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AIR FILTERING CLEANERS

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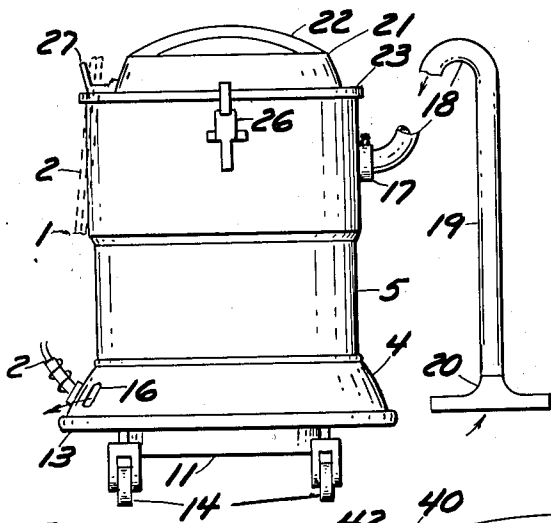


FIG. 1

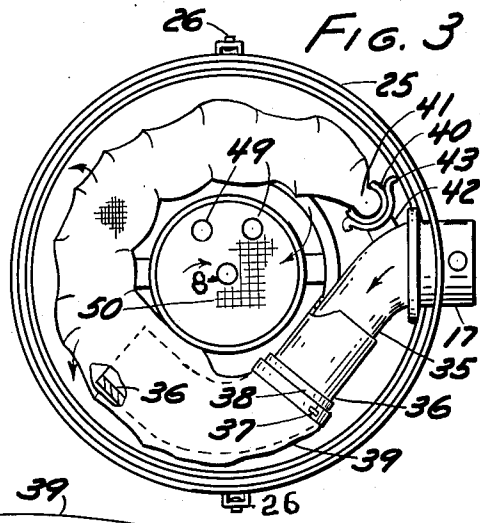


FIG. 3

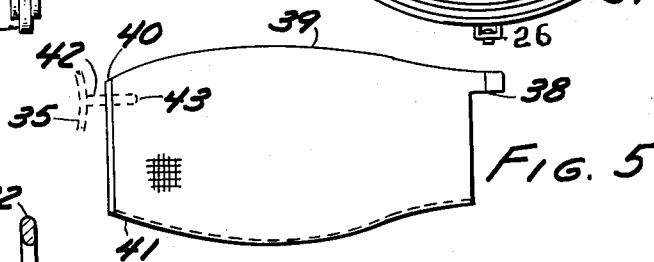


FIG. 5

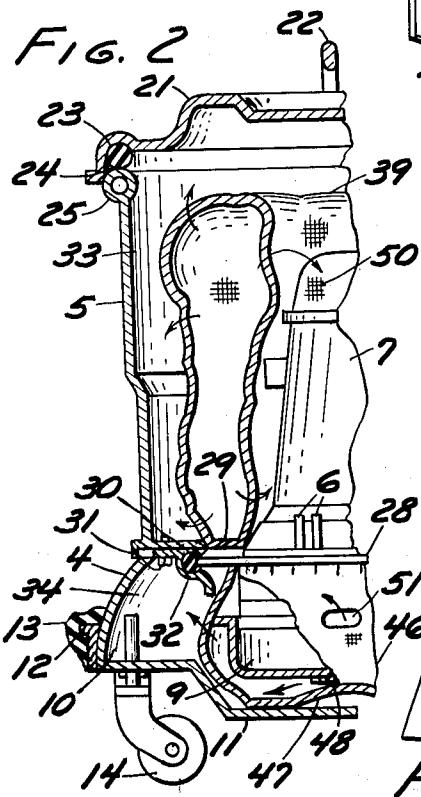


FIG. 2

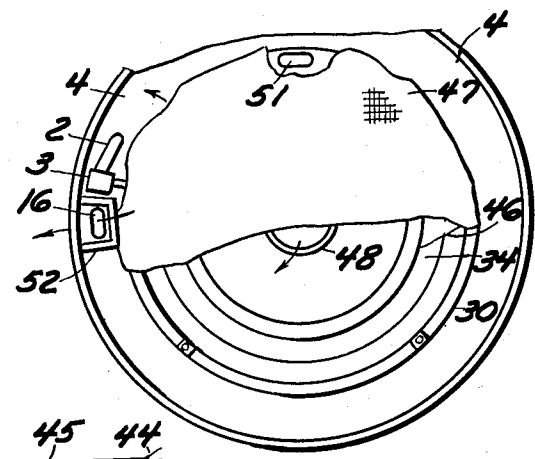


FIG. 4

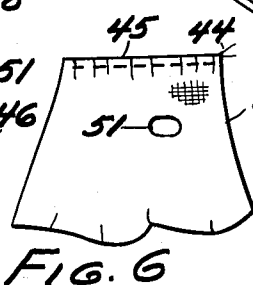


FIG. 6

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## AIR FILTERING CLEANERS

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2 Claims. (Cl. 183—37)

This invention relates to motor fan units having entraining means for particle carrying air handled thereby.

This invention has utility when incorporated in portable units of the blower and vacuum types, especially as comprising a motor and fan direct connected and cushion mounted in a housing having air passages in and out of such housing, with air particle entraining fabric bag sections in such passages each way from the fan, with such total air flow directed in motor cooling course.

Referring to the drawings:

Fig. 1 is a side elevation, with parts broken away, of an embodiment of the invention in a tank housing with dirt pick-up equipment therefor;

Fig. 2 is a partial vertical section, on an enlarged scale thru the tank of the embodiment in Fig. 1;

Fig. 3 is a top plan view of the unit of Fig. 1, with the cover or top section removed, showing the filter bag, partly broken away, at the air intake;

Fig. 4 is a bottom plan view of the unit of Fig. 1, portions being broken away, the housing bottom section being removed, and showing the filter bag location as to the discharge for air from the unit;

Fig. 5 is a smaller scale showing, in side elevation, of the intake bag extended or flat and with the bag large opening end closed by a channel clamp; and

Fig. 6 is a side elevation of the tie-cord mounted bag, here shown in hanging position, as depending from the fan to enclose discharge or air delivery from the fan.

A two-prong electric fitting 1 may be connected to a two-prong receiver fitting for connecting a line pair in a conduit 2 (Fig. 1) extending to a terminal block 3 (Fig. 4) positioned inside lower skirt section 4 of a tank or housing 5. A pair of conductor wires 6 lead from the block 3 to a motor 7 on a shaft 8 directly connected to a multistage fan in a fan housing 9 (Fig. 2).

Screws 10 mount an imperforate bottom 11 as a closure for the skirt section 4 lower rim. The bottom 11 includes a flange 12 about the lower portion of the skirt 4. On this flange 12 is stretched a rubber ring or buffer 13, providing cushioning protection against harsh contacts of the tank 5 as mounted by casters 14, for ready shifting about as in use. An outlet fitting or discharge port 16 is through the wall of the skirt 4.

The cylindrical tank 5 upper portion has a lateral fitting or intake port 17. For suction or vacuum cleaner type of use, a duct or hose 18, may be connected at the fitting 17 and extend to a wand 19 having a terminal suction nozzle 20. For blower use, there is the reverse connection, that is, at the port 16 (Fig. 1).

The tank 5 has a top lid or cover 21, provided with a handle 22. The lid 21 has a marginal rib forming an endless bottom opening or groove 23 for a compression gasket or rubber ring 24. A bead 25 forms a seat top edge for the tank 5 to abut against the exposed lower portion of the gasket 24. Sealing relation at this joint for the readily detachable cover 21 is effected by a pair of pull-down catches 26. A hook or catch 27 rises from

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one side of the lid 21 and thereby provides holding means for a coil of the conduit 2.

At the assembly of the fan housing 9 with the motor 7 there is a flange or partition section 28 as an endless rib adapted to enter a recess in a rubber ring or gasket 29 (Fig. 2). The tank 5 at its end toward the skirt 4 has a partition section or inwardly directed flange 30.

Bolts 31 thru the endless horizontal flange 30 assemble a seat-providing ring 32 in position as to the flange 30 to have a sealing-embracing coaction with the rubber ring 29. In this assembly for vertical set-up the directed connected motor 7 with its fan in the housing 9 have sound-deadening cushioning because of the mounting of the partition 28 in the ring 29.

With the lid 21 on and sealed to the tank 5, and the skirt 4 fixed with the tank 5 and the closure 11 assembled at the bottom, the intermediate yieldable partition or diaphragm 28, 29, 30, establishes an upper chamber 33 above this diaphragm 28, 29, 30, and a second independent chamber 34 below this diaphragm 28, 29, 30.

The intake fitting 17 is shown providing a horizontally extending bend section or elbow portion 35 near the top of the ring chamber 33. Upon the end of the bend section 35 is an additional elbow or bend section 36 of rubber tubing. An adjustable clamp ring 37 assembles fabric tubular throat 38 of filter bag 39 in thus completing intake connection. The woven bag 39 may be of nap facing to promote entraining of particles from air passing through the bag wall. An open side tube or spring channel 40 provides a readily detachable closure for this filter bag 39 large open end 41. The section 35 has a bracket 42 to mount a pair of spring fingers 43 in position to grip the channel 40 and hold such vertically for the bag 39 thus to extend in approximately a full wrap coil in the chamber 33.

A draw string 44 about upper open end 45 of a bag having side wall 46 and flat bottom 47, assembles this exhaust bag adjacent the under side of the diaphragm 28, 29, 30, with the fan housing 9 to have fan discharge opening 48. As so assembled, this discharge or second filter bag 46, 47, is flat-wise in the chamber 34 with the bag wall 47 upward from end inward of the tank bottom 11. To preclude clogging of motor vent ports 49 by the bag 39, a screen cap 50 is at the upper end of the motor 7. For air circuit promotion through the bag 46, 47, a pair of openings 51 are in the wall 46, about diametrically disposed.

The entrance 17 for air in-flow is a port which provides an upper support means through the connection tube 36 with the bag throat 38 for the bag or filter 39 to hang down therefrom, as the bag 39 takes on ring form in following the circular or ring contour of the chamber 33 in the housing concentric with the motor 7. In this arc wrapping of the bag 39 from the support means 36, the bag 39 extends to the entrance fitting 17 and there has its end 41 closed by the spring clip 40 engaging a second support means or clip 43. The draft of in-flowing air to the interior of the filter bag 39 has the full interior area thereof exposed for distributed leakage of the particle laden air therethrough to leave the particles to be entrained on the bag 39 interior and such pressure volume to inflate or distend the bag 39 for general slender oval vertical cross-section form as its flexible body adapts toward the enveloping or void regions of the chamber 33. This chamber 33 major volume is in the vertical ring portion in which the on edge split ring shaped bag 39 extends lengthwise and hangs downward from its supported ends 38, 41. The chamber 33 has a shallow upper portion to outlet port means 50, 49, where the air draft may not cause the bag 39 to clog the port 49 due to the screen 50 supporting any tendency of the bag 39 to sag over theretoward.

The tank 5 and skirt 4 comprise the major housing, in which the motor 7 and fan housing have vertical concentric axis location. The draft passage for motor cooling air from the port means 50, 49, has suction passage to the fan and blower discharge from the fan through port means 48. Tendency to inflate the filter bag 46, 47, may be reduced against motor stalling by the openings 51. A lattice 52 holds this exhaust filter shallow bag 46, 47, from clogging discharge port means 16. The general configuration of this filter bag 46, 47, is to have the bottom of such diameter that it allows for distension of the side 46 into the chamber 34 toward the skirt 4, thereby to an extent lifting the bottom 47 away from sealing contact with the housing bottom 11. Thus the chambers 33, 34, have their walls generally spaced from the filter walls to prevent filter throttling, the bag 39 having an area about 2½ times that of bag 46, 47.

A believed factor in the efficient performance hereunder is attributed to the intake receiver bag or filter 39. This filter is in series in the air flow toward the fan. Accordingly there is not fan blast in throwing particles against its wall. The bag 39 is loosely hanging down edgewise in a generally limp state. There is absence of any abrupt change in air flow general course, but a sort of plenum chamber dispersion of the velocity closely approaching pressure balance as to the chamber 33 as exterior of this bag 39. This minimizing of agitation in the chamber or bag 39 is a material factor for releasing particles from suspension and thus to drop freely into the loose lower portion of the bag ring. There is a slight unbalancing of pressure between the bag 39 interior and the chamber 33, and the extended area of the bag wall compensates for distributed seepage for the suction travel therefrom to the fan. The nap or surface entrained particles lodge quite uniformly with the heavier particles along the sort of trough lower portion of the bag.

With the bag 39 clean and no dirt pickup, but the intake 17 closed, there is speed of rotations per minute and pressure drop which speed at fully open position for the intake 17 decreases in the range of one fifth and the pressure is only about one fifth the previous drop. Notwithstanding the lowered effective suction and the decrease in speed, the electric power taken by the motor is

up nearly two fifths. With construction of the intake to about one third of the full open position, the power take drop is off around 7% and the volume of air handled drop about 40%. When there are particles of dirt entrained in the bag to increase the load on the motor around 9%, the air volume passing has fallen in the range of 16%. Using the dirt entrained bag and the intake restriction as above to about one third, there is about similar drop of around 7% as before and the air volume handled is around 34% less than the air volume handled at the fully open intake and the dirt carrying bag 39.

What is claimed and it is desired to secure by Letters Patent is:

1. A pneumatic type of cleaner unit comprising a tank having a substantially cylindrical side wall, a partition dividing the tank into upper and lower chambers, a motor fan unit mounted in said partition so said motor extends upwardly from said partition in the upper chamber in spaced relation to said cylindrical tank wall so as to define with said wall an annular space and said fan is in the lower chamber, an air passage communicating between said chambers through said motor and said fan, said fan being connected to and actuated by said motor, an air intake to the upper chamber, a first filter bag removably mounted over said air intake, a second filter bag in said lower chamber, and means for removably securing said second bag over and surrounding said fan so that all air passing through said cleaner unit passes through both said bags.

2. A cleaner unit according to claim 1 wherein said first filter bag is located in the annular space in said upper chamber around said motor inside said tank.

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