

[54] **REMOVABLE AIR CONDITIONING UNIT
FOR COOLING ROOMS**

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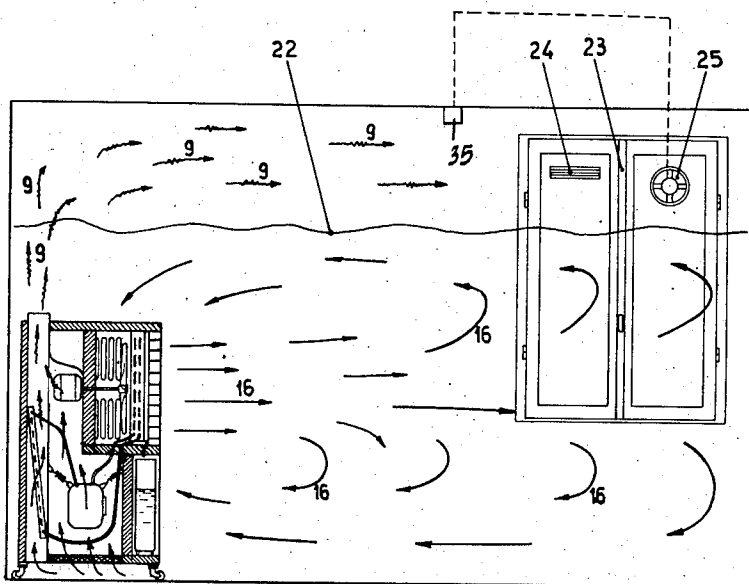
Attorney, Agent, or Firm—Holman & Stern

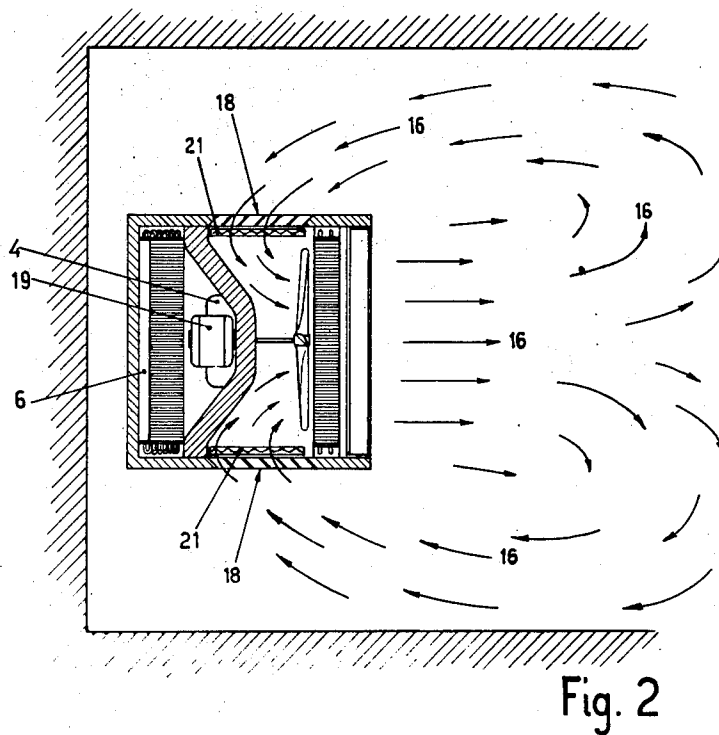
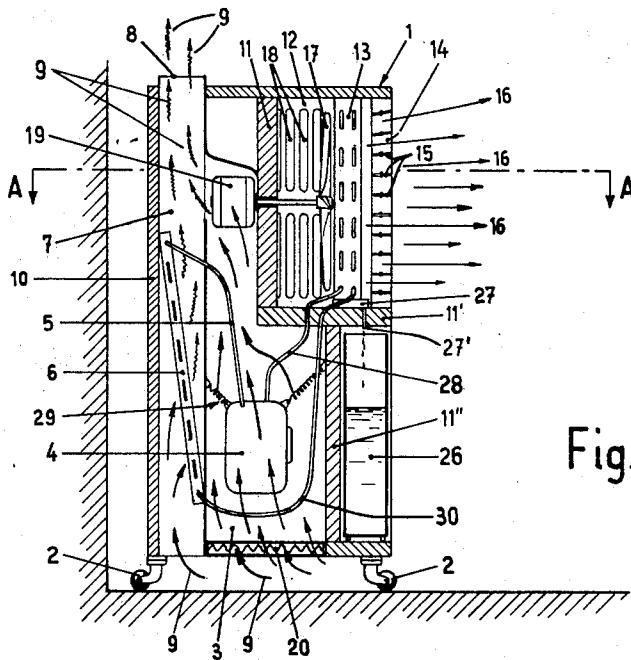
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ABSTRACT

An air conditioning device, of the kind which can be mounted on wheels so as to be placed at any selected position within a room, which is operative in combination with air-discharging means placed in communication with the outside atmosphere, with said air-discharging means and said conditioning device cooperating together so as to divide the room volume into two zones of air at different temperatures. The zone having the air at the higher temperature is the upper layer staying in the immediate vicinity of the room ceiling.

2 Claims, 4 Drawing Figures





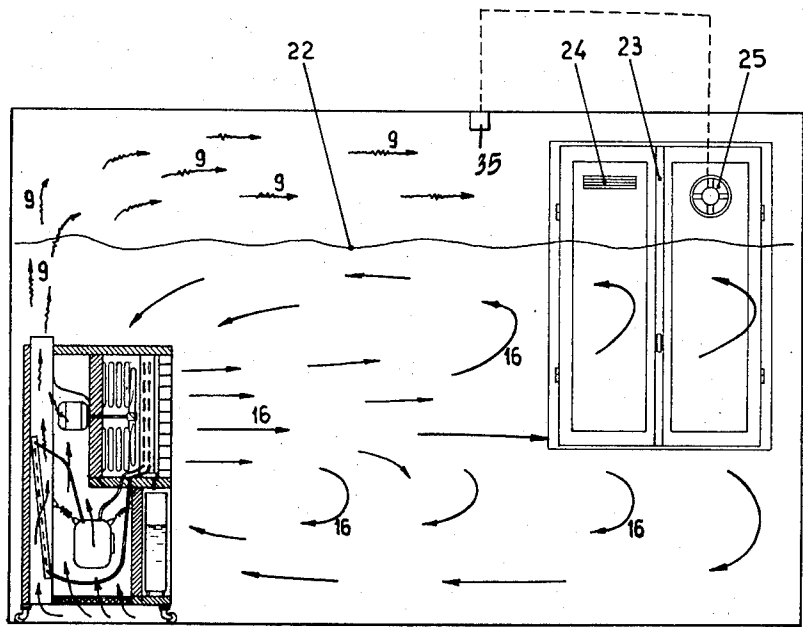


Fig. 3

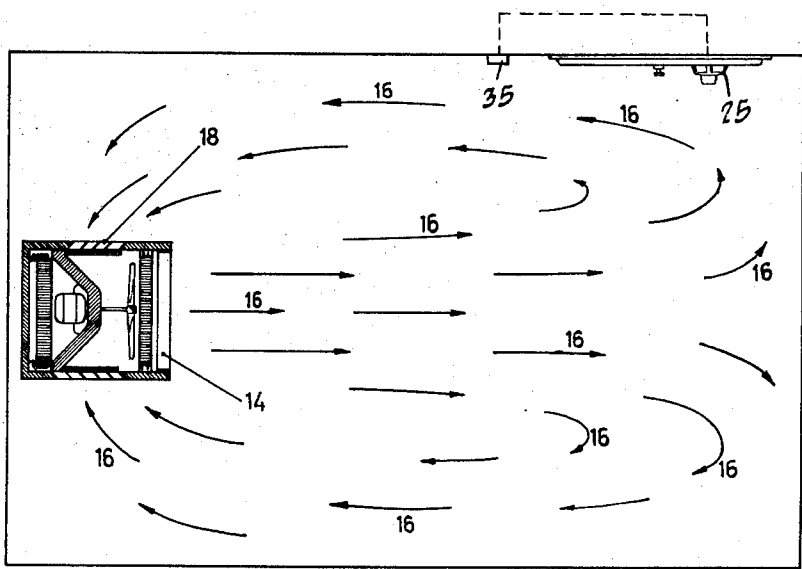


Fig. 4

REMOVABLE AIR CONDITIONING UNIT FOR COOLING ROOMS

BACKGROUND OF THE INVENTION

This invention relates to a device for conditioning the environmental air of apartment rooms, comprising a refrigerating circuit, means for causing the circulation of the air treated by said circuit and means for transferring the device into said room(s).

PRIOR ART

Many devices of the kind referred to above are known. A first kind of air conditioning device is adapted to be affixed into an empty space formed in a window or even through a wall: thus, the heat produced by the condenser and the compressor is removed, and the result is that the installation of the device is intricate and expensive. A second kind of air-conditioning device can be transferred from one apartment room to another, but in each apartment room, it should be affixed in an opening as formed usually in a window, still with a view to removing the heat as produced by the refrigerating circuit.

These devices are impaired by a number of defects, a few of which are common to the first and the second class of air-conditioning devices as defined above. More particularly, the service life of such air-conditioning devices is considerably restricted by the fact that the device, with the hot portion of the refrigeration circuit, is exposed to the temperature differentials, to wheather influences in general, to sunray irradiations and dust. These facts imply very high working and upkeep expenditures. As to the second class of the air-conditioning devices, they have the defect of obstructing the window space, thus diminishing the visibility field and rendering the light-adjusting means unadjustable.

The problem the device according to the invention intends to solve is the one of permitting an air-conditioning device to be installed in any portion of the room which is even remote from a window or wall, without any necessity of connecting the air-conditioning device directly to the outside atmosphere.

SUMMARY OF THE INVENTION

The problem is solved by the device according to the invention which is extremely simple and inexpensive. It is characterized by first air-circulation means for circulating air in a substantially horizontal direction and by second air-circulation means for circulating air in a substantially vertical direction, with said first and second means being adapted to control air at different temperatures in the room so as to provide in said room at least two horizontal layers of air at different temperatures, and means are provided for activating the exchange of air appertaining to the layer having a temperature substantially higher than that of the other layers.

This feature will become evident from the ensuing description and the accompanying drawings, wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view along a vertical plane of the device according to the invention;

FIG. 2 is a cross-sectional view taken along the line A—A of FIG. 1;

FIG. 3 is a cross-sectional view taken along a vertical plane of a room to be air-conditioned, and

FIG. 4 is a plan view of the room of FIG. 3.

DETAILED DESCRIPTION OF THE INVENTION

In FIG. 1, which shows the device in vertical cross-sectional view, there can be seen a cabinet 1, which has wheels 2 for its bottom portion, with the wheels being adapted to impart to the device the capability of being carried through the room. In the bottom portion of the cabinet there is a space 3 which houses a compressor 4 for a refrigerating unit.

There is also a connection 5 which carries the refrigerating fluid from the compressor 4 to a condenser 6. The condenser 6 is placed in a vertical duct 7 having a mouth 8 directed upwards. The arrows 9 indicate the air flow lines for the air flowing through the space 3 and the duct 7, which goes towards the top of the room in a linear motion.

The space 3 and the duct 7 which form the hot portion of the refrigerating circuit are heat-insulated towards the outside by an insulating layer 10 and towards the inside, that is, towards the cold portion of the refrigerating circuit, by an assembly of walls 11, 11' and 11''.

In addition to the above, there is a space 12, an evaporator 13, an outlet mouth 14 having baffles 15, which are adapted to guide the flow of refrigerated air as shown by the arrows 16 (FIGS. 1 and 2). The refrigerated air as driven by the vanes of a fan 17 enters a plurality of mouths 18 (FIG. 2) placed on the sidewalls of the cabinet 1. The fan 17 is driven by an electric motor 19.

In addition above, there is an air filter 20 (FIG. 1), placed at the inlet of the space 3, and two filters 21 (FIG. 2) through which, as will be seen hereinafter, the ambient air is caused to pass in order to condition the same.

A line 22 (FIG. 3) indicates the separation surface between a top hot air zone above the line 22 and an air-conditioned zone situated thereunder.

FIG. 3 shows a window 23 in which, for example, an opening 24 is formed and/or an exhaustor 25 with its motor is situated.

The motorized exhaustor 25 (FIG. 3) in a possible embodiment can be connected to the same controls as used for actuating the air-conditioning device so that the exhaustor will become operative simultaneously with the refrigerating circuit as intended to condition the room and/or controlled by a thermostat positioned at a certain level which actuates it as the temperature of the hot air layer exceeds a predetermined limiting value.

Reverting to FIG. 1, there can be seen a collection tank 26 for the water coming from air demisting circuit, with the water dripping from the evaporator 13 into a collecting tray 27 through a duct 27'. The tank 26 is removable.

In FIG. 1 there can be seen also a suction pipe 28 which returns from the evaporator 13 to the compressor 4 and springs 29 for the elastic suspension of the compressor. There is also illustrated a pipe 30 for feeding the refrigerating fluid to the evaporator 13.

The device according to the invention operates as follows:

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Once the refrigerating cycle has been activated by energizing the compressor 4 (FIG. 1), the refrigerated air follows the flowlines arrows 16 of FIG. 3, a track which is substantially horizontal.

The flow of refrigerated air, when encountering walls or other obstacles through its way, is deflected and creates a return flow towards the device, as can be seen from the trend of the arrows 16 of FIGS. 3 and 4. Whereas a portion of the refrigerated air is recirculated for its being drawn by the fan 17 (FIGS. 2 and 4), through the filters 21, a second portion which is passed through the filter 20 sweeps the gills of the condenser 6, is heated and follows the route of the arrows 9. This fact originates in the room a zone above the line 22 (FIG. 3), a zone in which the temperature is higher than that below the line 22.

The opening 24 of the window 23 is thus capable of discharging from the room air which is at a higher temperature and which is accumulated above the line 22, so that the line 22 remains at a level such as shown in the drawing, substantially adjacent to the room ceiling. By the exhaustor 25, the withdrawal of warm air can be controlled by a thermostat 35 responsive to the attainment of a preselected temperature at a high-level point of the room.

It is thus apparent that the conditioning appliance according to the invention is particularly simple and unexpensive. In addition, the warm air as produced by the condenser can be withdrawn from the room without any particular connections of the conditioning device with the external atmosphere. Lastly, the air-conditioning device can be placed at any point of a room, and more particularly remote from windows or walls.

The device, the subject of the present invention, can

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be equipped with the conventional implementations for regulating the temperature, the humidity, the wind speed and all the other apparatus and accessories which are appropriate in the air conditioning art and air processing in general, without departing from the scope of the invention.

What I claim is:

1. A removable air conditioning unit for cooling rooms, comprising a refrigeration circuit for processing the room air, said refrigeration circuit having an evaporator and a condenser, an air circulating device capable of producing at least two horizontal layers of air at different temperatures, and means for transferring the air conditioning unit in the room, the improvement that said air circulating device includes first means provided with at least an inlet opening and at least an outlet opening, which are located substantially in the same horizontal plane, a fan and said evaporator being housed in the space between the inlet and outlet openings, second means provided with a duct having an inlet mouth situated at the bottom of the conditioning unit, said condenser being housed within said duct, said first and second means being capable of producing, respectively, a forced air circulation in a substantially horizontal direction and a natural air circulation in a substantially vertical direction, and means for activating the removal of air belonging to the layer having a temperature substantially higher than that of the other layers.

2. The removable air conditioning unit as claimed in claim 1, in which said means for activating the removal of air includes a motorized exhaustor and means responsive to the temperature of a layer of air in the room controlling the motorized exhaustor.

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