

[54] **ROOM AIR CONDITIONER DAMPER DOOR OPERATING ARRANGEMENT**

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[57] **ABSTRACT**

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In a room air conditioner having an operable damper for controlling the exchange of air between the condenser section and the evaporator section, the damper is linked to a manually operable control at the face of the room-side section of the air conditioner by a one-piece, thin, flexible, plastic strip of electrically insulating character and which extends through an electrical component control chamber in its extension between the damper and the operating control.

[52] U.S. Cl..... **62/427, 62/262, 98/94**

[51] Int. Cl..... **F25d 17/06**

[58] Field of Search..... **62/262, 427**

[56] **References Cited**

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6 Claims, 6 Drawing Figures

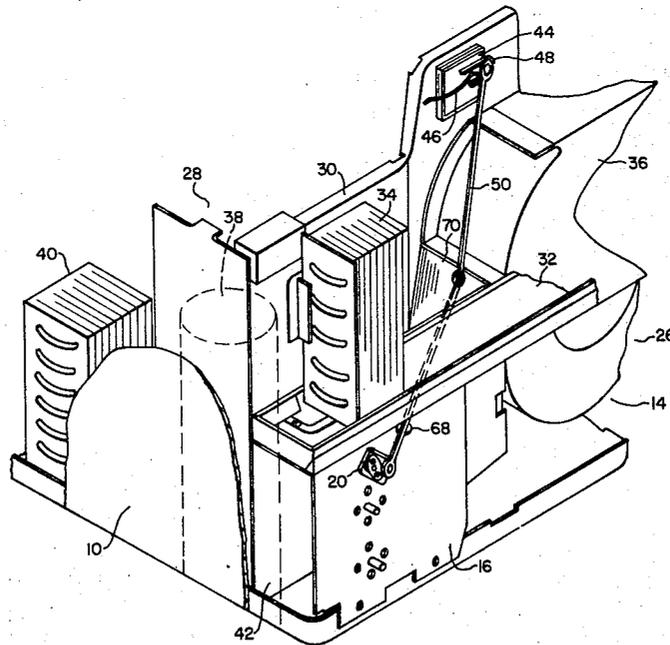


FIG. 1.

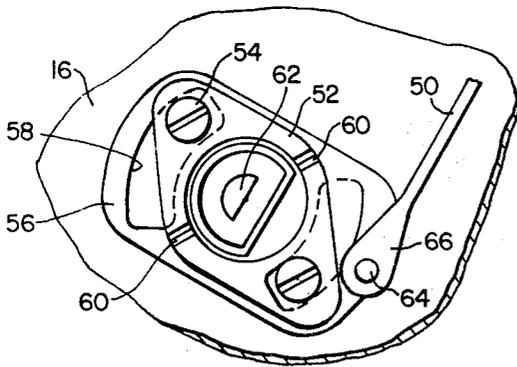
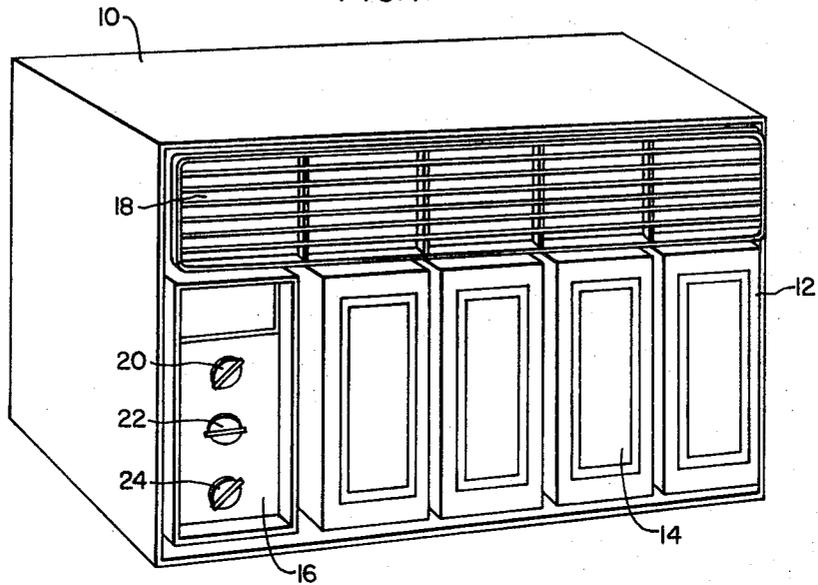


FIG. 3.

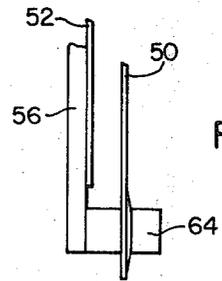


FIG. 4.

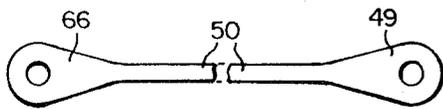


FIG. 6.

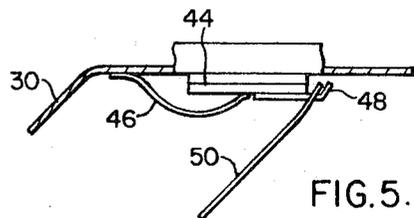


FIG. 5.

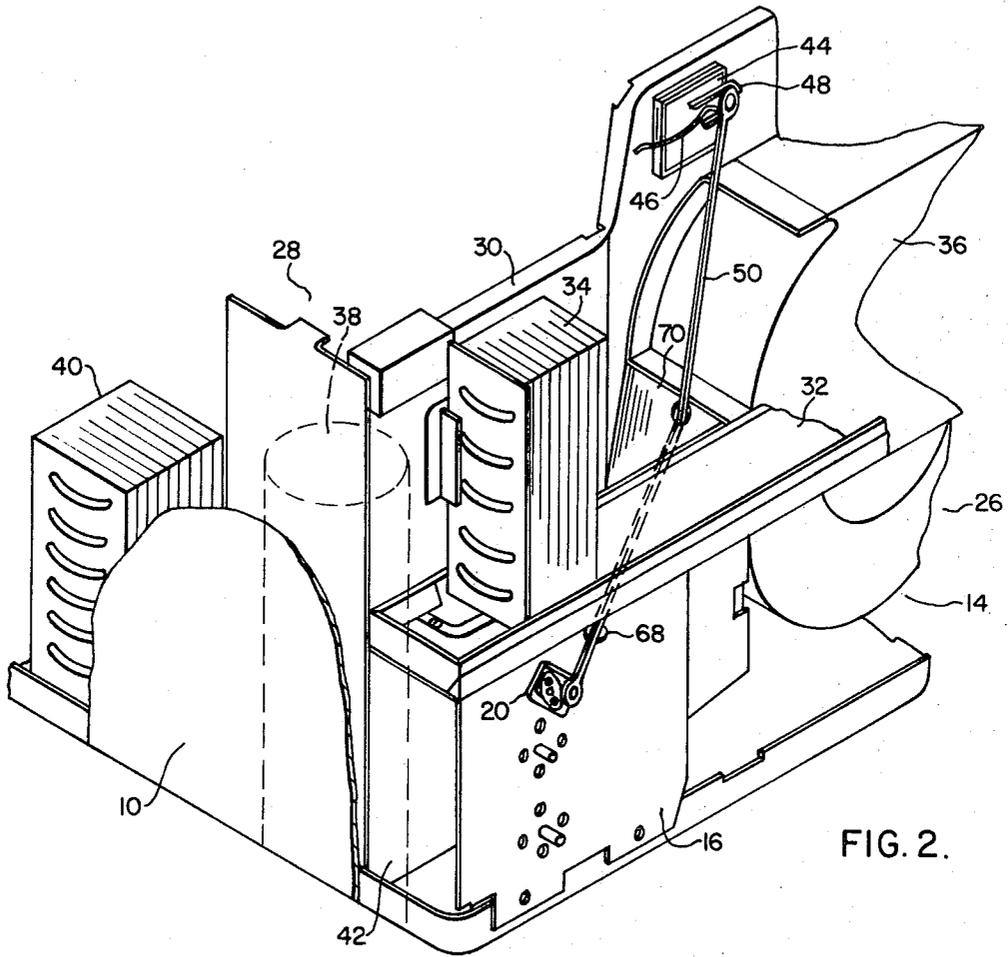


FIG. 2.

ROOM AIR CONDITIONER DAMPER DOOR OPERATING ARRANGEMENT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention pertains to the art of damper door operating arrangements for a self-contained room air conditioner.

2. Description of the Prior Art

Many room air conditioners are provided with a damper door on the bulkhead separating the interior of the room air conditioner cabinet into a room-side section and an outside section for the purpose of permitting the exchange of air between the two sections. A manually operable knob accessible from the room is usually linked to the damper door by a connecting element which so far as we know has typically been a metallic bead type chain, or a single or multi-strand wire pull cable in a sheath, or a single strand push-pull cable in a sheath, or in some instances a fabric type cord. The fabric type cord has not been satisfactory in our estimation because of its tendency to change length under extreme ambient temperature or humidity conditions. The metallic type links are typically relatively expensive. For example, a stranded wire cable provided with looped ends which must be formed and held in securement, and with a polyvinyl chloride tubing sheath, has an approximate cost of 12 to 15 cents. The sheath is considered necessary in any application where the link extends through a control chamber having electrically energized components therewithin, as well as to promote smooth movement of the link relative to the parts of the room air conditioner. Also, even with the sheathed wire arrangement, the ends of the wire project out of the sheath so that if an electrically-energized, open-wire heater is located near the end of the wire at the damper door, the possibility exists of a broken wire from the heater touching the wire cable and thereby conducting to a location closely adjacent the damper operating knob.

The arrangement according to the invention is intended to obviate the objections noted above, as well as provide a reduced cost arrangement.

SUMMARY OF THE INVENTION

In accordance with the invention, an air conditioning unit is provided with a damper door and a damper operator linked together by a one-piece, thin, flexible, resinous plastic strip having integral means at each end for attachment to the operator and the door with the plastic strip being a relatively tough, non-cracking, thermally stable, electrically insulating part, and of relatively negligible stretch in its employment to move the damper door in accordance with movement of the door operator. The currently preferred material for the plastic strip is polyester film, specifically a polyethylene terephthalate film such as that sold under the trademark MYLAR, which is die-cut and includes integrally formed eyelets at opposite ends to accommodate attachment to the operating knob and the damper by forcing the eyelets onto projecting posts.

DRAWING DESCRIPTION

FIG. 1 is an isometric view of a self-contained room air conditioner of the type to which the invention is applicable;

FIG. 2 is a partly broken isometric view of interior parts of the room air conditioner which have some relation to the invention;

FIG. 3 is an enlarged face view illustrating the arrangement at the end of the linking strip where the damper operator knob is located;

FIG. 4 is an edge view showing the press fit connection of the plastic strip to a post on the damper operator lever;

FIG. 5 is a top edge view of the damper door arrangement on the bulkhead and a connection of the strip thereto; and

FIG. 6 is a broken face view of the strip.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The self-contained room air conditioner shown in FIG. 1 includes a box-shaped outer wrapper or cabinet 10 having a generally open room-side face covered by a detachable front 12. The lower part of the front includes a decorative panel arrangement 14 on the right which is sufficiently open to permit room air to be conditioned to pass into the air conditioner, and a control face 16 on the left. The upper part 18 of the front serves as a discharge grille through which conditioned air is directed back into the room. The control face 16 has three rotatable knobs 20, 22 and 24 projecting forwardly therefrom for controlling, respectively, the damper opening setting, fan speeds and air conditioner operation, and room temperature.

In FIG. 2, the interior parts of the room air conditioner of particular interest in connection with the invention are shown. The interior of the cabinet is divided generally into a room-side space 26 and an outside-side space 28 by a generally vertically disposed bulkhead 30. The room-side space is generally divided into an upper and lower portion by a horizontally extending evaporator tray 32 over which the refrigerant evaporator 34 is located. Room air to be conditioned is drawn into the room-side space 26 through the recirculation inlet 14 by the fan (not shown) within the scroll 36 and is forced through the evaporator 34 back into the room through the discharge grille 16 (FIG. 1).

The outside-side space 28 houses a refrigerant compressor 38, a refrigerant condenser 40, and a condenser fan (not shown) which forces outside air through the condenser.

The space immediately behind the control face 16 in the room-side space is an enclosed electrical components compartment or, as it is sometimes called, a control chamber 42 and houses electrical switches, a thermostat, and in some cases other electrical components. This control chamber is for the most part isolated from the remainder of the interior of the room-side space, although provision may be made for the passage of a bypass flow of air therethrough for purposes of temperature sensing of the room air.

A damper door 44 hinged along its left edge as seen in FIG. 2 is provided to overlie an opening in the bulkhead 30. A leaf spring 46 having one end secured to the bulkhead and the other end pressing against the face of the door 44 biases the door to a closed position. The door 44 has a lug or post 48 projecting from its right side as seen in FIGS. 2 and 5 to accommodate the connection thereto of an end of a pull link 50. The pull link 50 extends from the damper door to the damper con-

trol operating means 20 located on the control face 16.

Referring to FIG. 3, the damper control means includes a spring steel plate 52 which is secured to the control face or control panel 16 by two screws 54 to hold the damper operator crank member 56 in position while permitting limited rotation of the crank member 56. The crank member 56 includes a pair of openings 58 to accommodate the screws 54 which pass there-through. The spring member 52 includes trough-shaped detents 60 at a pair of its opposite edges, these detents 60 resting in a complementary pair of grooves on the face of the crank member 56 at the two different positions of the crank member corresponding to the damper door being opened and closed.

The damper door operator crank 56 (FIG. 3) includes as a fixed part thereof a centered, D-shaped shaft 62 upon which the damper control operator knob 20 seats. When the knob is turned in a clockwise direction as seen in FIG. 3, the crank 56 as a whole rotates in a clockwise direction and moves the lower end of the crank 56, carrying a forwardly projecting post 64 thereon, in an arc. One end 66 of the link 50 is connected to this post 64 by being pressed thereon into tight frictional engagement, and accordingly a pull is transmitted through the link to move the damper door 44 to an open position. The position of the damper control operator shown in FIG. 3 corresponds to the damper door being closed.

Referring to FIG. 2, the link 50 extends from the damper door control operating means to the damper door as follows. From the post 64 on crank 56 it extends upwardly and to the right in front of the control panel face 16, then through an opening 68 in the panel and rearwardly and diagonally to the right through the control chamber 42 to a location under a horizontal partition 70, upwardly through an opening 72 in the partition 70 and diagonally toward the rear for the connection to the lug 48 on the damper door 44.

It is noted that the general construction of the room air conditioner, as well as the parts of the damper operating means including the plate and crank, is generally conventional and can take other forms within the contemplation of the invention.

The material from which the link 50 (FIG. 6) is formed is a polyester film material available under the trademark "Mylar." This material is relatively tough, noncracking, thermally stable, electrically insulating and has relatively negligible stretch in its employment in the invention to move the damper door 44 to an open position against the force of the damper door spring. This material also has a high resistance to an abrasion and a low coefficient of friction so that in its extension from the damper control operating means through the openings in the panels to the damper door, smooth operation is obtained without significant wear on the link. Also it has low moisture absorption so that variations in the humidity do not materially affect its length.

The link 50 (FIG. 6) is formed by die-cutting it from a "Mylar" sheet, with the eyelets 49 and 66 at opposite ends of the link being integrally formed in the die-cutting operation. Satisfactory links 50 are formed from "Mylar" sheets of about 14 mils thick material.

We have found that such links, having a nominal width of about one-eighth of an inch, will elongate approximately 0.04 inch with a tensile force of 20 pounds

applied thereto, which is the limit of the working range of the force in the air conditioner environment. While this elongation is approximately double that of a multi-strand steel cable previously used, the elongation is of no practical significance in satisfactory operation of the air conditioner. The cost of the "Mylar" link 50 is currently in the range of 2 to 5 cents, as contrasted to the cost of a sheathed multi-strand steel cable of about 12 to 15 cents. Additionally, by making the diameter of the eyelet 66 to be fastened on the post 64 of the damper operator crank slightly less than the diameter of the post, the eyelet end 66 may be pressed onto the post and assume a cone shape, as illustrated in FIG. 4, so that the end remains secured to the post without the requirement of any additional fastening means. Such additional fastening means is required with the current sheathed multi-strand wire having loops formed on the ends by turning the strands back upon themselves and fastening them.

It will be appreciated from the foregoing that a relatively inexpensive arrangement is provided in accordance with the invention. It provides the advantage of allowing generally direct passage between the control operator and the damper door, even though it passes through a control chamber containing electrical switches and other electrical components. It permits the use of an open wire electrically energized heater in a location relatively close to the damper door and the connection of the link thereto without the danger of the link functioning as an electrical conductor if a wire should become dislodged from the heater and touch the link.

What is claimed is:

1. In a self-contained room air conditioner having a room-side section separated by a bulkhead from an outside-side section, and provided with an operable damper for controlling the exchange of air between said sections through an opening in said bulkhead adapted to be closed by said damper:

means defining a control knob area at a face of said room-side section;

manually operable damper control operating means located at said control knob area; and

means connecting said damper control operating means with said damper, said connecting means comprising a one-piece polyester film strip having integrally formed means at opposite ends for attachment to said operating means and said damper.

2. In an air conditioner according to claim 1 wherein:

said plastic strip includes an integrally formed eyelet at each of its opposite ends, said eyelet at at least one of its ends having a diameter adapting it for frictional engagement by distension of said eyelet at its attachment to said damper control operating means.

3. In an air conditioner according to claim 1 wherein:

said room-side section includes fan means for causing a flow of air through said room-side section, and a refrigerant evaporator in said room-side section;

wall means in said room-side section separating said room-side section into an upstream space and a downstream space relative to said fan means; and

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said plastic strip extends through openings formed in said wall means in its passage between said damper control operating means and said damper.

4. In an air conditioner according to claim 1 wherein:

said room-side section includes a control chamber containing electrical switch means therein, said control chamber having a front panel forming said control knob area; and

said damper control operating means is mounted on said front panel with said attachment of said plastic strip end to said damper control operating means being located forwardly of said front panel.

5. A self-contained room air conditioner including:

a housing including wall means separating the interior thereof into an outside-side section and a room-side section;

a refrigerating system including a compressor and condenser means in said outside-side section, and an evaporator and fan means for causing a flow of air from the room through said room-side section and through said evaporator in said room-side section;

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means forming an opening in said wall means to permit the exchange of air between said outside-side section and said room-side section;

movable door means for said opening;

means forming a control chamber in said room-side section; and

means for controlling the position of said door means, said controlling means including a manually operable door operator located at the front of said control chamber, and a connecting link between said operator and said door and extending through said control chamber, said link comprising a one-piece thin, flexible, elongate resinous plastic strip having means at each end for attachment to said operator and said door, said plastic strip being relatively tough, non-cracking, thermally stable, electrically insulating and of relatively negligible stretch in its employment to move said door in accordance with movement of said door operator.

6. A room air conditioner according to claim 5 wherein:

said plastic strip is polyethylene terephthalate.

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