Oct. 9, 1934. R. S. NELSON 1,975,859

ROOM COOLING APPARATUS

Filed Nov. 12, 1931

Fig. 1.

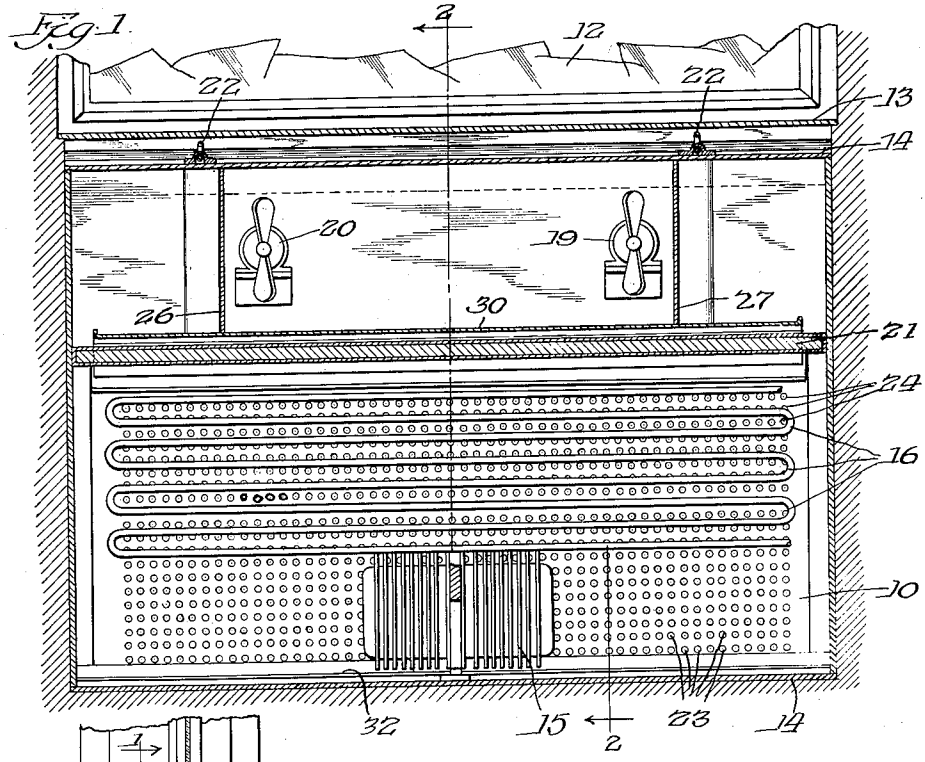


Fig. 2.

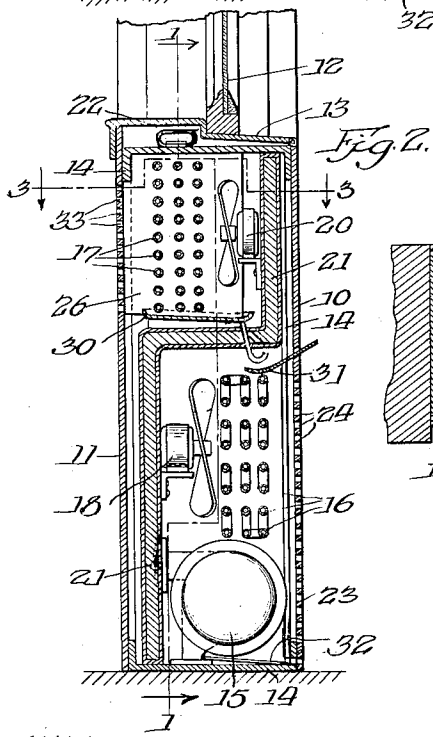
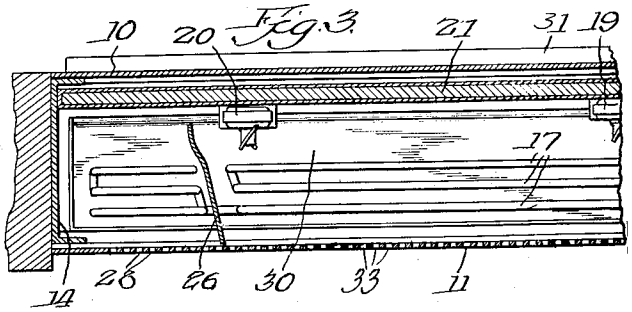


Fig. 3.



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UNITED STATES PATENT OFFICE

1,975,859

ROOM COOLING APPARATUS

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6 Claims. (Cl. 62—129)

This invention relates to refrigerating apparatus and more particularly to air conditioning apparatus designed to be mounted in the wall of a building and adapted to cool and dehumidify the air therein.

In the construction of buildings, as for example large office buildings, it is customary for the windows on one floor to be directly above those on the floor beneath. Since the sill of the window is usually several feet above the floor, there is a space between the window of one floor and that of the floor below which cannot be used to support weight and which, if filled with solid building material, merely adds to the total weight of the building.

It is an object of the present invention to utilize this space to house and conceal refrigerating apparatus adapted to cool the air in the room in which the window is located.

A further object of the invention is to provide air-cooled refrigerating apparatus of a compact assembly and of a unitary structure which can be easily placed in and removed from the wall of a building in which it may be located.

A further object is to provide a novel design for a building so as to adapt the same to receive individual room coolers without utilizing space normally occupied by other appurtenances.

Other objects and advantages will be apparent from the following description of the invention taken in connection with the accompanying drawing in which

Figure 1 is a vertical cross-sectional view taken on the line 1—1 of Figure 2 of a refrigerating apparatus mounted in the wall of a building in accordance with the principles of the invention.

Figure 2 is a vertical cross-sectional view of the apparatus of Figure 1 taken on the line 2, 2 thereof.

Figure 3 is a fragmentary horizontal cross-sectional view of the apparatus of Figures 1 and 2 taken on the line 3—3 of Figure 2.

Referring to the drawing, the outside surface member of the wall of a building is designated by the numeral 10 and the inside member of the wall by the numeral 11, the view being taken at a point beneath the window 12. In an ordinary building construction the space between the surfaces 10 and 11 is filled with solid material, but in accordance with the present invention the wall is hollow so that it may be occupied by refrigerating apparatus.

A sill 13, upon which window 12 seats, is hinged to the outer portion 10 of the wall and forms a cover for the refrigerating apparatus.

The refrigerating unit is connected to and supported by a framed structure 14 adapted to fit snugly between the wall members 10 and 11 and extend from the floor to the sill 13. The refrigerating unit may comprise a motor-compressor 15 which may be of the type shown in the U. S. patent to Crane No. 1,704,655, a condenser coil 16 and an evaporator 17, together with the expansion valve and connecting pipes (not shown) which go to make up a complete compression type refrigerating system. To properly insulate the evaporator 17 from the motor-compressor 15 and the condenser 16 a suitable insulating partition is provided as indicated at 21, this member extending from the top of the frame 14 to the bottom and from side to side thereof. As shown in Figure 2, the insulating partition 21 is angle shaped. In this way the motor-compressor 15 and the condenser 16 are located in a compartment exposed to the atmosphere on the outside of the building while the evaporator 17 is located in a compartment in communication with the air in the room to be cooled.

A motor driven fan 18 causes outside air to circulate over the motor compressor unit 15 and the condenser 16. As shown in Figure 2 the condenser 16 and fan 18 may be located above the motor compressor unit 15, the fan 18 causing a current of air to enter through lower openings or holes 23 in the outer member 10 of the wall and pass over the motor compressor unit and thence upwardly across the condenser 16 and out through an upper set of holes 24 in member 10. Thus the motor-compressor and the condenser 16 may be adequately air-cooled.

Similarly, fans 19 and 20 cause air to circulate over the coils of the evaporator 17, the air being removed from and returned to the room. As shown in Figures 2 and 3, the upper portion of member 11 is provided with openings 28 near the sides and openings 33 in the central portion. Baffles 26 and 27 are arranged in between sets of coils of the evaporator 17 and cooperate with the fans 19 and 20 to cause air to enter through openings 28, pass across the two end coils of the evaporator and thence across the main central coil thereof and back into the room through the central holes 33.

The arrangement shown is intended to illustrate only one way in which the air might be directed and it is within the scope of the invention to cause the air to flow upwardly through the inner portion of the window sill 13 by merely providing holes in that member and changing the angular position of the fans 19 and 20. Other ar-

rangements for circulating the air may also be employed.

Due to the fact that the evaporator coil 17 is maintained at a temperature considerably lower than that of the room, drops of moisture will form thereon as the air from the room passes thereover. The water so collected may be caused to drip on to a pan 30 and be conveyed down through the insulating member 21 onto the condenser coils 16. The condenser 16 being warmer than the air outside of the building, the water which drips on to the condenser will evaporate and facilitate the cooling of the condenser. Thus the causing of condensate to form on the coil 17 not only dehumidifies the air in the room being cooled, but also provides an arrangement for cooling the condenser 16 to some extent.

While the condenser 16 is essentially an air-cooled condenser, the efficiency of the unit may be improved not only by the water which drips on to the condenser 16 from the evaporator 17 but also by water which may be collected in rainy weather. To accomplish this a trough 31 may be provided as shown in Figure 2, the trough having a portion extending through an opening in the outer member 10 of the wall and disposed at a slight angle to catch rain water which may be running down the outside of the building.

Any water which may not have evaporated on the condenser coil 16 drips on to the motor compressor unit and is returned to the outside of the building by means of the drip pan 32.

It will be seen that the entire refrigerating unit may be removed from the wall for repair or replacement by merely removing the trough 31, raising the window 12, swinging the hinged sill 13 outwardly and lifting the unit by the handles 22 attached to the frame 14.

While an arrangement has been shown in which the motor compressor and the condenser are largely air-cooled, it is obvious that the invention is not limited to air-cooled apparatus. It may be advantageous in some localities and under some circumstances to water-cool these parts. As is well known, one of the great difficulties in air cooled compression units is the high back pressure of the condenser. It might be necessary to actually have a water conduit to supply water to the exterior of the condenser, or a wick connected with a reservoir, or perhaps a spray actuated by the fan motor. By this means it should be possible to cool the condenser even below the atmospheric temperature. An advantage of thus cooling the condenser is that a smaller unit can be used for a capacity equivalent to that obtained with an air-cooled condenser and a larger motor compressor. It is also obvious that the operation of the unit may be controlled in various ways as by thermostatically operated switches in the electric circuit to the motor in accordance with principles now well known to those skilled in the art. Various changes in the arrangement and the construction of parts may be made without departing from the spirit of the invention or the scope of the annexed claims.

I claim:—

1. The combination with the wall of a building having a window and a concealed compartment immediately beneath the window of a supporting frame mounted in said compartment, an insulating partition carried by said frame and dividing the compartment into two chambers, refrigerating apparatus carried by said frame and including an evaporator located in one chamber and a heat discharging element located in the other chamber, means for causing air in the building to flow across said evaporator and means for causing air from outside the building to flow across said heat discharging element to air cool the same.

2. The combination with the wall of a building having a window and a concealed compartment immediately beneath the window of a supporting frame mounted in said compartment, an insulating partition carried by said frame and dividing the compartment into two chambers, refrigerating apparatus carried by said frame and including an evaporator located in one chamber and a motor-compressor and a condenser located in the other chamber, means for causing air to flow across said evaporator and into a room in the building and means for causing air from outside the building to flow across said motor-compressor and said condenser to thereby air cool the same.

3. In a device for cooling the air of a room in a building, a concealed unitary portable structure mounted in the wall of a building, and having an insulating partition and a refrigerating apparatus mounted thereon said refrigerating apparatus including a cooling element and an air cooled heat discharging element disposed on opposite sides of said partition, said cooling element being arranged so as to permit it being exposed to the air in the room and said heat discharging element being so disposed as to permit discharge of heat to the air outside of the building, and said insulating partition being adapted to cooperate with portions of the wall of the building to substantially seal said cooling element from said heat discharging element.

4. In combination, a wall of a building having a hollow portion, refrigerating apparatus mounted therein and having a cooling element, a heat discharging element and insulating means between said elements, means for directing air inside the building over said cooling element to cool the air and cause moisture therein to collect on said cooling element, means for conveying the moisture so collected into heat transfer relation with said heat discharging element and means for directing air outside of the building over said heat discharging element to cause the moisture thereon to evaporate and assist in the discharge of heat therefrom.

5. In combination, a wall of a building having a hollow portion, refrigerating apparatus mounted therein and having a cooling element, a heat discharging element and insulating means between said elements, means for directing air inside the building over said cooling element, means for bringing water in heat transfer relation with said heat discharging element and means for directing air outside of the building over said heat discharging element to cause the water to evaporate and assist in the discharge of heat therefrom.

6. In combination, a wall of a building having a hollow portion, refrigerating apparatus mounted therein and having a cooling element, a heat discharging element and insulating means between said elements, means for directing air inside the building over said cooling element, means for directing air outside of the building over said heat discharging element and means for collecting rain water during rainy weather and bringing it in heat transfer relation with said heat discharging element to assist in causing heat to be discharged therefrom.

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