Nov. 14, 1944. H. W. SCHAEFER 2,362,933

AIR CONDITIONING APPARATUS

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Fig. 1

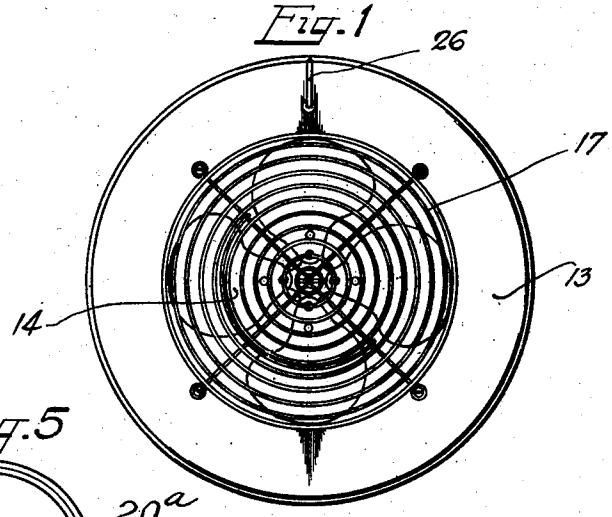

Fig. 5

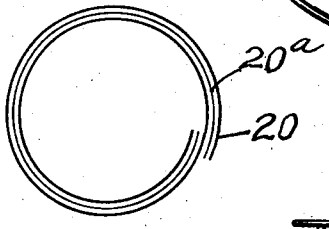

Fig. 2

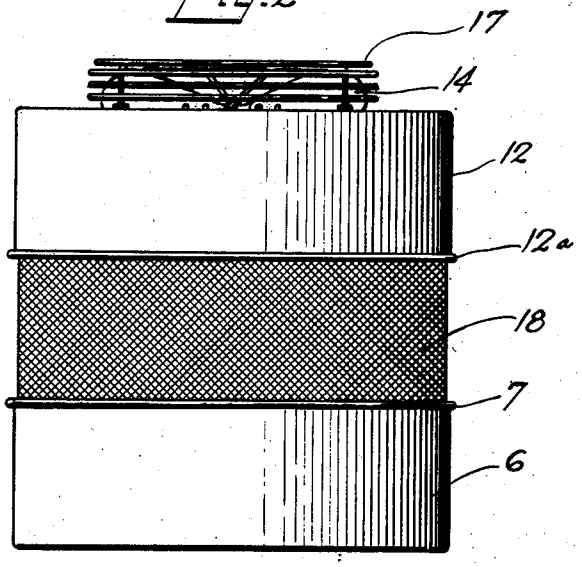

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Fig. 3

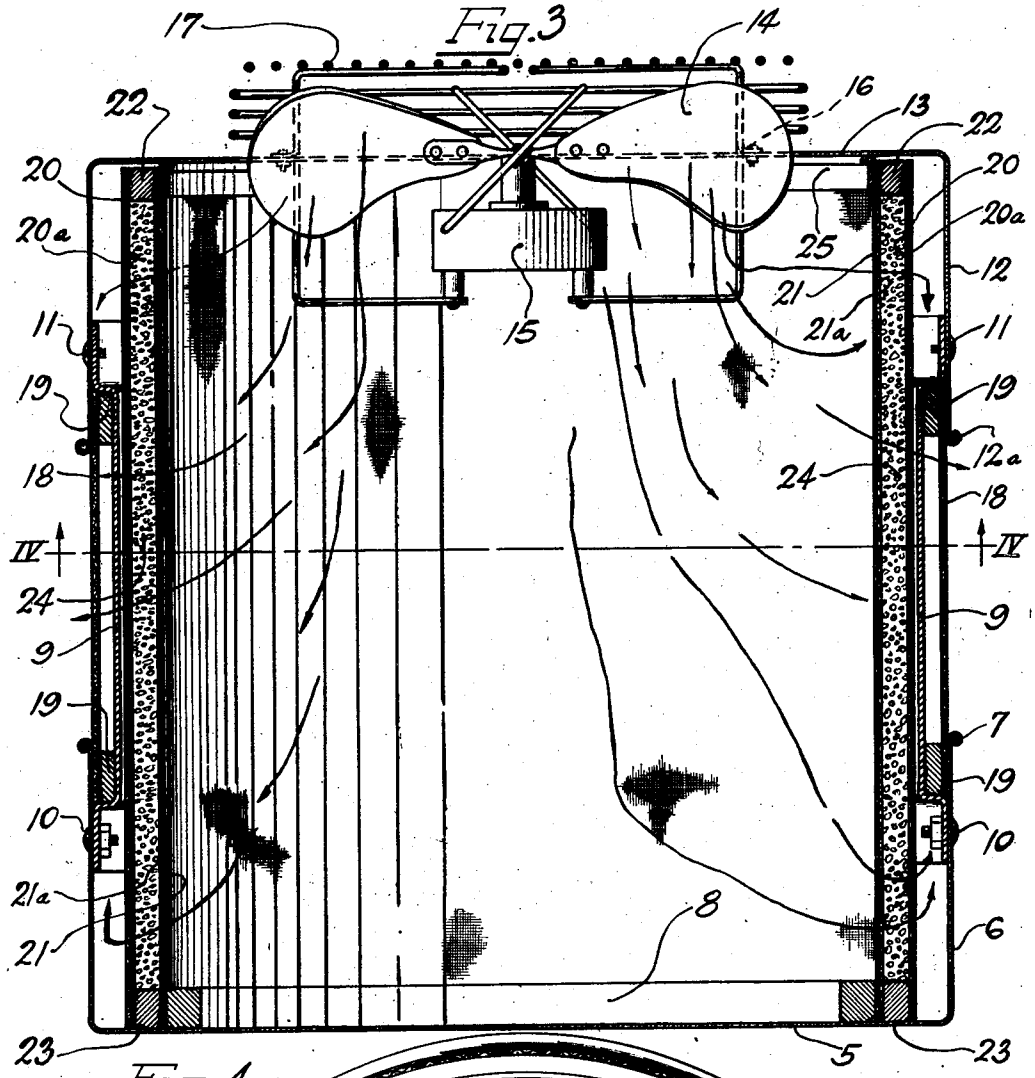
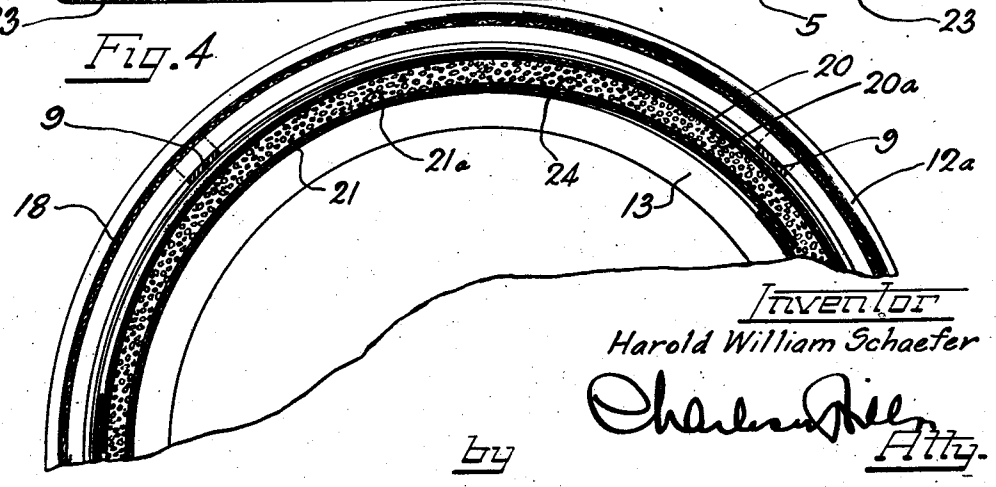


Fig. 4



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UNITED STATES PATENT OFFICE

2,362,933

AIR CONDITIONING APPARATUS

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Application March 8, 1941, Serial No. 382,325

8 Claims. (Cl. 183—36)

This invention relates to air conditioning apparatus and particularly to that class of air conditioning apparatus which is employed in the elimination of objectionable odors which frequently prevail in kitchens, hospitals, public rooms, experimental test laboratories, and pet shops or menageries.

Several methods are employed in the attempted elimination of such offensive odors. First and most common is by dilution of the room air with fresh outdoor air. This is objectionable in cold weather and, unless exceedingly large quantities of outdoor air are admitted, the odors frequently persist. The use of suction fans for the removal of odor-laden air is effective but, unless odors are to be circulated throughout an entire building, requires the use of suction apparatus for each room or of suction ducts leading to such apparatus. This involves objectionable expense.

Sometimes incense or similar material having a pleasing odor is discharged into the room containing the offensive odor. This procedure does not eliminate the odor. It only serves to mask it to a certain degree.

The present invention provides apparatus effectively absorbing such odors by drawing or forcing the room air through a bed of material having the property of absorbing odors contained in such air and then discharging the odor-free air back into the room. I have found that activated carbon in powdered or comminuted form serves admirably as a material for absorbing odors and that odor-laden air passed through a relatively thin bed thereof emerges substantially odor free.

It is an important object, therefore, of the present invention to provide a portable apparatus embodying a bed of odor-absorbing material and mechanism for causing odor-laden air to be forced therethrough and discharged into a room from which the air was originally taken.

It is a further object of this invention to provide odor-absorbing apparatus wherein the bed of absorbing material is in cartridge form to permit of its ready replacement when its odor-removing qualities have been substantially exhausted.

It is another object of the present invention to provide a cartridge of odor-absorbing material which is of improved and economical construction and which may be readily inserted or withdrawn from a supporting structure.

It is finally an important object of this invention to provide simple, durable apparatus for use in the removal of offensive odors from room air, which apparatus is readily portable and may be used any place within the room without danger to the occupants.

Other and further important objects of this invention will be apparent from reference to the following specification and the accompanying drawings.

The invention, in a preferred form, is shown on the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a top plan view of an apparatus embodying the present invention.

Figure 2 is a side elevation thereof.

Figure 3 is a central vertical section taken through apparatus embodying the present invention with parts shown in elevation.

Figure 4 is a fragmentary section on the line IV—IV of Figure 3.

Figure 5 is a diagrammatic showing of one method of fabricating a wall of the odor absorbing cartridge.

As shown on the drawings:

In the apparatus embodying principles of the present invention, there is provided a stamped metal base portion having an integral bottom part 5 and an annularly extending outside upstanding wall 6. The wall portion 6 terminates at its upper extremity in a beaded edge 7. As shown in Figure 3, the height of the base portion as defined by the wall 6 is preferably approximately one-third that of the air conditioning assembly.

Annular cartridge-positioning rings 8 rest on the upper face of the bottom portion 5 extending upwardly therefrom, and provide means for limiting the inward movement of the absorbent cartridge in a manner to be described hereinafter. Secured to the inner side of the upstanding side wall portion 6 are a plurality of spacing brackets 9 which are conveniently attached to the member 6 by bolts or screws 10, as plainly shown in Figure 3. These spacing brackets 9 are offset inwardly directly above their points of attachment to the side wall 6 and extend upwardly in a plane parallel to but spaced inwardly from the plane of said portion 6.

At their upper ends the members 9 are again bent outwardly and upwardly to afford attaching portions in alignment with portions of said members attached to the base 6. At such upper ends, each of said members 9 is attached by removable bolts or screws 11 to a cup-shaped top or cover member which embodies an annular wall portion 12 extending in substantially the same plane as

the bottom wall portion 6 and which further embodies a centrally apertured top portion 13.

Carried by said top portion 13 and positioned in the central aperture formed therein is a suction fan 14 driven by a motor 15, the entire fan and motor assembly being carried by a bracket 16 attached to the top portion 13 near the edge of the central aperture therethrough. Supported on the cover member 13 and surrounding that portion of the fan 14 which projects from the casing is a grille type guard 17 constructed of wire, steel rod or in any suitable manner. This guard prevents accidents to occupants of the room who might otherwise accidentally come in contact with the rotating fan 14.

Each of the brackets 9 is spaced between the lower edge of the side wall 12 of the cover portion (which is beaded as at 12*a*) and the upper edge of the side wall section. An annular screen or grille 18, of relatively thin screen wire material, is positioned between the inner faces of the members 6 and 12 at their upper and lower edges respectively and stapled to the outer faces of spacer blocks 19 which are interposed between the said screen member 18 and the extremities of the offset portions of the brackets 9.

The assembly of parts just described provides apparatus which, when the motor 15 and fan 14 are operated, will serve to draw air from a room in which the apparatus is positioned into the interior of the casing and force it outwardly through the screens or grilles 18.

Reference will now be made to the removable odor-absorbing cartridge which is positioned in the path of the air in its movement just described.

This cartridge, which is most plainly shown in Figures 3 and 4, in effect comprises odor-absorbing filter beds of activated carbon material, such, for example, as finely powdered or comminuted charcoal, which material has been found to have the property of absorbing odors from air and retaining such odors even though relatively large quantities of air are passed therethrough over a considerable period of time. The removable cartridge which I have devised consists of a cylindrical member having spaced annular walls the outer portions of which are preferably formed of screen or wire cloth which is designated at 20 and 21 in order to retain the powdered or comminuted material forming the filter bed. These annular screen or wire cloth members 20 and 21 are each provided with a liner 20*a* and 21*a* respectively of textile material such, for example, as finely woven cotton cloth.

These outer and inner walls of the cartridge comprising the layers 21 and 21*a* and 20 and 20*a* respectively are rolled into overlapping annular form as shown in Figure 4 and are retained in such annular cartridge form by top and bottom spacing blocks 22 and 23 (Figure 3). Positioned between walls 20—20*a* and 21—21*a* and the end spacing blocks 22 and 23 is the bed of odor-absorbing material designated by the reference numeral 24 and which, as heretofore stated, comprises powdered or finely comminuted activated carbon or charcoal.

The lower end of this cylindrical cartridge of odor-absorbing material engages over the outer periphery of the annular member 8 at the bottom of the apparatus while the upper end thereof engages over the outside of an annular gasket 25 depending from the cover 13.

Figure 5 diagrammatically illustrates one method of preparing the walls of the cartridge filter bed. As previously described, and in the construction shown in Figures 3 and 4, such walls comprise an inner cloth lining 20*a* and an outer annular screen or wire cloth 20 supporting such lining. The inner cloth lining and the outer screen or wire cloth retaining means for the inner wall of the cartridge are similarly designated by the reference numerals 21*a* and 21, respectively.

In the modification shown in Figure 5, the walls of the cartridge are formed in a slightly different manner, the annular screen or wire cloth 20 of a given wall in each instance being wound about itself for one complete turn. Thereupon the cloth lining 20*a* is wound upon said annular screen for one complete turn, after which the annular screen is again wound upon the cloth lining 20*a* for one additional turn. Thus in this arrangement, as shown in Figure 5, it is apparent that there are two layers of screen or wire cloth with an intervening layer of fabric cloth therebetween. The composite wall structure so fabricated would form the outer wall of the absorbent filter cartridge while the inner wall comprising cloth 21*a* and screen or wire cloth 21 would be similarly formed.

It will be apparent from the foregoing construction that air drawn into the casing by the fan 14 will, because of the plenum condition created within the casing, be forced outwardly through the filter bed of activated carbonaceous material 24 and, after being so forced outwardly through such filter bed in which its objectionable odors are absorbed, be discharged into the room through the grille 18.

Although I have found that a cartridge filter bed of moderate size will remain effective for a long period of time, it is, of course, obvious that after continuous use, the cartridge may become so saturated as to no longer be effective. In such event, it is a simple matter to remove the exhausted cartridge of absorbent material and replace it with a new one. This is accomplished by removing the cover member 12, 13—removing the screws 11, and simply lifting off the annular cartridge assembly and replacing it with another; after which the cover member 12, 13 is replaced and the screws 11 again being placed in position to retain the structure in assembled relation.

In addition to this feature of ready removal and replenishing of the odor-absorbing cartridge, the device herein described is readily portable and may be carried from room to room in a building to completely deodorize the air within such rooms. Since all working parts are completely enclosed, the device may be readily operated any place within the room without danger to the occupants since deodorizing of air within the room is accomplished by this apparatus without the necessity of dilution of the room air with cold outdoor air, and the use of this apparatus in no way affects heating economy.

Furthermore, it will be noted that the apparatus embodying this invention is pleasing in appearance, of simple and rugged construction, and is susceptible of economical manufacture.

I have disclosed a practical embodiment of the features of my invention, but I do not desire to be limited to the exact construction and arrangement shown and described, as changes and modifications may be made without departing from the scope of this invention.

I claim as my invention:

1. In an apparatus of the character described, a casing comprising a base member having an upstanding annular flange, spaced brackets se-

cured to said flange having upwardly extending inwardly offset portions, a centrally apertured top member having a depending annular flange with its lower edge spaced from the upper edge of the first mentioned flange removably secured to the upper ends of said brackets in substantially the same vertical plane as the flange of the base member, a grille extending between the said flanges and secured between the inner faces thereof and said brackets, a motor driven fan carried by the top member and positioned in the aperture therein to draw air into the casing and discharge it therefrom through said grille, and a filter bed of odor-absorbing material extending lengthwise of the casing and positioned adjacent said brackets.

2. In an apparatus of the character described, a casing comprising a base member having an upstanding annular flange, spaced brackets secured to said flange having upwardly extending inwardly offset portions, a centrally apertured top member having a depending annular flange with its lower edge spaced from the upper edge of the first mentioned flange removably secured to the upper ends of said brackets in substantially the same vertical plane as the flange of the base member, a grille extending between the said flanges and secured between the inner faces thereof and said brackets, a motor driven fan carried by the top member and positioned in the aperture therein to circulate air through the casing and a filter bed of odor-absorbing material positioned in the casing between the grille and the fan in the path of such circulating air.

3. In an apparatus of the character described, a casing comprising a base member having an upstanding annular flange, spaced brackets secured to said flange having upwardly extending inwardly offset portions, a centrally apertured top member having a depending annular flange with its lower edge spaced from the upper edge of the first mentioned flange removably secured to the upper ends of said brackets in substantially the same vertical plane as the flange of the base member, a grille extending between the said flanges and secured between the inner faces thereof and said brackets, a motor driven fan carried by the top member and positioned in the aperture therein to draw air into the casing and discharge it therefrom through said grille and a filter bed of odor-absorbing material removably mounted in the casing between the fan and the grille.

4. In an apparatus of the character described, a casing comprising a base member having an upstanding annular flange, spaced brackets secured to said flange having upwardly extending inwardly offset portions, a centrally apertured top member having a depending annular flange with its lower edge spaced from the upper edge of the first mentioned flange removably secured to the upper ends of said brackets in substantially the same vertical plane as the flange of the base member, a grille extending between the said flanges and secured between the inner faces thereof and said brackets, a motor driven fan carried by the top member and positioned in the aperture therein to draw air into the casing and discharge it therefrom through said grille and a cylindrical cartridge of odor-absorbing material positioned in the casing between the fan and the grille and spaced inwardly from said grille.

5. In an apparatus of the character described, a casing comprising a base member having an upstanding annular flange, spaced brackets secured to said flange having upwardly extending inwardly offset portions, a centrally apertured top member having a depending annular flange with its lower edge spaced from the upper edge of the first mentioned flange removably secured to the upper ends of said brackets in substantially the same vertical plane as the flanges of the base member, a grille extending between the said flanges and secured between the inner faces thereof and said brackets, a motor driven fan carried by the top member and positioned in the aperture therein to circulate air through the grille and casing, annular positioning means extending upwardly from the base member and spaced inwardly from the upstanding flange thereon, annular positioning means depending from the top member and spaced inwardly from the depending flange thereon and a cylindrical cartridge of odor-absorbing material positioned in the casing in the path of air flowing between the fan and grille held in position in said casing by said means which extends upwardly from the base thereof and depends from the top thereof.

6. In apparatus of the character described, a cylindrical casing having a closed bottom and a removable apertured top member, a motor driven fan carried by the top member and mounted in the aperture therein with the median line of the fan substantially in the plane of the aperture, guard means supported by the top member of the casing and extending over the fan to prevent accidental contact therewith, screened discharge openings in the wall of the casing remote from the fan to permit of passage of air in relatively large quantities, and an odor-removing filter bed assembly of activated carbon mounted and so positioned in the casing that air flowing between the fan and such screened opening necessarily passes through said odor-removing filter bed.

7. A filter cartridge for air treating apparatus comprising a plurality of spaced cylindrical walls each consisting of a continuous double layer of metallic screen with a layer of textile fabric therebetween and comminuted odor-absorbent material between said walls.

8. Air treating apparatus comprising confronting casing members each having an end wall, one of said end walls having an opening therethrough, bracket members spaced around the peripheries of said casing members and removably connecting them together in spaced apart relation, a rotatable fan carried by said one end wall within the opening therethrough for drawing air into said casing members and discharging the drawn-in air through the space therebetween, and a filter member in said casing members seated against said end walls and said bracket members to cover the space between said casing members whereby air discharged by said fan passes through the filter member.

HAROLD WILLIAM SCHAEFER.