United States Patent [19]

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[54] **MODULAR HEATING AND COOLING APPARATUS**

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[52] **U.S. Cl.** **165/50,** 62/259, 62/263

[51] **Int. Cl.** **F24f 3/08**

[58] **Field of Search**.....165/22, 50–57, 165/48, 50; 62/263, 259

[56] **References Cited**

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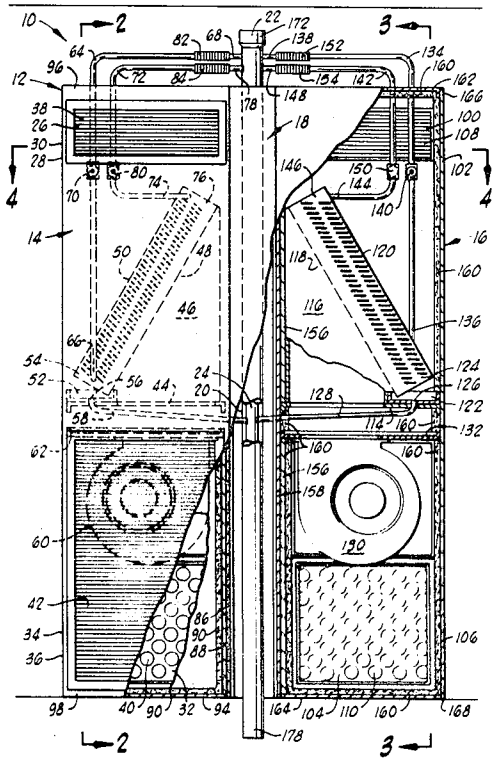
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[57] **ABSTRACT**

A heating and cooling apparatus for installation in a multiple-story building structure comprising a plurality of vertically stacked heating and cooling units forming a vertical tier extending upwardly through the building structure with one heating and cooling unit located at each floor level for heating or cooling two horizontally adjacent room areas separated by a common vertical partition within which partition the heating and cooling unit is installed. Each heating and cooling unit includes an independent room unit for heating and cooling a respective room area adjacent thereto, the room units being separated from one another within the housing by a riser duct carried by the housing and extending the full height thereof. Each independent room unit comprises a discharge air vent and a return air vent communicating between the room unit and the room area to be heated and cooled, a heat exchanger coil for heating or cooling air passing thereover carried within the unit intermediate the return air vent and the discharge air vent, and a motor-driven blower for drawing air from the room area through the return air vent and blowing the air over the heat exchanger coil and discharging the heated or cooled air through the discharge air vent back into the room area. The riser duct carries a supply riser pipe, a return pipe and a condensate drain riser pipe each of which is sized and positioned in the riser duct such that the upper end of each riser pipe may be connected to the lower end of the respective riser pipe in the heating and cooling unit installed next above to form continuous riser pipes extending upwardly through the entire vertical tier. The heat exchanger coil of each room unit is connected at one end thereof to the supply riser pipe adjacent thereto and is connected at the opposite end thereof to the return riser pipe adjacent thereto whereby heated or chilled fluid heat transfer medium may flow through the coil from the supply riser pipe and back to the return riser pipe. Means are disclosed for collecting and returning moisture which condenses on the heat exchanger coils to the condensate drain riser pipe.

11 Claims, 5 Drawing Figures



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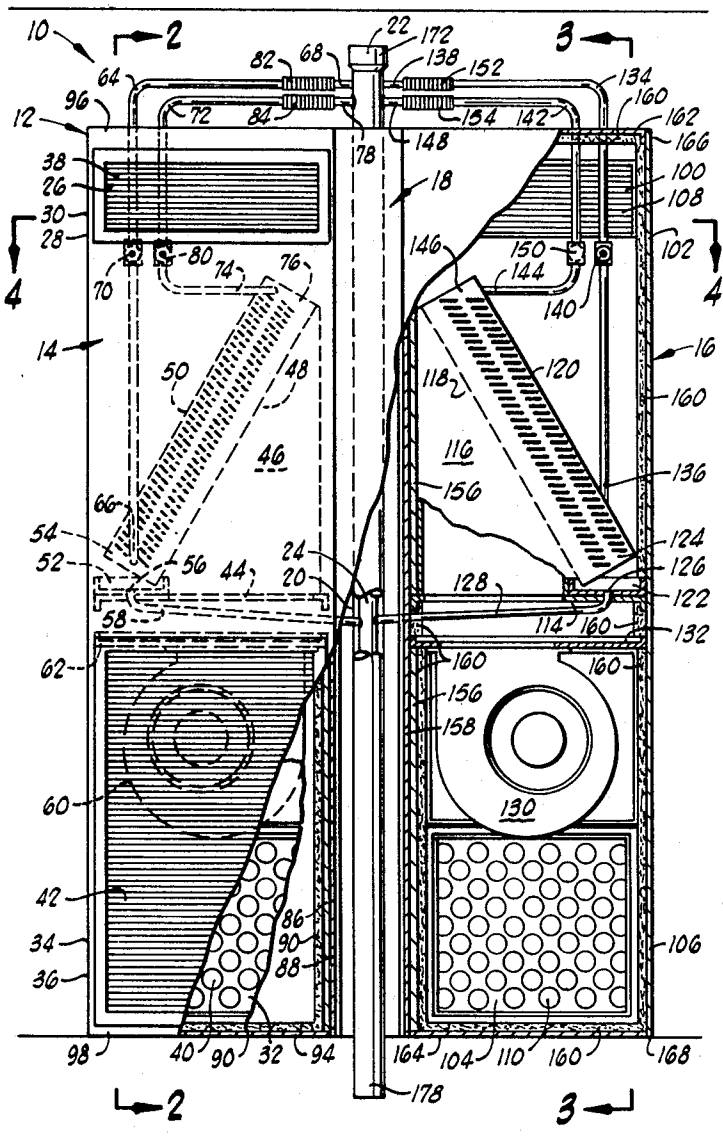


FIG. 1

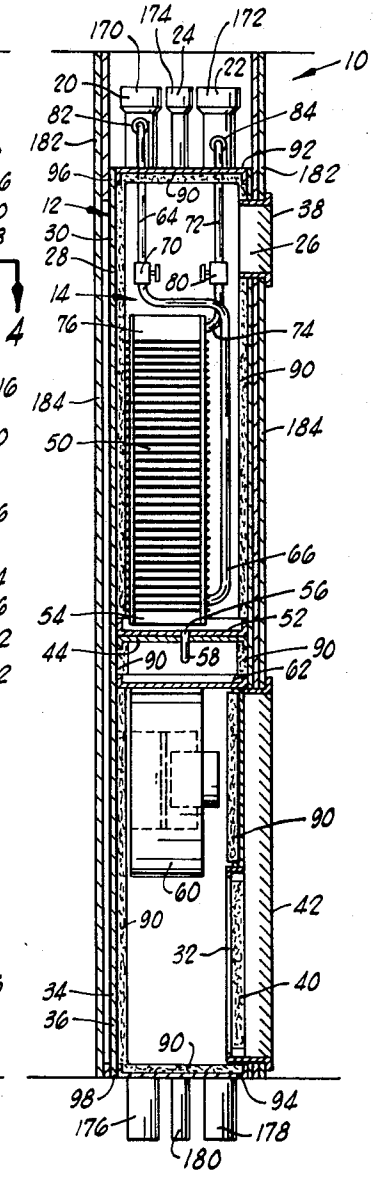


FIG. 2

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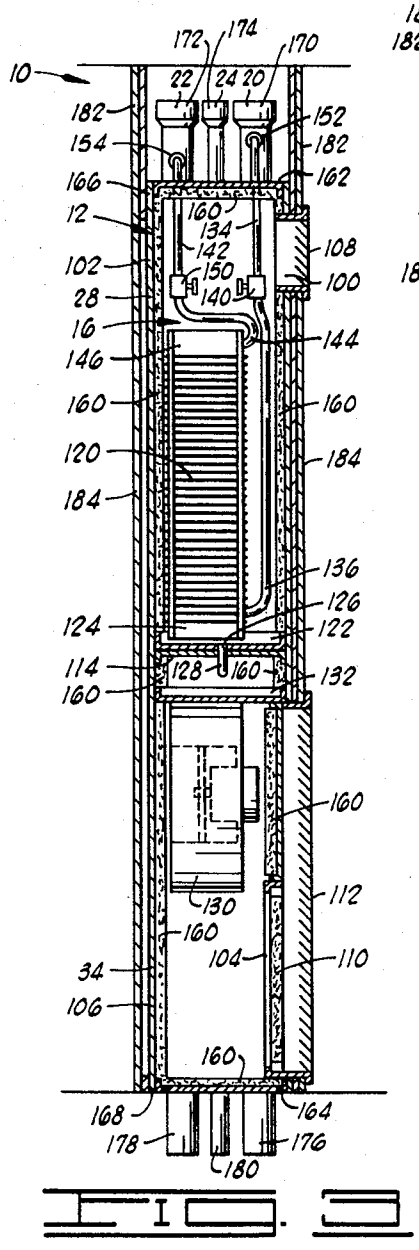


FIG. 3

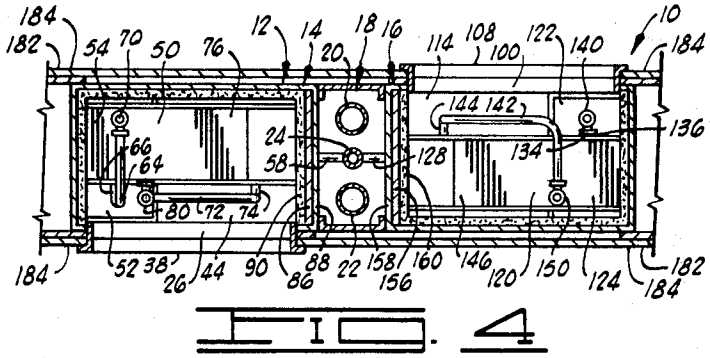


FIG. 4

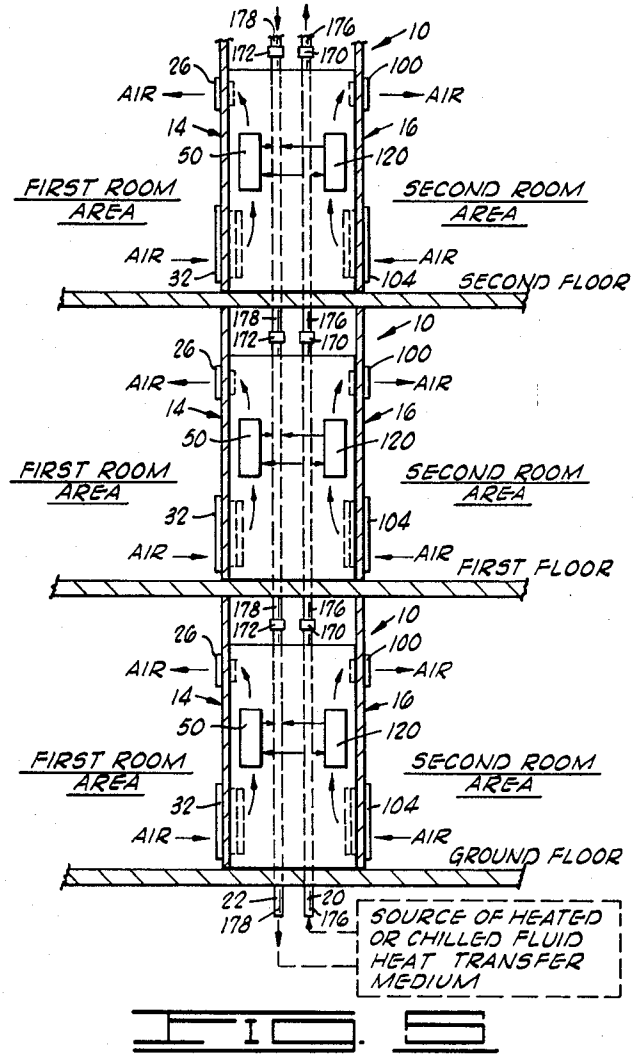


FIG. 5

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MODULAR HEATING AND COOLING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to improvements in heating and cooling apparatus, and more particularly, but not by way of limitation, to heating and cooling apparatus of the fan coil type for modular installation in multiple-story building structures.

2. Description of the Prior Art

The prior art contains many teachings of heating and cooling units of the type utilizing a fan blowing air over a heat exchanger coil through which coil passes heated or chilled fluid heat transfer medium. Generally the prior art heating and cooling units are designed to provide heated or cooled air to only one room area, thereby requiring field installation of one unit per each room area to be heated and cooled. Further, the prior heating and cooling units require external plumbing to connect the units to separate supply and return riser pipes which are built into the building structure and connected to a source of heated or chilled fluid heat transfer medium. A common method of plumbing the prior heating and cooling units is to connect them in series between the supply of heated or chilled fluid heat exchange medium and the return piping which returns the fluid heat transfer medium to the heating or chilling source for recirculation. When heating and cooling units are plumbed in this manner the heating and cooling efficiency of each successive unit in the series is progressively reduced.

Many of the prior art heating and cooling units are of such great physical size as to require an undue amount of floor space for installation, thereby reducing revenue producing floor space in commercial installations such as hotels, motels, apartment buildings and office buildings.

SUMMARY OF THE INVENTION

The present invention contemplates a heating and cooling unit for connection with a source of heated or chilled fluid heat transfer medium for simultaneously heating or cooling a first room area and a second room area separated by a common vertical partition. The heating and cooling unit comprises a housing installed in and forming a portion of the common vertical partition which extends substantially the full height of the partition, a first room unit carried by the housing extending substantially the full height of the housing, and a second room unit carried by the housing and also extending substantially the full height of the housing. A riser duct is carried by the housing, which riser duct extends substantially the full height of the housing and separates the first and second room units within the housing. A first discharge air vent is formed in the upper portion of the housing and communicates between the first room area and the upper portion of the first room unit. A second discharge air vent is formed in the upper portion of the housing and communicates between the second room area and the upper portion of the second room unit. A first return air vent is formed in the lower portion of the housing and communicates between the first room area and the lower portion of the first room unit. A second return air vent is formed in the lower portion of the housing and communicates between the second room area and the lower portion of the second room unit.

A first heat exchanger coil is carried within the first room unit intermediate the first return air vent and the first discharge air vent. A first motor-driven blower is carried within the first room unit for drawing air from the first room area through the first return air vent and blowing the air over the first heat exchanger coil and discharging the air through the first discharge air vent back into the first room area.

A second heat exchanger coil is carried within the second room unit intermediate the second return air vent and the second discharge air vent. A second motor-driven blower is carried within the second room unit for drawing air from the second room area through the second return air vent and blowing the air over the second heat exchanger coil and discharging the air through the second discharge air vent back into the second room area.

A supply riser pipe is carried within the riser duct for connection with the source of heated or chilled fluid heat transfer medium for supplying heated or chilled fluid heat transfer medium to the heating and cooling unit. A return riser pipe is carried within the riser duct for connection with the source of heated or chilled fluid transfer medium for returning the fluid heat transfer medium from the heating and cooling unit to the source of heated or chilled fluid heat transfer medium for recirculation.

A first supply tube connects the supply riser pipe to one end of the first heat exchanger coil through which tube the fluid heat transfer medium is supplied to the first heat exchanger coil. A first return tube connects the opposite end of the first heat exchanger coil to the return riser pipe through which tube the fluid heat transfer medium is returned from the first heat exchanger coil. A second supply tube connects the supply riser pipe to one end of the second heat exchanger coil through which tube, the fluid heat transfer medium is supplied to the second heat exchanger coil. A second return tube connects the opposite end of the second heat exchanger coil to the return riser pipe through which tube, the fluid heat transfer medium is returned from the second heat exchanger coil.

An object of the present invention is to provide a modular heating and cooling unit for heating and cooling two adjacent room areas in a building structure.

Another object of the present invention is to provide a modular heating and cooling unit for installation within a partition wall separating two adjacent room areas and providing independent heating or cooling to each room area.

A further object of the present invention is to provide a modular heating and cooling unit a plurality of which may be installed one on top of the other to form a vertical tier of heating and cooling units extending upwardly through a multiple-story building structure.

A still further object of the present invention is to provide a modular heating and cooling unit which includes factory installed self-contained riser piping which forms a continuous riser piping system when a plurality of such units are installed one on top of the other in a multiple-story building structure.

Another object of the present invention is to provide a modular heating and cooling unit requiring a minimum amount of field labor to install such units one on top of the other in a multiple-story building structure.

A further object of the present invention is to provide a modular heating and cooling unit which is economical in construction, simply and economically installed, easily serviced and economical in operation.

Other objects and advantages of the present invention will be evident from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevation view of a modular heating and cooling unit with portions broken away to more clearly illustrate internal construction.

FIG. 2 is a sectional view taken along lines 2—2 of FIG. 1 and showing portions of the partition wall.

FIG. 3 is a sectional view taken along lines 3—3 of FIG. 1 and showing portions of the partition wall.

FIG. 4 is a sectional view taken along lines 4—4 of FIG. 1 and showing portions of the partition wall.

FIG. 5 is a schematic elevation view illustrating the installation of a plurality of modular heating and cooling units in a multiple-story building structure.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and more particularly, to FIG. 1, the apparatus of the present invention is generally designated by reference character **10**. The apparatus **10** will be referred to hereinafter as a modular heating and cooling unit. The modular heating and cooling unit **10** comprises a housing **12** of rectangular horizontal cross section and preferably constructed of galvanized sheet steel. A first room unit **14** and a second room unit **16** are carried in the housing **12** and are separated from one another by a riser duct **18** carried in the housing **12**. The first and second room units **14** and **16** are generally vertically oriented within the housing **12** as is the riser duct **18**.

A supply riser pipe **20** and a return riser pipe **22** are each vertically oriented in the riser duct **18** and fixedly secured therein. A condensate drain riser pipe **24** is also positioned in the riser duct **18** parallel to the riser pipes **20** and **22** and is fixedly secured therein.

A first discharge air vent **26** is formed in the upper portion **28** of the housing **12** and communicates between the interior of the upper portion **30** of the first room unit **14** and the room area which will be heated or cooled by the first room unit **14**. A first return air vent **32** is formed in the lower portion **34** of the housing **12** and communicates between the interior of the lower portion **36** of the first room unit **14** and the room area to be heated or cooled by the first room unit **14**. A grille **38** is removably mounted in the first discharge air vent **26**. A conventional glass fiber filter **40** is removably mounted in the first return air vent **32**. A grille **42** is removably mounted on the lower portion **36** of the first room unit **14** to cover the filter **40** and the return air vent **32**.

A coil support member **44** is horizontally positioned within the first room unit **14** and fixedly secured therein. A duct **46** is mounted on the coil support member **44** and extends upwardly therefrom. The duct **46** is rectangular in horizontal cross section and the upper end **48** thereof is truncated at an angle to the vertical. A first heat exchanger coil **50** is supported by and fixedly secured to the upper end **48** of the duct **46** and is positioned at an angle to the vertical. The angular positioning of the first heat exchanger coil **50** within the first room unit **14** permits the employment of a greater heat exchange surface within the limited confines of the first room unit **14**.

A first condensate tray **52** is horizontally positioned below the lower end **54** of the first heat exchanger coil **50** and is supported in this position by the coil support member **44**. The first condensate tray **52** provides means for collecting moisture which condenses from the air on the coils of the first heat exchanger coil **50** and drips downwardly therefrom. A drain hole **56** is formed in the bottom of the first condensate tray **52** and is connected by means of a drain tube **58**, which tube **58** extends slightly downwardly therefrom, to the condensate drain riser pipe **24** thereby providing means for removing condensate collected in the first condensate tray **52** from the first room unit **14** by gravity flow.

A first motor-driven blower **60** is supported within the lower portion **36** of the first room unit **14** by means of a horizontally positioned blower support member **62** which is fixedly secured to the interior of the first room unit **14**. The first motor-driven blower **60** is preferably of the centrifugal, direct-drive type and functions to draw air from the room being heated or cooled by the first room unit **14** through the filter **40** in the return air vent **32** and to blow the air upwardly through the duct **46** and over the first heat exchanger coil **50** to be discharged back into the room area to be heated or cooled through the discharge air vent **26**.

A first supply tube **64** is connected at one end **66** thereof to the lower end **54** of the first heat exchanger coil **50**, and is connected at the opposite end **68** thereof to the supply riser pipe **20**. A shut-off valve **70** is installed in the first supply tube **64** intermediate the ends **66** and **68** thereof. A first return tube **72** is connected at one end **74** thereof to the upper end **76** of the first heat exchanger coil **50** and is connected at the opposite end **78** thereof to the return riser pipe **22**. A combination shut-off and balancing valve **80** is installed in the first return tube **72** intermediate the ends **74** and **78** thereof. A flexible tube section **82** is installed in the first supply tube **64** adjacent the end **68** thereof. Another flexible tube section **84** is installed in the first return tube **72** adjacent the end **78** thereof. The flexible tube sections **82** and **84** are provided to compensate for expansion and contraction of the supply and return riser pipes **20** and **22** respectively when the modular heating and cooling unit **10** is used to provide heat for the room areas being serviced thereby. The tubes **64** and **72** provide means for circulating fluid heat transfer medium, preferably water, from the supply riser pipe **20** through the first supply tube **64** to the first heat exchanger coil **50** and back from the first heat exchanger coil **50** through the first return tube **72** to the return riser pipe **22**. The valve **70** provides means for cutting off the supply of fluid heat transfer medium to the first heat exchanger coil **50**, and the valve **80** provides means for cutting off the return flow of fluid heat transfer medium from the first heat exchanger coil **50**. The valve **80** further provides means for adjusting the flow of fluid heat transfer medium through the first heat exchanger coil **50** to obtain a desired flow rate.

A sheet of fire retardent gypsum board **86** is mounted on the interior wall **88** of the first room unit

14 adjacent the riser duct 18. The sheet of gypsum board 86 provides a fire and sound barrier between the first room unit 14 and the second room unit 16 and further provides a fire and sound barrier between the separate room areas being served by the modular heating and cooling unit 10. Insulation material 90, preferably neoprene coated glass fiber insulation, is secured to and lines the entire interior surface of the first room unit 14 including the horizontal top plate 92 and the horizontal bottom plate 94 thereof, said top plate 92 and bottom plate 94 being fixedly secured respectively to the upper end 96 and the lower end 98 of the first room unit 14.

A second discharge air vent 100 is formed in the upper portion 28 of the housing 12 and communicates between the interior of the upper portion 102 of the second room unit 16 and the room area which will be heated or cooled by the second room unit 16. A second return air vent 104 is formed in the lower portion 34 of the housing 12 and communicates between the interior of the lower portion 106 of the second room unit 16 and the room area to be heated or cooled by the second room unit 16. A grille 108 is removably mounted in the second discharge air vent 100. A conventional glass fiber filter 110 is removably mounted in the second return air vent 104. A grille 112 is removably mounted on the lower portion 106 of the second room unit 16 to cover the filter 110 and the return air vent 104.

A coil support member 114 is horizontally positioned within the second room unit 16 and fixedly secured therein. A duct 116 is mounted on the coil support member 114 and extends upwardly therefrom. The duct 116 is rectangular in horizontal cross section and the upper end 118 thereof is truncated at an angle to the vertical. A second heat exchanger coil 120 is supported by and fixedly secured to the upper end 118 of the duct 116 and is positioned at an angle to the vertical. The angular positioning of the second heat exchanger coil 120 within the second room unit 16 permits the employment of a greater heat exchange surface within the limited confines of the second room unit 16.

A second condensate tray 112 is horizontally positioned below the lower end 124 of the second heat exchanger coil 120 and is supported in this position by the coil support member 114. The second condensate tray 122 provides means for collecting moisture which condenses from the air on the coils of the second heat exchanger coil 120 and drips downwardly therefrom. A drain hole 126 is formed in the bottom of the second condensate tray 122 and is connected by means of a drain tube 128, which tube 128 extends slightly downwardly therefrom, to the condensate drain riser pipe 24 thereby providing means for removing condensate collected in the second condensate tray 122 from the second room unit 16 by gravity flow.

A secOnd motor-driven blower 130 is supported within the lower portion 106 of the second room unit 16 by means of a horizontally positioned lower support member 132 which is fixedly secured to the interior of the second room unit 16. The second motor-driven blower 130 is preferably of the centrifugal, direct drive type and functions to draw air from the room area being heated or cooled by the second room unit 16 through the filter 110 in the return air vent 104 and to blow the air upwardly through the duct 116 and over the second heat exchanger coil 120 to be discharged back into the room area to be heated or cooled through the discharge air vent 100.

A second supply tube 134 is connected at one end 136 thereof to the lower end 124 of the second heat exchanger coil 120, and is connected at the opposite end 138 thereof to the supply riser pipe 20. A shut-off valve 140 is installed in the second supply tube 134 intermediate the ends 136 and 138 thereof. A second return tube 142 is connected at one end 144 thereof to the upper end 146 of the second heat exchanger coil 120 and is connected at the opposite end 148 thereof to the return riser pipe 22. A combination shut-off and balancing valve 150 is installed in the second return tube 142 intermediate the ends 144 and 148 thereof. A flexible tube section 152 is installed in the second supply tube 134 adjacent the end 138 thereof. Another flexible tube section 154 is installed in the second return tube 142 adjacent the end 148 thereof. The flexible tube sections 152 and 154 are provided to compensate for expansion and contraction of the supply and return riser pipes 20 and 22 respectively when the modular heating and cooling unit 10 is used to provide heat for the room areas being serviced thereby. The tubes 134 and 142 provide means for circulating fluid heat transfer medium, preferably water, from the supply riser pipe 20 through the second supply tube 134 to the second heat exchanger coil 120 and back from the second heat exchanger coil 120 through the second return tube 142 to the return riser pipe 22. The valve 140 provides means for cutting off the supply of fluid heat transfer medium to the second heat exchanger coil 120, and the valve 150 provides means for cutting off the return flow of fluid heat transfer medium from the second heat exchanger coil 120. The valve 150 further provides means for adjusting the flow of fluid heat transfer medium through the second heat exchanger coil 120 to obtain a desired flow rate.

A sheet of fire retardent gypsum board 156 is mounted on the interior wall 158 of the second room unit 16 adjacent the riser duct 18. The sheet of gypsum board 156 provides a fire and sound barrier between the second room unit 16 and the first room unit 14 and further provides a fire and sound barrier between the separate room areas being served by the modular heating and cooling unit 10. Insulation material 160, preferably neoprene coated glass fiber insulation is secured to and lines the entire interior surface of the second room unit 16 including the horizontal top plate 162 and the horizontal bottom plate 164 thereof, said top plate 162 and bottom plate 164 being fixedly secured respectively to the upper end 166 and the lower end 168 of the second room unit 16.

It should be noted that the first and second room units 14 and 16 are of similar construction. In the situation where the two adjacent room areas to be heated or cooled present identical or substantially identical heating and cooling loads to the modular heating and cooling unit 10, the first and second room units 14 and 16 may be substantially identical, being distinguished only by the routing of their respective supply and return tubes to connect with the supply riser pipe 20 and the return riser pipe 22. If the heating and cooling loads presented by the room areas to be heated or cooled by

the modular heating and cooling unit **10** present substantially different heating and cooling loads to the unit **10**, then the first room unit **14** and the second room unit **16** may be constructed with cooling and heating capacities substantially differing from one another. Variations in heating and cooling capacity may be obtained by installing heat exchanger coils of various sizes and providing motor-driven blowers of various capacities.

As illustrated in FIG. **5**, a plurality of modular heating and cooling units **10** may be installed vertically, one on top of the other, thereby forming a vertical tier extending upwardly through a multiple-story building structure.

The riser pipes **20**, **22** and **24** mounted in a respective modular heating and cooling unit **10** are each of a length substantially equal to the vertical distance from the floor level upon which said respective modular heating and cooling unit **10** is installed to the floor level next above. By sizing the riser pipes **20**, **22** and **24** in each modular heating and cooling unit **10** in this manner, it is possible to form a continuous supply and return riser system within the aforementioned vertical tier of modular heating and cooling units **10** comprised entirely of riser pipes **20**, **22** and **24** mounted therein. When installed, the upper end **170** of the supply riser pipe **20**, the upper end **172** of the return riser pipe **22** and the upper end **174** of the condensate drain riser pipe **24** of one modular heating and cooling unit **10** are each connected respectively to the lower end **176** of the supply riser pipe **20**, the lower end **178** of the return riser pipe **22** and the lower end **180** of the condensate drain riser pipe **24** of the modular heating and cooling unit **10** next above.

In the uppermost modular heating and cooling unit **10** of each tier, the upper ends **170**, **172** and **174** of the respective riser pipes **20**, **22** and **24** are plugged or capped. In the bottom modular heating and cooling unit **10** of each tier, the lower end **176** of the supply riser pipe **20** is connected to a source of heated or chilled fluid heat transfer medium, such as water, from which source heated or chilled fluid heat transfer medium is provided to all the modular heating and cooling units **10** comprising the tier. The lower end **178** of the return riser pipe **22** of the bottom modular heating and cooling unit **10** is also connected to the source of heated or chilled fluid heat transfer medium to return the fluid heat transfer medium that is passed through the heat exchanger coils **50** and **120** of each modular heating and cooling unit **10** for reheating or rechilling and recirculation. The lower end **180** of the condensate drain riser pipe **24** of the bottom modular heating and cooling unit **10** is conveniently connected with the drainage system of the building structure for disposal of the condensate carried therein.

OPERATION

The modular heating and cooling unit **10** may be conveniently installed in an opening formed in a partition wall **182** separating two adjacent room areas as shown in FIG. **4**. It may be desirable to extend portions of the wallboard **184** to substantially enclose the unit **10** within the partition wall **182**. In operation, heated or chilled fluid heat transfer medium is supplied to the unit **10** through the supply riser pipe **20**. Fluid heat transfer medium is supplied to the first room unit **14** of the modular heating and cooling unit **10** through the first supply tube **64** to the lower end **54** of the first heat exchanger coil **50**. The fluid heat transfer medium circulates through the first heat exchanger coil **50**, exiting the first heat exchanger coil **50** at the upper end **76** thereof to flow through the first return tube **72** to the return riser pipe **22** for return to the source of heated or chilled fluid heat transfer medium for reheating or rechilling. Air is drawn from the room area being served by the first room unit **14** through the filter **40** carried in the return air vent **32** by the first motor-driven blower **60**. The first motor-driven blower **60** blows the air upwardly through the duct **46** and over the surface of the first heat exchanger coil **50**, the air then passing back to the room area being heated or cooled through the first discharge air vent **26**. It will be obvious to one skilled in the art that in order to cool the air in the room area being served by the first room unit **14**, chilled heat transfer medium must be circulated through the first heat exchanger coil **50**. As the air blows over the resultingly chilled surface of the first heat exchanger coil **50**, heat is transferred from the air to the fluid heat transfer medium in the first heat exchanger coil **50** thereby lowering the temperature of the air prior to its return to the room area being cooled through the first discharge air vent **26**. Conversely, in order to heat the room area being served by the first room unit **14**, heated fluid heat transfer medium is supplied to the first heat exchanger coil **50**. As the air passes over the resultingly heated surface of the first heat exchanger coil **50**, heat is transferred to the air from the fluid heat transfer medium thereby raising the temperature of the air prior to its passage into the room area being heated through the first discharge air vent **26**.

The operation of the second room unit **16** of the modular heating and cooling unit **10** is identical to that described for the first room unit **14** and therefore will not be described in detail. It should be noted, however, that the second room unit **16** serves to heat and cool a room area horizontally adjacent to the room area served by the first room unit **14**, said adjacent room area being separated by the vertical partition wall **182**. See FIG. **4**.

From the foregoing, it will be apparent that the present invention provides a modular heating and cooling unit which displays significant improvements in the heating and cooling art and is economical in construction, simply and economically installed, easily serviced and economical in operation.

Changes may be made in the combination and arrangement of parts or elements as heretofore set forth in the specification and shown in the drawings without departing from the spirit and scope of the invention.

What is claimed is:

1. A heating and cooling unit of the type requiring connection to a source of heated or chilled fluid heat transfer medium for providing simultaneous heating or cooling to a first room area and a second room area, said first and second room areas being horizontally adjacent and separated by common vertical partition means having an opening formed therein sized and shaped to receive said heating and cooling unit therein to form a portion of the common vertical partition means, comprising:

housing means for housing said heating and cooling unit, said housing means being adapted for installation within the opening formed in the common vertical partition means separating the first and second room areas thereby forming a portion of the common vertical partition means;

a first room unit carried within said housing means;

a second room unit carried within said housing means;

riser duct means carried within said housing means for separating said first and second room units within said housing means;

first discharge air vent means formed in said housing means for communicating between the first room area and said first room unit;

second discharge air vent means formed in said housing means for communicating between the second room area and said second room unit;

first return air vent means formed in said housing means for communicating between the first room area and said first room unit;

second return air vent means formed in said housing means for communicating between the second room area and said second room unit;

a first heat exchanger coil carried within said first room unit;

means carried by said first room unit for drawing air from the first room area through said first return air vent means, blowing air over said first heat exchanger coil and discharging the air through said first discharge air vent means back into the first room area;

a second heat exchanger coil carried within said second room unit;

means carried by said second room unit for drawing air from the second room area through said second return air vent means, blowing the air over said second heat exchanger coil and discharging the air through said second discharge air vent means back into the second room area;

supply riser pipe means carried within said riser duct means for connecting with a source of heated or chilled fluid heat transfer medium for supplying heated or chilled fluid heat transfer medium to said heating and cooling unit;

return riser pipe means carried within said riser duct means for connecting with a source of heated or chilled fluid heat transfer medium for returning the fluid heat transfer medium from said heating and cooling unit to the source of heated or chilled fluid heat transfer medium;

first supply tube means for connecting said supply riser pipe means to one end of said first heat exchanger coil through which tube means the fluid heat transfer medium is supplied to said first heat exchanger coil from said supply riser pipe means;

first return tube means for connecting the opposite end of said first heat exchanger coil to said return riser pipe means through which tube means the fluid heat transfer medium is returned from said heat exchanger coil to said return riser pipe means;

second supply tube means for connecting said supply riser pipe means to one end of said second heat exchanger coil through which tube means the fluid heat transfer medium is supplied to said second heat exchanger coil from said supply riser pipe means; and

second return tube means for connecting the opposite end of said second heat exchanger coil to said return riser pipe means through which tube means the fluid heat transfer medium is returned from said second heat exchanger coil to said return riser pipe means.

2. A heating and cooling unit as defined in claim 1 wherein said housing means extends substantially the full height of the common vertical partition means.

3. A heating and cooling unit as defined in claim 2 wherein said first and second room units and said riser duct means extend substantially the full height of said housing means.

4. A heating and cooling unit as defined in claim 3 wherein said first and second discharge air vent means are formed in the upper portion of said housing means and communicate respectively between the first room area and the upper portion of said first room unit, and between the second room area and the upper portion of said second room unit; and wherein said first and second return air vent means are formed in the lower portion of said housing means and communicate respectively between the first room area and the lower portion of said first room unit, and between the second room area and the lower portion of said second room unit.

5. A heating and cooling unit as defined in claim 4 wherein said first heat exchanger coil is carried within said first room unit intermediate said first return air vent means and said first discharge air vent means; and wherein said second heat exchanger coil is carried within said second room unit intermediate said second return air vent means and said second discharge air vent means.

6. A heating and cooling unit as defined in claim 5 wherein said means carried by said first room unit for drawing air from the first room area through said first return air vent means, blowing the air over said first heat exchanger coil and discharging the air through said first discharge air vent means is characterized further to include a first motor-driven blower carried within said first room unit; and wherein said means carried by said second room unit for drawing air from the second room area through said second return air vent means, blowing air over said second heat exchanger coil and discharging the air through said second discharge air vent means is characterized further to include a second motor-driven blower carried within said second room unit.

7. A heating and cooling unit as defined in claim 6 characterized further to include:

condensate drain riser pipe means carried within said riser duct means for draining off moisture condensed from the air passing over said first and second heat exchanger coils;

first condensate tray means carried within said first room unit beneath said first heat exchanger coil for collecting moisture which condenses on and falls downwardly from said first heat exchanger coil;

first condensate drain tube means connected at one end thereof to said first condensate tray means and extending slightly downwardly therefrom to connect at the opposite end thereof to said condensate drain riser pipe means for draining moisture collected in said first condensate tray means by gravi-

ty therethrough to said condensate drain riser pipe means;

second condensate tray means carried within said second room unit beneath said second heat exchanger coil for collecting moisture which condenses on and falls downwardly from said second heat exchanger coil; and

second condensate drain tube means connected at one end thereof to said second condensate tray means and extending slightly downwardly therefrom to connect at the opposite end thereof the said condensate drain riser pipe means for draining moisture collected in said second condensate tray means by gravity therethrough to said condensate drain riser pipe means.

8. A heating and cooling unit as defined in claim 6 characterized further to include:

first supply shut-off valve means positioned in said first supply tube means intermediate said supply riser pipe means and said first heat exchanger coil for alternately opening and closing said first supply tube means to the flow of fluid heat transfer medium through said first supply tube means;

second supply shut-off valve means positioned in said second supply tube means intermediate said supply riser pipe means and said second heat exchanger coil for alternately opening and closing said second supply tube means to the flow of fluid heat transfer medium through said second supply tube means;

first combination shut-off and balancing valve means positioned in said first return tube means intermediate said first heat exchanger coil and said return riser pipe means for controlling the flow of fluid heat transfer medium through said first return tube means; and

second combination shut-off and balancing valve means positioned in said second return tube means intermediate said second heat exchanger coil and said return riser pipe means for controlling the flow of fluid heat transfer medium through said second return tube means.

9. A heating and cooling unit as defined in claim 7 wherein said housing means, riser duct means, supply riser pipe means, return riser pipe means and condensate drain riser pipe means are sized and positioned relative to one another such that a plurality of said heating and cooling units may be vertically positioned one on top of the other in a building structure of multiple story design thereby forming a vertical tier through said building structure, said supply riser pipe means, return riser pipe means and condensate drain riser pipe means of each of said heating and cooling units being connected to the respective supply riser pipe means, return riser pipe means and condensate drain riser pipe means of the heating and cooling unit next above thereby forming respectively a continuous supply riser pipe, a continuous return riser pipe and a continuous condensate drain riser pipe extending vertically through said vertical tier.

10. A heating and cooling unit as defined in claim 9 wherein the fluid heat transfer medium is water.

11. An apparatus for heating or cooling an area at each floor level in a multiple-story building structure, the apparatus being of the type requiring connection to a source of heating or chilled fluid heat transfer medium, comprising:

a plurality of vertically oriented housing means assembled in superposed relation for extending upwardly through the multiple-story building structure and forming a vertical tier of housing means with one of the housing means being positioned at each floor level of the multiple-story building structure within a respective vertical partition means located at the respective floor level, and forming a portion of the respective vertical partition means;

discharge air vent means formed in each housing means for communicating between the interior of the respective housing means and the area to be heated or cooled at the respective floor level;

return air vent means formed in each housing means for communicating between the interior of the respective housing means and the area to be heated or cooled at the respective floor level;

a heat exchanger coil carried within each housing means intermediate the respective discharge air vent means and the respective return air vent means formed therein;

means carried by each housing means for drawing air from the reSpective area to be heated or cooled through the respective return air vent means, blowing the air over the respective heat exchanger coil and discharging the air through the respective discharge air vent means into the respective area to be heated or cooled;

supply riser pipe means carried by each housing means for receiving heated or chilled fluid heat transfer medium from the source thereof, the lower end of the supply riser pipe means carried by the lowermost housing means of the vertical tier being connected to a source of heated or chilled fluid heat transfer medium, the upper end of the respective supply riser pipe means carried by each housing means being connected to the lower end of the respective supply riser pipe means carried by the housing means next above, the upper end of the respective supply riser pipe means carried by the uppermost housing means of the vertical tier being capped, thereby forming a continuous supply riser pipe extending upwardly within the entire vertical tier of housing means;

a return riser pipe means carried by each housing means for returning fluid heat transfer medium to the source thereof, the lower end of the return riser pipe means carried by the lowermost housing means of the vertical tier being connected to a source of heated or chilled fluid heat transfer medium, the upper end of the respective return riser pipe means carried by each housing means being connected to the lower end of the respective return riser pipe means carried by the housing means next above, the upper end of the respective return riser pipe means carried by the uppermost housing means of the vertical tier being capped, thereby forming a continuous return riser pipe extending upwardly within the entire vertical tier of housing means;

supply tube means carried within each housing means for interconnecting the respective supply

riser pipe means and one end of the respective heat exchanger coil carried therein, through which supply tube means the fluid heat transfer medium is supplied to the respective heat exchanger coils from the respective supply riser pipe means; and

return tube means carried within each housing means for interconnecting the respective return riser pipe means and the opposite end of the respective heat exchanger coil carried therein through which return tube means the fluid heat transfer medium is returned from the respective heat exchanger coils to the respective return riser pipe means.

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