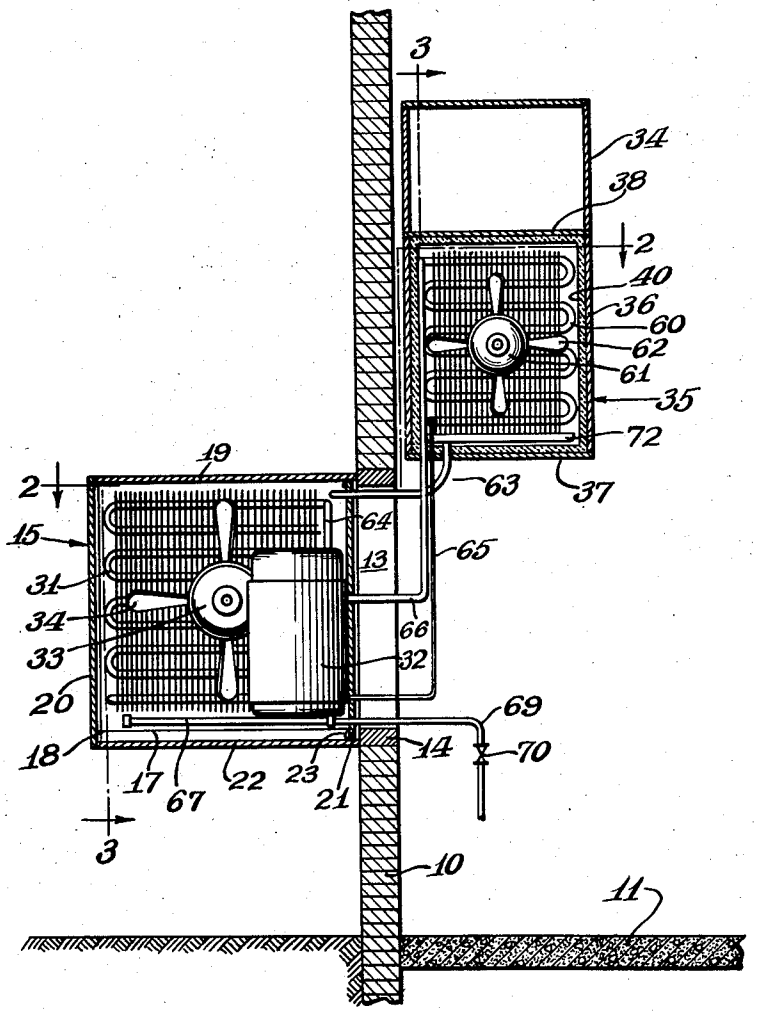
July 7, 1953 W. F. BORGERD 2,644,321

WALL MOUNTED AIR CONDITIONING UNIT

Filed July 12, 1951 2 Sheets-Sheet 1

FIG. 1.



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FIG. 2.

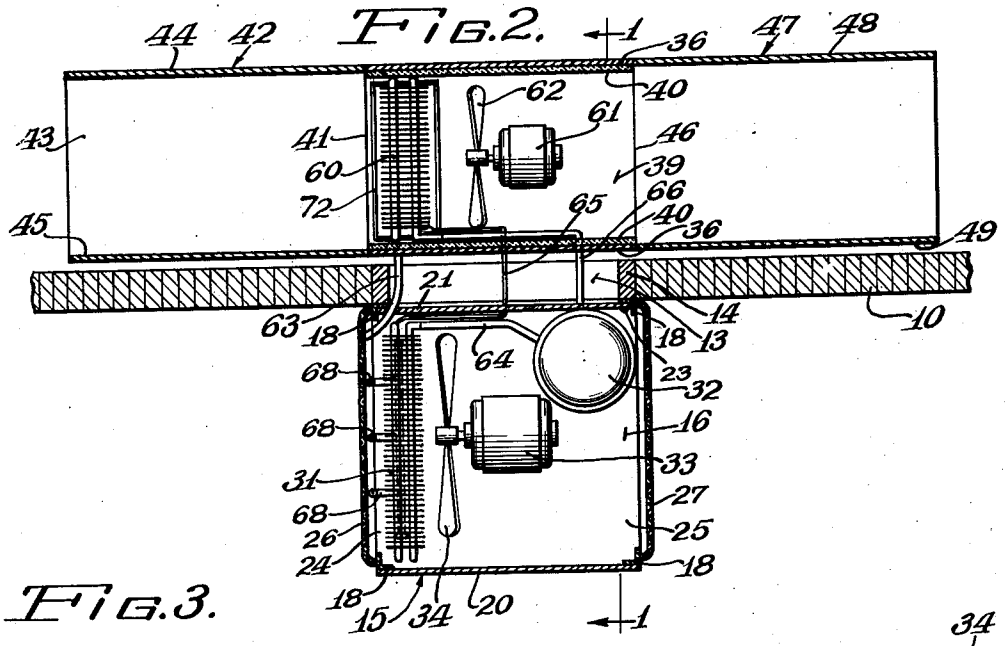
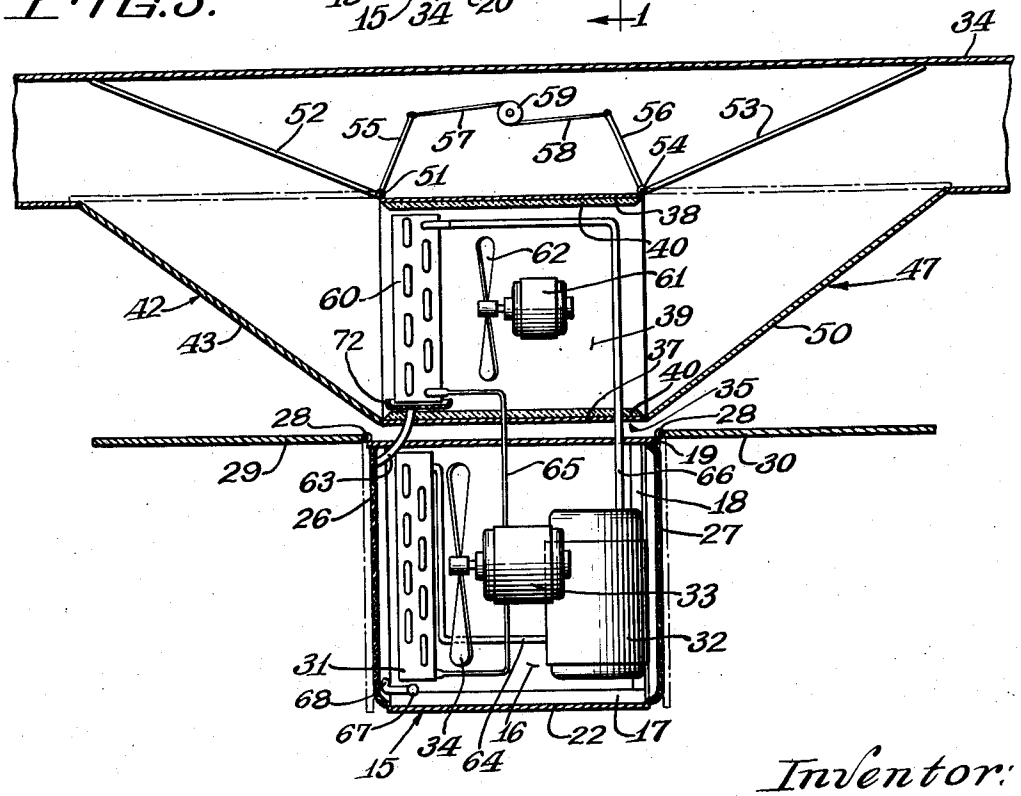


FIG. 3.



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WALL MOUNTED AIR CONDITIONING UNIT

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5 Claims. (Cl. 62—140)

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This invention relates generally to an air conditioning unit, and more particularly to an air conditioning unit which is adapted to be mounted on the outer wall of a building and to cool the air within the building.

Since air conditioning of homes is a relatively recent development, many of the older buildings are not equipped with suitable means for installing a centralized air conditioning system adapted to cool all the rooms of the building. Consequently, the room type air conditioner has been installed by many home owners, the two most common types being the window mounted unit and the console unit. Both of these types are usually too compact for proper air circulation therethrough which causes the efficiency of the refrigeration system to be lowered. The window mounted unit is usually positioned on a window sill in such a manner that it obstructs a substantial portion of the window sill, whereas the console unit is usually positioned entirely within the room so that it is difficult to completely insulate the noise and heat of the refrigeration machinery from the room. The units are not particularly attractive in the room and each one obstructs a portion of the floor space of the room. The present invention provides an air conditioning unit which overcomes the above mentioned disadvantages and offers the many objects and advantages as hereinafter listed.

One object of the present invention is to provide an air conditioning unit which is adapted to cool all the rooms of a building.

Another object of the invention is to provide an air conditioning unit in which the refrigeration system is completely assembled by the manufacturers before shipment to the building in which it is to be installed.

Another object of the invention is to provide a unit of the character mentioned in which the high side compartment is positioned outside the building and secured to a wall of the building over an opening which extends therethrough.

Another object of the invention is to provide a unit of the character mentioned in which the evaporator and other components of the low side compartment are inserted through the opening and disposed within the building.

Another object of the invention is to provide a unit of the character mentioned in which the evaporator is adapted to be placed in the utility room or other storage space within the building.

Another object of the invention is to provide

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a unit of the character mentioned in which the low side compartment is adapted to be installed in parallel with a furnace duct system with means for controlling the passage of air over the evaporator.

Another object of the invention is to provide a unit of the character mentioned in which the high side members are properly cooled by outside air.

Another object of the invention is to provide a unit of the character mentioned in which the noise and heat from the high side machinery will not be projected into the building.

Another object of the invention is to provide a unit of the character described having means for draining condensate from the evaporator into the air stream passing over the condenser.

Another object of the invention is to provide a unit of the character described having means for spraying water over an air cooled condenser during overload periods.

Further objects and advantages of the present invention will be apparent from the following description and drawings, it being understood that the drawings are for the purpose of illustration only and not a definition of the limits of the invention, reference being made for this purpose to the appended claims.

In the drawings:

Fig. 1 is a vertical sectional view of an air conditioning unit and a portion of a wall taken substantially on line 1—1 of Fig. 2.

Fig. 2 is a horizontal cross sectional view of the unit and wall taken substantially along line 2—2 of Fig. 1.

Fig. 3 is a vertical sectional view of the unit taken substantially along line 3—3 of Fig. 1.

Referring to the drawings for a detailed description of the invention, a portion of an outer wall of a building is represented by reference numeral 10 and a portion of a floor is represented by reference numeral 11. It is contemplated that the floor 11 be the floor of a utility room or other storage room which is particularly adaptable for having an air conditioning unit positioned therein. Wall 10 is provided with a rectangular opening 13 therethrough which is spaced above floor 11 and encased by a suitable frame 14.

Positioned outside the building and secured to wall 10 is a casing 15 which encloses a high side compartment 16. The casing 15 comprises a horizontal base 17, vertical corner channels 18, top wall 19, front wall 20, inner wall 21, and bottom wall 22 and is secured against wall 10

by bolts 23 which are anchored in frame 14. The open ends 24 and 25 of the casing 15 are provided with screens 26 and 27 respectively which will protect compartment 16 from foreign objects and prevent unauthorized personnel from tampering with the components therein. Pivotally secured to top wall 19 by hinges 28 are doors 29 and 30 which are adapted to be raised as shown by solid lines in Fig. 3 and held in a horizontal plane by suitable means (not shown). These doors 29 and 30, when in a horizontal position, shield the compartment from the sun and the weather and can be swung downwardly to a vertical position, as shown by dotted lines in Fig. 3, to cover the open ends 24 and 25 so that the compartment 16 is completely closed during the winter months when the air conditioning unit is not being operated. Positioned adjacent open end 24 of the casing 15 is a finned tube air cooled condenser 31. A combination motor-compressor unit 32 is secured to base 17 adjacent open end 25 and an electric motor 33 is disposed in the central portion of the compartment 16. Secured to the armature shaft of the electric motor 33 is a propeller type fan 34 having the blades pitched in such a manner that when motor 33 is running, outside air will be pulled into open end 24, circulated through compartment 16 and discharged through open end 25.

Positioned adjacent the inner surface of the outer wall 10 is a horizontal duct 34 which may be secured in any suitable manner. It is contemplated that duct 34 be a portion of a duct system from a hot air furnace to the various rooms of the building but it is to be understood that it could be a portion of a duct system installed for the express purpose of supplying cold air to the rooms of the building. Secured below duct 34 is a casing 35 comprising side walls 36, bottom wall 37 and top wall 38 which enclose a low side compartment 39 and are provided with insulating material 40 located proximate the inner surfaces thereof. One open end 41 of the casing 35 is connected to duct 34 by duct member 42 which comprises an upwardly inclined bottom wall 43 and vertical side walls 44 and 45. The opposite open end 46 is enclosed by duct member 47 which connects into horizontal duct 34 and comprises vertical side walls 48 and 49 and inclined bottom wall 50.

Pivotally connected to top wall 38 by hinges 51 is a damper 52 which is adapted to open and close the opening between horizontal duct 34 and duct member 42. A second damper 53 is connected to top wall 38 over open end 46 by hinges 54 in a manner to allow opening and closing of the opening between horizontal duct 34 and duct member 47. Fixedly secured to dampers 52 and 53 are levers 55 and 56 to which flexible cords 57 and 58 are joined. The cords 57 and 58 are secured to pulley 59 in such a manner that when the pulley is rotated in one direction, the dampers 52 and 53 are both raised to the position shown by solid lines in Fig. 3, and when rotated in the opposite direction, the dampers are lowered to the portions illustrated by dotted lines in Fig. 3. Either manual means or automatic means may be provided for operating pulley 59 but are not shown since the invention is not directed to that feature.

A finned tubed evaporator 60 is positioned in low side compartment 39 across open end 41 with an electric motor 61 secured between the evaporator and the opposite open end 46. The motor 61 drives a propeller type fan 62 which pulls air over the evaporator 60 from the horizontal duct 34 when the dampers 52 and 53 are in raised position. If the horizontal duct 34 is provided with a blower for circulating air through a furnace, fan 61 could be eliminated by utilizing the blower to force the air through low side compartment 39. Positioned under evaporator 60 is a shallow tray 72 having an outlet connected to a drain tube 63 which slopes downwardly through opening 13 and terminates adjacent screen 26. As the air to be cooled contacts the cold surface of the evaporator, it will usually be cooled below its dew point and moisture will condense on the evaporator. As this condensate drips from the evaporator, it will be collected by tray 72 and be disposed therefrom in the manner explained hereinafter.

The members of the refrigeration system are connected by proper tubing and charged with a suitable refrigerant. During the refrigeration cycle, the refrigerant is compressed by the motor-compressor unit 32 and forwarded by conduit 64 to condenser 31 where it is cooled and condensed by the outside air being passed thereover by fan 34. From the condenser 31, the refrigerant passes through a restrictor capillary tube 65 to the evaporator 60 where it is heated by the room air passing thereover, then returned to the motor-compressor unit 32 by conduit 66. Since the operation of such a system is well known, further explanation is not deemed necessary.

It is contemplated that the outer casing 15 and the refrigeration system of the present invention be completely assembled by the manufacturer before shipment to the place of installation. Capillary tube 65 and suction tube 66 are made sufficiently flexible so that the evaporator 60 can be shipped in a position directly over the top of high side casing 15. The manufacturer can completely charge the refrigeration system with the correct amounts of refrigerant and oil. After outer wall 10 has been provided with opening 13 and casing 35 has been connected to horizontal duct 34, evaporator 60 is inserted through opening 13 and casing 15 is secured to frame 14. Dampers 52 and 53 are then installed, duct members 42 and 47 assembled, suitable connections made, and the air conditioning unit is in condition for operation. By styling outer casing 15 so that it will blend in well with the exterior portion of the building, the unit will present a neat appearance. Since low side casing 35 is located in a utility room or similar storage space, the living quarters of the building will not be obstructed by any part of the unit.

When the building is to be cooled, doors 29 and 30 are raised and secured in a horizontal position and pulley 59 is rotated in the proper direction to pull dampers 52 and 53 upwardly to the raised position. Suitable controls (not shown) are provided to control the operation of the refrigeration machinery in response to room temperature. When the machinery is operating, fan 34 will pull outside air over the condenser 31 and motor-compressor unit 32 with a resultant cooling of each. Since the casing 15 is disposed completely outside the building, the walls of the casing will be further cooled by outside air circulating thereover. Room air will be pulled from horizontal duct 34 by fan 62 and circulated through duct member 42, over evaporator 60, through low side compartment 39 and

returned to the horizontal duct through duct member 47.

Any condensate formed on evaporator 60 will drip into tray 72 and drain therefrom through tube 63 onto screen 26 over which it will spread. As the outside air is pulled through screen 26 by fan 34, the condensate will be carried by the air over the condenser 31 and then discharged into the atmosphere through open end 25. As the water contacts the condenser 31, it will be evaporated so that considerable heat will be removed from the condenser. Any condensate which is not picked up by the air stream from the screen 26 will drip harmlessly to the ground below.

Secured below condenser 31 is a header 67 having several nozzles 68 which are directed toward the surface of the condenser 31. The header 67 is connected to a suitable water supply (not shown) by pipe 69 and a valve 70 is provided to open and close the flow of water through the pipe. The purpose of the header 67 is to spray cooling water through nozzles 68 onto the condenser 31 when overload conditions are encountered. The cooling water will be vaporized as it absorbs heat from the condenser and then passed into the atmosphere by fan 34. Since the amount af heat required to vaporize water is quite large, only a relatively small amount of water will be required to lower the temperature of condenser 31 during overload conditions. Valve 70 may be manually operated or controlled by automatic means (not shown) in response to the temperature of condenser 31.

During the months of the year when air conditioning is not required, dampers 52 and 53 are rotated to the lowered position and doors 29 and 30 are swung downwardly to a vertical position whereby open ends 24 and 25 of casing 15 are covered so that high side compartment 16 is completely closed from the weather and the machinery therein will be protected. With the dampers 52 and 53 in the lowered position, duct members 42 and 47 are closed and no air will circulate through low side compartment 39. The horizontal duct 34 can now be used to circulate warmed air from a furnace to the various rooms of the building.

From the foregoing it is apparent that an air conditioning unit is disclosed which is particularly adaptable for cooling all the rooms of a building. The refrigeration system can be completely assembled at the factory where the proper charge of refrigerant and oil can be inserted into the system without the danger of excessive moisture being present, whereby the service man who installs the unit does not have the task of properly charging the system. The unit is relatively simple to install and does not require seasonal removals and replacements as do many of the room type air conditioning units being manufactured at present. By positioning the high side compartment completely outside the building, the very best of cooling is provided for the machinery therein and the noise therefrom will be insulated from the living quarters of the building. The unit is provided with simple and effective means for removing the condensate from the evaporator and with a water spray system which will operate to quickly cool the condenser during overload periods. By connecting the low side compartment in parallel with a portion of a hot air system, it is not necessary to install a separate duct system for the air conditioning unit.

Without further description it is thought that the features and advantages of the invention will be readily apparent to those skilled in the art, and it will of course be understood that various changes and modifications in construction may be resorted to, without departing from the spirit of the invention and scope of the appended claims.

What is claimed is:

1. In combination, an enclosure to be cooled having an opening through an outer wall, a casing positioned over said opening and secured to the outside surface of said wall, said casing having open ends and fan means positioned therebetween for circulating outside air therethrough, a compressor and condenser secured in said casing, a door pivotally secured over each open end in a manner to shield said open ends when in open position and to cover said open ends when in closed position, an evaporator secured within said enclosure with connecting conduits to said condenser and compressor extending through said opening, and means for circulating the air within said enclosure into contact with said evaporator.

2. In combination, an enclosure having an outer wall which is provided with an opening therethrough, a casing which is secured outside said enclosure, a condenser positioned within said casing, an evaporator connected to said condenser by flexible tubing so that the evaporator can be inserted through said opening and secured within a low side compartment, said low side compartment being positioned in parallel with a portion of a hot air duct, and means for controlling the flow of air from said duct through said low side compartment.

3. In combination with the outside wall of a building having a duct disposed along the inside of said wall and having an opening through said wall, a high side compartment and a low side compartment, said low side compartment mounted on the inside of said wall below said duct and above said opening, an evaporator mounted within said low side compartment, said high side compartment comprising a casing mounted on the outside of said wall completely enclosing said opening, a compressor, condenser and fan means mounted within said high side compartment, flexible tubing interconnecting said evaporator, compressor and condenser, two openings disposed in two sides of said casing, said condenser and said fan means mounted horizontally in line with said two openings so that said fan means operates to cause a horizontal air circulation into one of said two openings, over said condenser and out of the other of said openings, two openings disposed in two sides of said low side compartment, a pair of ducts, each of said pair of ducts mounted to enclose one of said openings in said sides of said low side compartment, and connected to said duct disposed along said wall, damper means associated with said pair of ducts and operable to one position to effectively place said low side compartment within said duct disposed along said wall and operable to another position to effectively remove said low side compartment from said duct disposed along said wall.

4. In a combination as claimed in claim 3, a screen mounted over each of said openings in two sides of said casing to protect said high side compartment, and a door pivotally mounted over each of said openings in two sides of said casing to shield said high side compartment when said doors are in an open position, and to seal said

high side compartment from the weather when said doors are in a closed position.

5. In a combination as claimed in claim 4, a tray mounted below said evaporator whereby any condensate forming on said evaporator drips into said tray, a flexible tube connected to said tray and disposed adjacent said screen mounted over said one of said two openings in said casing whereby any condensate in said tray is gravitationally fed over the surface of said screen.

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