

[54] **PREFABRICATED HEATING, VENTILATING AND AIR CONDITIONING UNIT**

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[58] Field of Search.....165/48, 16, 36, 50, 22, 125, 165/74; 62/159, 333, 334

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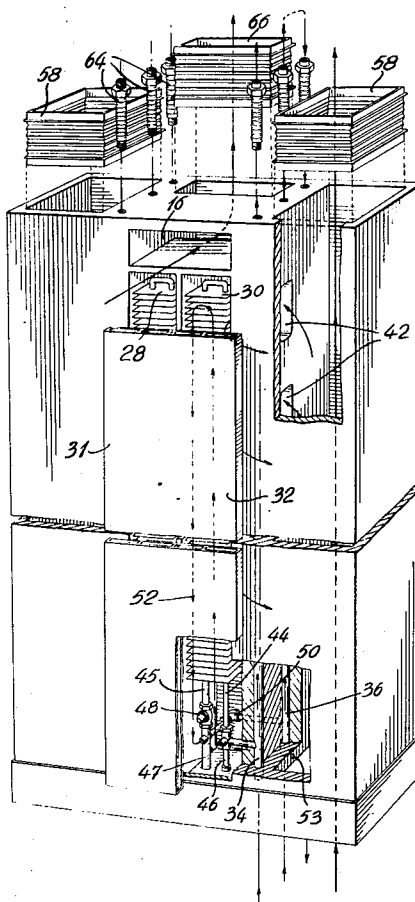
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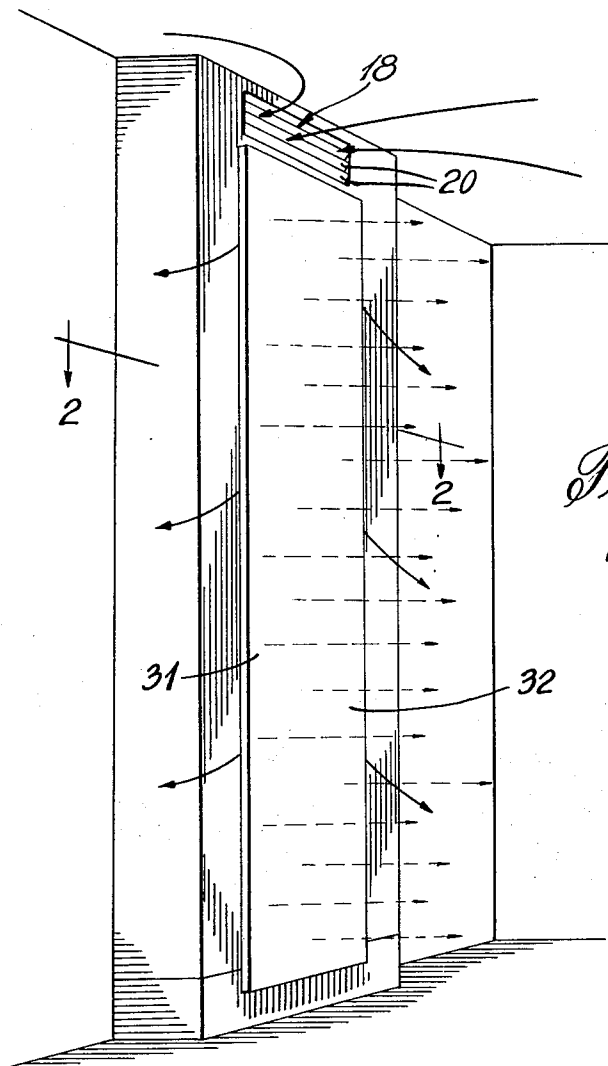
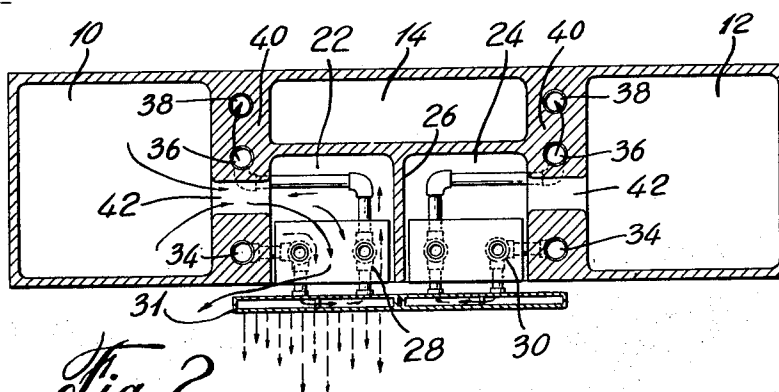
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[57] **ABSTRACT**

A heating, ventilating and air conditioning unit comprising separate hot air and cold air supply compartments adapted for connection to separate air supplies, a foul air return compartment in communication with each room for withdrawing foul air from the room, and two open compartments housing respectively hot water and cold water fin-type radiators. Flat-tube radiators having hot and cold water sections are located in front of the open compartments. In addition, separate hot and cold water distribution systems are provided in the unit and connected to the flat-tube radiators and to the fin-type radiators for supplying water thereto.

6 Claims, 10 Drawing Figures





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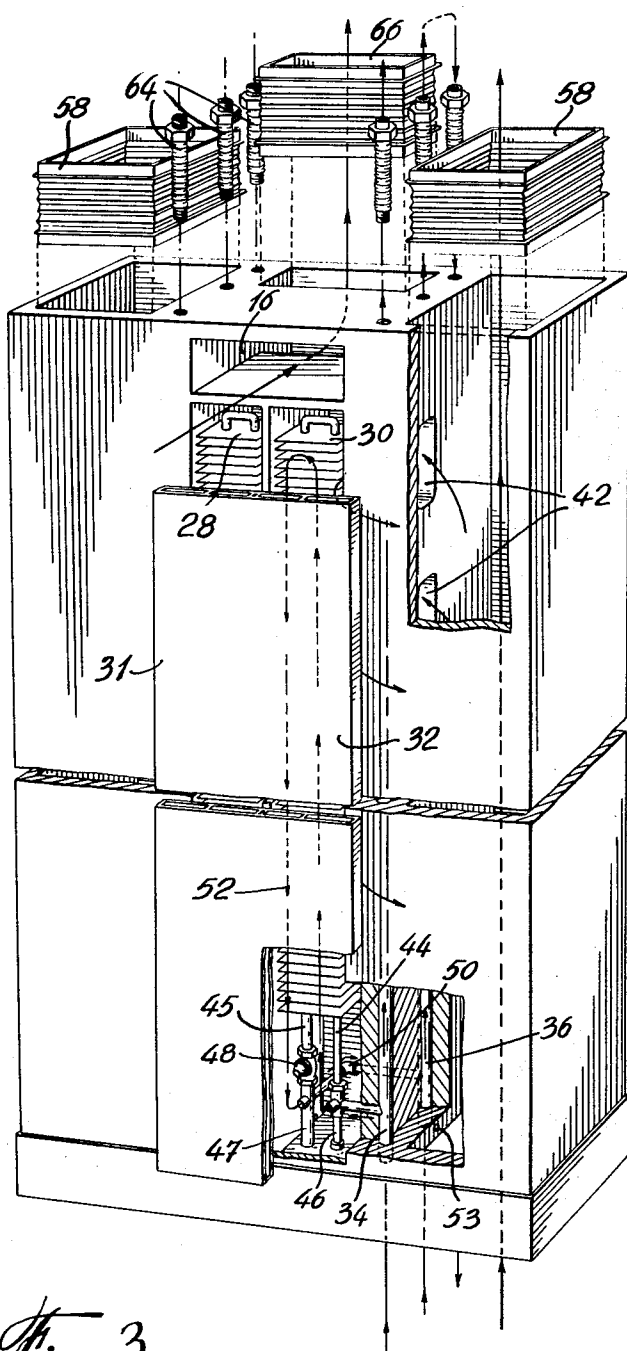


Fig. 3

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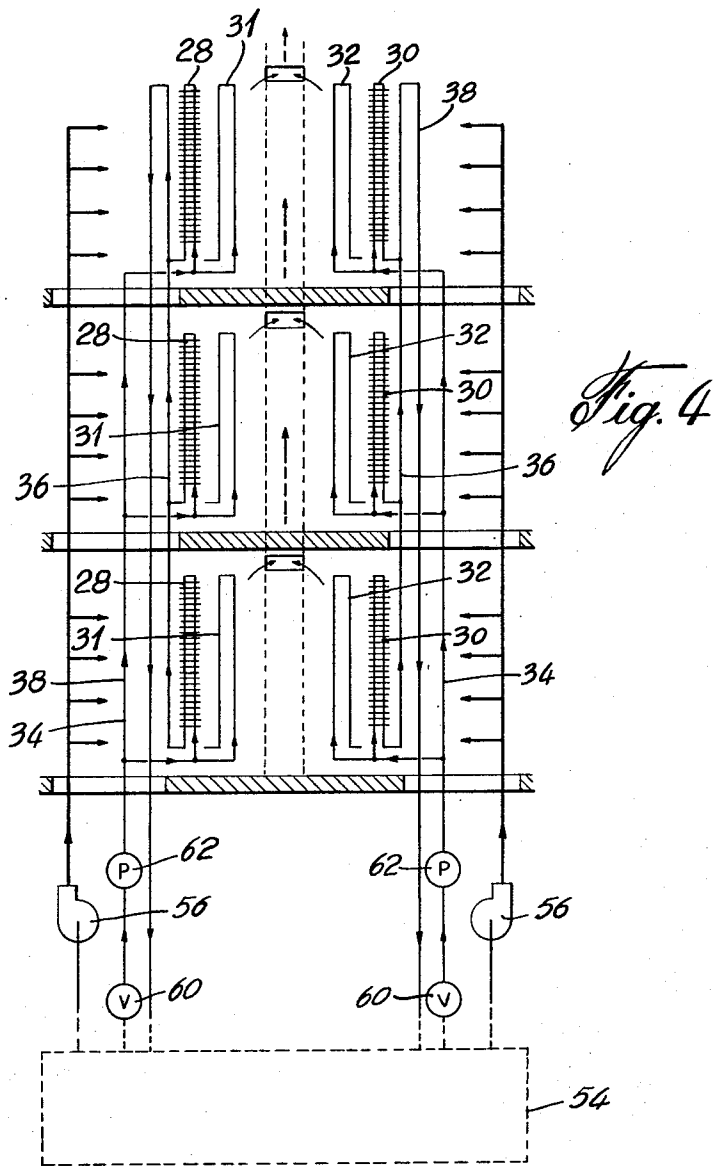


Fig. 4

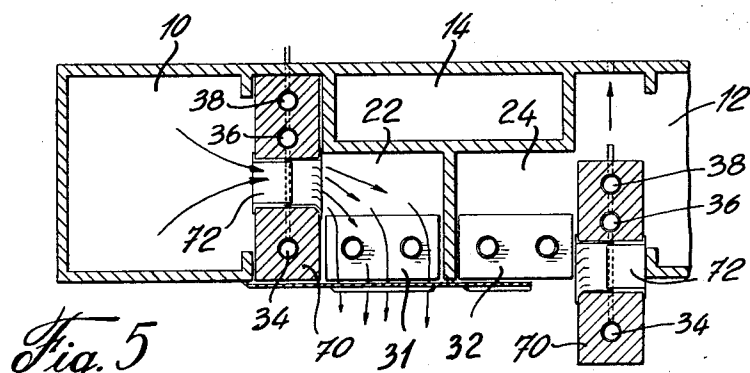


Fig. 5

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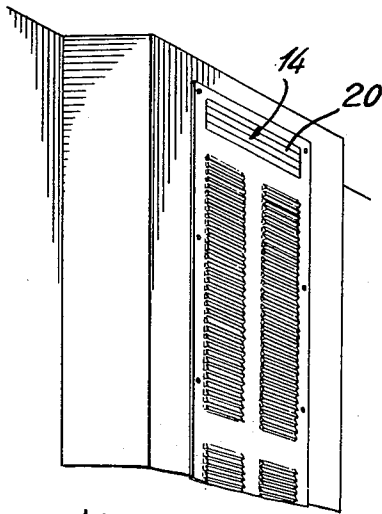


Fig. 7

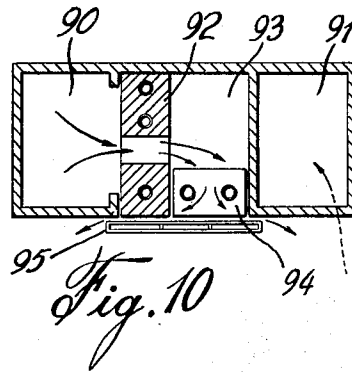


Fig. 10

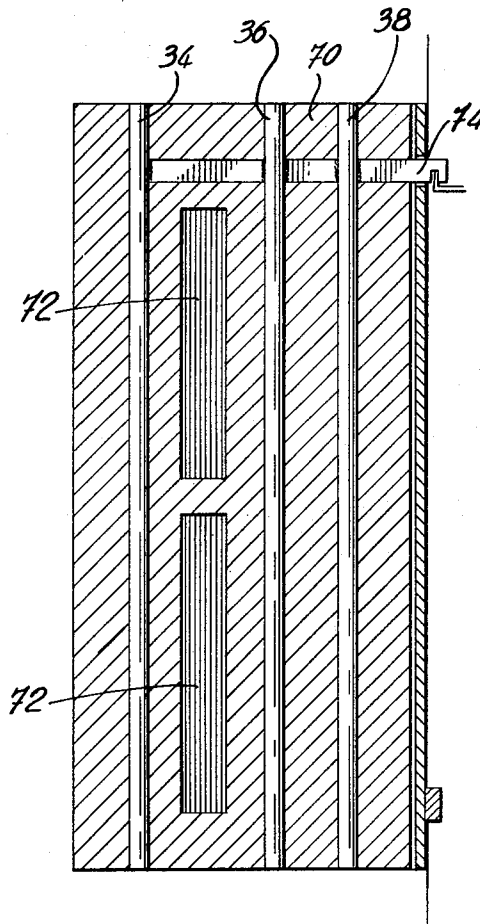
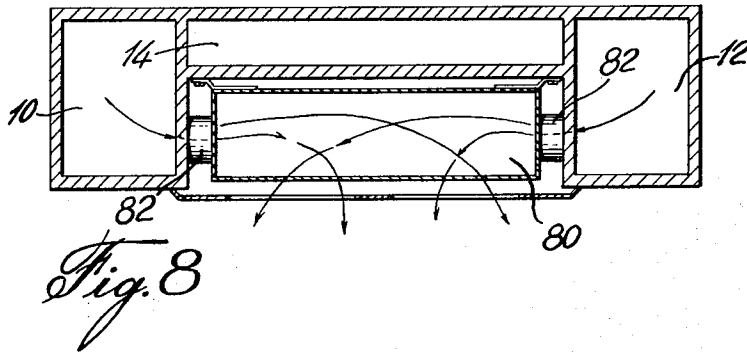
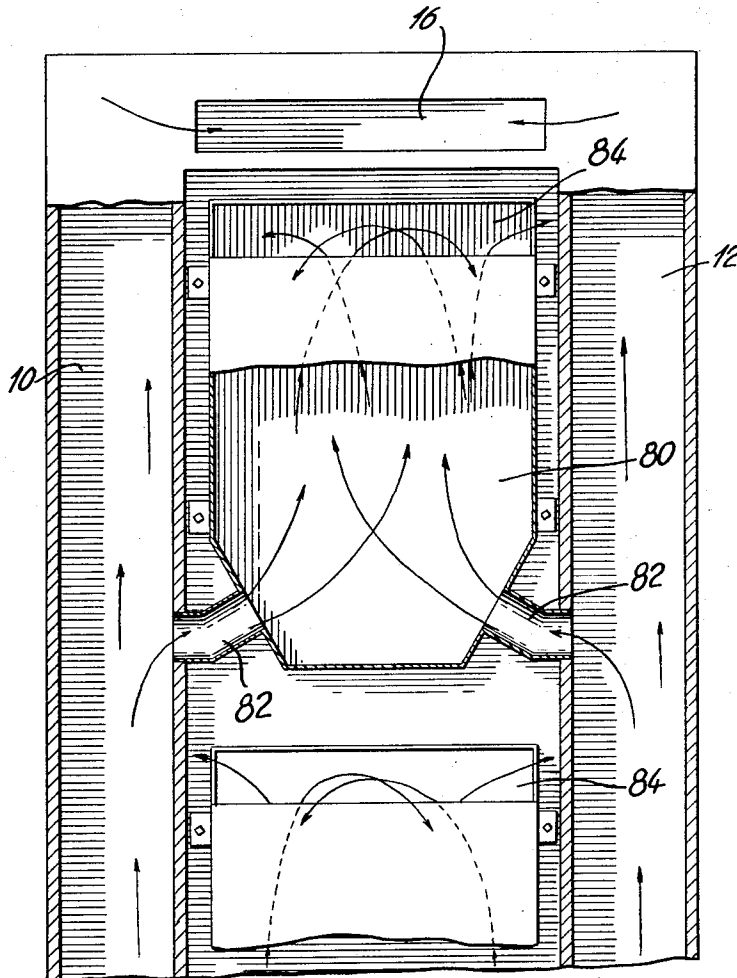


Fig. 6

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PREFABRICATED HEATING, VENTILATING AND AIR CONDITIONING UNIT

This invention relates to a prefabricated heating, ventilating and air conditioning unit for use more particularly in juxtaposed rooms of buildings having a number of floors.

Prefabricated heating, ventilating and air conditioning units have been manufactured for some time. However, such units have always been separate and have required skilled labor to install them. Since the cost of labor has gradually increased during the past years, the industry has been looking for a reduction of labor cost in the manufacture as well as in the installation of such units.

In addition, the arrangement of the various units in a building has always been a problem from the point of view of space and good appearance as well.

It is therefore the object of the present invention to provide a complete installation grouping in a single unit all the equipment needed for heating, ventilating and air conditioning each room of a building. The complete units in each room may be juxtaposed and interconnected from floor to floor. It will be easily understood that the installation of such a unit is much more simple and thus requires less man hours.

A complete unit, in accordance with the invention, comprises separate hot air and cold air supply compartments adapted for connection to separate air supplies, a foul air return compartment for communication with each room for withdrawing foul air from each room, and two open compartments housing respectively hot water and cold water fin-type radiators. Flat-tube radiators having hot and cold water sections are located in front of the open compartments, and separate hot and cold water distribution systems are provided in each unit for connecting the above mentioned radiators to separate hot and cold water supplies.

It will be understood that the above disclosed complete unit may be simplified depending on what is required in a particular building under construction. If, for example, heating only is required, the unit may be simplified by eliminating the compartments used for cooling. In addition, the foul air returned compartment could be eliminated if not needed.

Furthermore, only one type of radiators may be required. If the flat-tube radiators are deleted, they may be replaced by a grill for covering the open compartments. The flat-type radiators may be kept, but the fin-type radiators replaced by mixing boxes in communication with the hot and cold air supply compartments. Finally, the flat-tube radiators and the water distribution systems may be deleted altogether, leaving the mixing boxes and the hot and cold air supply compartments alone.

Another unit may also be envisaged in which the hot and cold air supply compartments are eliminated leaving only at least one water distribution system in the unit and at least one hot or cold flat-tube radiator located in front of the unit.

The invention will now be disclosed with reference to a few embodiments of the invention and to the accompanying drawings in which:

FIG. 1 illustrates a perspective view of a unit in accordance with the invention installed in a room;

FIG. 2 illustrates a section along lines 2—2 of FIG. 1;

FIG. 3 illustrates a perspective view of the unit with some sectional views therein so as to illustrate certain elements of the units;

FIG. 4 illustrates the connection of a number of units in series and to a conditioning and heating plant;

FIG. 5 illustrates an alternative embodiment of the water distribution systems illustrated in FIG. 2;

FIG. 6 illustrates a section view through one of the water distribution systems of FIG. 5;

FIG. 7 illustrates an alternative embodiment of FIG. 1 in which the radiators appearing in front of the unit have been replaced by a grill;

FIG. 8 illustrates a section view through a unit in which the radiators and water distribution systems have been replaced by mixing boxes;

FIG. 9 illustrates a front view of the unit of FIG. 8 with the grill removed; and

FIG. 10 illustrates a further embodiment of the invention.

Referring to FIGS. 1, 2 and 3, there is shown a complete unit incorporating all the elements required for heating, ventilating and air conditioning a room. Such unit comprises a hot air supply compartment 10 and a cold air supply compartment 12 extending the full length of the unit and being open at the top and at the bottom thereof for a purpose which will be disclosed later.

Intermediate the air supply compartments 10 and 12, there is provided a foul air return compartment 14 for withdrawing foul air from each room of the building. Foul air return compartment 14 extends the full length of the unit and is provided with an opening 16 which is closed by a grill 18 having regulating vanes 20.

In front of foul air return compartment 14, there are provided two compartments 22 and 24 separated by a partition 26 and opened at the front. Open compartment 22 houses a fin-type radiator 28 in which hot water is circulated and open compartment 24 houses a fin-type radiator 30 in which cold water is circulated. Flat-tube radiators 31 and 32 each made of two sections are located in front of the open compartments 22 and 24 secured to the unit.

A water distribution system including tubes 34, 36 and 38 is molded in each partition 40 located between the air supply compartments and the open compartments for circulating hot or cold water into the radiators 28, 30, 31 and 32 as it will be disclosed more fully in a later part of the description. Each partition 40 has openings 42 therein for permitting hot or cold air circulating in supply compartments 10 and 12 to pass through open compartments 22 and 24 and to exit in the room behind flat-tube radiators 31 and 32.

Referring now more particularly to FIG. 3, it may be seen that water enters into the fin-type radiator 30 from the front tube 34, goes up pipe 44, and comes back through pipe 45 and thermostatic valve 48 and goes back to tube 36 by means of pipe 50. Similarly, water entering through pipe 34 goes up one section of flat-type radiators 32 and down an adjacent section as indicated by arrow 52 into tube 36.

Pipes 44 and 45 have extensions 46 and 47 respectively which are secured to the bottom of the open compartments for holding the lower part of the radiators. Other means (not shown) are provided for holding the upper part thereof.

As it will be easily understood, the circulation of hot water through fin-type radiator 28 and through flat-tube radiators 31 is identical and need not be disclosed in detail.

An opening 53 may be provided in partitions 40 for the evacuation of water condensed in open compartments 22 and 24.

The connections of plural units in series from floor to floor of a building is illustrated schematically in FIG. 4 of the drawings. The hot or cold air supply originating from the conditioning and heating plant 54 is pumped into the air supply compartments 10 or 12 of the various units by vacuum pump 56. The hot and cold supply compartments are joined from floor to floor by flexible connections 58 such as illustrated in FIG. 3 of the drawings. From the respective supply compartments air is pushed into each room as mentioned previously.

The hot or cold water supply originating from the conditioning and heating plant 54 is pumped through valve 60 by pump 62 into tubes 34 of the various units in a manner such as to establish substantially the same differential pressure at the input of the radiators of each floor. For example, the radiators of the first floor have the shortest input path (from plant 54 to the bottom of the unit) but the longest output path (three lengths of tube 36 and three return lengths of tube 38). Such an arrangement is known in the art of the Tichelman connection. The tubes 34, 36 and 38 are interconnected by flexible connections 64 as illustrated in FIG. 3. In addition tubes 36 and 38 of the top unit are interconnected.

The foul air return compartments of each unit are also interconnected by flexible connections 66 such as illustrated in FIG. 3. The foul air return compartments usually exit on the roof of the building.

The complete unit disclosed so far may be simplified or modified to suit various needs. A first alternative embodiment is the one illustrated in FIGS. 5 and 6 in which the water distribution system is built in a block 70 which is independent from the unit and may be removed and replaced at will. Such block 70 may also be equipped with well known air diffusers 72 to replace the openings 42 in the partition 40 of FIGS. 1 to 3 of the drawings. Block 70 may be secured to the wall by means of a bar 74 passing through the back of the unit as illustrated in FIG. 6.

FIG. 7 illustrates a further modification of the unit in accordance with the invention in which the flat-tube radiators have been removed and wherein the open compartments are covered by a grill 74.

Another embodiment of the invention is illustrated in FIGS. 8 and 9 of the drawings wherein the partition 26 of FIGS. 1 to 3 has been removed and the radiators have been replaced by mixing boxes 80 having intakes 82 into the hot and cold air supply compartments 10 and 12 and outlets 84 in the front. The mixing boxes are well known in the art and are used for circulating air at high speed in the air supply compartments.

It is to be understood that various other modifications could be made to the units so far disclosed. For example, the spacing of the flat-tube radiators from the units may be adjustable and variable vanes could be provided behind the radiators for directing the flow of

air into the room.

Furthermore, a unit could be positioned on a wall which is common to two adjacent rooms and may be used for heating, ventilating and air conditioning the two rooms.

Finally, in some particular installations, it may not be necessary to provide all the conveniences of the unit disclosed. An example of a simplified arrangement is illustrated in FIG. 10. Such an arrangement comprises a single air supply compartment 90, a foul air return compartment 91, a single water distribution system 92, and a single open compartment 93 housing a fin-type radiator 94. A flat-tube radiator 95 or a grill closes the open compartment.

Such a simplified arrangement could be advantageously used in kitchens and bathrooms to replace the systems now used.

All the above disclosed units provide an installation which is complete per se. Such a unit may be installed very easily at the building site and connection to the conditioning and heating plant.

I claim:

1. A unit permitting heating, ventilating and air conditioning of a room comprising a cabinet extending the full height of the room and including:
 - a. at least one vertical air supply compartment for connection to an air supply at one end thereof;
 - b. at least one vertical open compartment for housing radiator means;
 - c. a partition separating said air supply compartment and said open compartment, said partition having openings therein for communicating the air supply compartment with the open compartment; and
 - d. at least one water distribution system located within said partition and extending vertically through the entire length thereof for connecting said radiator means to a water supply at one end of said partition.
2. A unit as defined in claim 1, wherein said partition is removable.
3. A plurality of units as defined in claim 1, used for a building having a number of floors, and further comprising flexible connections for connecting together a plurality of juxtaposed units located one in each floor.
4. A unit as defined in claim 1, wherein there are two open compartments for housing said radiator means one for a hot water radiator and the other for a cold water radiator, two air supply compartments one for hot air and one for cold air located one on each side of said open compartments, two water distribution systems, one for hot water and one for cold water, and wherein said cabinet further includes one foul air return compartment located at the back of said open compartments and in communication with said room for withdrawing foul air from said room.
5. A unit as defined in claim 4, further comprising flat-tube radiators located in front of said open compartments and also connected to said water distribution systems.
6. A unit as defined in claim 4, further comprising a grill closing the open portion of the compartments housing the radiator means.

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