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[54] **AIR CONDITIONING APPARATUS**

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[52] **U.S. Cl.** **165/48,** 165/59, 165/122

[51] **Int. Cl.** **F25b 29/00**

[58] **Field of Search** 165/59, 48, 22, 16, 50, 165/103, 26, 27, 122

[56] **References Cited**

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[57] **ABSTRACT**

An elongated generally rectangular housing having air inlet and discharge openings in its opposite ends, a cooling element and a heating element being mounted within the housing in spaced relationship longitudinally of the housing. A blower is mounted in the housing for receiving air from the interior of the housing and delivering conditioned air outwardly through the discharge opening. A damper arrangement provides for heat directing air selectively through or past the cooling element for controlling the temperature of air being delivered to the discharge opening of the housing.

5 Claims, 3 Drawing Figures

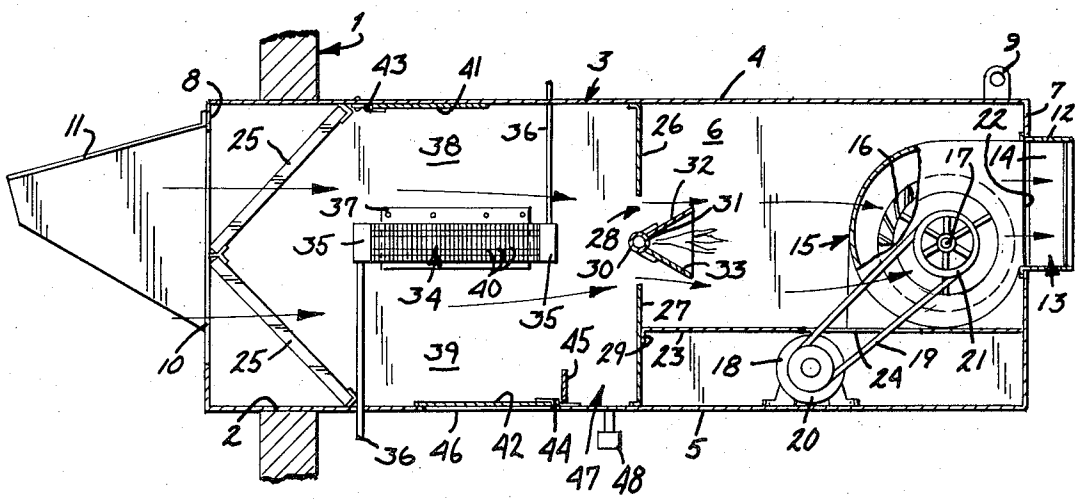


FIG. 1

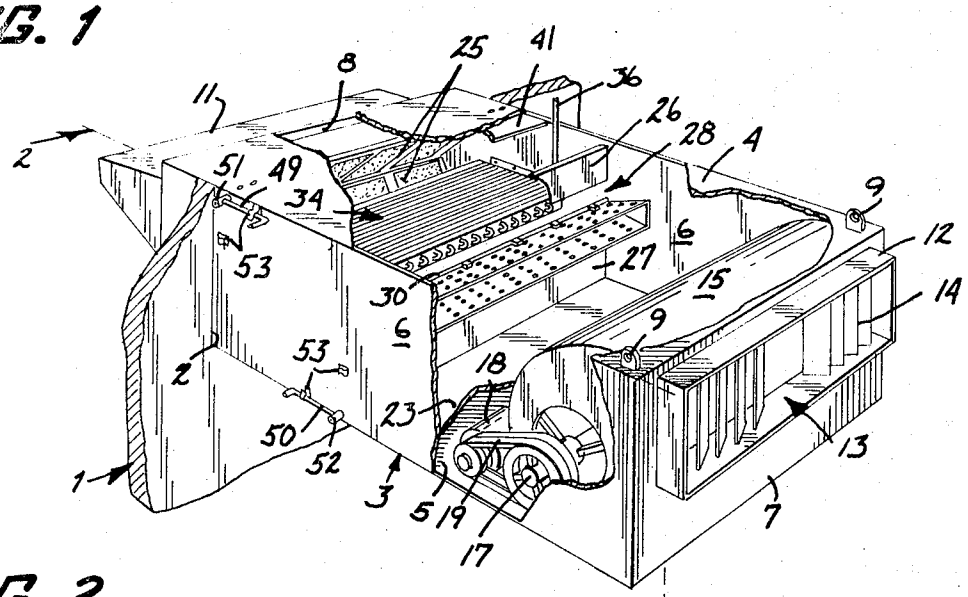


FIG. 2

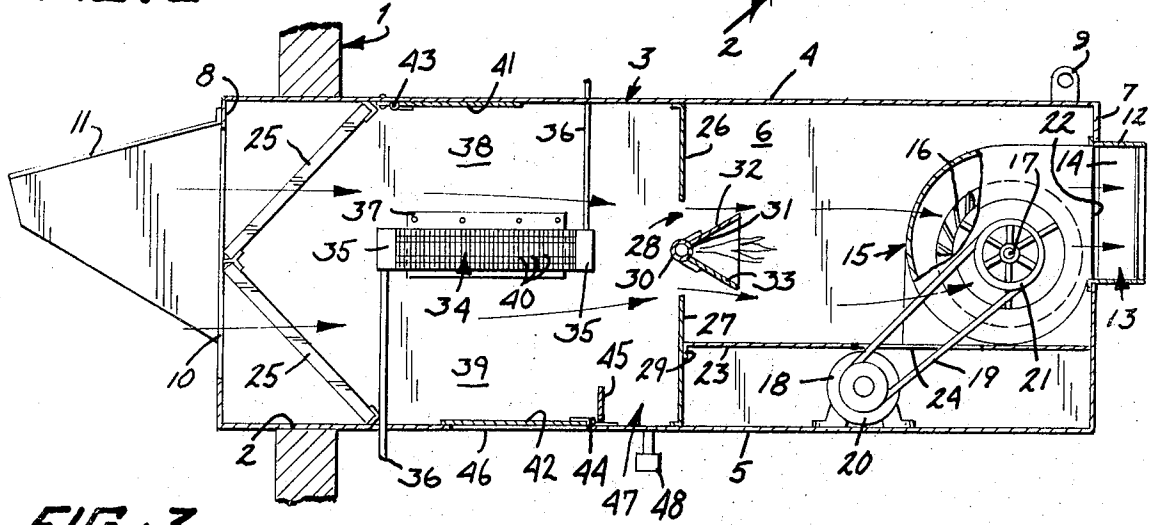
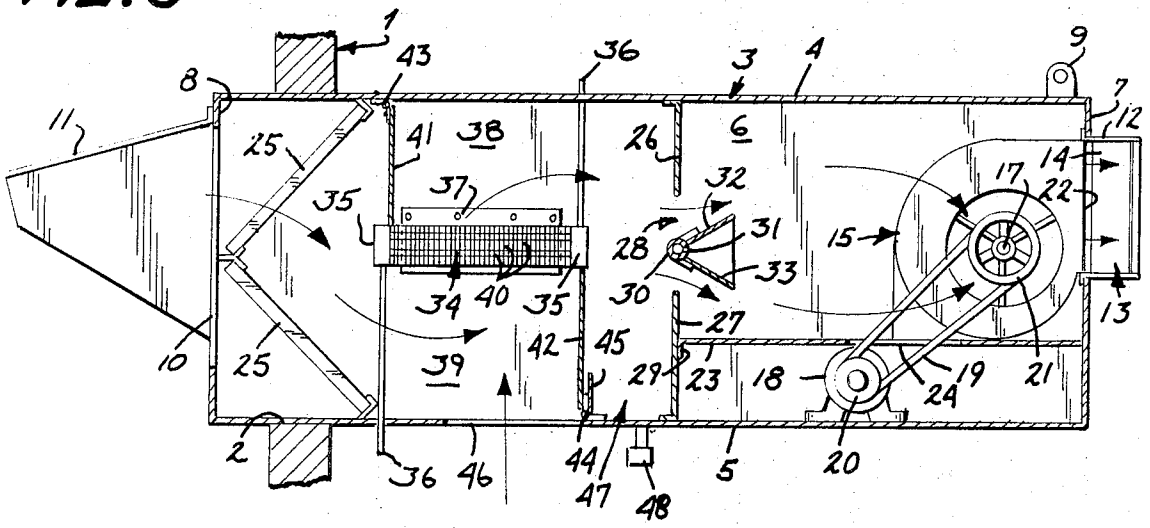


FIG. 3



AIR CONDITIONING APPARATUS

SUMMARY OF THE INVENTION

This invention relates to air conditioning apparatus and more particularly to a device for supplying cooled or heated air selectively to an enclosure. An important object of this invention is the provision of apparatus which is easily and quickly controlled to provide heated or cooled fresh air to the interior of a room or like building enclosure from the exterior of the building, or to provide a cool air mixture of exterior and interior air to the interior of the building.

Another object of this invention is the provision of air conditioning apparatus utilizing a blower, a fluid fuel burner, and the evaporator coil of a cooling system within a housing arranged to be mounted in an opening through an outside wall of a room, so as to impose a minimum amount of overhead weight; the burner and evaporator coil being respectively connected to a remote source of fuel and a remote refrigeration compressor, motor and condensor.

To the above ends, I provide an elongated generally rectangular housing having flat top and bottom walls, laterally spaced flat side walls and air inlet and discharge openings in its opposite ends; the housing being adapted to be mounted in an opening in a vertical wall with the inlet opening outside the wall and the discharge opening within the interior of the building or room. Air filter elements and a motor-driven blower are mounted in the housing adjacent the inlet and outlet openings respectively, the blower receiving air flowing through the housing and discharging the air through the discharge opening in the housing. Inwardly of the filter elements, a horizontal evaporator radiator extends from one of the housing side walls to the other, generally centrally between the top and bottom walls of the housing, to divide a portion of the interior of the housing into upper and lower air passageways having inlet and outlet ends. The radiator is provided with transverse passageways interconnecting the upper and lower passageways. A fuel burner extends across the interior of the housing between the radiator and the blower for heating air moving through the housing from the outlet ends of the upper and lower passageways. The housing bottom wall has an auxiliary opening which underlies the radiator adjacent the outlet end of the lower passageway inwardly of the room wall. A damper plate is hinged to the housing for movements between a generally horizontal position wherein it covers the auxiliary opening, and a generally vertical position wherein it uncovers the auxiliary opening and closes the outlet end of the lower passageway, so that air moving through the lower passageway is drawn upwardly through the transverse passageways in the radiator. A second damper plate is pivotally mounted in the housing adjacent the inlet end of the upper passageway for movements between a generally horizontal position permitting free movement of air through the upper passageway, and a generally vertical position blocking the flow of air through the inlet end of the upper passageway so that, in the generally vertical position of the second damper plate, all of the air entering the inlet end of the housing is drawn through the transverse passages in the radiator, when the first-mentioned damper plate is in its generally vertical position.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary view in perspective of a building wall showing the air conditioning apparatus of this invention mounted therein, some parts being broken away and some parts being shown in section;

FIG. 2 is a longitudinal section taken substantially on the line 2—2 of FIG. 1; and

FIG. 3 is a view corresponding to FIG. 2 but showing a different position of some of the parts.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the drawing, a generally vertical building wall is indicated fragmentarily at **1** and having a rectangular opening **2** therethrough. The air conditioning apparatus of this invention comprises an elongated generally rectangular housing **3** having horizontally disposed top and bottom walls **4** and **5** respectively, laterally spaced parallel side walls **6**, and inner and outer end walls **7** and **8** respectively. As shown, the housing **3** is mounted in the wall opening **2**, with the end wall **8** being disposed outwardly of one side of the wall **1**. It may be assumed that the wall **1** is an outside wall of a building or other enclosure, so that the end wall **8** is disposed exterior of the building. The top wall **4** is preferably provided with a pair of lugs **9** whereby the inner end of the housing **3** may be supported from the ceiling of the building structure by any suitable means, not shown. The outer end wall **8** is formed to provide an inlet opening **10**, and is provided with a hood **11** for protection of the interior of the housing **3** from rain, sleet or other foreign matter. The inner end wall **7** is provided with a longitudinally inwardly projecting peripheral flange **12** that defines a discharge opening **13** in which is mounted a plurality of laterally spaced air directing louvers or vanes **14**.

A blower **15** is mounted within the housing **3** adjacent the inner end wall **7** and includes a rotor **16** mounted on a shaft **17**, and is driven by a motor **18** mounted on the bottom wall **5** of the housing **3**. A pair of endless drive belts **19** are entrained over a double-groove pulley **20** that is mounted on the drive shaft of the motor **18** and a second double-groove pulley **21** mounted on the rotor shaft **17**. As shown, the blower **15** has its outlet portion **22** disposed at the discharge opening **13**, and is operative to draw air inwardly through the inlet opening **10**, longitudinally through the interior of the housing **3**, and discharge the air into the room, through the discharge opening **13**. A horizontal partition **23** overlies the motor **18**, the partition having an opening **24** therein through which the drive belts **19** extend.

Air being drawn into the interior of the housing **3** by the blower **15** passes through a pair of conventional filter elements **25** disposed adjacent the inlet opening **10**. A pair of upper and lower vertical partition elements **26** and **27** are secured to the top and bottom walls **4** and **5** respectively and cooperate to define a restricted opening **28** intermediate the opposite ends of the housing **3**. As shown in FIGS. **2** and **3**, the horizontal partition **23** is provided with a flange **29** that is welded or otherwise rigidly secured to the lower partition element **27**. A fluid fuel burner is in the nature of an elongated tube **30** that extends transversely across the interior of the housing **3** and may be assumed to be operatively connected to a source of fluid fuel. As shown in FIGS.

2 and 3, the burner tube 30 is disposed in the restricted opening 28 substantially midway between the adjacent edges of the partition elements 26 and 27, and is provided with a plurality of longitudinally spaced burner openings 31 that are directed longitudinally toward the blower 15. Only one of the burner openings 31 is shown in FIGS. 2 and 3. Fuel supply means for the burner tube 30 and burner ignition means are conventional and in and of themselves do not comprise the instant invention. Hence, for the sake of brevity, showing and description thereof is omitted. The burner tube 30 is provided with a pair of elongated upper and lower heat radiating panels 32 and 33 respectively that diverge in the direction of the discharge opening 13, the panels 32 and 33 extending from one side wall 6 to the opposite side wall 6. As air passes through the opening 28 toward the blower 15, it impinges on the panels 32 and 33, and is heated by the radiating panels 32 and 33 as well as by burning fuel from the burner tube 30.

For the purpose of cooling air passing through the housing 3 in warm weather, with the burner 30 rendered inoperative, I provide an elongated rectangular evaporator radiator 34 of conventional design having headers 35 at its opposite ends and being adapted to be connected, by means of pipes 36 in a conventional refrigerator circuit, not shown, but which may be assumed to include the usual motor-driven compressor and condensor elements. As shown, evaporator radiator 34 is horizontally disposed between the partitions 26–27 and the filter elements 25, and extends from one of the side walls 6 to the other side wall 6 generally centrally between the top and bottom walls 4 and 5 respectively. The evaporator radiator 34 is supported at its opposite ends by brackets 37 bolted or otherwise rigidly secured to the side walls 6. The evaporator radiator 34 cooperates with the adjacent portions of the walls 4, 5 and 6 to define upper and lower longitudinal passageways 38 and 39 respectively through which air is adapted to move from the inlet opening 10 to the restricted opening 28. The evaporator radiator 34 is preferably of the tube and fin variety, the tubes extending horizontally between the headers 35 and the fins being vertically disposed to provide transverse passageways 40 interconnecting the longitudinal passageways 38 and 39. For the purpose of directing air through the transverse passageways 40, I provide a pair of generally rectangular plate-like damper elements the former of which is pivotally secured in the housing 3 by means of a hinge or the like 43 for pivotal movements between a horizontally disposed position parallel to and adjacent the top wall 4, as shown in FIG. 2, and a second vertically disposed position at the inlet end of the longitudinal passageway 38 at the left-hand end of the evaporator radiator 34, as shown in FIG. 3. As there shown, the damper element 41 closes off the passage of air from the inlet opening 10 directly through the passageway 38.

The damper element 42 is pivotally mounted adjacent the bottom wall 5 of the housing 3, by means of a hinge or the like 44 adjacent a vertical partition member 45, for swinging movements between a horizontally disposed position shown in FIG. 2, and a vertically disposed position shown in FIG. 3. In the vertical position of the damper element 42, the flow of air through the blower passageway 39 is blocked from direct movement to the opening 28. Thus the air moves upwardly through the transverse passageways 40 to the upper longitudinal passageway 38 and from thence to and through the opening 28. The bottom wall 5 of the housing 3 is provided with an auxiliary air opening 46 that is covered or closed by the damper element 42 when the same is moved to its generally horizontal position of FIG. 2. When the lower damper element 42 is raised to its vertical position, the passageway 39 communicates with the interior of the building through the auxiliary opening 46. With both damper elements 41 and 42 in their vertical positions shown in FIG. 3, and the blower 15 operating, air is drawn into the passageway 39 from both the exterior of the building through the filter elements 25, and the interior of the building through the auxiliary opening 46, and through the transverse passageways 40 in the evaporator radiator 34 wherein the air is cooled. From thence, the cooled air is drawn through the upper passageway 38, through the opening 28 to the blower 15 and outwardly into the interior of the building through the discharge opening 13. The partition element 27 and partition 45 form opposite sides of a tray 47 wherein condensed moisture collects and is discharged to a drain, not shown but through a suitable fitting 48.

The damper elements 41 and 42 may be moved between their respective horizontal and vertical positions and held therein by any suitable means. For the purpose of the present example, I provide a pair of damper control arms 49 and 50, see FIG. 1. The arms 49 and 50 are mounted on outwardly projecting ends of pivot shafts 51 and 52 respectively, these forming parts of the pintles of the hinges 43 and 44 respectively, or otherwise rigidly connected to their respective damper elements 41 and 42. The arms 49 and 50 are each movable between a pair of spaced spring clips or the like 53 that are secured to the adjacent one of the housing side walls 6, whereby to releasably hold the damper elements 41 and 42 in either of their horizontally or vertically disposed positions. Obviously, if desired, either one of the control arms 49 or 50, or both thereof, may be provided with means for releasably holding the same in any desired angular position of their respective damper elements 41 and 42.

From the above, it should be evident that the apparatus of this invention is capable of being quickly and easily converted from heating apparatus to cooling apparatus or conversely. When it is desired to heat the interior area of the building, it is only necessary to move the damper elements 41 and 42 to their horizontally disposed positions shown in FIG. 2, deenergize the cooling apparatus, ignite the burner 30 and energize the blower motor 18. Fresh air is drawn into the housing 3 through the filter elements 25, moving longitudinally through the longitudinal passages 38 and 39, and the restricted opening 28, and through the blower 15. As the air passes over and under the burner 30, it becomes heated by the flame of the burner and by radiation from the panels 32 and 33, the heated air being blown into the room by the blower 15. In warm weather, it is only necesary to deenergize the burner 30, energize the refrigeration apparatus, not shown, to enable cooling fluid to be passed through the evaporator radiator 34, and move the damper elements 41 and 42 to their vertical positions as shown in FIG. 3. Should the exterior temperature be such that cooling is not required, the damper elements 41 and 42 may be moved to their horizontal positions of FIG. 2 and the burner 30 and evaporator radiator 34 both be deenergized.

This invention has been thoroughly tested and found to be completely satisfactory for the accomplishment of the objectives set forth; and, while I have shown and described a commercial embodiment of my air conditioning apparatus, it will be understood that the same is capable of modification without departure from the spirit and scope of the invention, as defined in the claims.

What is claimed is:

1. Air conditioning apparatus comprising:

a. an elongated generally rectangular housing having a pair of vertically spaced top and bottom longitudinal walls and laterally spaced longitudinal side walls, and opposite ends defining an air inlet opening at one end and an air discharge opening at the other end;

b. air filter means in said housing adjacent said inlet opening;

c. blower means in said housing adjacent said discharge opening and disposed to receive air from said outlet opening and deliver air outwardly through said discharge opening;

d. air heating means in said housing between the ends thereof;

e. air cooling evaporator radiator means in said housing between said heating means and one of said blower means and filter means and adapted to be connected to a source of cooling fluid;

f. said radiator means extending transversely between one pair of said longitudinal walls in spaced relation to the other pair of said longitudinal walls and cooperating therewith to define a pair of longitudinal air passageways each having an inlet end toward said inlet opening and an outlet end toward said discharge opening, one of said longitudinal walls defining an auxiliary opening in spaced relation to said inlet opening and communicating with one of said longitudinal passageways;

g. said radiator means having transverse passageways therethrough interconnecting said longitudinal passageways;

h. and damper means at the inlet end of one of said passageways and the outlet end of the other of said passageways for controlling flow of air through said longitudinal and transverse passageways selectively, said damper means including a damper element pivotally movable between a first position covering said auxiliary opening and opening its respective longitudinal passageway, and a second position closing said respective longitudinal passageway and uncovering said auxiliary opening.

2. The air conditioning apparatus defined in claim **1** in which said damper element is disposed to close the outlet end of said other one of the longitudinal passageways, said damper means including a second damper element disposed adjacent the inlet end of said one of the passageways.

3. The air conditioning apparatus defined in claim **1** in which said air heating means is disposed between said evaporator radiator means and said blower, said air heating means comprising a burner element extending transversely between said one pair of longitudinal walls, and a pair of panel-like heat radiating members extending longitudinally of said burner and diverging in the direction of the discharge end of the housing.

4. The air conditioning apparatus defined in claim **1** in which said evaporator radiator means is disposed in a horizontal plane intermediate said top and bottom longitudinal walls and extends to said opposite side walls to dispose said longitudinal air passageways above and below said evaporator radiator means, said bottom wall defining said auxiliary opening underlying the evaporator radiator means adjacent the delivery end of the lower one of said longitudinal passageways, said damper element being pivotally mounted to said bottom wall at the delivery end of said lower longitudinal passageway for swinging movements between a lowered position covering said auxiliary opening and permitting free flow of air through said lower longitudinal passageway and a raised position blocking the delivery end of said lower passageway and uncovering said auxiliary opening.

5. The air conditioning apparatus defined in claim **4** in which said damper means includes a second damper element pivotally secured to said housing adjacent the inlet end of the upper one of said longitudinal passageways for movements between a first position generally parallel to said top wall to permit free flow of air through said upper longitudinal passageway, and a second position blocking said upper longitudinal passageway.

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