May 19, 1959 J. D. LOVELEY 2,886,956

EVAPORATOR UNIT WITH CONDENSATE COLLECTING MEANS

Filed Dec. 22, 1954 3 Sheets-Sheet 1

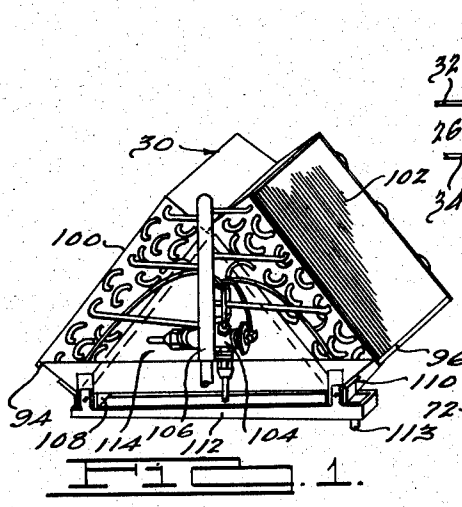



Fig. 1.

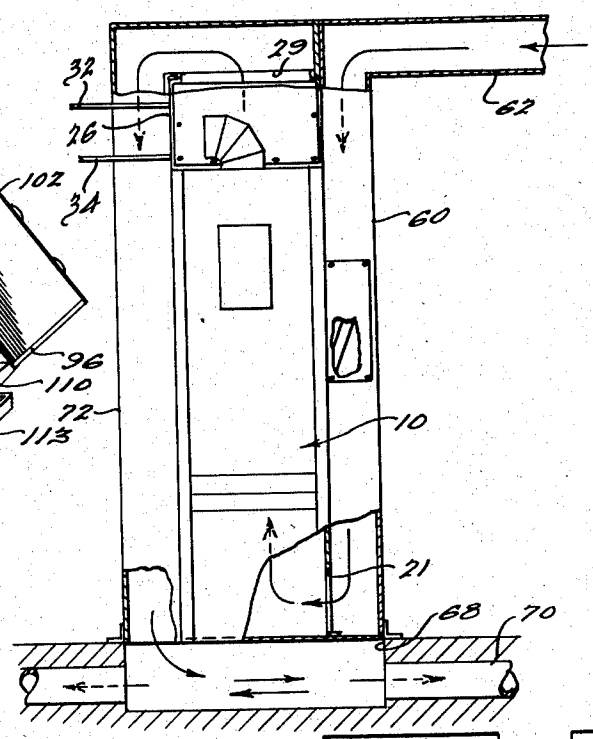
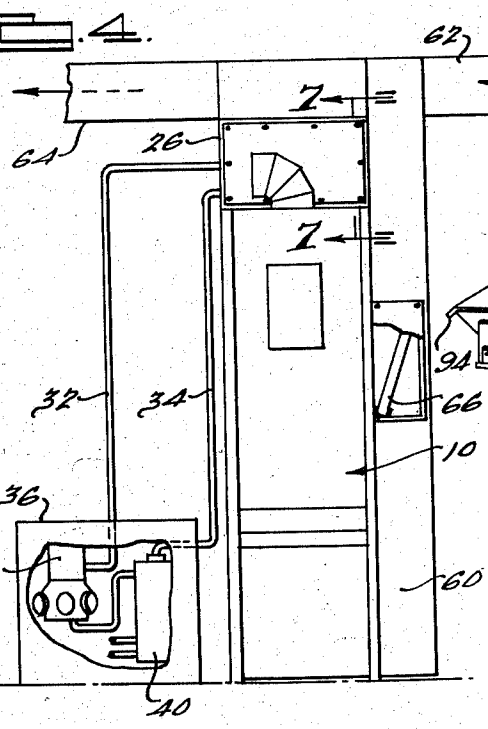



Fig. 5.

Fig. 4.



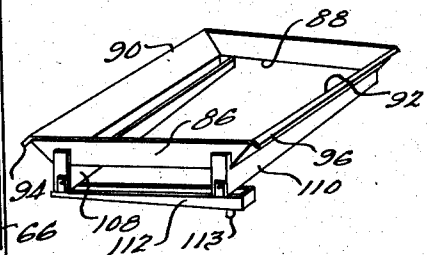




Fig. 3.

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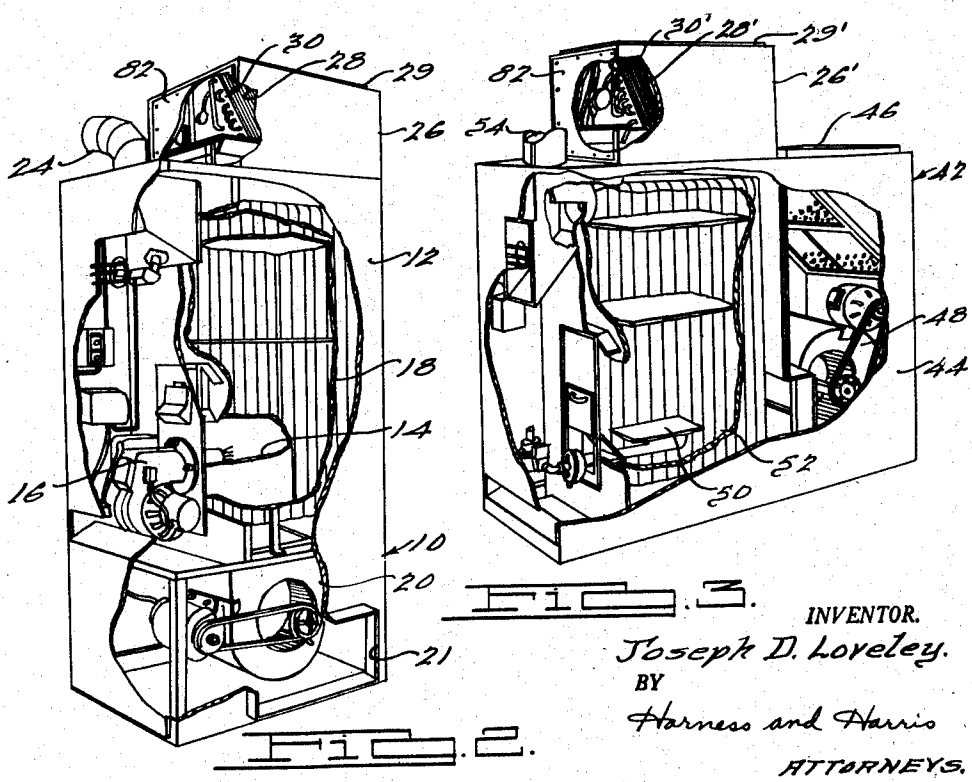



FIG. 2.

FIG. 3.

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Filed Dec. 22, 1954 3 Sheets-Sheet 3

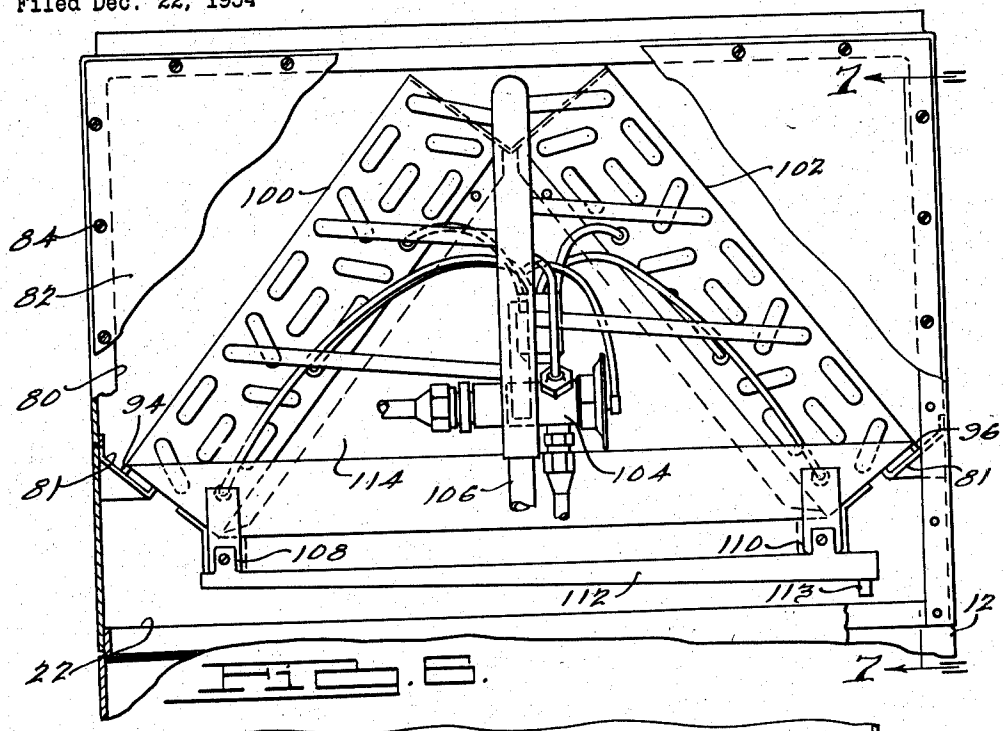



Fig. 6.

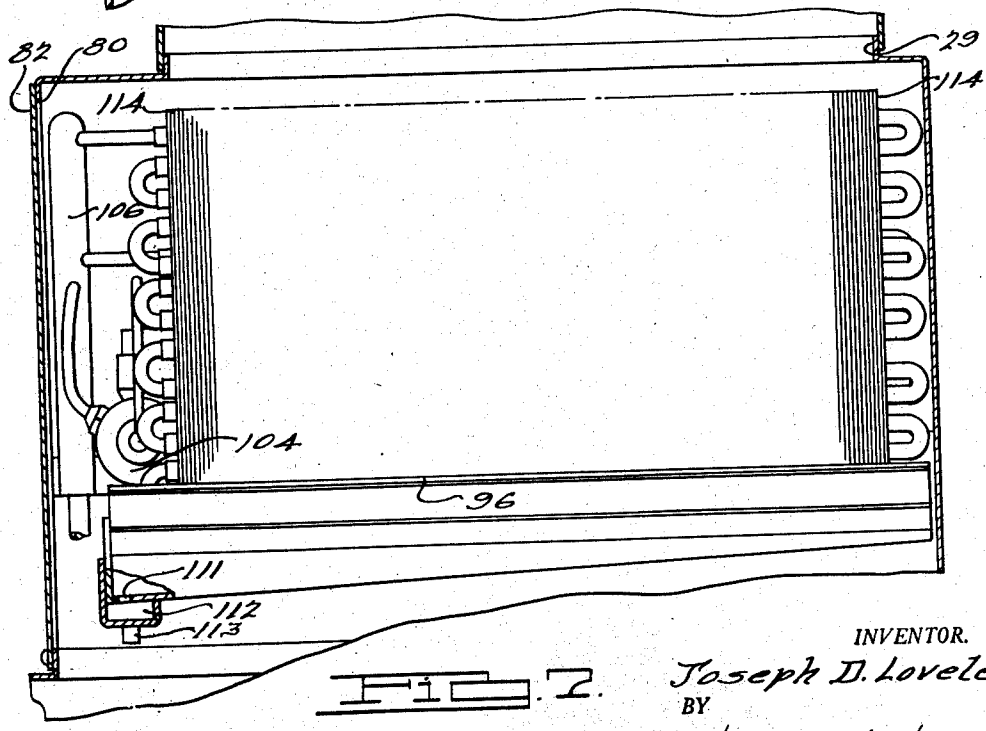



Fig. 7.

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2,886,956

# EVAPORATOR UNIT WITH CONDENSATE COLLECTING MEANS

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Application December 22, 1954, Serial No. 477,039

3 Claims. (Cl. 62—285)

This invention relates to an improved installation for an evaporator unit in a hot air furnace.

It is a principal object of this invention to provide an evaporator unit and cooperating means in a furnace casing defining a plenum to accommodate installation of the evaporator unit with a minimum of duct alterations.

It is also an object of this invention to provide an evaporator unit and cooperating furnace components to facilitate installation of an evaporator unit directly over a furnace thereby requiring no floor space either for the evaporator or for access to it beyond the floor space utilized by the furnace.

It is an additional object of the invention to provide means for mounting an evaporator coil package in association with a furnace such that access to the package for service from one direction will be adequate rather than requiring access from a plurality of directions.

It is also an object of the invention to provide an evaporator coil package or unit that may be installed at the time of installation of a furnace, or in the alternative, may be installed at a later date by merely sliding the coil package into place without the necessity of any alteration in duct work.

It is a further object of the invention to provide an evaporator coil package construction particularly adapted to provide an adequate coil surface in a small space and to provide a condensate disposal means which is fully exposed to facilitate inexpensive servicing.

In the drawings:

Fig. 1 is a perspective view of one form of an evaporator unit adapted for installation in a plenum above a hot air furnace;

Fig. 2 is a perspective view of one type of furnace showing the evaporator unit of Fig. 1 installed in a plenum above the furnace;

Fig. 3 is a perspective view of the evaporator unit of Fig. 1 installed in a plenum provided above another type of furnace;

Fig. 4 is a diagrammatic showing of one installation of the Fig. 2 type of furnace and evaporator unit;

Fig. 5 is a diagrammatic view of a modified installation of the Fig. 2 type of furnace and evaporator unit;

Fig. 6 is an enlarged fragmentary front elevation of the plenum and evaporator unit mounted on the furnace in Figs. 2, 4 and 5;

Fig. 7 is a vertical section taken on the lines 7—7 of Fig. 4 and Fig. 6; and

Fig. 8 is a perspective view of the supporting frame of the evaporator unit illustrated in Fig. 1.

In Fig. 2 a hot air furnace 10 is illustrated. This furnace is of conventional construction and has been illustrated as of the oil fired type although it is to be understood that a gas fired furnace could be used if desired. The construction of the furnace 10 includes a sheet metal jacket 12 housing a combustion chamber 14 which is heated by an oil burner 16. A heat exchanger 18 surrounds the combustion chamber and a blower 20 is provided for drawing air in through an opening 21 in jacket 12 and forcing the air upwardly through the furnace 10



over the heat exchanger 18 and outwardly through an opening 22 provided in the upper surface of the furnace 10. The opening 22 is best illustrated in Figs. 6 and 7. A flue 24 is provided on the furnace for the discharge of the combustion gases.

A box-like casing 26 defining a plenum chamber 28 is positioned on top of the furnace 10 with the casing 26 encompassing the furnace air outlet 22. The casing 26 is preferably provided with an opening 29 in its upper surface for the discharge of conditioned air. There is thus provided an air path extending upwardly through the casing 26 from furnace 10.

An evaporator unit 30 is illustrated in Fig. 1 and this evaporator coil package or unit is adapted for installation in the casing 26 in a manner to be described herein. The evaporator unit 30 is adapted to cool air that is forced through it and is adapted for connection by refrigerant lines 32 and 34 to a conventional condensing unit 36 which is diagrammatically illustrated in Fig. 4 as including a compressor 38 and a condenser 10. The condensing unit 36 may be either air cooled or water cooled.

The blower 20 of the furnace 10 is utilized for forcing air over the heat exchanger 18 and through the evaporator unit 30 and the air will be heated or cooled depending upon whether the furnace is in operation or the evaporator unit has been cooled by the condensing unit 36. Suitable controls which do not form a part of this invention may be used to control the operation of the furnace or alternatively to initiate the operation of the evaporator package unit 30 so that suitably conditioned air will be discharged from the opening 29.

In Fig. 3 an installation that resembles the installation of Fig. 2 is illustrated and the principal difference between the two figures is that the evaporator unit 30 is installed in a different type of conventional furnace in Fig. 3. A furnace 42 is illustrated in Fig. 3 in combination with the evaporator unit and is provided with a sheet metal jacket 44 having an air inlet opening 46. The jacket 44 encloses conventional components such as a blower 48 and a gas burner 50 which is positioned in a heat exchanger 52. A flue 54 is provided for the discharge of combustion gases and the blower 48 is adapted to draw air in through the opening 46 and force it over the heat exchanger 52 and discharge the air upwardly into a casing 26′ that is positioned on top of the furnace in a manner similar to that described in connection with Fig. 2. The casing 26′ has an opening 29′ on the top thereof for the discharge of air and it houses an evaporator unit 30′ of the type illustrated in Fig. 1 in a plenum defined by the casing 26′.

The furnace 10 which was described in connection with Fig. 2 is illustrated in Fig. 4 in one typical installation in which a duct 60 conducts air from the usual cold air return duct 62 so that the air is admitted to the furnace through the opening 21 of Fig. 2 for subsequent passage upwardly through the furnace and discharge from the opening 29 into a duct 64. If desired the duct 60 may be provided with a filter 66.

In some buildings a type of heating which is commonly referred to as perimeter heating is used and in such installations it is desirable for a furnace to discharge air downwardly into a pit 68 for discharge through a plurality of radial ducts 70 which extend to various parts of the building. Fig. 5 illustrates the application of the furnace 10 and casing 26 to an installation of this type. The cold air return duct 62 and vertically extending duct 60 are identical to that illustrated in Fig. 4, but a duct 72 conducts air discharged from opening 29 downward for discharge into the pit 68.

The casings 26 and 26′ are each provided with a pair of parallel tracks 81 which are respectively welded or

otherwise secured to the inner surface of opposite sides of the casing as illustrated in Fig. 6. The casings **26** and **26'** are also provided with an access opening **80** and a removable cover plate **82** which is adapted to cover the access opening **80**. Suitable screws **84** secure the cover plate in position on casing **26** or **26'**. The evaporator unit **30** is of a size adapted for longitudinal insertion through the access opening **80** as illustrated in Fig. 6. Thus the evaporator unit **30** may be installed in the casing **26** or **26'** at any time without the necessity of extensive duct work being performed and this is accomplished by reason of the fact that the evaporator unit **30** is adapted for slidable reception on a pair of tracks **81**. Temporary removal of cover plate **82** and flue **24** adapt the furnace and casing **26** for reception of the evaporator unit **30**.

The evaporator unit **30** includes a frame **86** that is most clearly illustrated in Fig. 8. The frame **86** is generally rectangular in plan view and has an opening **88** defined thereby. The frame **86** has oppositely disposed inclined side walls **90** and **92** which are respectively provided with depending lips of flanges **94** and **96**. The lip **94** is adapted to be slidably received on one of the parallel tracks **81** and the lip **96** is adapted to be received on the other of the tracks **81**. A pair of flat rectangular evaporator coils **100** and **102** are mounted on the frame structure **86** as illustrated in Fig. 1 and Fig. 6 with coil **100** resting on the inclined side wall **90** of the frame structure **86** and with coil **102** resting on the inclined side wall **92** of frame **86**. The evaporator coils **100** and **102** are operatively connected to an expansion valve **104** and a discharge header **106** in a manner well known in the art.

The frame structure **86** also includes a pair of longitudinally extending drain troughs **108** and **110** which are respectively secured to the frame structure along the inner edge of inclined side walls **90** and **92**. As illustrated in Fig. 7 the drain troughs **108** and **110** are provided with a drain hole **111** which is located above a transversely extending trough **112** which is carried by drain troughs **108** and **110** and positioned immediately below these drain troughs. A pipe **113** carries the condensate from drain trough **112**.

End plates **114** are secured to the front and back edges of the evaporator coils **100** and **102**, as illustrated in Figs. 1 and 6, to prevent air which is being forced through the coils **100** and **102** from escaping out the ends of the coils. Air is thus forced upwardly by blower **20** and passes through evaporator coils **100** and **102** for cooling thereby when the coils are in a chilled condition. Moisture which collects upon the coils is prevented from dropping off the coils by virtue of the upwardly flowing air. The moisture runs down the coils by capillary action and is deposited in the drain troughs **108** and **110**.

I claim:

1. A frame structure for supporting a pair of evaporator coils and collecting condensate therefrom comprising first and second oppositely disposed, elongated side walls each having a generally flat rectangular plate portion with an inner edge and an outer edge, said inner edges being substantially parallel and said side walls being spaced from each other to define an opening therebetween to accommodate an upward movement of air therethrough, said plate portions diverging upwardly and being adapted to serve as supports for a pair of evaporator coils, said frame structure further including first and second end portions respectively secured to each of said side walls and spanning the space therebetween to give rigidity to the frame structure, said side walls each including a structure defining a drain trough, said drain trough structures being respectively coextensive in length with the inner edge of one of said plate portions and being carried respectively by their associated plate portions in immediate proximity with and at a lower elevation than the inner edge of that plate portion, each of said side walls further including a lip depending from the aforementioned outer edge of one of said plate portions so that said lips flare outwardly from said plate portions to define a pair of spaced track elements by means of which said frame structure may be supported.

2. A frame structure for supporting a pair of evaporator coils and collecting condensate therefrom comprising first and second oppositely disposed elongated side walls each having a generally flat rectangular plate portion with an inner edge, said inner edges being substantially parallel and said side walls being spaced from each other to define an opening therebetween to accommodate an upward movement of air therethrough, said plate portions diverging upwardly and being adapted to serve as supports for a pair of evaporator coils, said frame structure further including first and second end portions respectively secured to each of said side walls and spanning the space therebetween to give rigidity to the frame structure, said side walls each including a structure defining a drain trough, said drain trough structures being respectively coextensive in length with the inner edge of one of said plate portions and being carried respectively by their associated plate portions in immediate proximity with and at a lower elevation than the inner edge of that plate portion.

3. Cooling apparatus comprising wall structure defining an air duct of rectangular horizontal section, said wall structure including parallel side walls, track elements carried by said side walls and extending inwardly thereof into the above mentioned duct, an evaporator unit supported within the duct on said track elements, said evaporator unit including a frame structure having first and second oppositely disposed, elongated side structures each having a flat, rectangular plate portion with an inner edge, said inner edge being substantially parallel and said side structure being spaced from each other to define an opening therebetween to accommodate an upward movement of air through the above mentioned duct, said plate portions diverging upwardly toward said duct side walls, first and second end portions on said frame structure respectively secured to each of said side structures and spanning a substantial portion of the aforementioned duct to give rigidity to the frame structure, said side structures each including a portion defining a drain trough, said drain trough portions being respectively coextensive in length with the inner edge of one of said plate portions and being carried respectively by their associated plate portions in immediate proximity with and at a lower elevation than the inner edge of the associated plate portion, each of said side structures resting upon one of said track elements to support said frame structure in said duct and first and second, flat evaporator coils substantially coextensive in length with said plate portions, said evaporator coils having greater heighth than thickness and respectively resting upon said plate portions and converging above the above mentioned opening.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,945,379 | Roesch | Jan. 30, 1934 |
| 2,004,255 | Trane | June 11, 1935 |
| 2,136,222 | Starr | Nov. 8, 1938 |
| 2,150,076 | Neubauer et al. | Mar. 7, 1939 |
| 2,173,280 | Tourneau | Sept. 19, 1939 |
| 2,175,396 | Hoffman | Oct. 10, 1939 |
| 2,265,272 | Ditzler | Dec. 9, 1941 |
| 2,319,062 | Holmes | May 11, 1943 |
| 2,506,257 | Whelan | May 2, 1950 |
| 2,615,687 | Simmons | Oct. 28, 1952 |
| 2,690,654 | Graham | Oct. 5, 1954 |
| 2,702,994 | Borgerd | Mar. 1, 1955 |
| 2,798,366 | Erl | July 9, 1957 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 450,340 | Great Britain | July 15, 1936 |
| 986,222 | France | Mar. 21, 1951 |