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AIR CONDITIONING APPARATUS

Filed Dec. 16, 1935

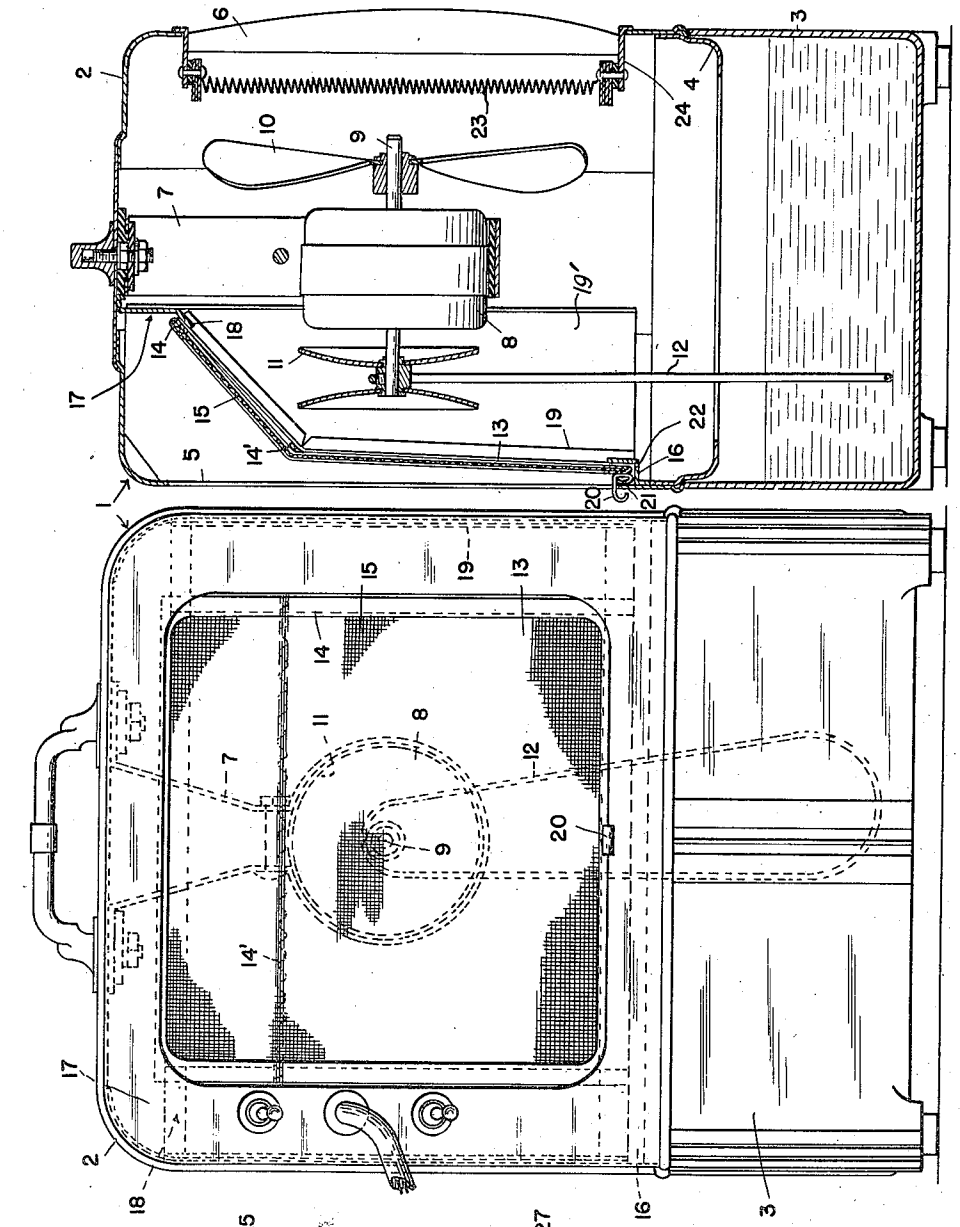


FIG. 2.

FIG. 1.

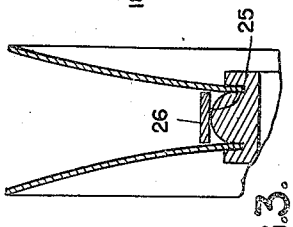


FIG. 3.

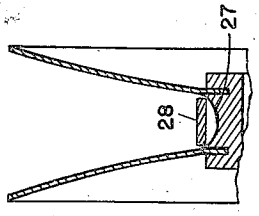


FIG. 4.

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AIR CONDITIONING APPARATUS

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9 Claims. (Cl. 183—9)

The invention relates to air conditioning apparatus and refers more particularly to a portable apparatus which may be readily and easily moved from one place to another.

The invention has for one of its objects to provide an efficient apparatus for securing the desired cleanness, humidity, and temperature of air passing through the apparatus. The invention has for another object to so construct the apparatus that its parts are readily accessible. The invention has for further objects to provide a removable air filter and to provide the filter with a portion overhanging the liquid elevating device so that the elevated liquid will be discharged directly against the filter.

With these and other objects in view, the invention resides in the novel features of construction and combinations and arrangements of parts as more fully hereinafter set forth.

In the drawing:

Figure 1 is a rear elevation of an air conditioning apparatus embodying my invention;

Figure 2 is a vertical section therethrough;

Figures 3 and 4 are sectional views corresponding to a part of Figure 2 and showing modifications.

The air conditioning apparatus, as shown in Figures 1 and 2, comprises the casing 1 which is formed of the upper and lower sections 2 and 3 respectively. These sections are preferably formed of sheet metal and the upper section is preferably of lighter gauge than the lower. Both sections are preferably of rectangular horizontal cross section. The lower section has an open upper end and the upper section has an open lower end which registers with and is supported upon the upper edges of the side walls of the lower section. To position the upper section upon the lower section, there is the angle-shaped sheet metal strip 4 which is fixedly secured at its upper edge to the inner sides of the side walls of the upper section and which depends downwardly inside the lower section.

The upper section has the air inlet and outlet openings 5 and 6 respectively in its rear and front walls and located above its lower end and below its top and substantially registering with each other. 7 is a support secured to the top of the upper section and depending therefrom, the lower portion of this support being in the nature of a loop for engaging and fixedly securing and carrying the electric motor 8. Upon the front end of the motor shaft 9 there is fixedly secured the fan 10 and upon the rear end of this motor shaft there is fixedly secured the pulley 11. The endless belt 12, which is shown particularly in Figure 2, is of circular cross section and extends around the hub of the pulley 11 and depends downwardly within the lower section 3 and into the liquid contained in this lower section. It will be seen that the electric motor will drive both the fan and pulley and that the fan will create a circulation of air through the upper section of the casing, the blades of the fan being inclined to pull the air through the inlet opening and to force the air through the outlet opening. The pulley causes the belt 12 to travel around its hub and this belt will carry liquid upwardly from the receptacle and deposit the same upon the pulley, the sides or disks of which throw the liquid in a fine spray.

For humidifying and cleaning the air passing through the upper section of the casing, I have provided the filter 13 which is preferably located within the casing and near the air inlet opening 5. This filter comprises the frame 14 which is preferably formed of sheet metal and the fibrous material or member 15 stretched between the top and bottom bars and the side bars of the frame, these bars being preferably crimped upon the fibrous material or member. The side bars are preferably bent intermediate the top and bottom bars so that the filter has a generally vertically extending lower portion and an inclined upper portion. The upper portion overhangs the pulley 11 to catch liquid thrown off by the pulley. The caught liquid spreads over the entire exposed surface of the fibrous material or member by both gravity and capillary action, so that an extended moistened area is provided for contact with the air. To hold the fibrous material or member 15 from sagging at the bend when wet, I have provided the support 14' which extends beneath the fibrous material or member from one side bar to the other. This support contacts at spaced zones with the fibrous material or member and, as a result, presents very little interference with the movement of the liquid from the upper portion of the fibrous material or member to its lower portion. The support, as shown in the present instance, is a coiled wire with the coils spread apart a considerable distance to have limited contact with the fibrous material or member.

For removably supporting the filter in the upper section, I have provided the Z-shaped sheet metal strip 16 which is fixedly secured to the rear wall of the upper section and which forms with the portion of the rear wall bordering the lower end of the air inlet opening a channel for

detachably receiving the bottom bar of the filter. I have also provided the sheet metal strip 17 which is secured to the top of the upper section and which depends therefrom and terminates in the inclined shelf 18 for detachably supporting the top bar of the filter. The strips 16 and 17 also serve to prevent the passage of air through the space between the bottom bar of the filter and the rear wall of the upper section and the space between the top bar of the filter and the top of the upper section. For sealing the space between the side bars of the filter and the end walls of the upper section, I provide the sheet metal strips 19, each of these strips being preferably of angular cross section and having a flange fixedly secured to an end wall of the upper section and a flange for abutting a side bar of the filter. The strips 19 may be mounted upon suitable sheet metal strips 19', each of which is preferably of angular cross section and has a broad flange secured to an end wall of the upper section.

To firmly hold the filter, there is the spring clip 20 which is fixedly secured to the bottom bar of the filter at its middle and which has the resilient leg 21 for yieldably engaging the inner side of the portion of the rear wall of the upper section below the air inlet opening 5.

To avoid the possibility of liquid filling the channel engaged by the bottom of the filter, the strip 16 preferably is provided with the drain holes 22 which are located in front of or inwardly beyond the filter.

For heating the air passing through the casing, I have provided the electric heating element 23 which is insulatably carried by the sheet metal frame 24. This frame is mounted upon the upper section 2 within the air outlet opening 6 and extends rearwardly or inwardly from the front wall of the upper section. This heating element serves to more effectively vaporize the liquid being carried by the air.

Figure 3 shows a modified construction of pulley and endless belt in which the portion 25 of the hub of the pulley between the sides or disks is crowned or convex and the endless belt 26 is flat or of rectangular cross section and of much greater width than thickness. Its width is less than the distance between the adjacent portions of the sides or disks of the pulley so that it can not bind on the sides or disks. With the construction shown in this figure, the belt during operation will be automatically centered upon the pulley so that the belt can not ride out upon the sides or disks.

In the modification shown in Figure 4, the portion 27 of the hub of the pulley between its sides or disks is concave, while the endless belt 28 is of the same cross section as the belt 26. The curvature of the hub and the adjacent portions of the sides or disks of the pulley is sufficiently large to avoid binding of the belt on the hub or sides or disks.

In both of these modified forms, the endless belts will carry the liquid to the pulleys and either throw off the elevated liquid directly or conduct the liquid to the sides or disks of the pulleys which will throw off the liquid, or conduct the liquid to the hubs which in turn conduct the liquid to the sides or disks.

From the above description, it will be readily seen that I have provided a simple construction of air conditioning apparatus in which the upper section of the casing may be used with or without the lower section. When the two sections are used together, the air passing through the upper section comes into contact with the liquid upon the filter and also the liquid being thrown off the sides or disks of the pulley, which are convex and rounded, in a fine spray, so that the air is effectively cleaned and humidified. The air may also be heated during its passage by turning on the switch controlling the operation of the heating element. When the upper section alone is used, the filter may be impregnated with a suitable liquid, such as a medicament, and air may be drawn through the filter and also heated, if desired. As an example, the upper section may be used in the treatment of patients having hayfever. It will be further seen that the filter used in humidifying and cleaning the air may be readily mounted in place or removed and that this filter is so constructed that it has a portion directly in the path of the liquid which has been elevated and is being thrown off or discharged from the pulley.

What I claim as my invention is:

1. An air conditioning apparatus, comprising means forming an air passageway and means forming a liquid receptacle below said air passageway, means for creating a flow of air through said air passageway, a filter through which said air passes, said filter having an overhanging portion, and means below said overhanging portion for elevating liquid from said receptacle and throwing the elevated liquid directly against said overhanging portion.

2. An air conditioning apparatus, comprising a casing having a liquid receptacle in its lower portion and also having air inlet and outlet openings in its upper portion, a fan within the upper portion of said casing for creating a flow of air therethrough, a motor for driving said fan, a pulley also driven by said motor, an endless belt extending around said pulley and depending into the liquid within said receptacle, and a filter through which the air passes, said filter being removably mounted within said casing and having an inclined portion extending over said pulley.

3. An air conditioning apparatus, comprising a casing having substantially registering air inlet and outlet openings respectively in its rear and front walls, said casing also having a liquid receptacle below said openings, means upon said rear wall cooperating with the portion thereof bounding the lower edge of said air inlet opening to form an upwardly opening channel, means suspended from the top of said casing intermediate said front and rear walls forming a shelf, a filter comprising a frame having its lower edge extending into said channel and its upper edge supported upon said shelf, said filter also comprising a fibrous member upon said frame, a fan for creating a flow of air through said openings and fibrous member, and means revoluble with said fan for elevating liquid from said receptacle and thowing the elevated liquid against the portion of said fibrous member near said shelf.

4. An air conditioning apparatus, comprising means forming an air passageway, a filter in said air passageway comprising a fibrous member and a surrounding frame, said fibrous member having a substantially vertically extending lower portion and an inclined upper portion, means for discharging liquid upon said fibrous member, and a coiled wire beneath and supporting said upper portion.

5. An air conditioning apparatus, comprising means forming an air passageway, a liquid re-

ceptacle below said air passageway, means for creating a flow of air through said air passageway, a pulley having sides and a hub with a crowned portion between said sides, and an endless flat belt extending over and engaging said crowned portion and depending into the liquid in said receptacle.

6. An air conditioning apparatus, comprising means forming an air passageway, a liquid receptacle below said air passageway, means for creating a flow of air through said air passageway, a pulley having sides and a hub with a concave portion between said sides, and an endless flat belt extending over and engaging said concave portion and depending into the liquid in said receptacle.

7. An air conditioning apparatus, comprising a casing having a liquid receptacle in its lower portion and also having air inlet and outlet openings in its upper portion to provide for the passage of air through the latter portion, a motor driven pulley element located within the air stream, an endless belt extending around the pulley element and depending into the liquid within the receptacle for elevating liquid from the receptacle to the air stream, and a filter positioned in the air stream and having a portion extending over the pulley element.

8. An air conditioning aparatus, comprising a casing having a liquid receptacle in its lower portion and also having air inlet and outlet openings in its upper portion to provide for the flow of air through the latter portion, a motor driven pulley element located within the air stream, an endless belt extending around said pulley element and depending into the liquid within said receptacle for elevating liquid to the air stream, said pulley element having opposed side portions shaped to discharge the elevated liquid outwardly in a fine spray, and a filter located within the air stream in a position to intercept the spray effected by said pulley element.

9. An air conditioning apparatus, comprising a casing having a liquid receptacle in its lower portion and having an air passageway extending therethrough above the receptacle, a fan in the air passageway for creating a flow of air through said passageway, a motor for driving the fan, means for elevating liquid from the receptacle into the air stream effected by the fan including an endless belt depending into the liquid in the receptacle, means driven by the motor and positioned in the air stream including a pulley element supporting said endless belt and effecting a spray of the liquid elevated by said belt, and a filter positioned to intercept the spray effected by the pulley element.

GEORGE W. LANGFORD.