

Sept. 5, 1944.

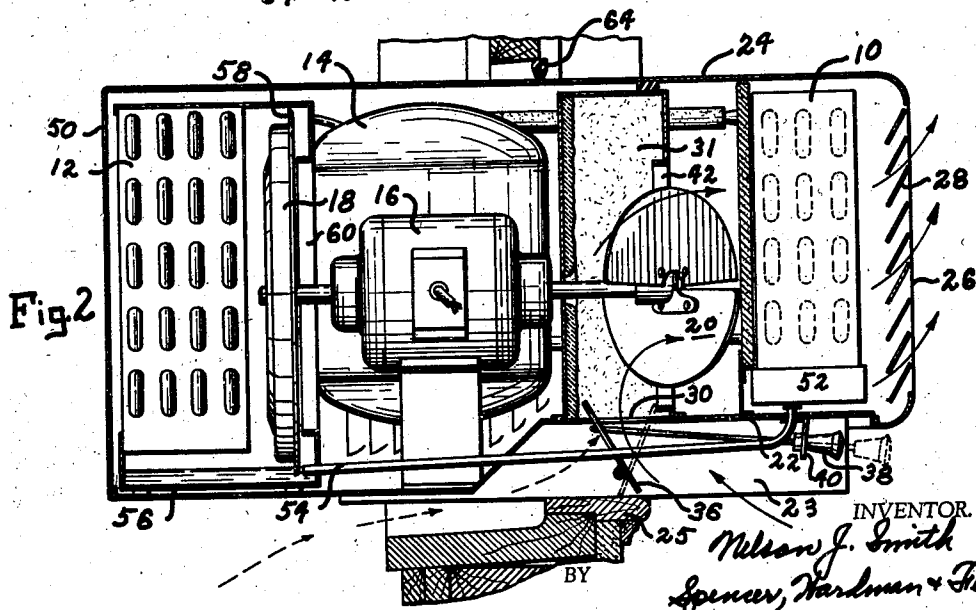
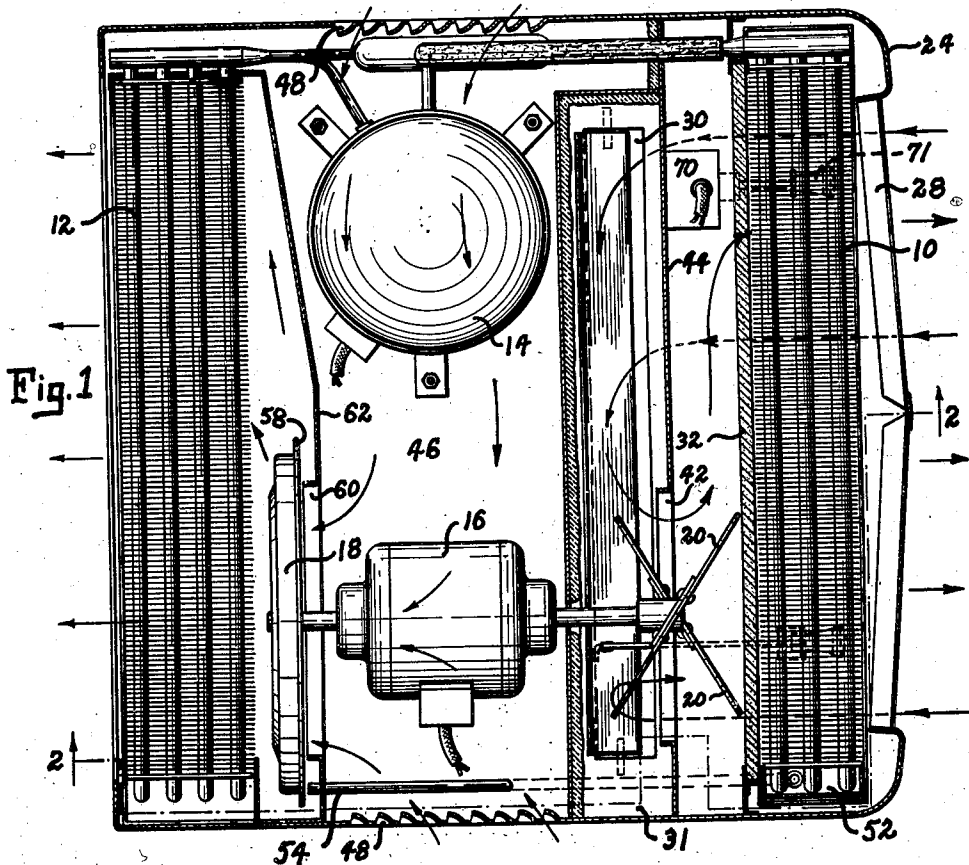
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2,357,362

REFRIGERATING APPARATUS

Filed April 30, 1940

2 Sheets-Sheet 1



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Fig. 3

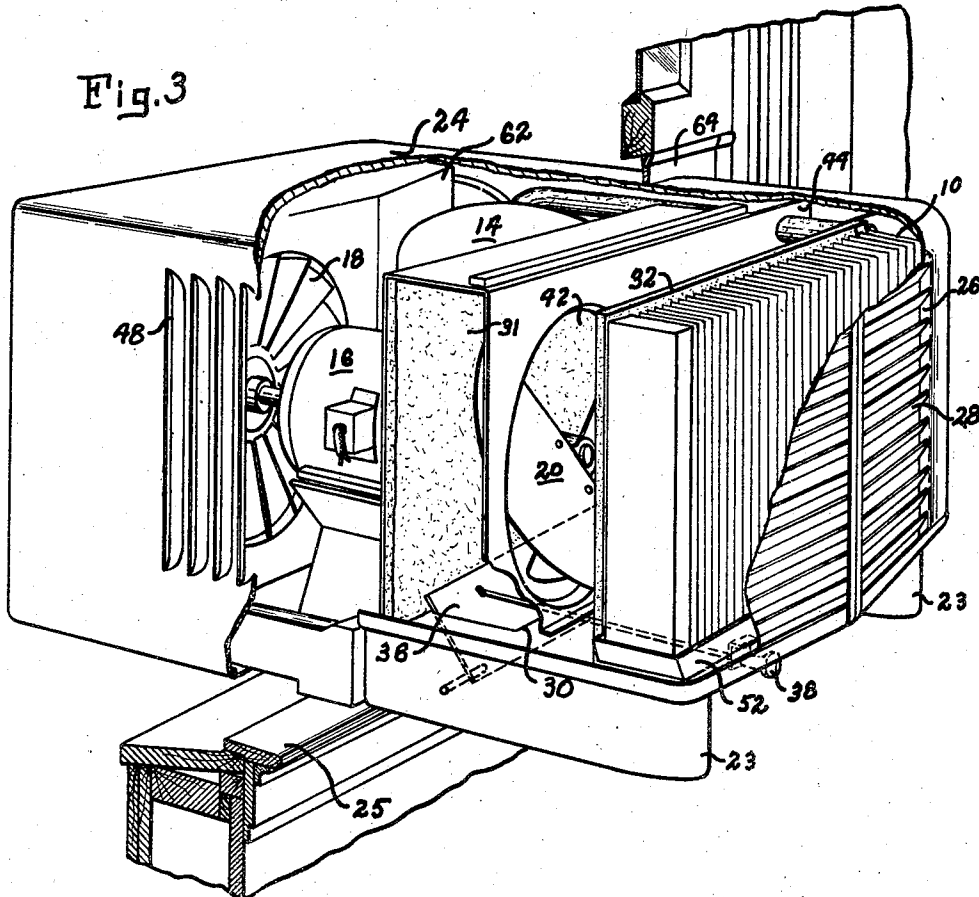
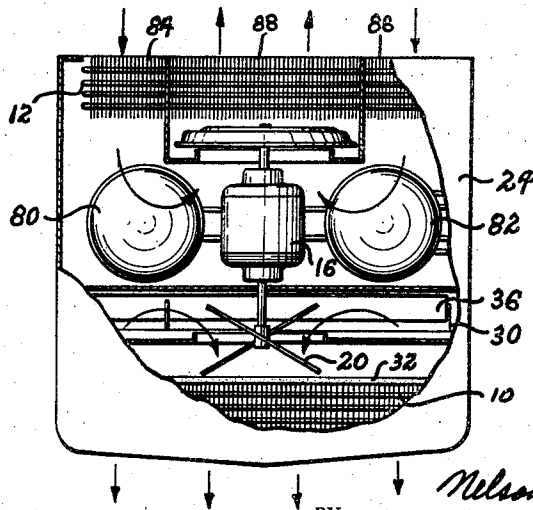


Fig. 4



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UNITED STATES PATENT OFFICE

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REFRIGERATING APPARATUS

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5 Claims. (Cl. 62—140)

This invention relates to refrigeration and more particularly to a refrigerating unit adapted to be mounted directly on the window sill of an enclosure.

One object of this invention is to provide a simplified window type air conditioning unit which is quiet and efficient in operation.

Another object of this invention is to provide an improved arrangement for introducing outside air into the space to be conditioned.

Still another object of this invention is to provide improved air flow through the evaporator and condenser compartments.

Still another object of this invention is to provide air circulating means which is quiet and efficient in operation.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a plan view partly in section showing the arrangement of the elements in a preferred modification;

Fig. 2 is a vertical sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a perspective view of the apparatus shown mounted within a window with part of the cabinet broken away to show the interior arrangement; and

Fig. 4 is a plan view with parts broken away showing a slightly modified window air conditioning unit.

In the preferred arrangement, as disclosed in Figs. 1, 2 and 3, the volatile refrigerant system comprises a refrigerant evaporator 10, a condenser 12, a hermetically sealed motor-compressor unit 14, a blower motor 16 and associated blowers 18 and 20, all of which are carried directly by the bottom wall 22 of the main casing generally designated by the reference numeral 24. The flow of refrigerant from the condenser to the evaporator may be controlled by any conventional refrigerant control such as an expansion valve or a fixed restrictor. The casing 24 is of the type which is adapted to be supported upon a window sill such as 25. The bottom wall 22 of the cabinet has secured thereto a pair of supports 23 which space the bottom wall of the cabinet from the window sill 25 as best shown in Fig. 2. The side walls and the top of the main casing may be formed integrally or may be made up in several sections. The side of the cabinet which faces the space to be conditioned is pro-

vided with an air discharge opening 26 which is provided with louvers 28 for directing the conditioned air upwardly. For purposes of illustration, the louvers have been shown as fixed louvers; whereas, it is within the purview of this invention to provide adjustable louvers at the air outlet opening.

As best shown in Fig. 2, all of the air to be conditioned, either fresh air, recirculated air or a mixture of both, enters the cabinet 24 through an opening 30 provided in the bottom wall of the cabinet. The air passing through the opening 30 enters the chamber 31 and is then picked up by the fan 20 which blows the air through a filter element 32 placed next to the evaporator 10. The air leaving the filter element 32 passes in thermal exchange relationship with the evaporator 10 before being discharged into the room through the discharge opening 26. Inasmuch as there are times when it is desirable to condition a mixture of recirculated room air and fresh air or fresh air only, a damper 36 has been provided for controlling the flow of air through the air inlet opening 30. The damper 30 is controlled by a slide rod 38 which is frictionally held in adjusted position by the guide bracket 40 secured to the under wall of the unit. With the damper 36 in an intermediate position a mixture of fresh air and recirculated room air is free to enter the suction chamber 31. The outside air is permitted to pass between the bottom wall 22 of the cabinet and the upper surface of the window sill structure 25. By pulling the rod 38 all the way out, the damper 36 serves to completely close off the the return air, whereby fresh air only is circulated over the evaporator. All of the air entering the opening 30 is required to pass through the circular fan opening 42 in the vertical wall 44 which forms the front wall of the chamber 31.

Inasmuch as the usual type of fan is not capable of circulating large volumes of air without making considerable noise and inasmuch as the fan noise in a window unit is readily transmitted to all parts of the room, a special type of fan has been provided which employs only two fan blades, as shown in Fig. 1. Each fan blade is of flat construction and covers substantially one-half of the fan area. By virtue of this particular type of fan construction the frequency of the sound waves set up by the fan when operating at the usual fan speed is so low as to have practically no effect on the average person's sense of hearing.

It will be noted that the refrigerant liquefying

portion of the apparatus is mounted in that portion of the cabinet projecting outside of the window. Inasmuch as window units of this type depend upon the outside air for dissipating the condenser heat, I have provided a fan 18 operated by the motor 16 for circulating air over the motor-compressor 14 and the condenser 12. The outside air enters the motor-compressor compartment 46 through the side openings 48 and then flows outwardly over the condenser 12. The rear wall of the cabinet 24 is provided with an air discharge opening 50. The usual refrigerant flow connections are provided between the evaporator, condenser and compressor. Condensate which collects on the evaporator 10 is collected in the drip pan 52 placed directly beneath the evaporator 10. A drain 54 conveys the condensate from the pan 52 to a pin 56 located directly beneath the condenser 12. As the water in the pan 56 rises, it comes into contact with the flinger 58 provided on the condenser fan 18. The flinger 58 serves to atomize the condensate into the condenser air stream whereby much of the condensate is reevaporated as the air flows in thermal exchange relationship with the condenser.

As shown in Fig. 1, all of the air circulated by the fan 18 is required to pass through the opening 60 in the wall 62 which separates the motor-compressor compartment 14 from the condenser compartment. In order to prevent the flow of air through the window at the sides and top of the cabinet, the usual form of gasket 64 is provided. The motor-compressor mechanism 14 is started and stopped by means of a manually operated switch 70 provided with an operating button 71 placed so as to be accessible from the front of the unit immediately below the evaporator.

In Fig. 4 I have disclosed a slightly modified arrangement in which the fan motor 16 is centrally located within the cabinet and in which two hermetically sealed motor-compressor units 80 and 82 are provided in parallel for compressing the refrigerant vaporized in the evaporator. In the arrangement disclosed in Fig. 4 the outside condenser cooling air enters the cabinet through the side portions 84 and 86 of the condenser unit and is discharged through the center opening 88 after having been circulated over the hermetically sealed motor-compressor units. The arrangement for controlling the flow of inside and outside air into the evaporator compartment is the same in this modification as in the modification shown in Figs. 1 through 3 and therefore needs no further description. The same reference characters have been used to designate corresponding parts in both modifications.

While the form of embodiment of the invention as herein disclosed, constitutes a preferred form, it is to be understood that other forms might be adopted, all coming within the scope of the claims which follow.

What is claimed is as follows:

1. In a window air conditioning unit, a cabinet adapted to be disposed directly within the window opening, a refrigerant evaporator within said cabinet, refrigerant liquefying means for supplying refrigerant to said evaporator mounted within said cabinet, an air inlet opening in the bottom of said cabinet, blower means for circulating air in through said opening over said evaporator and out into the space to be conditioned, means for introducing outside air into said air inlet

opening, and means for controlling the ratio of fresh air and recirculated air flowing through said air inlet.

2. An air conditioning unit of the type adapted to be supported on the window sill of an enclosure, a cabinet, means for spacing the bottom wall of said cabinet from said window sill, means for dividing said cabinet into a refrigerant evaporating compartment and a refrigerant liquefying compartment, an evaporator within said evaporating compartment, refrigerant liquefying means including a condenser within said liquefying compartment, means for circulating outside air in over one portion of said condenser and out over another portion of said condenser, means for circulating air to be conditioned through said evaporator compartment, said last named means comprising an air inlet opening in the bottom wall of said cabinet, and means for introducing outside air into said enclosure through the space between the bottom wall of said cabinet and said window sill.

3. In a window air conditioning unit, a cabinet adapted to be disposed within the window of a room, means for dividing said cabinet into an evaporator compartment and a refrigerant liquefying compartment, a refrigerant evaporator within said evaporator compartment, refrigerant liquefying means for supplying liquid refrigerant to said evaporator mounted within said refrigerant liquefying compartment, means including a blower for circulating room air over said evaporator and out into the space to be conditioned, means for introducing outside air into said evaporator compartment and for directing the outside air in thermal exchange with said evaporator comprising a raised portion at the bottom of the refrigerant liquefying compartment for admitting outside air into the cabinet from beneath said cabinet, said raised portion including an opening leading into said evaporator compartment.

4. In a window air conditioning unit, a cabinet adapted to be disposed directly within the window opening, a refrigerant evaporator within said cabinet, refrigerant liquefying means for supplying refrigerant to said evaporator mounted within said cabinet, a recirculated air inlet opening in the bottom of said cabinet, blower means for circulating air in through said opening over said evaporator and out into the space to be conditioned, and means for introducing outside air into said air inlet opening whereby said outside air is cooled and discharged into the space to be conditioned.

5. In an air conditioning unit of the type adapted to be supported on the window sill of an enclosure, a cabinet, means for spacing a portion of the bottom wall of said cabinet from said window sill, means for dividing said cabinet into an evaporator compartment and a condenser compartment, an evaporator within said evaporator compartment, a condenser within said condenser compartment, a compressor, refrigerant flow connections between said evaporator, compressor and condenser, means for circulating outside air over said condenser, means for circulating air to be conditioned through said evaporator compartment, said last named means comprising an air inlet opening in the bottom wall of said cabinet, and means for introducing outside air into said enclosure through the space between the bottom wall of said cabinet and said window sill.

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