May 26, 1959 D. D. WILE ET AL 2,887,856

AIR CONDITIONING SYSTEM

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FIG. 1.

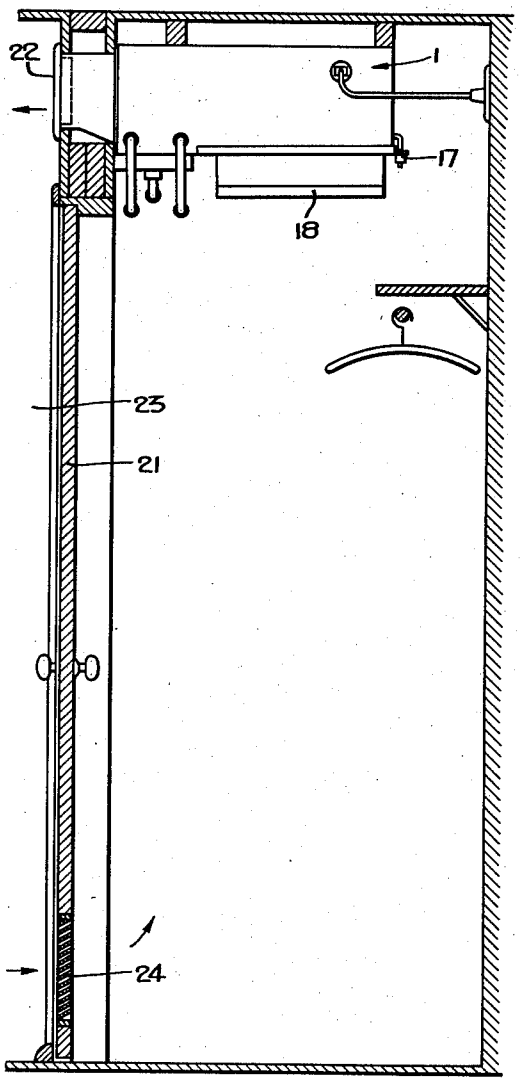


FIG. 2.

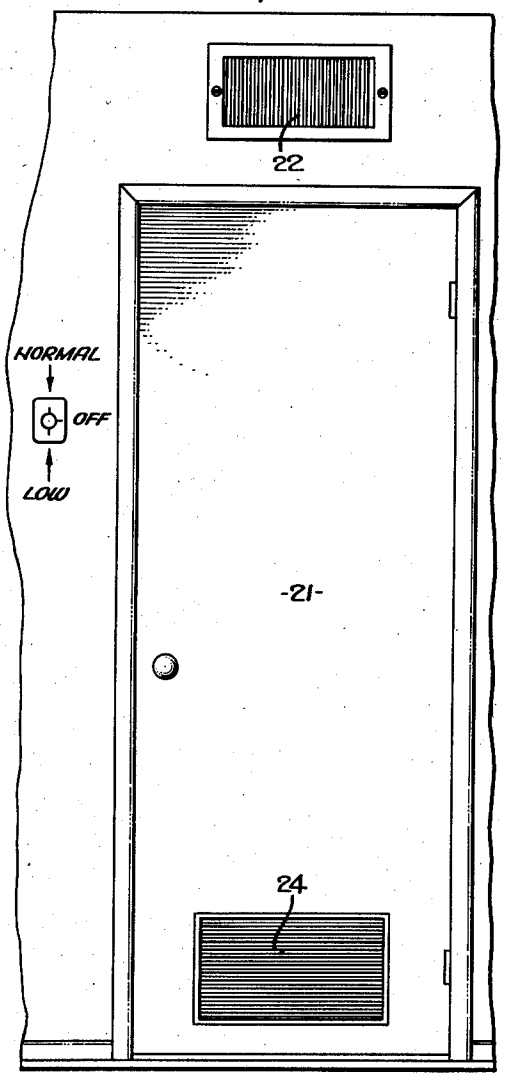
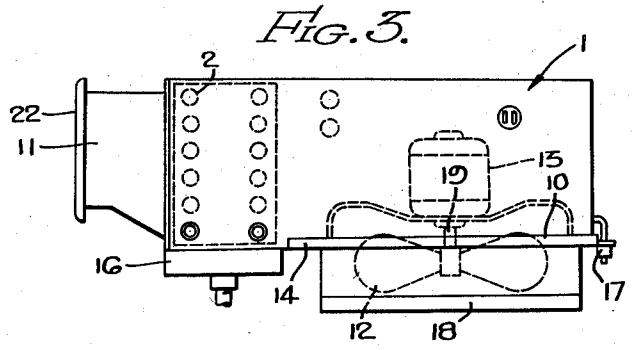


FIG. 3.



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FIG. 4.

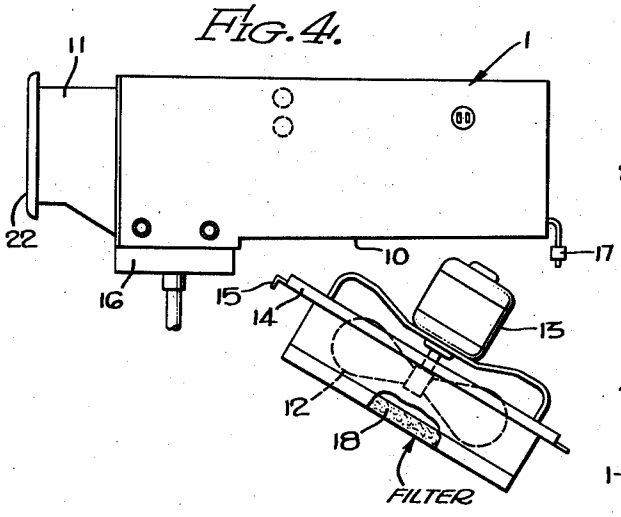


FIG. 5.

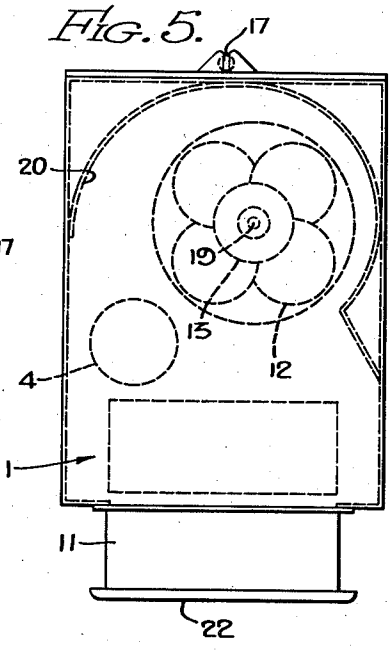


FIG. 6.

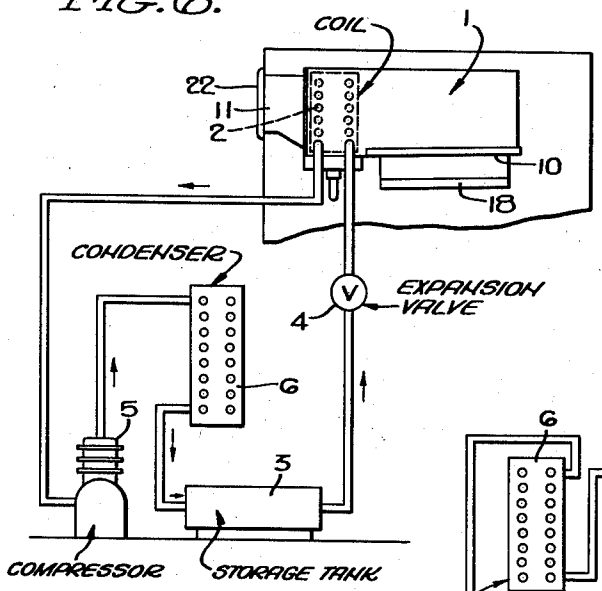
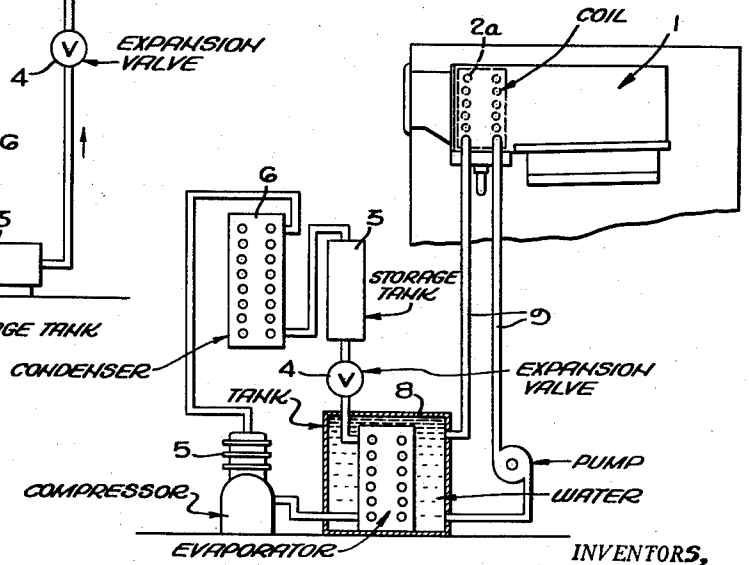


FIG. 7.



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AIR CONDITIONING SYSTEM

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Application November 7, 1955, Serial No. 545,218

1 Claim. (Cl. 62—426)

This invention relates to air conditioning units and is more particularly concerned with the construction of an air conditioning unit of simple, inexpensive form and which will operate in such manner that it may be installed in a room and will operate at a greatly reduced noise level. We have discovered that we may be able to operate an air conditioning unit of simple form including a casing in which the heat exchange or cooling coil is positioned and wherein we provide a propeller blade type fan for drawing the air into the casing and distributing the same over the coil and discharging the same into the room to be air conditioned and wherein said apparatus functions at a greatly reduced noise level when the axis of the fan is positioned off center in the casing or at a position which we prefer to refer to as the approximate center of the involute space within the casing.

Other objects and advantages of our invention it is believed will be apparent from the following description hereof as the same is illustrated in the accompanying drawings.

Figure 1 is a fragmental side elevation illustrating a space to be air conditioned and having adjacent thereto a closet space within which the air conditioning unit embodying our invention is positioned.

Figure 2 is a front elevation of the structure illustrated in Figure 1.

Figure 3 is an enlarged elevation of the air conditioning unit embodying my invention.

Figure 4 is a view similar to Figure 3 illustrating the unit in exploded condition.

Figure 5 is a top plan view thereof.

Figure 6 is a diagrammatic view of the refrigeration system employed in conjunction with the air conditioning system embodying our invention.

Figure 7 is a modified form of refrigeration or cooling unit applicable for the cooling of water for use in the air conditioning system embodying our invention.

In the preferred embodiment of our invention as illustrated in the accompanying drawings, we have shown the air conditioning system embodying our invention as applicable for both direct expansion refrigeration and water cooling.

In either case, the coolant whether it be the expanding refrigerant or the refrigerant water, is passed through a coil **2** which is mounted in the casing **1**. A typical refrigeration system is illustrated in Figure 6, wherein it is shown that the refrigerant liquid from the storage tank **3** is passed through the expansion valve **4** leading to the coil **2** in which the said liquid is expanded to cool the coil. The gas leaving the coil **2** passes to the compressor **5** in which the gas is compressed and leaving the compressor **5** is passed through the condenser **6** to condense the gas to a liquid prior to its return to the storage tank **3**. In the case of the modification illustrated in Figure 7, the evaporator **2** is used to refrigerate or cool water in a tank **8** and the water from the tank **8** is circulated through the coil **2***a* through the medium of suitable pipe connections **9**.

The element embodying our invention is more particularly related to the means employed for circulating and cooling the air as the air is passed over either the coil **2** or **2***a*. This unit includes the casing **1** which has an inlet **10** and an outlet **11**, the inlet and outlet being upon opposite sides of the coil **2**. The casing **1** is of any desirable construction and is herein illustrated as rectangular in form where the inlet is in the bottom rear portion of the casing and the outlet is at the front vertical face. Mounted within the casing **1** in position to draw air through the inlet **10**, distribute the same over the coil **2** and discharge the same through the outlet **11**, is a blade type propeller fan **12**, which is driven by a suitable electric motor **13**. As illustrated, this assembly is supported upon a face plate **14** which is removably positioned in the opening **10**. For this purpose the forward edge of the plate **14** is provided with a right angle bend **15** which fits over the horizontal rear edge of a cover plate **16** so that as the plate **14** is thus supported at its forward edge, it may be hinged upwardly to fit over the opening **10** and be secured in position by any suitable fastening means such as the screws **17**.

There may be fitted upon the face of the plate **14** a filter assembly **18** through which the air to be conditioned is drawn. This filter assembly may be of any suitable or desirable form and its precise construction forms no part of the present invention.

The axis of the supporting drive shaft **19** of the fan **12** is supported in the casing **1** in position offset from the center of the casing and in a position which we define as the involute center of the casing. This we have found to be of great importance for the reasons that it enables us to have more perfect air distribution over the pipes of the coil **2** while maintaining a substantially noiseless operation of the fan in circulating the air. We define the offset position as being substantially at the involute center of the casing **1** for the reason that we found that in shrouding the interior of the casing **1** as illustrated in the dotted lines **20** to form an involute air passage, and mounting the shaft of the fan **12** on the center of this involute casing, that we obtained a very quiet fan operation with a more perfect air distribution over the coil **2**. Further development showed us that on removal of the shroud indicated by the dotted lines **20**, that the operation remained the same even though the interior of the casing **1** was truly of rectangular cross section. With the fan position as shown, the apparent result is to develop an involute air passage where the spaces which would ordinarily lie outside of such involute passage merely become dead air spaces and do not materially add to or detract from the operation in so far as the development of a satisfactory air distribution over the coil **2** and a quiet fan operation are concerned. As illustrated in Figures 1 and 2 of the drawings, we prefer to mount the casing **1** in an elevated position within a closet or the like, preferably above or to one side of the door **21** and to provide a suitable louver **22** over an outlet opening through the wall of the door **21** so that the vanes of the said louver may be correctly angled to insure the desired air distribution throughout the space **23** which is to be air conditioned. At the lower portion of the closet and if desired, through an opening formed in the door **21**, a second louvered passage **24** is provided having a suitable louver structure therein to insure that the air is drawn from the lower portion of the space **23** as it is returned through the closet to the inlet **10** of the casing **1**.

The important development produced by our invention is the provision of an air distributing and conditioning unit which may be mounted in a closet or other space adjacent a room such as the space **23** and which will operate easily and effectually to circulate and cool the air in the room **23** and at the same time will operate

at a very low noise level, being substantially inaudible. We have here set forth that the fan **12** is operated in offset position and at relatively low speeds. We prefer that the fan operate at speeds of between 400 and 700 r.p.m.

Having fully described our invention, it is to be understood that we do not wish to be limited to the details herein set forth, but our invention is of the full scope of the appended claim.

We claim:

An air conditioning apparatus, comprising: a relatively flat substantially rectangular casing structure having an outlet opening in an end wall, and an inlet opening in its bottom wall adjacent the opposite end wall, said inlet opening being displaced from the center of said casing structure toward one of the side walls, the center of said inlet opening substantially coinciding with an involute figure tangent to the side walls of said casing structure and said opposite end wall; a cooling unit disposed within said casing structure adjacent said outlet opening; and a propellor blade-type of fan mounted in said inlet opening for drawing air upwardly therethrough for horizontal flow to the walls of said casing structure and discharge through said outlet.

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