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COOLING MEANS FOR ASSEMBLY WITH A COUNTERFLOW FURNACE

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FIG. 1.

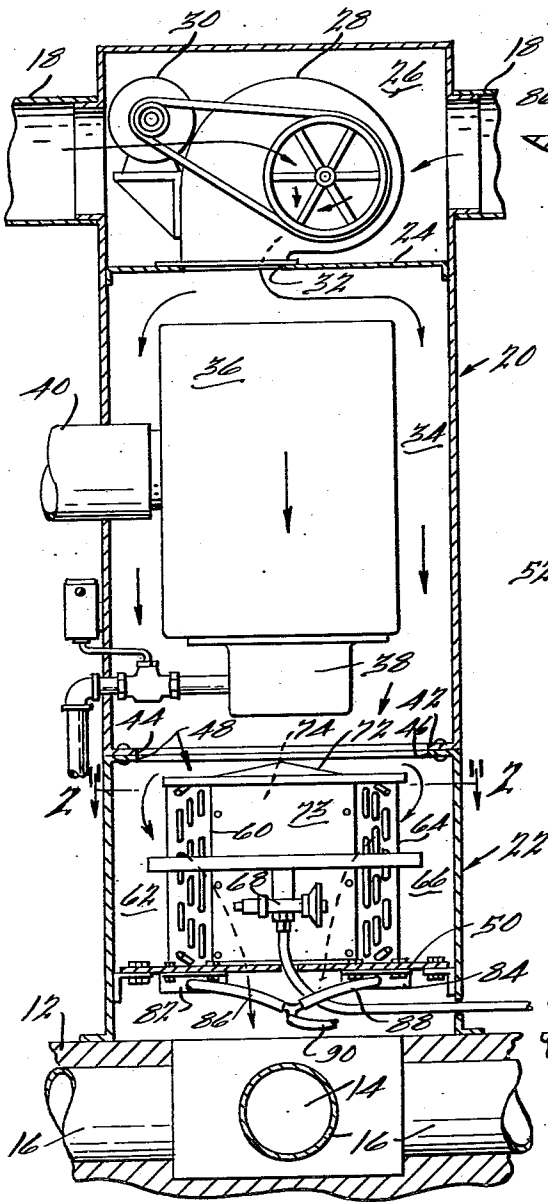
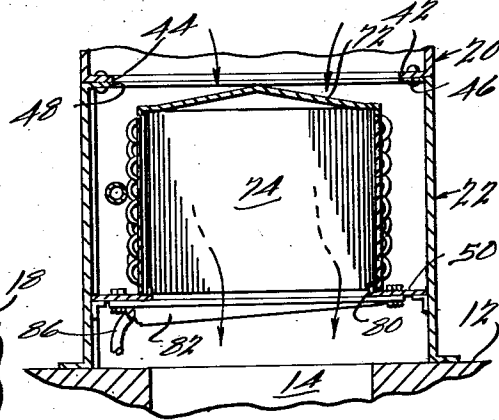
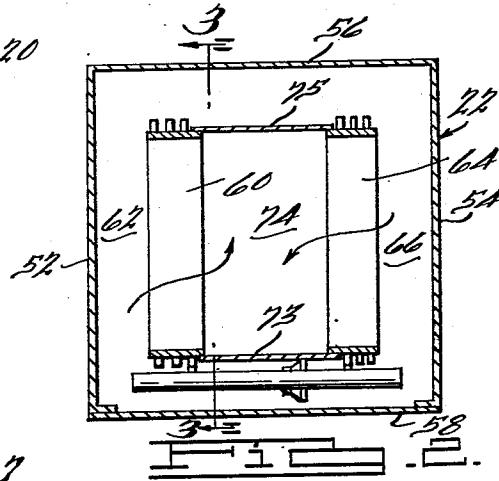
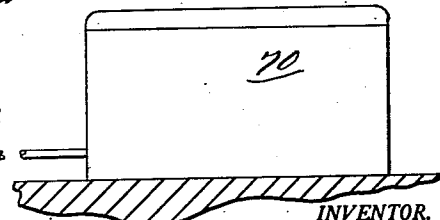


FIG. 3.



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COOLING MEANS FOR ASSEMBLY WITH A COUNTERFLOW FURNACE

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1 Claim. (Cl. 62—140)

This invention relates to a cooling coil package for use with a standard counterflow furnace.

The air conditioning industry is in a period of rapid development of cooling coil packages which may be assembled with standard furnaces with a minimum of alterations to provide air heating and cooling means that use the same blower for circulating the air and the same distribution system for delivering the air to remote places in a building. One type of furnace that is in common commercial use is known as a counterflow furnace and it generally consists of a casing having an air inlet adjacent its upper end and a blower that blows air downwardly through the casing and over a heat exchanger and discharges the air adjacent the bottom of the furnace casing.

It is a principal object of this invention to provide a package containing a cooling coil means that may be inserted beneath a standard counterflow furnace casing.

It is also an object of this invention to provide a casing containing a cooling coil means which will take up no more floor area than the original counterflow casing. This is an important feature for frequently counterflow furnaces are installed in cramped locations in homes such as installations in closets.

It is also an object of the invention to provide a casing with cooling coil means for insertion below a counterflow furnace that will offer a minimum of air flow resistance through the coil unit so that a standard furnace blower will be capable of forcing the air through the furnace, the cooling coil means and distribution ducts.

It is a further object of the invention to provide means for the collection of and drainage of condensate water from the cooling coil unit as it would be undesirable if the air which was flowing through the cooling coil blew the water from the coil unit into the distribution duct system.

In the drawings:

Fig. 1 is a vertical sectional view of a counterflow furnace installation having my improved cooling unit installed below the furnace casing;

Fig. 2 is a horizontal sectional view taken on the line 2—2 of Fig. 1; and

Fig. 3 is a transverse vertical sectional view taken on the line 3—3 of Fig. 2.

In Fig. 1 a furnace and air conditioning assembly 10 is illustrated as mounted on a floor 12 of a building. The floor 12 in accordance with a common practice, includes a pit or plenum chamber 14 and a plurality of air distribution ducts 16 extending laterally therefrom. The furnace and air conditioning assembly 10 is installed over the pit 14 in the floor so that the furnace and air conditioning assembly 10 may discharge air downwardly into the pit 14 for distribution throughout the building by ducts 16. The furnace and air conditioning assembly 10 is also connected adjacent its upper portion to a plurality of return air ducts 18.

The furnace and air conditioning assembly 10 includes

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casing means 20 which houses a conventional counterflow furnace and an auxiliary casing means 22 which is mounted below the casing 20 and contains my cooling unit assembly.

The casing means 20 is provided with a partition 24 which defines an upper plenum chamber 26 that is in fluid flow communication with the return air ducts 18. A conventional blower 28 and electric motor 30 for driving the blower are mounted in chamber 26. The partition 24 is provided with an opening 32 and the scroll of blower 28 is mounted for discharge of air through the opening 32 into a chamber 34 in which a conventional furnace heat exchanger 36 is mounted. A burner 38 and a discharge flue 40 for the discharge of combustion gases are connected with the bottom and side respectively, of heat exchanger 36. The bottom of furnace casing 20 is in the form of a partition 42 having an air discharge opening 44 provided therein for the downward discharge of air from compartment 34.

My cooling unit assembly is mounted within an outer casing 22 which is located intermediate the furnace casing 20 and the floor 12. The casing 22 is provided with a top surface 46 that is adapted to register with the partition 42 of furnace casing 20. The top surface 46 is provided with an opening 48 which registers with the opening 44 in the furnace casing 20 and accommodates the admission of air to the casing 22 from compartment 34 of the furnace casing. The flow air is, of course, induced by operation of blower 28. The casing 22 is further provided with an open bottom so that when the casing 22 is mounted on floor 12 in registry with the pit 14 air which is discharged downwardly out the bottom of casing 22 will ultimately reach the radial discharge ducts 16.

The outer casing 22 is provided with a transverse floor structure 50 and preferably has parallel side walls 52 and 54 which are connected by a pair of end walls 56 and 58. An evaporator coil 60 of generally rectangular shape is mounted on floor structure 50 in parallel relationship with side wall 52, but is spaced inwardly therefrom to define an air space 62 between the coil 60 and the side wall 52. Similarly, a coil 64 is carried by floor structure 50 in parallel spaced relation to side wall 54 of casing 22 so that an air space 66 is formed between the coil 64 and side wall 54.

The coils 60 and 64 operate as evaporator coils of a conventional refrigeration system including an expansion valve 68 and a remotely located unit 70 including a conventional compressor and condenser. It is to be understood that although coils 60 and 64 have been illustrated in a vertical position they could be inclined slightly without departing from my invention which contemplates only that they be generally upright and substantially vertical.

A cover 72 is positioned across the top of coils 60 and 64 to deflect air entering casing 22 through opening 48 so that the air will ultimately be forced to air space 62 or air space 66. A pair of plates 73 and 75 extend between the respective ends of the coils 60 and 64 and cooperate with the coils 60 and 64 and cover 72 to define an inner casing surrounding a central air passage 74 which is disposed between the coils 60 and 64 and below the cover 72. Air which is admitted to air spaces 62 and 66 is thus ultimately forced through the coils 60 and 64, respectively, and occupies the central air passage 74.

The floor structure 50 serves as a baffle to prevent air in air spaces 62 and 66 from escaping downwardly without passing through the evaporator coils 60 or 64. The floor structure 50 is provided with a central opening having a lip 80 around its periphery. The central opening is adapted to permit air to pass from the central air

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passage 74 downwardly to the pit 14 and a pair of condensate collecting pans 82 and 84 are respectively carried by the floor structure 50 immediately below the evaporator coils 60 and 64. The lip 80 which extends around the periphery of the central opening retains condensate in pans 82 and 84. The central opening in the floor structure 50 is large enough to permit water to drain from the evaporator coils 60 and 64 to their respective condensate collecting pans 82 and 84. The condensate collecting pans 82 and 84 are preferably connected by tubing 86 and 88 to a common discharge tube 90 which disposes of the condensate by gravity into a household drain or other convenient place for waste water.

In the operation of the device it will thus be seen that the blower 28 draws air from the return air ducts 18 and discharges this air downwardly through the furnace and air conditioning assembly 10. In winter operation the heat exchanger 36 will frequently be warm due to operation of the burner 38 so that the air which passes through chamber 34 will be heated and forced downwardly to pit 14 and ducts 16. It is contemplated that at this time the cooling unit assembly will be inoperative. In the summer the heat exchanger 36 and burner 38 will be inoperative and evaporator coils 60 and 64 will frequently be cool due to operation of the refrigeration system. Whenever blower 28 operates air passes downwardly through compartment 34 of furnace casing 20 and enters casing 22 through opening 48. The air is deflected to the air spaces 62 and 66 by the cover or baffle 72 so that some of the air passes through evaporator coil 60 while other air passes through evaporator coil 64 to the central air passage 74. After passing through the central air passage 74 all of the air is discharged downwardly into the pit 14 for distribution by the ducts 16.

It has been found that this construction of the cooling coil unit occupies a minimum of floor space and provides a minimum resistance to air flow due to the large coil area that is presented to the air.

I claim:

An evaporator unit including a rectangular first casing

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forming a plenum chamber and an air inlet opening in the top thereof to accommodate the admission of air, said first casing further being provided with means defining a bottom wall, a pair of spaced side walls and a pair of end walls respectively connecting said side walls, a second substantially rectangular casing mounted within said first casing, said second casing comprising substantially upright wall structure and a top wall structure cooperating to define a central air space, a portion of said upright wall structure comprising first and second flat, rectangular evaporator coils arranged in upright, spaced, parallel relationship with respect to each other, said coils being respectively spaced from the side walls of said first casing in parallel relationship therewith and adapted to accommodate the flow therethrough of air admitted through the above mentioned air inlet opening, means forming an outlet from said central air space through said bottom wall of said first casing means, the above mentioned outlet being wholly located inwardly of said upright wall structure so that said evaporator coils are disposed above portions of said bottom wall of said first casing, and a lip element extending upwardly from said bottom wall around the periphery of the above mentioned outlet, said bottom wall and lip element cooperating to define means for collecting condensate that drips from said evaporator coils and preventing such condensate from flowing through the above mentioned outlet.

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