Dec. 11, 1956 P. W. WYCKOFF 2,773,675

AIR CONDITIONER

Filed Aug. 22, 1952 2 Sheets-Sheet 1

Fig. 1.

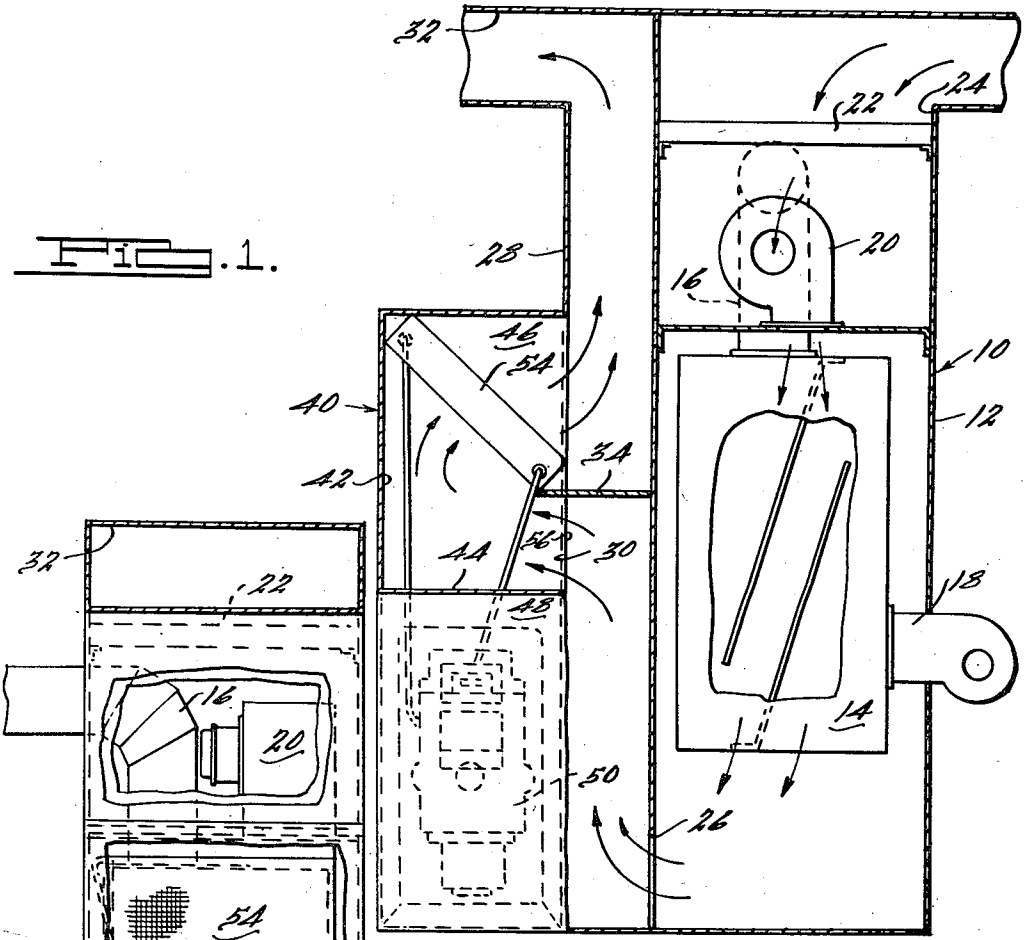
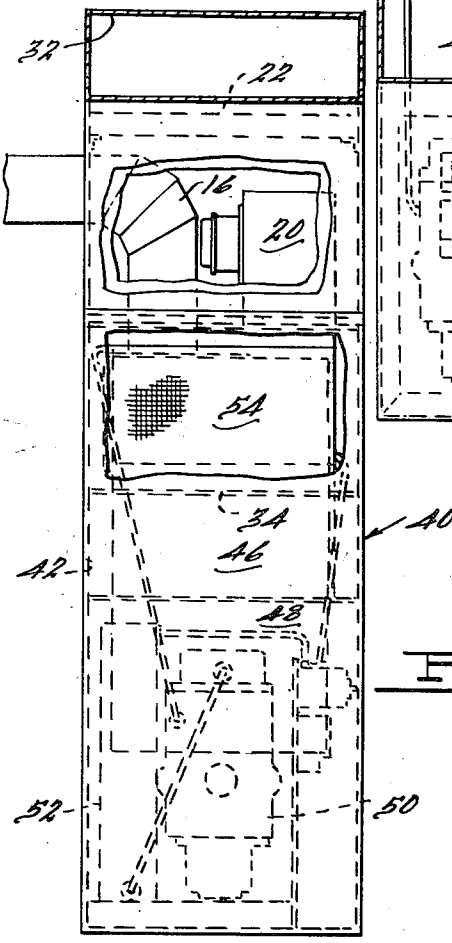


Fig. 2.



INVENTOR.
Paul W. Wyckoff.
BY
Harness and Harris
ATTORNEYS.

Dec. 11, 1956 P. W. WYCKOFF 2,773,675

AIR CONDITIONER

Filed Aug. 22, 1952 2 Sheets-Sheet 2

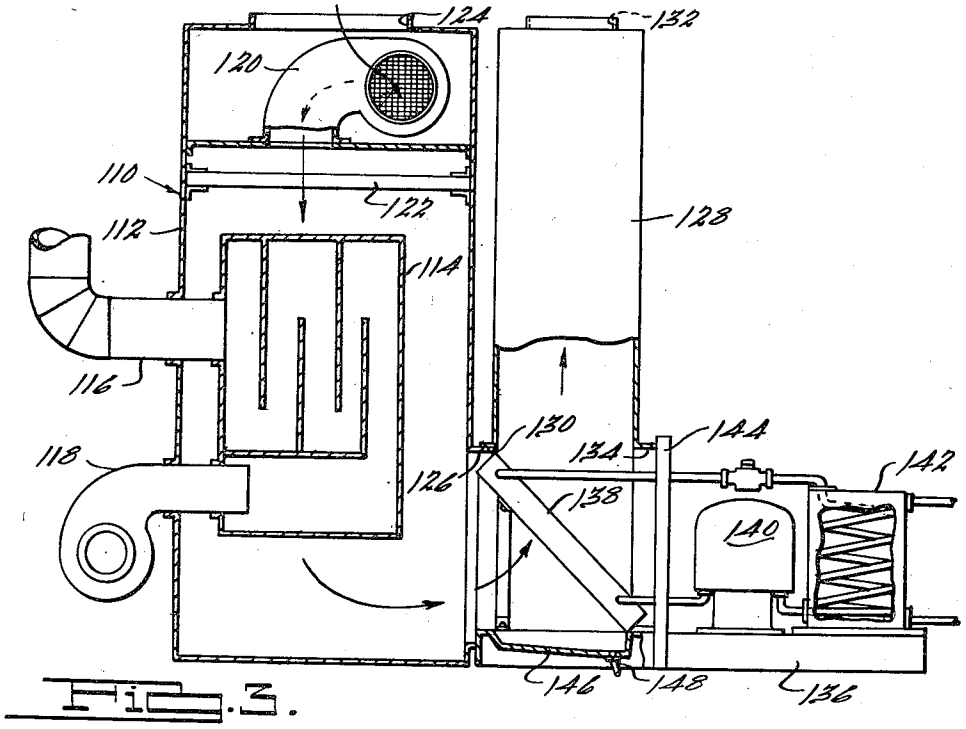


Fig. 3.

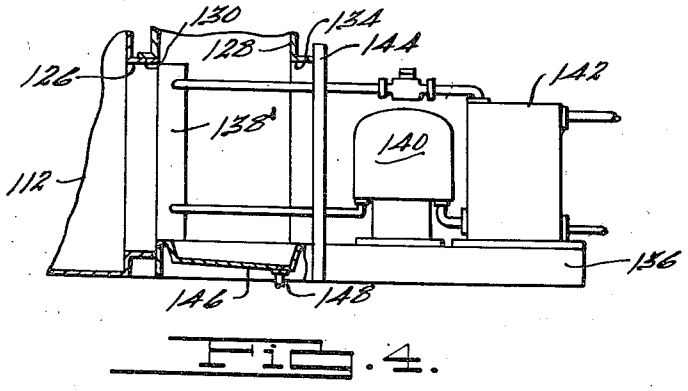


Fig. 4.

INVENTOR.
Paul W. Wyckoff.
BY
Harness and Harris
ATTORNEYS

United States Patent Office 2,773,675 Patented Dec. 11, 1956

2,773,675

AIR CONDITIONER

Paul W. Wyckoff, Dayton, Ohio, assignor to Chrysler Corporation, Highland Park, Mich., a corporation of Delaware

Application August 22, 1952, Serial No. 305,859

12 Claims. (Cl. 257—8)

This invention relates to residential air conditioners and more particularly, to a novel combination of a furnace and cooling unit to provide year round air conditioning.

Heretofore, when it has been desired to combine a cooling unit and a furnace so that the heating ducts and the blowers of the furnace may be utilized in the summer for cooling, it has been necessary to do considerable installation work reconverting the ducts to provide the new air paths required by the combination of the furnace and cooling units. This is expensive and cumbersome for the extensive labor required in reforming the ducts causes the installation cost to be extremely high.

It is a principal object of this invention to so arrange the furnace and cooling units that a heating unit can first be installed in the building and at a later date, when the owner feels like making an additional investment, a cooling unit may be added with no additional duct work required. The cooling unit can thus be installed with no installation costs except for the usual plumbing and electrical power connections. It is to be understood, of course, that the initial installation could include both the furnace and cooling unit if desired.

It is a particular object of this invention to provide a furnace having means forming an air path which accommodates the movement of air downward past a heat exchanger and then upwardly in a duct which is operatively associated with a cooling coil to accommodate selective cooling of the air prior to its discharge to the rooms to be conditioned.

In the drawings:

Figure 1 is a front elevation, partly in section, of a device incorporating my invention;

Figure 2 is a side elevation, partly in section, of the device illustrated in Figure 1;

Figure 3 is a side elevation, partly in section, of a modified form of the invention; and

Figure 4 is a fragmentary view showing a modified form of the invention generally resembling the Figure 3 form of the invention, but having the position of the evaporator coil altered.

Referring to Figures 1 and 2 of the drawings, it will be seen that a furnace 10 is provided with a casing 12 containing a heat exchanger 14 which is connected with a flue 16 and has a conventional oil burner 18 extending into it. It is to be understood that a gas burner or other type of heating device could be substituted for the oil burner 18. A blower and scroll assembly 20 is located above the heat exchanger 14 and a filter 22 is located upstream of the blower and the heat exchanger. The casing 12 is provided with an air inlet opening 24 adjacent the top thereof and is provided with an air outlet opening 26 in a side wall adjacent the base of the casing.

This furnace is adapted to receive air through opening 24 while the blower and its scroll assembly 20 draw air downwardly through the filter 22 and discharge the air over the heat exchanger 14 to heat the air when controls, which are not illustrated, dictate that the oil burner 18 is in operation.

A vertically extending duct 28 is located adjacent the furnace casing 12 and is adapted to receive air from the casing 12 through opening 26 so that the air may travel upwardly through duct 28 for discharge from an outlet 32. The outlet 32 is adapted to be connected to ducting leading to the various rooms to be conditioned in accordance with conventional practice.

The duct 28 is provided with an additional opening 30 in its side wall, and this opening may be covered with a cover plate, not shown, when a cooling unit is not desired. However, when a cooling unit is desired and installed, as illustrated in Figures 1 and 2, the opening 30 is adapted to cooperate with the cooling unit to define an air path in which a cooling coil is interposed. A baffle 34 is inserted in the duct 28 to direct the air therefrom over the cooling coil.

A cooling unit 40 includes a housing 42 having a horizontal partition 44 dividing the housing into upper and lower compartments 46 and 48 respectively. The lower compartment 48 houses a compressor 50 and water-cooled condenser 52 of a conventional refrigeration apparatus while the compartment 46 houses an evaporator coil 54 which is operatively connected thereto. The evaporator 54 is preferably disposed in a slanted condition in compartment 46, and compartment 46 is provided with an opening 56 which is in registry with the opening 30 in duct 28. The previously mentioned baffle 34 is preferably positioned immediately below the coil 54 and intermediate the upper and lower edges of openings 30 and 56. The air which is rising in duct 28 is thus directed into compartment 46 by baffle 34, and after being cooled by contact with evaporator coil 54, it is returned to duct 28 for additional upward movement and delivered to the rooms to be conditioned.

It should be noted that the only alteration of the furnace or the ducting that is required to accommodate the cooling unit, is the incorporation of opening 30 in duct 28 which may be accomplished by the removal of a cover plate. Baffle 34 must also be added although it could, if desired, be carried by the housing 42 of the cooling unit.

Referring to Figures 3 and 4 of the drawings, it will be seen that a modified form of the invention is illustrated and that furnace 110 is provided with a casing 112 containing a heat exchanger 114 which is connected with a flue 116 and has a conventional oil burner 118 extending into it. The furnace generally resembles the furnace illustrated in Figures 1 and 2, and it is to be understood that a gas burner or other type of heating device could be substituted for the oil burner 118. A blower and scroll assembly 120 is located above the heat exchanger 114, and a filter 122 is interposed between the blower and the heat exchanger. The casing 112 is provided with an air inlet opening 124 in its upper surface and is provided with an air outlet opening 126 in a side wall adjacent the base of the casing.

This furnace 110 is adapted to receive air through opening 124 while the blower and its scroll assembly 120 discharge air downwardly through the filter 122 and over the heat exchanger 114 to heat the air when controls, which are not illustrated, dictate that the oil burner 118 is in operation.

A vertically extending duct 128 is located adjacent the furnace casing 112 and is provided with a cooperating opening 130 which is in registry with the opening 126 and adapted to receive air from the casing 112 so that the air may travel upwardly through duct 128 for discharge from an outlet 132. The outlet 132 is adapted to be connected to ducting leading to the various rooms to be conditioned in accordance with conventional practice.

The duct 128 is provided with an additional opening 134 in its external side wall, and this opening 134 is

aligned with the openings **126** and **130** and may be covered with a cover plate, not shown, when a cooling unit is not desired. However, when a cooling unit is desired and installed, as illustrated in Figure 3, the opening **134** is adapted to receive a portion of the cooling unit.

The cooling unit includes a base **136** on which an evaporator coil **138**, a compressor **140**, and a conventional water-cooled condenser **142** are mounted and connected in refrigerant flow relationship. In addition, the base includes a transverse partition **144** which is adapted to close the opening **134** when the cooling unit is placed in assembled relationship with the furnace **110** and duct **128**. The base **136** preferably includes a portion **146** serving as a drain pan to collect evaporator condensate. A conventional connection **148** may be provided to conduct the condensate to a sewer.

The parts of the cooling unit are so arranged that the evaporator **138** is positioned on one side of the partition **144** while the compressor and condenser are positioned on the other side of the partition. The components of the cooling unit are so proportioned in size relative to duct **128** and its opening **134** that they may be assembled with the evaporator coil **138** positioned in the U-shaped air path defined by the casing **112** and duct **128** so that during summer months the air discharged downwardly by the blower and scroll assembly **120** will be cooled as it passes over the evaporator coil **138** and is discharged upwardly in duct **128**.

In the Figure 3 form of the invention, the evaporator coil **138** is illustrated as being mounted in an inclined position so that it extends substantially diagonally across the lower portion of the duct **128**. Figure 4 illustrates a modified form of the invention in which the position of the evaporator coil is altered. In the Figure 4 form of the invention, the evaporator coil **138'** is mounted vertically on the forwardmost portion of the base and it is so shaped that its face area corresponds to the area of openings **126** and **130**. The evaporator coil **138'** is positioned relative to the partition **144** so that when the cooling unit is assembled with the duct **128** and the partition **144** closes the opening **134** in the duct **128** the evaporator coil **138'** is located in substantially the plane of openings **126** and **130**. The operation of the unit is substantially identical to that of the Figure 1 form of the invention.

I claim:

1. An air conditioning unit comprising a furnace having a vertically extending casing and a discharge duct mounted adjacent said furnace casing in parallel vertical relation thereto, said furnace casing and said discharge duct being provided with a fluid flow connection adjacent their respective base portions to define a generally U-shaped air path extending downwardly through said furnace casing and upwardly through said discharge duct, air propelling means within the upper portion of said casing adapted to cause air to travel said air path, apparatus for heating air within the lower portion of said casing, said discharge duct being provided with a first opening in a side wall thereof, and a cooling device including a compressor, a condenser, a housing defining an evaporator compartment having a second opening in a side thereof and an evaporator located in said compartment, said cooling unit being mounted with said first and second openings in fluid flow communication, and a baffle in said duct between the upper and lower extremities of said openings adapted to cooperate with said openings to direct air travelling upwardly in said duct into said evaporator compartment over said evaporator and back to said duct downstream of said baffle.

2. An air conditioning unit comprising a furnace having a vertically extending casing defining a first downwardly extending air path therein, a heat exchanger mounted in said casing and in said air path, duct means mounted adjacent said furnace casing and defining a second upwardly extending air path, said furnace casing and said discharge duct being provided with a fluid flow connection adjacent their respective base portions so that said first and second air paths cooperate to define a generally U-shaped air path extending downwardly through said furnace casing and upwardly through said discharge duct, air propelling means within said casing adapted to cause air to travel said U-shaped air path, said discharge duct being provided with a first opening in a side wall thereof, and a cooling device of the compressor, condenser, evaporator type including a housing defining an evaporator compartment having a second opening in a side thereof and an evaporator located in said compartment, said cooling unit and duct being mounted with said first and second openings in fluid flow communication and a baffle in said duct between the upper and lower extremities of said openings adapted to cooperate with said openings to direct air travelling upwardly in said second air path into said compartment, over said evaporator and back to said duct downstream of said baffle.

3. An air conditioning unit comprising a furnace casing and a discharge duct arranged in parallel vertical relation and a cooling unit of the compressor, condenser evaporator type including a casing defining an evaporator compartment, said furnace casing and said discharge duct being provided with means adjacent the bores thereof defining a first fluid flow connection between said casing and said duct and means providing a second fluid flow connection between said duct and said evaporator compartment, said furnace casing, said duct, said first fluid flow connection, said second fluid flow connection and said evaporator compartment cooperating to define an air path that extends downwardly through said casing and upwardly through said duct and evaporator compartment, apparatus for heating air located within the lower portion of said casing and air propelling means within said casing adapted to force air through said air path.

4. An air conditioning unit comprising a furnace having a vertically extending casing and a discharge duct mounted adjacent said furnace casing in parallel vertical relation thereto, said furnace casing and said discharge duct being provided with a fluid flow connection adjacent their respective base portions to define a generally U-shaped air path extending downwardly through said furnace casing and upwardly through said discharge duct, air propelling means within said casing adapted to cause air to travel said air path, apparatus for heating air located within the lower portion of said casing said discharge duct being provided with a first opening in a side wall thereof, and a cooling device including a casing defining an upper compartment having an opening in a side wall thereof positioned in registry with said first opening in said duct and a lower compartment, an evaporator mounted in said last mentioned casing in said upper compartment and a compressor and condenser mounted in said lower compartment, baffle means carried transversely of said duct intermediate the upper and lower limits of said registered openings whereby air which is travelling upwardly in said duct is directed into said evaporator compartment over said evaporator and back to said duct downstream of said baffle.

5. An air conditioning unit comprising a furnace having an air discharge duct operatively connected thereto to define an air path, a blower in said furnace adapted to move air through said furnace and said duct, said furnace having a heat exchange device mounted therein below said blower, said discharge duct being provided with an opening in a side wall thereof, a cooling device including a base, an evaporator, a compressor and a condenser supported as a unitary assembly on said base, said cooling unit being mounted with a portion thereof extending through said opening so that said evaporator and a portion of said base are positioned in said duct in said air path and said compressor, condenser and

another portion of said base are supported outside of said duct and removable closure means for covering said opening.

6. An air conditioning unit comprising a furnace casing and a discharge duct arranged in substantially parallel vertical relation and provided with means adjacent the respective bases thereof defining a fluid flow connection between said casing and said duct to provide an air path that extends downwardly through said casing and upwardly through said duct, air propelling means within said casing adapted to force air through said air path, a heat exchange device mounted in said casing below said air propelling means, and a cooling device including an evaporator and refrigeration means for compressing and condensing refrigerant prior to circulation through said evaporator, said evaporator being positioned in said duct and said compressor and condenser being positioned exteriorly of said duct.

7. An air conditioning unit comprising a furnace having a vertically extending casing and a discharge duct mounted adjacent said furnace casing in parallel vertical relation thereto, said furnace casing and said discharge duct being provided with a fluid flow connection adjacent their respective base portions to define a generally U-shaped air path extending downwardly through said furnace casing and upwardly through said discharge duct, a heat exchange device mounted in said casing in said air path, air propelling means within said casing adapted to cause air to travel said air path, said discharge duct being provided with an opening in a side wall thereof, a cooling device including a base, an evaporator, a compressor and a condenser supported as a unitary assembly on said base, said cooling unit being mounted with a portion thereof extending through said opening so that said evaporator is positioned in said air path and a portion of said base is positioned in said duct with said compressor, condenser and another portion of said base supported outside of said duct, said base including a water receiving receptacle positioned below said evaporator and a drain connection for the removal of water from said receptacle so that condensate from said evaporator may be disposed of and closure means adapted to cover said opening after said evaporator is installed in said duct.

8. An air conditioning unit comprising a furnace having a vertically extending casing and a discharge duct mounted adjacent said furnace casing in parallel vertical relation thereto, said furnace casing and said discharge duct being provided with a fluid flow connection adjacent their respective base portions to define a generally U-shaped air path extending downwardly through said furnace casing and upwardly through said discharge duct, a heat exchange device mounted in said casing in said air path, air propelling means within said casing adapted to cause air to travel said air path, said discharge duct being provided with an opening in a side wall thereof, and a cooling device including a base, a transverse vertical partition mounted on said base, an evaporator positioned on one side of said partition, a compressor and condenser positioned on the other side of said partition and mounted on said base, said cooling unit being mounted with a portion thereof extending through said opening so that said evaporator is positioned in said air path and a portion of said base is positioned in said duct with said transverse vertical partition sealing said opening in said duct side wall, said compressor, condenser and another portion of said base being positioned outside of said duct.

9. An air conditioning unit comprising a furnace having a vertically extending casing provided with side walls, partition means having an opening and dividing said casing into upper and lower compartments, a heat exchange device mounted in said casing and positioned in said lower compartment, said heat exchange device including a fuel burner and means forming a passage for the discharge of products of combustion from said casing, air propelling means mounted in said casing above said partition and adapted to discharge air to be heated through the opening in said partition, into said lower compartment and into heat exchange relation with said heat exchange device, said casing having an opening in a side wall thereof below said heat exchange device for the discharge of air from said lower compartment, wall structure defining a generally vertical discharge path for air in fluid flow communication with said last mentioned opening so that said air propelling means, upper and lower compartments and wall structure cooperate to define a generally U-shaped path for air, and a cooling unit of the compressor, condenser and evaporator type consisting of a unitary assembly positioned with the evaporator thereof mounted within said path and the compressor and condenser of said unit located adjacent to but externally of said path.

10. An air conditioning unit comprising a furnace having a vertically extending casing provided with a base portion and side walls, partition means having an opening and dividing said casing into upper and lower compartments, a heat exchange device mounted in said casing and positioned in said lower compartment, air propelling means mounted in said casing above said partition and adapted to discharge air to be heated through the opening in said partition, into said lower compartment and into heat exchange relation with said heat exchange device, said casing having an opening in a side wall thereof below said heat exchange device for the discharge of air from said lower compartment, wall structure defining an air duct adjacent one side of the furnace extending upwardly from the level of said base portion and in fluid flow communication with said last mentioned opening so that said air propelling means, upper and lower compartments and wall structure cooperate to define a generally U-shaped path for air, and a cooling unit of the compressor, condenser and evaporator type consisting of a unitary assembly positioned with the evaporator thereof mounted in heat exchange relation with the air in said duct and the compressor and condenser of said unit located adjacent to but externally of said path.

11. An air conditioning unit comprising a furnace having a vertically extending casing provided with side walls, partition means having an opening and dividing said casing into upper and lower compartments, a heat exchange device mounted in said casing and positioned in said lower compartment, air propelling means mounted in said casing above said partition and adapted to discharge air to be heated through the opening in said partition, into said lower compartment and into heat exchange relation with said heat exchange device, said casing having an opening in a side wall thereof below said heat exchange device for the discharge of air from said lower compartment, wall structure defining a generally vertical discharge path for air in fluid flow communication with said last mentioned opening so that said air propelling means, upper and lower compartments and wall structure cooperate to define a generally U-shaped path for air, said wall structure being provided with a first opening in a wall thereof, and a cooling device including a casing defining an upper compartment having an opening in a side wall thereof positioned in registry with said first opening in said wall structure and a lower compartment, an evaporator mounted in said last mentioned casing in said upper compartment and a compressor and condenser mounted in said lower compartment, baffle means carried transversely of said wall structure intermediate the upper and lower limits of said registered openings whereby air which is travelling upwardly in said wall structure is directed into said evaporator compartment over said evaporator and back to said wall structure downstream of said baffle.

12. An air conditioning unit comprising a furnace having a vertically extending casing provided with side walls, partition means having an opening and dividing said casing into upper and lower compartments, a heat exchange device mounted in said casing and positioned in said lower

compartment, air propelling means mounted in said casing above said partition and adapted to discharge air to be heated through the opening in said partition, into said lower compartment and into heat exchange relation with said heat exchange device, said casing having an opening in a side wall thereof below said heat exchange device for the discharge of air from said lower compartment, wall structure defining a generally vertical discharge path for air in fluid flow communication with said last mentioned opening so that said air propelling means, upper and lower compartments and wall structure cooperate to define a generally U-shaped path for air, said wall structure being provided with a first opening in a wall thereof, and a cooling device including a base, a transverse vertical partition mounted on said base, an evaporator positioned on one side of said partition, a compressor and condenser positioned on the other side of said partition and mounted

on said base, said cooling unit being mounted with a portion thereof extending through said opening so that said evaporator is positioned in said air path and a portion of said base is positioned in said duct with said transverse vertical partition sealing said opening in said wall structure, said compressor, condenser and another portion of said base being positioned outside of said air path.

References Cited in the file of this patent

UNITED STATES PATENTS

2,022,835	Whiteley	Dec. 3, 1935
2,126,931	Sorsoleil	Aug. 16, 1938
2,265,272	Ditzler	Dec. 9, 1941
2,598,397	Levine	May 27, 1952
2,699,922	Herbst	Jan. 18, 1955