

Oct. 15, 1935.

C. A. DUFFNER

2,017,590

AIR PURIFIER

Filed Nov. 2, 1933

3 Sheets-Sheet 1

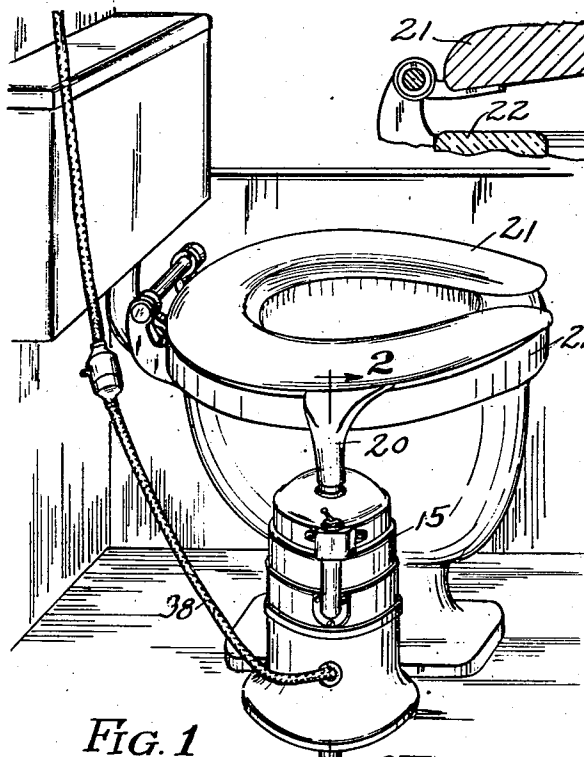


FIG. 1

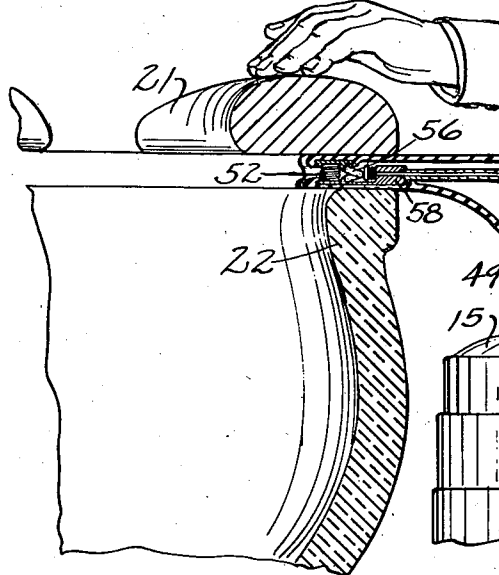


FIG. 7

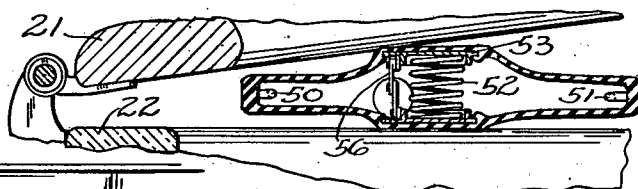


FIG. 9

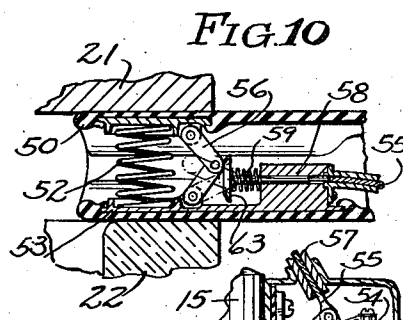


FIG. 10

FIG. 11

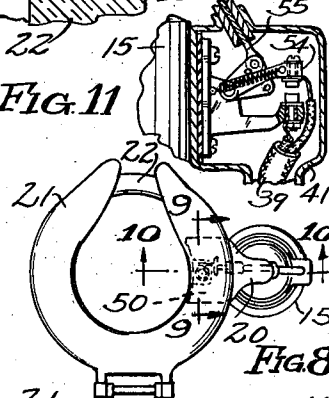


FIG. 8

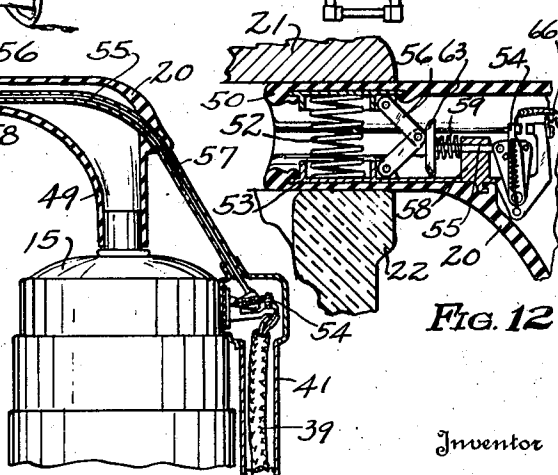


FIG. 12

Inventor

Carl A. Duffner
Bates, Golrick & Peare

Attorneys

Oct. 15, 1935.

C. A. DUFFNER

2,017,590

AIR PURIFIER

Filed Nov. 2, 1933

3 Sheets-Sheet 2

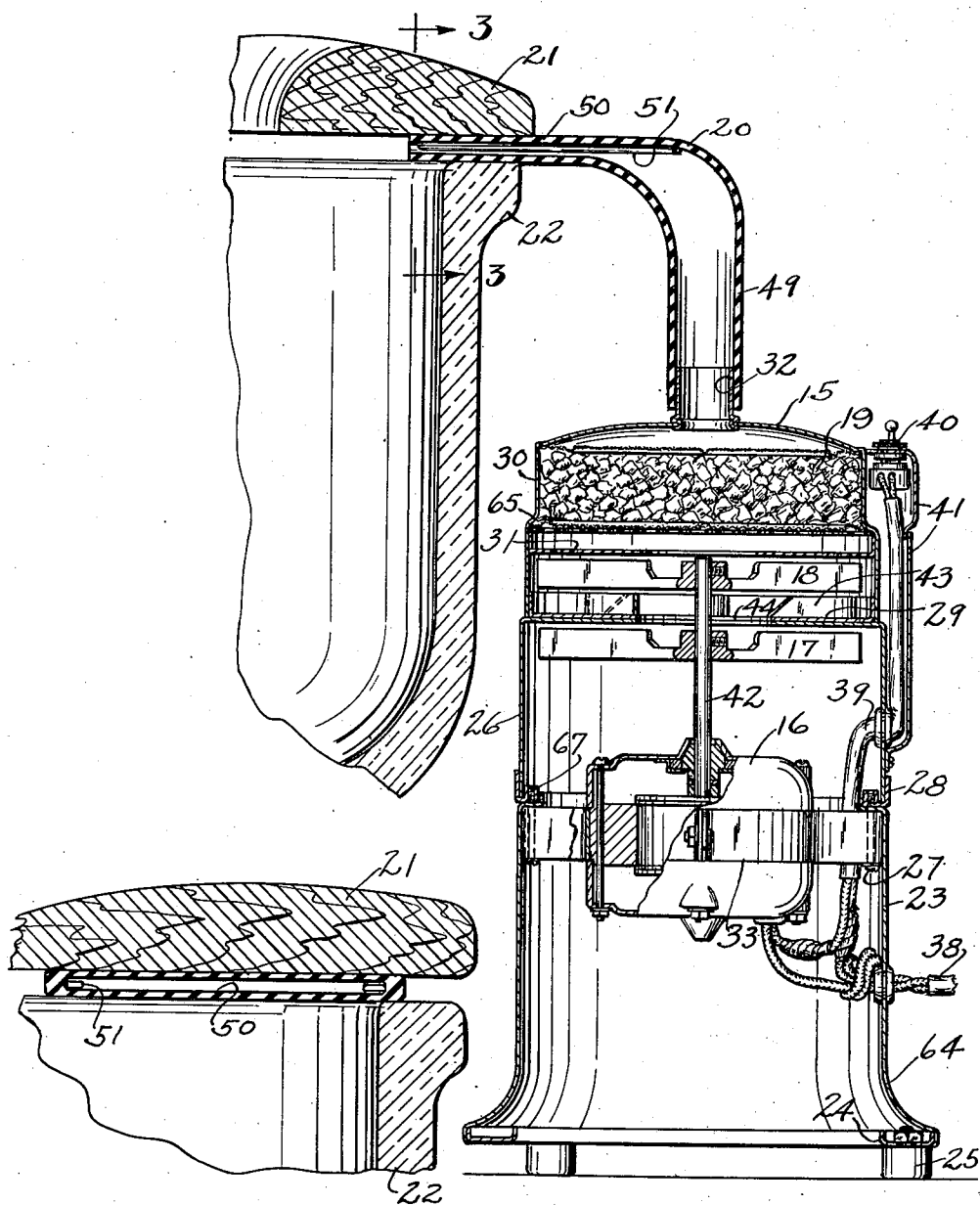


FIG. 3

FIG. 2

Inventor

Carl A. Duffner
By *Rates, Coltrick & Teare*

Attorneys

UNITED STATES PATENT OFFICE

2,017,590

AIR PURIFIER

Carl A. Duffner, Cleveland Heights, Ohio

Application November 2, 1933, Serial No. 696,355

7 Claims. (Cl. 4-213)

This invention relates to an air filter or purifier and more particularly to one especially adapted for use in connection with toilet bowls for the elimination of obnoxious odors. I am aware that other devices of this general nature have been proposed, and the general object of the present invention is to provide, in an economical manner, an efficient, power-operated, air-filtering device of a type which embodies the use of an air-filtering, chemical membrane through which the air is drawn by a motor driven suction device. My device is also quickly and easily installed in connection with any toilet bowl, without change in the toilet fixture itself, and by an adjustment which is simply and easily made by anyone.

Further advantages of my invention will be apparent from the description and drawings, and the essential features are set out in the claims.

Referring now to the drawings, Fig. 1 represents a general perspective view of my device when associated with a toilet fixture in operative position; Fig. 2 is a sectional view on the lines 2-2 indicated in Fig. 1; Fig. 3 is a partial sectional view, as indicated by the lines 3-3 in Fig. 2; Figs. 4, 5 and 6 are views of the component parts of my device in a partially disassembled relation, and with certain portions removed to more clearly disclose the general features of my device. Fig. 7 is a partial sectional view, in the same general position as Fig. 2, but indicating one method of automatically controlling the operation of my device; Fig. 8 is a general plan view of such a control; Fig. 9 is a sectional view on the lines indicated at 9-9 in Fig. 8, while Fig. 10 is a partial sectional view on the lines 10-10, as indicated in Fig. 8; Fig. 11 is a partial sectional view through an electric switch adapted to control my device, while Fig. 12 is a view, partly in section, of a modification of the automatic control.

My invention includes a sectional casing, indicated generally by the numeral 15, and which is shown as enclosing a motor 16, which drives fans 17 and 18, so as to draw air through a foul gas absorbing medium 19, by means of a connecting nozzle 20, extending from the casing to the toilet bowl. When placed in operative position the nozzle is disposed between the toilet seat 21 and the rim of the bowl 22.

The casing 15 is constructed preferably of drawn sheet metal sections for assembly advantages. I show this casing as comprising a lower motor-supporting section 23, which may rest directly upon the floor or other supporting

medium, or may be provided with an annular ring, as shown at 24, to which are attached legs or supports 25, which maintain a greater space for air flow between the casing and its support. This ring 24 also serves to reinforce the bottom of the casing. The bottom portion of member 23 may be flared outwardly as at 64 to give greater stability and a pleasing appearance. Above this I have shown another casing member 26, surrounding the upper portion of the motor, and the fan 17. This member may be fastened directly to the member 23, as by screws 27, or, as shown in Fig. 2, I may provide an annular reinforcing ring 28, attached to the member 26, as by spot-welding, and in turn secured to the lower member 23. Secured to the upper surface of the member 26, as, for instance, by spot-welding, is a cup-shaped member 29, containing air-diverting vanes. This member 29 also serves to reinforce the walls of the casing. A cap member 30 forms the upper portion of the casing, and is shown surrounding the absorbing medium 19, and extending downwardly to surround fan 18, and interfitting with the cup-shaped member 29, to which it may be secured in any manner desired. Within the cap 30 I show another member 31, adapted to hold the absorbing medium in place, and preferably pressed into position so as to be readily removable for replacement of the absorbent 19. This member also reinforces the walls of the casing. A shoulder 65 on the cap 30 serves to accurately locate the member 31. I have shown the casing members 26, 29 and 31 as provided with registering central openings, through which air is adapted to pass. For connecting the nozzle 20 to the casing I show a nipple member 32, leading from approximately the mid-portion of the cap 30, and over which the nozzle 20 is adapted to fit snugly. All interfitting sections of the casing are so formed as to provide substantially air-tight joints.

I obtained a pleasing appearance of the casing as a whole, as shown in Fig. 1, by having the bottom flare out and by progressively decreasing the outside diameter toward the top. The top cap may have a slightly convex surface to aid the appearance.

The motor 16 may be of a well-known type adapted for use with either alternating or direct current of the voltages and frequencies usually found in house circuits. This motor is supported in approximately the mid-portion of the casing, and for this purpose I have shown the novel motor supporting bands 33. I prefer to use two metallic straps, having portions 34, adapted to rest against

the motor, and loops 35 extending outwardly to the casing and back again to other portions lying against the motor. These bands may be supplied with ears 36 by which it is clamped about the motor by members 37. The screws or bolts 27, previously mentioned as holding the members 23 and 26 of the casing together, are adapted to pass through the loops 35, thus performing the additional function of supporting the motor in place. I have shown the bolts 27 threaded directly in the metal of ring 28 which is struck up in punching the holes. This is an aid to quick assembly, although the usual nuts might be used.

The motor is adapted to be connected to a house circuit by connection 38, leads from which, as at 39, may be conducted to a switch 40, located at a convenient position. An opening 60 in the casing is shown for an extension cord. For ease in construction I may locate the leads 39 on the outside of the casing, and a hole 61 is shown to allow this. These leads may be protected and enclosed by the members 41, secured to the casing. The switch 40 may be supported by the members 41 as shown in Fig. 2.

For the propulsion of the air, I show two fans, 17 and 18, rigidly mounted upon an extension of the motor shaft 42. These fans may be constructed of any material, but in my preferred form I have constructed them of phenolic derivative mouldings. The fans are shown as located one on either side of the member 29, upon which are supported vane members 43. These vanes may be struck up from the metal of the member 29, as shown at 62 in Fig. 4, or otherwise formed, as desired. These vane members serve to direct the air delivered by the fan 18 from the periphery of the fan toward the central opening 44, where it is picked up by the fan 17.

The substance shown at 19 for purifying the air or absorbing the obnoxious odors therefrom, may comprise charcoal or activated carbon or other well-known substances. For retaining this absorbing material in place, I show screen members 45 and 46 above and below it, and a perforated plate 47 on the underside for further support. This is shown as retained in place by the removable member 31. I find that in ordinary use this absorbing material need be changed but infrequently.

The nozzle member 20 is preferably made of some flexible, durable and easily-severable material, such as rubber, and is shown as having a tubular portion 49 adapted to fit over the nipple 32 of the casing, and a flat mouth portion 50, which I may retain in shape by a spreader member shown at 51. I prefer to use a U-shaped piece of spring wire for such a spreader member. This nozzle 20 will usually be provided with a tubular portion 49 longer than necessary, so that, when installing the unit it is only necessary to place it in the proper position and cut off the portion of the tube 49 not needed. The nozzle 20 is sufficiently rigid to be held in operative position at all times by the nipple 32. Thus the unit may be readily moved if desired, and the member 20 is easily removed for cleaning purposes, if necessary.

If it is desired to operate the filter automatically by pressure upon the toilet seat, rather than by the hand switch, shown at 40, I may provide a spring 52, for holding the seat normally in a slightly raised position. This spring may be held in position in the mouth 50 of the nozzle 20, by means of retaining and wear-resisting members 53, molded in the rubber. These members 53 may be of hard rubber or of metal. In this case I pro-

vide a quick make-and-break switch 54, in place of the switch 40, which may be operated by a device such as push rod 55, shown in Fig. 7, which, in turn, is operated by a toggle connection 56, actuated by pressure upon the seat. The push rod 55 may be of a well-known type, shown as having a protective casing 57, extending from the metal casing 41 adjacent the switch, through the wall of the nozzle 20 to an end piece 58, molded in the mouth-portion 50 of the nozzle. A spring 59 is shown for the purpose of holding the head 63 of the push-rod against the toggle 56. This serves to open the switch when the pressure on the seat is removed.

A modification of the automatic control mechanism is shown in Fig. 12, where parts, having similar functions to those just described, have been similarly numbered. The quick make-and-break switch 54 is here shown supported by the nozzle 20 adjacent the toilet bowl and wires 66 lead to the motor 16.

One advantage of supporting the automatic control on the nozzle is that the user need only place the device in position, upon which, it is ready to operate.

It will be seen that most of the parts of my device may be easily stamped from sheet metal. The casing may be assembled in three main portions. The lower would include parts 23 and 24. The middle portion would include parts 26, 28 and 29. The upper would include 32, 30 and 31 with the absorbing material in place. The motor with fan 17 in place might then be secured by bolts 27, which at the same time unite the lower and middle portions of the casing. Fan 18 might then be secured to the motor shaft and the top portion of the casing attached to member 29. The leads 39 might then be connected to switch 40 and the members 41 secured to the main casing. Placing the nozzle 20 on the nipple 32 would complete the assembly.

While my device, as described, is substantially air-tight, yet small leaks in the casing would not defeat the purpose of my device, as all air entering the apparatus must pass through the purifying and absorbing medium before being discharged.

The use of my invention does not cause a heating problem by removing air from the room and discharging it outside. The air is purified and returned to the room.

The unit may be sold without installation cost, as the buyer need only set it alongside the toilet bowl and cut off the unnecessary portion of the connecting nozzle.

I claim:

1. In an air filter, the combination of a casing open at the bottom, and containing a motor in the lower portion, said motor being mounted with its shaft vertical, absorbing material near the top, a diaphragm therebeneath with a central opening, a fan mounted on the motor shaft beneath the diaphragm, a second diaphragm beneath the fan and having a central opening and vanes adapted to direct a current of air towards the central opening, and a second fan mounted on the motor shaft and beneath the second diaphragm.

2. In an apparatus of the class described, a casing generally cylindrical in shape having a lower portion enclosing a motor and a fan, a middle portion slightly smaller in diameter than the first-mentioned portion, said middle portion enclosing a second fan and a top portion slightly smaller in diameter than the second-mentioned portion, said top portion enclosing absorbing material.

3. In an apparatus of the class described, the combination of a casing substantially cylindrical in shape, absorbing means within the casing and adjacent the top thereof, a pair of superposed fans therebeneath, a motor beneath the fans, and four reinforcing rings contacting the walls of the casing, one at the bottom, a second adjacent the motor, and one adjacent each fan.

4. In an apparatus of the class described, a casing having a lower portion surrounding a motor and a fan, an upper portion surrounding absorbing material and another fan, and a member attached to one portion adapted to position the other portion thereon and to secure the other portion thereto.

5. In an apparatus of the class described, the combination of a casing having two separable parts, portions of one part containing a replaceable deodorizing substance and being adapted to overlie portions of the other part, a motor support and fan arrangement carried by the lower casing, and means for securing the portions of the

casing together and securing the support to the casing.

6. In an apparatus of the class described, a rubber nozzle having a tubular portion, and a flared mouth portion, said mouth portion being maintained in shape by a U-shaped metallic member.

7. The combination with a toilet bowl and its associated seat, of a casing containing air-conditioning means, including a motor, a switch controlling the motor circuit, a flexible nozzle communicating with the casing, said nozzle being adapted to lie between the bowl and the seat, a spring carried by said nozzle remote from said casing and operatively associated with the nozzle and the seat and normally maintaining the seat in a slightly raised position, means for closing the switch upon compression of the spring, and means for opening the switch upon release of the spring compression.

CARL A. DUFFNER.