

Sept. 14, 1943.

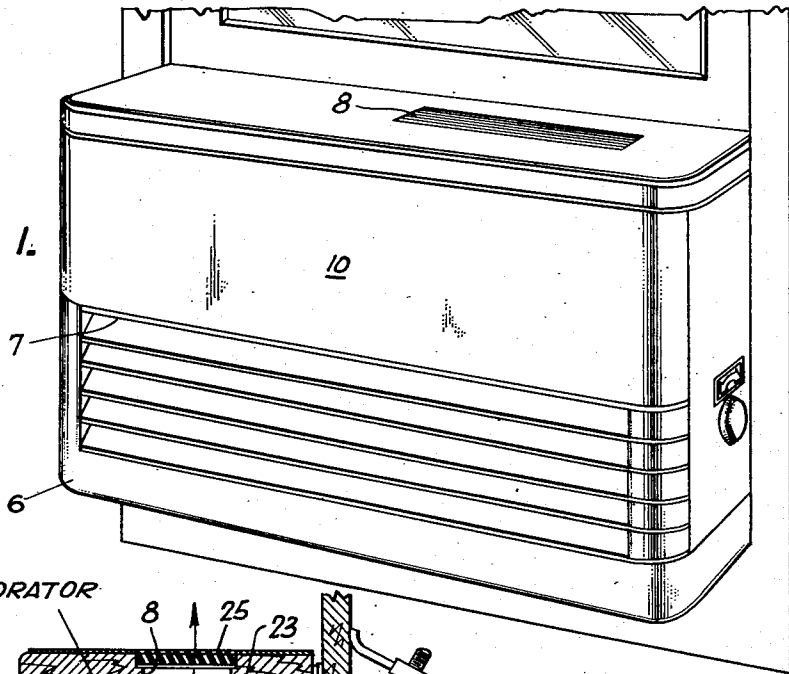
J. L. DITZLER ET AL
AIR CONDITIONING APPARATUS

2,329,342

Filed March 18, 1941

2 Sheets-Sheet 1

FIG. 1.



EVAPORATOR

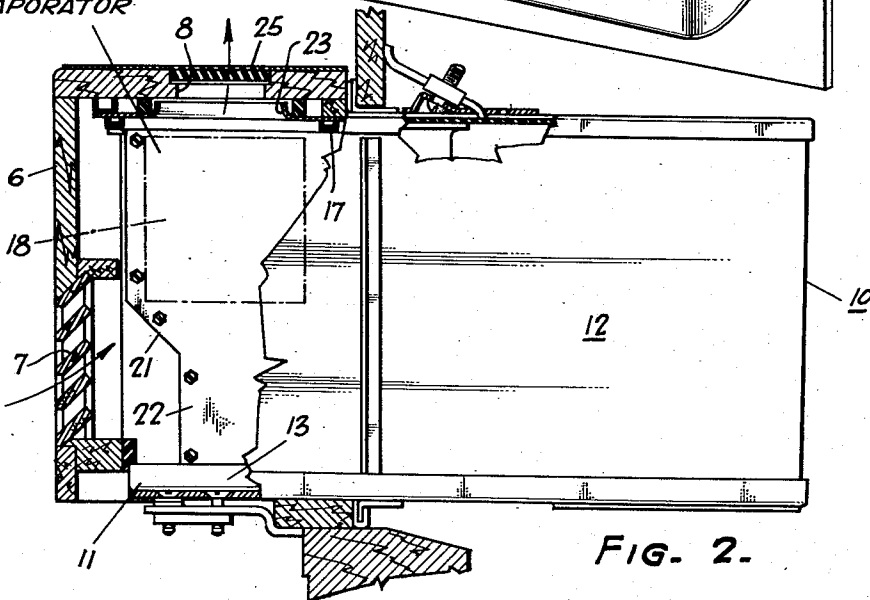
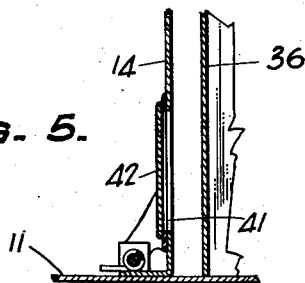


FIG. 2.

FIG. 5.



WITNESSES:

R. J. Eisinger
Andrew J. Cook

INVENTOR
JOHN L. DITZLER &
RICHARD E. HOLMES
BY *W. A. Stueger*
ATTORNEY

Sept. 14, 1943.

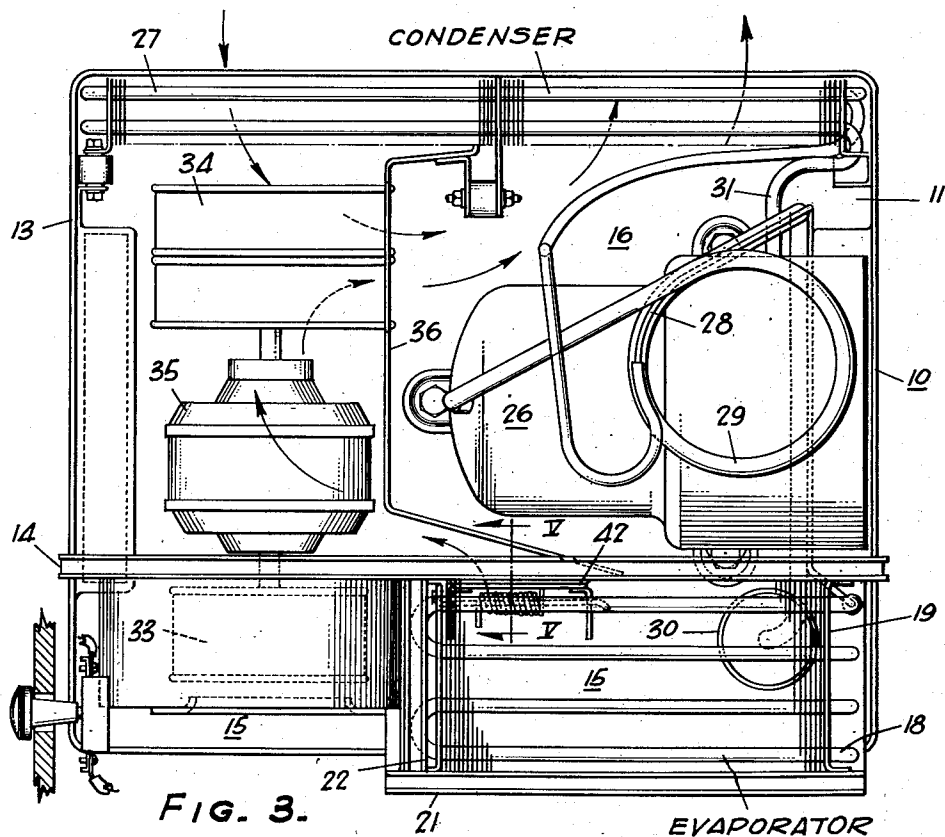
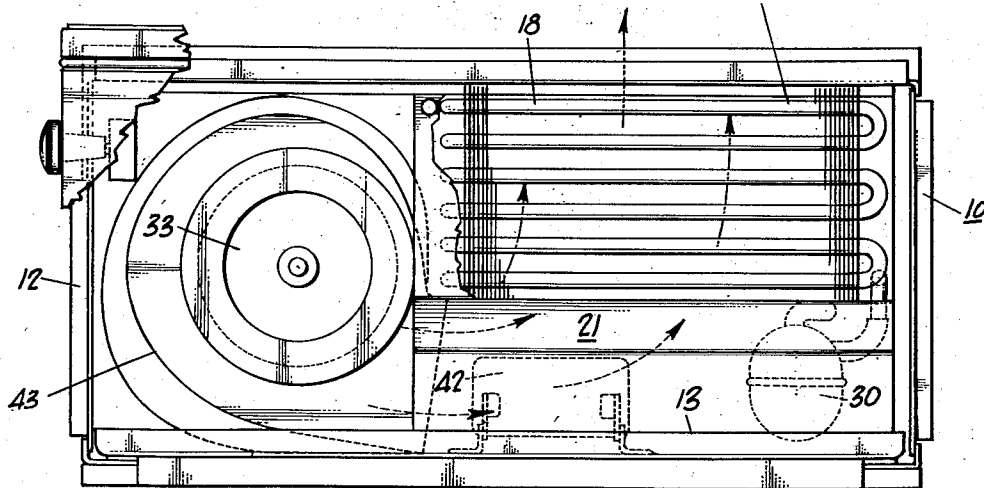
J. L. DITZLER ET AL

2,329,342

AIR CONDITIONING APPARATUS

Filed March 18, 1941

2 Sheets-Sheet 2



WITNESSES:

R. J. Eisinger
Andrew J. Cook

FIG. 4.

INVENTOR
JOHN L. DITZLER &
RICHARD E. HOLMES
BY *W. A. Steger*
ATTORNEY

UNITED STATES PATENT OFFICE

2,329,342

AIR CONDITIONING APPARATUS

John L. Ditzler and Richard E. Holmes, Springfield, Mass., assignors to Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., a corporation of Pennsylvania

Application March 18, 1941, Serial No. 384,000

3 Claims. (Cl. 62-129)

Our invention relates to air conditioning apparatus, more particularly to a self-contained unit air cooler, such as one that may be mounted in a window of a room to be cooled.

An object of the invention is to provide improved apparatus of the character set forth.

A more particular object is to provide a unit air cooler having an improved arrangement of parts therein.

A further object is to provide a unit air cooler having an improved arrangement for exhaust of air from the room.

A further object is to provide an improved arrangement of discharging air from the unit air cooler so as to reduce noise.

These and other objects are effected by our invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a perspective view of our self-contained unit air cooler mounted in a window;

Fig. 2 is an end view of the unit air cooler mounted in the window, some of the parts being shown in section;

Fig. 3 is a plan view showing the internal parts of the air cooler;

Fig. 4 is a front elevation thereof; and

Fig. 5 is a detail section taken on the line V—V of Fig. 3.

The present invention is a modification of the unit air cooler disclosed and claimed in the application of R. D. Heitchue and C. S. Cody, Serial No. 317,094.

Referring to the drawings in detail, our invention comprises a unit air cooler 10 adapted to be mounted, as shown in Figs. 1 and 2, in a window of the room to be cooled. It extends horizontally, the front portion projecting into the room and the rear portion projecting exteriorly of the room.

The air cooler includes a refrigerating system of the compression type, the parts of which are mounted on a combined base and drain pan 11 and which form therewith a removable refrigerating unit. The refrigerating unit is adapted to be slid horizontally into a mounting structure 12 which is fastened in the window and which forms a housing for the air cooler, which housing is open at the front and the back. A wooden cabinet 6, having an inlet opening 7 in the front and a discharge opening 8 in the top, encloses the portion of the air cooler projecting into the room. The base member 11 is formed with an upstanding flange 13 extending about

the periphery thereof to retain the moisture condensed from the air.

A vertical partition 14 is secured to the base member 11 and forms a division between a cooling compartment 15 and an apparatus compartment 16, which compartments are formed by the base member 11, the mounting structure 12 and the vertical partition 14. A U-shaped gasket 17 may be provided along the edge of the partition 14 to seal against the top and side walls of the mounting structure 12.

The refrigerating system includes an evaporator 18, which may comprise a conventional cross-fin coil. The evaporator is disposed in the upper right-hand portion of the cooling compartment 15, as shown in Figs. 2, 3 and 4. The evaporator may be mounted in any suitable manner, for example, it may be provided with end brackets 19 attached to the partition 14. The evaporator is enclosed in a wall structure which includes a front wall 21 and end walls 22, the partition 14 constituting a rear wall. This wall structure provides a vertical passage through which air flows upwardly in contact with the surfaces of the evaporator. As will be noted from Fig. 2, the passage extends below the evaporator to form an inlet portion.

The top wall of the mounting structure 12 is provided with a discharge opening 23 disposed directly above and centrally of the evaporator air passage, but of less width, as is shown in Fig. 2. The discharge opening 8 in the wooden cabinet 6 is disposed directly above and centrally of the discharge opening 23, and is of less width than the opening 23. The openings 23 and 8 are preferably of successively decreased length. A suitable grill 25 may be positioned in the opening 8.

The refrigerating system further includes a motor-compressor unit 26, which is preferably of the enclosed type, comprising a compressor, a motor for driving the compressor, and a fluid-tight casing enclosing both the compressor and the motor. It is disposed in the apparatus compartment 16 and mounted on the base member 11 in any suitable manner. A condenser 27, preferably of a conventional cross-fin type, is disposed in the apparatus compartment along the back, and is also mounted on the base member 11 in any suitable manner.

The refrigerating system further includes parts for connecting the evaporator, the motor-compressor unit and the condenser in a complete refrigerant circuit through which the refrigerant is circulated. Such parts include a ca-

pillary tube 28 for conveying condensed refrigerant from the condenser to the evaporator and for reducing the pressure thereof, a suction conduit 29 for conveying the vaporized refrigerant from the evaporator to the motor-compressor unit, a separating chamber or reservoir 30 interposed in the suction line to retain any liquid refrigerant leaving the evaporator, thereby preventing its admission to the inlet compressor unit, and a discharge conduit 31 for conveying the compressed refrigerant from the motor-compressor unit to the condenser. Preferably, the capillary tube and the suction conduit are soldered to each other, thereby providing a heat exchanger for transferring heat from the refrigerant in the capillary tube to the refrigerant vapor in the suction conduit.

Centrifugal fans 33 and 34 are provided for effecting flow of air through the evaporator and the condenser, respectively. They are overhung on the shaft of an electric motor 35 disposed in the apparatus compartment on the left-hand side of the unit, as shown in Fig. 3, with the shaft extending horizontally from front to back and with the front end of the shaft projecting through the partition 14 into the cooling compartment 15. The casing 34 of the evaporator fan 33 is arranged with its outlet disposed on the lower side, as shown in Fig. 4, and connected to the inlet portion of the evaporator air passage.

A partition 36 is provided in the apparatus compartment 16 to separate the portions of the compartment which are on the suction and the discharge side, respectively, of the condenser fan 34. The partition 36 is formed with a suitable opening to which the outlet of the fan 34 is connected, so that the fan 34 operates to draw the air through the left-hand portion of the condenser, and to discharge it through the right-hand portion of the compartment 16 and the right-hand portion of the condenser 27.

To provide for exhaust of room air through the unit air cooler, the partition 14 is provided with an opening 41 which is controlled by a damper 42, which is actuated in any suitable manner. As shown in Fig. 3, the partition 36 is extended to the right of the opening 41, so that the latter communicates with the compartment 16 on the suction side of the fan 34.

Operation

The refrigerating system operates in the usual manner of such apparatus. Refrigerant vapor is compressed by the motor-compressor unit 26, and circulated through the refrigerant circuit. It is condensed in the condenser 27, its pressure is reduced by the capillary tube 28 and it is vaporized in the evaporator 18, thereby extracting heat from the air circulated over the outer surfaces of the evaporator by the fan 33.

The motor 35 is energized to drive the fans 33 and 34. The fan 33 is effective to cause room air to enter through the inlet 7 in the wooden cabinet and to flow to the inlet of the fan 33. From the latter fan, the air is discharged horizontally from the lower portion of the fan 33 into the lower or inlet portion of the evaporator air passage. It then flows upwardly through the latter in contact with the outer surfaces of the evaporator. It then flows through the discharge openings 23 and 8 upwardly from the unit air cooler. As the air flows successively through the openings 23 and 8, which are of successively less width and successively less flow area, the velocity of the air is successively in-

creased. It has been found that this arrangement materially reduces the noise produced by the air cooler.

To provide for exhaust of air from the room, the damper 42 is moved to open position. Room air is then exhausted as follows: The air enters through the inlet 7 in the wooden cabinet and flows through the fan 33 to the inlet portion of the evaporator air passage. It then flows through the opening 41 to the suction side of the fan 34, and from the latter it is discharged to the right-hand portion of the apparatus compartment 16 and the right-hand portion of the condenser 27. It will be apparent, therefore, that the air which is exhausted flows through the two fans in series, that the air is removed from the cooling compartment before it passes over at least a portion of the condenser to help cool the same. This is advantageous since the room air is at a lower temperature than outside air.

While we have shown our invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof, and we desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What we claim is:

1. In a self-contained unit air cooler adapted to be mounted in a window, the combination of a housing structure including a vertical partition dividing the same into a cooling compartment and an apparatus compartment, a compressor, a condenser and a fan in said apparatus compartment, said fan effecting flow of air from outdoors over the condenser and back to outdoors, a motor disposed in the apparatus compartment for driving said fan and having its shaft projecting through said partition into said cooling compartment, a centrifugal fan disposed in said cooling compartment and having its rotor overhung on said projecting portion of said shaft, an evaporator disposed in said cooling compartment laterally of said shaft, the cooling compartment having an inlet communicating with the inlet of the centrifugal fan and having an outlet communicating with said evaporator, wall means disposed about said evaporator to form a passage through which air flows vertically into contact with said evaporator to said outlet, said passage having an inlet portion directly below the evaporator, said centrifugal fan being arranged and having its outlet connected to said inlet portion in such manner that air is discharged from the lower portion of the fan horizontally directly into said inlet portion.

2. In a unit room cooler, the combination of an evaporator, means providing a passage for flow of air vertically through said passage in contact with said evaporator, a flat horizontal inner wall disposed across the top of said passage and having an opening which is formed entirely within said inner wall and which is of materially less area and materially less width than said passage, and a flat horizontal outer wall disposed over and adjacent said inner wall and having an opening which is formed entirely within said outer wall and which is in registry with and of materially less area and materially less width than said opening in the inner wall, whereby the flow area is successively reduced and the noise is reduced.

3. In a self-contained unit air cooler adapted to be mounted in a window, the combination of a housing structure including a vertical partition

dividing the same into a cooling compartment and an apparatus compartment, each of said compartments having an inlet and an outlet for admission and discharge of air, a centrifugal fan and an evaporator disposed side by side in said cooling compartment with the centrifugal fan arranged to discharge air from the lower portion of the fan horizontally directly into the space beneath the evaporator, passage-forming means providing for flow of air from said space vertically into contact with the evaporator and thence to

said outlet, the inlet of the fan being in communication with the inlet of the cooling compartment, a compressor and a condenser disposed in said apparatus compartment and arranged in refrigerant-flow relation to said evaporator and a fan in said apparatus compartment for effecting flow of air from said inlet over said condenser and through said outlet.

JOHN L. DITZLER.
RICHARD E. HOLMES.