, except that they are longer to conform to the size of the front conduit, as indicated in Figures 1, 2, and 3.

It will be apparent that, when the dampers are in their lower, horizontal position, air will be drawn from the upper room into the air conditioning unit through openings 50 and 51 in the casing and openings 23 and 24 in the unit housing, and discharged therefrom back into that room through the opening 39 in the housing and opening 52 in the casing. Hence, in this position of the parts, the air conditioning unit will function in substantially conventional manner, and will condition the air in the room in which it is situated. When the dampers are shifted to their upper, vertical positions, however, the openings 50, 51, and 52 will be closed or blocked and the conduits 31, 32 and 33 will be opened. Hence, the air conditioning unit will draw air from the room below, upwardly through the grills 45, 46, ducts 40, 41 and conduits 31, 32, into the chamber 12 through openings 36 and 24 at one end and 37 and 23 at the other end. The conditioned air will be discharged from the chamber 12 through openings 28 and 39 into duct 33, through which it will flow downwardly to and through the duct 42 and grill 47 into the room below, to cool and condition the air therein.

The invention is not limited to the details of construction shown in the accompanying drawings and described above, but includes all modifications coming within the scope of the appended claims and their equivalents.

I claim:

1. The combination with an air cooling and conditioning unit, adapted to be positioned in a room in a building, and including means within the unit for circulating indoor air to be cooled and conditioned from and to the room in which the unit is positioned, of conduit means connected to the unit and leading to and from another room, and valve means associated with the conduit means for circulating the indoor air alternately from and to the first mentioned room and from and to the second mentioned room.

2. The combination with an air cooling and conditioning unit, adapted to be positioned in a room in a building, and including means within the unit for circulating indoor air to be cooled and conditioned from and to the room in which the unit is positioned, of means defining independent conduits leading from another room to the unit and from the unit to the last mentioned room, and damper means associated with each of said conduits for circulating the indoor air from the first mentioned room to the unit and back to that room in one position of the damper means, and from the other room to the unit and back to the last mentioned room in another position of the damper means.

3. The combination with an air cooling and conditioning unit, adapted to be positioned in a room in a building, and including means within the unit for circulating indoor air to be cooled and conditioned from and to the room in which

the unit is positioned, of conduit means leading from the unit through the floor of said room to and from a room therebelow, said conduit means having openings communicating with the first mentioned room, and damper means establishing communication alternately between the unit and the first mentioned room, and between the unit and the room therebelow.

4. The combination with an air cooling and conditioning unit, adapted to be positioned in a room in a building, and including means within the unit for circulating indoor air to be cooled and conditioned from and to the room in which the unit is positioned, of conduit means leading from the unit through the floor of said room to a room therebelow, said conduit means having openings communicating with the first mentioned room, and damper means arranged in one position to close said openings and to establish communication between the unit and the lower room, and, in the other position, to block the conduit means and to expose the openings, to establish communication between the unit and the first mentioned room.

5. The combination with an air cooling and conditioning unit, adapted to be positioned in a room in a building, and including means within the unit for circulating indoor air to be cooled and conditioned from and to the room in which the unit is positioned, of casing means defining conduits leading from the unit to another room in the building and to the first mentioned room, and damper means in the casing establishing communication with the first mentioned room in one position and with the second mentioned room in the other position.

6. The combination with an air cooling and conditioning unit, adapted to be positioned in a room in a building, and including means within the unit for circulating indoor air to be cooled and conditioned from and to the room in which the unit is positioned, of casing means defining conduits communicating with a room below the first mentioned room, said casing having openings in the conduits communicating with the first mentioned room, and damper means adapted in one position to expose the openings and block the conduits and in the other position to block the openings and open the conduits.

7. The combination with an air cooling and conditioning unit adapted to be positioned in a room in a building and including means for drawing indoor air from the room in which the unit is positioned into the unit and for discharging the same into the room, of a casing associated with said unit, including conduits connected to said air drawing and discharging means and leading to another room in the building, and damper means movable to two positions for circulating the air through the conduit means, or directly to and from the first mentioned room, alternately.

8. The combination with an air cooling and conditioning unit adapted to be positioned in a room in a building and comprising a housing having indoor air circulating means and an inlet opening in end wall and a discharge opening in its front wall, of a casing defining conduit means leading from another room in the building to said air intake opening and from the discharge opening back to said other room, said conduit means having openings communicating with the first mentioned room, and damper means in the housing adapted in one position to uncover the last-mentioned openings and block the conduit means, whereby air is circulated from and to the first mentioned room, and in the other position to close the openings and open the conduit means to effect circulation of air from and to the second mentioned room.

9. The combination with an air cooling and conditioning unit of the type adapted to be supported in a window opening in a room and including indoor air cooling and circulating openings, of a casing, adapted to be supported upon the floor of the room, enclosing said openings and having supplemental openings in communication with the room in which the unit is supported and conduit means communicating with a room therebelow, and damper means in the casing adapted in one position to establish communication between the openings in the casing and the air circulating openings in the unit, and, in the other position, to block the openings in the casing and to establish communication through said conduit means with the room therebelow.

10. The combination with an air cooling and conditioning unit of the type adapted to be supported in a window opening in a room and having an indoor air inlet opening in one end wall and a conditioned air discharge opening in its front wall, of a casing enclosing said openings, having supplemental openings aligned therewith and independent conduits leading from the end openings and the front openings downwardly to the ducts extending through the floor of the room to a room therebelow, and damper means in the casing adapted in one position to establish communication between the end and front wall openings and the aligned supplemental openings, respectively, to cool and condition the air in the first mentioned room, and in the other position to block the openings in the casing and to establish communication between the front and end wall openings and the conduit means, to circulate air to and from the room therebelow.

RICHARD F. ROPER.

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