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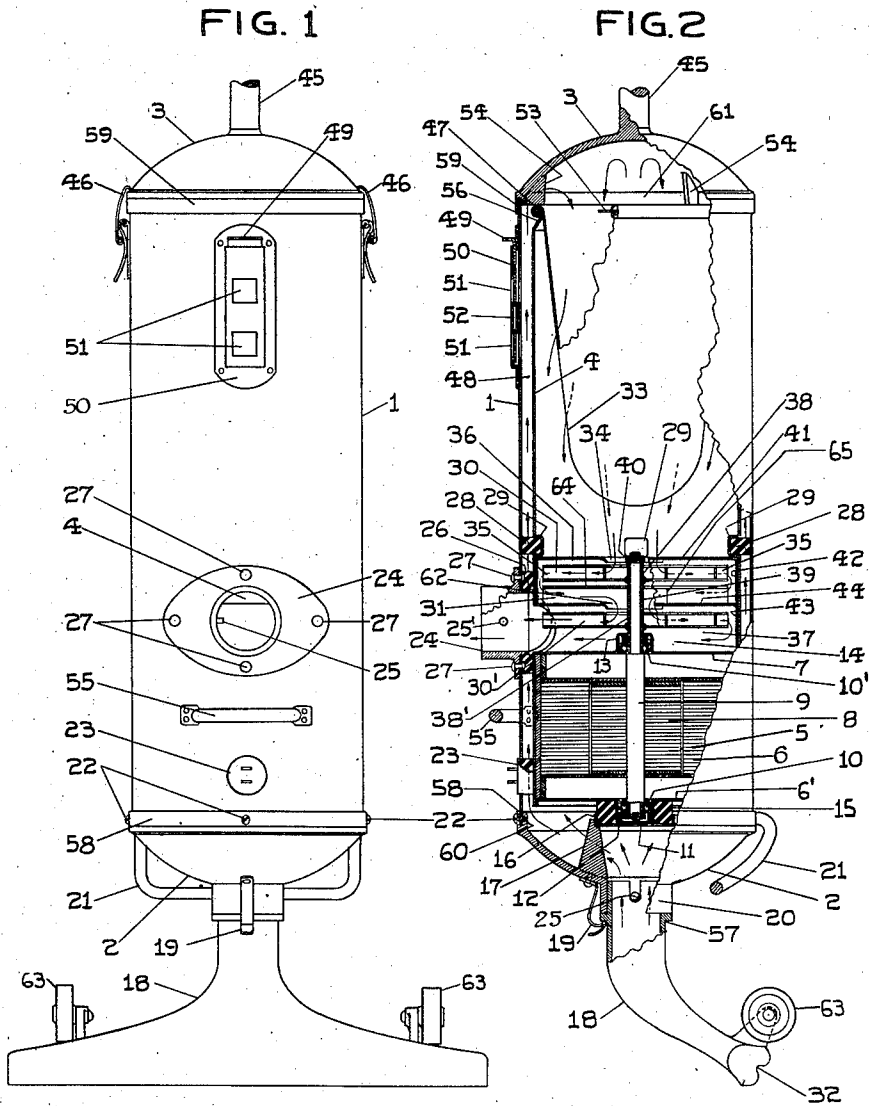
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2,033,833

SUCTION CLEANER

Filed March 27, 1934

2 Sheets-Sheet 1



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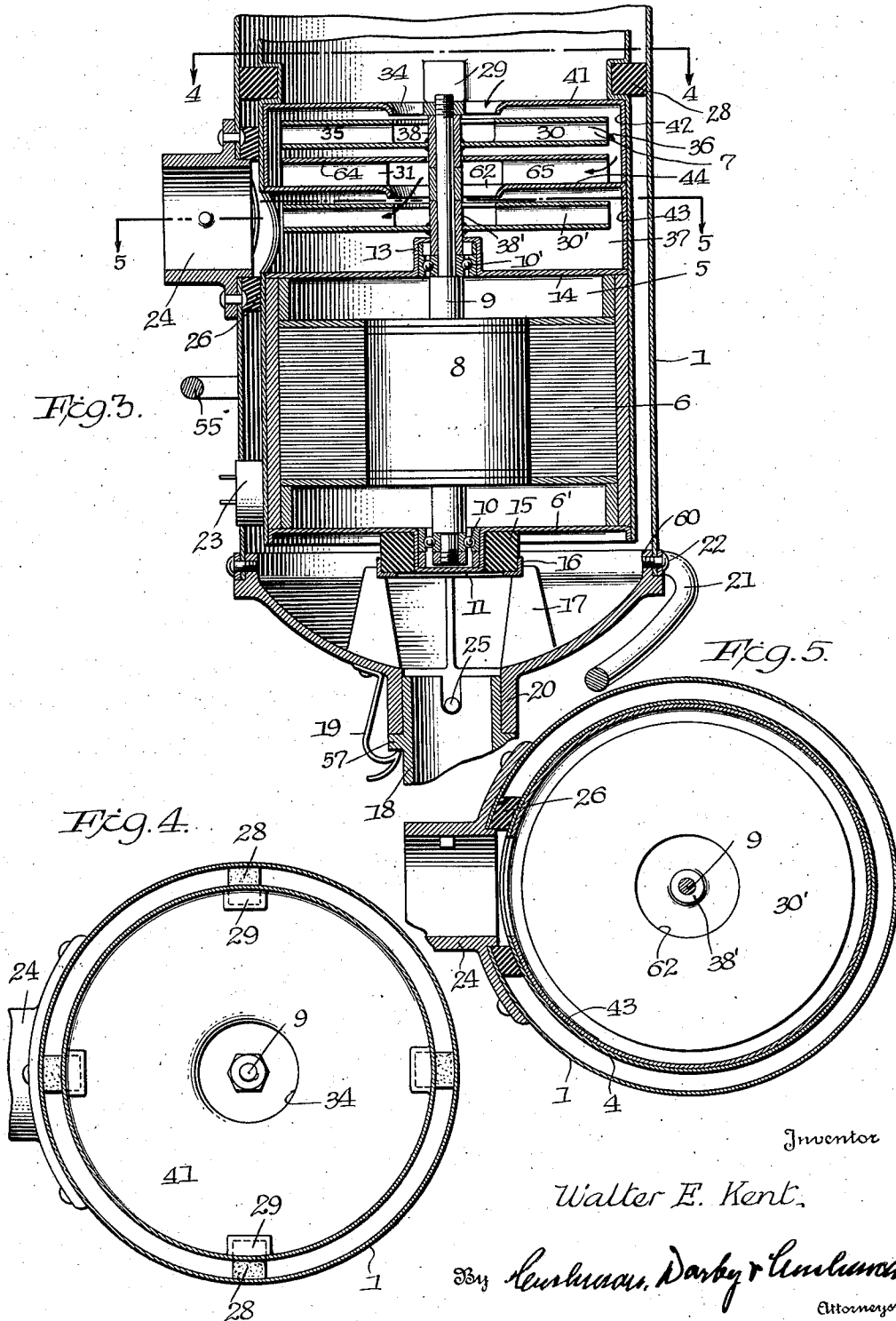
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2 Sheets-Sheet 2



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SUCTION CLEANER

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3 Claims. (Cl. 183—37)

The present invention relates to suction cleaners.

An important object of the invention is to provide a suction cleaner which is so designed that the dust-laden air passing therethrough will be cleaned before passing through the suction element or fan of the cleaner and so that dust and dirt cannot reach the interior of the motor of the cleaner or the fan.

In suction cleaners now generally used, the dust-laden air drawn into the cleaner passes directly through and accumulates in the suction element or fan, seriously interfering with the efficiency of the entire cleaner. Also, in many suction cleaners, the motor is not encased to such an extent as to entirely prevent dust from reaching its interior, thereby resulting in wear of the motor parts.

Still another object of the invention is to provide a suction cleaner so designed that the motor will be cooled by the movement of the air normally drawn into the machine and without the necessity of providing any auxiliary fans or other means to move air past the motor.

Another important object of the invention is to provide a vacuum cleaner which is conveniently portable, may be used in any position, and which may be readily manufactured and assembled.

A further object of the invention is to provide a suction cleaner which is entirely encased and wherein the objects set forth above are attained in an extremely compact structure.

A still further object of the invention is to provide a machine which includes means to vary its suction effect so that the machine may be used to clean fragile fabrics or articles without damaging them in any way.

Another object of the invention is to provide a cleaner which may be used either as a suction cleaner or as a blower.

Other objects and advantages of the invention will be apparent from the following drawings, wherein like numerals refer to similar parts throughout the several views.

In the drawings:

Figure 1 is a front elevation of the cleaner;

Figure 2 is a view of the machine, partly in central longitudinal section;

Figure 3 is a detail view showing the motor and fan unit in central longitudinal section;

Figure 4 is a transverse sectional view taken on the line 4—4 of Figure 3; and

Figure 5 is a transverse sectional view taken on the line 5—5 of Figure 3.

The numeral 1 indicates the outer casing of the vacuum cleaner which casing is preferably of cylindrical form and provided at its lower end with a nozzle head 2 and, at its opposite end, with a cap 3. An inner casing 4, also of generally cylindrical shape, is supported within the outer casing 1 and a motor and fan unit generally indicated by the numeral 5 and comprising an electric motor 6 and a fan 7 is positioned in the lower end of the inner casing 4.

The rotor 8 of the motor includes a shaft 9 which is journalled at its lower end in bearings 10 positioned within a cup-shaped extension 11 in a flanged disc 6' which closes the lower end of the inner casing 4. The shaft 9 is also provided with journals at 10' positioned in a cup 13 in a partition wall or plate 14 which closes the fan chamber from the motor chamber.

In order to support the inner casing 4 including the motor and fan unit within the outer casing 1 and to provide insulation against noise and vibration, the lower end of the inner casing is provided with a collar 15 of resilient material. The collar 15 surrounds the cup-shaped extension 11 of the lower wall 6' of the inner casing and rests in a flanged ring 16 positioned in spaced inwardly extending lugs 17 formed integral with the nozzle head 2 of the outer casing. The inner casing is further supported by resilient blocks 28 fitted in pockets 29 intermediate its length, the pockets 29 being circumferentially spaced about the wall of the inner casing 4 so that the blocks 28 will bear upon the outer casing at spaced points.

The pockets 29 extend inwardly of the wall of the inner casing and thereby serve as limit stops for the inner end of the motor and fan unit 5, as shown in Figures 2 and 3.

The head 2 of the cleaner includes a flange 60 about its inner end which extends into the lower end of the casing 1. A ring 58 is secured about the exterior of the lower end of the casing and set screws or bolts 22 extend through this ring and the casing and into the flange 60 to secure the head to the casing.

The cap 3 is secured to the casing 1 by means of clips 46 spaced about the casing. The cap 3 is provided with inwardly extending flanges 59 and 61 between which the edge of the casing 1 is fitted so that a tight seal will be provided between the casing and the cap. The cap 3 is provided with a handle 45 by means of which the machine may be moved about. A second handle 55 is provided adjacent the lower end of the cas-

ing 1 to further facilitate the handling of the cleaner.

The nozzle head 2 of the cleaner includes a central boss 20 in which the floor tool 18 of the machine is fitted and the floor tool is provided with a suction inlet or slot 32 and supporting rollers 63. An annular flange 57 provided upon the floor tool bears against the outer end of the boss 20 and is adapted to be engaged by clips 19 so that it will be securely held in position upon the nozzle head. The inner end of the floor tool is slotted, these slots being adapted to engage pins 25 provided within the boss 20 to guide the floor tool or other tool into proper alignment with the boss. When the machine is operated in a substantially vertical position, as in cleaning rugs, it will rest upon the floor tool 18 and rollers 63.

A support 21 is provided upon the lower end of the outer casing 1 to permit the cleaner to be laid in a horizontal position with tools other than the floor tool 18, and of well known types, applied to the boss 20.

The dust-laden air drawn into the machine through the floor tool 18 or other tools applied to the boss 20 will move through the nozzle head 2 between the lugs 17 and thence upwardly through a passage 48 provided between the outer casing 1 and the inner casing 4. This passage is preferably annular in shape so that air will flow entirely about the inner casing 4. It will be noted that the movement of air upwardly in this passage will cause the motor 6 to be efficiently cooled and without the necessity of providing any additional means for such cooling action.

The upper end 56 of the inner casing 4 is bent inwardly as shown in Figure 2 and a resilient ring 47 internally reinforced by a wire 53 rests upon the outer surface of this inturned portion or flange, the ring 47 supporting a dust bag or filter 33 within the inner casing 4. In order that the ring 47 will be held firmly positioned about the flange 56, the head 3 is provided with lugs 54 which bear upon the ring and prevent any movement thereof. The ring 47 is spaced inwardly from the flange 61 of the cap 3 so that air may flow between the two and down through the filter 33. Since ring 47 is of resilient material, it will assist in insulating the inner casing from the outer casing, thereby reducing vibration. It will be noted that cap 3 and nozzle head 2, acting through their respective lugs 54 and 17, provide means for holding inner casing 4 and the contents thereof in proper position, being aided in this function by resilient members 15, 28 and 47, as well as by the gasket 26.

As shown in Figure 3, the fan 7 includes a first stage chamber 36 and a second stage chamber 37, these chambers being formed by substantially cup-shaped members 41 and 44, respectively. The member 44 includes a flange 43 bearing against the partition wall 14 which divides the fan chamber from the motor chamber and the flange 42 of the member 41 defining the first stage casing 36 bears against the wall of the second stage chamber member 44 so that the two members are held in proper position.

The first stage chamber 36 includes an inlet 34 provided centrally of the wall of the first stage chamber member 41 and surrounding the shaft 9. Air is drawn through the screen 33 and into the inlet 34 by the first stage fan 30 fixed to a hub 38 suitably secured to the shaft 9. The air drawn inwardly through the inlet 34 will move through the passages 35 of the fan 30 as indicated by the arrows and will thence return toward

the shaft 9 through a passage 31 formed by a plate 64 supported above the outer wall of the second stage chamber 37 by radially extending spacers 65. A port 62 is provided in the wall of the second stage chamber 37 through which the air will pass to the latter chamber, the air being then moved outwardly by the second stage fan 30' to an outlet 24.

The fan blades 30 and 30' are held spaced upon the shaft 9 by a spacer 39 and are secured upon the shaft by an end nut 40.

The outlet 24 is in the form of a sleeve and is secured to the outer casing 1 by rivets or the like 27. Within the casing 1, a resilient packing 26 surrounds the outlet sleeve, this packing bearing against the inner surface of the outer casing and the outer surface of the inner casing so as to seal the outlet 24 from the passage 48. To permit blowing tools to be attached to the outlet 24, it is provided with inwardly projecting pins 25' similar to the pins 25 provided in the nozzle head 2.

In order to enable the suction effect of the machine to be varied, means is provided in the wall of the outer casing 1 to permit air to be drawn into the passage 48 and thereby reduce the suction effect in the floor tool 18. This means comprises a gate valve 49 which is slidable in a slideway 50 secured to the casing 1. The slideway 50 is provided with spaced ports 51 which are aligned with openings in the wall of the casing and the valve 49 is also provided with a port 52. When the valve is in closed position so that the entire suction effect will be exerted at the floor tool 18, the port 52 in the valve 49 is positioned between the ports 51 in the slideway 50 as shown in Figure 2. However, when it is desired to decrease the suction effect at the floor tool 18, the valve 49 may be moved upwardly so that the port 52 will be aligned with the upper port 51 in the slideway to the desired degree. Air will also flow inwardly through the lower port 51 and past the lower end of the valve 49. The valve 49 may therefore be operated to permit very fine adjustment of the degree of suction exerted at the floor tool, permitting the machine to be used for either cleaning heavy articles such as rugs or for the cleaning of delicate fabrics.

The suction effect may also be varied by providing a throttle valve, not shown, in the outlet 24. Such a valve would obviously operate in a manner similar to the throttle of a centrifugal water pump.

The motor of the machine may be supplied with current through a plug 23 opening through the outer casing 1 of the machine.

In the operation of the machine, dust laden air will be drawn inwardly through the slot 32 of the floor tool 18 or through hose connected tools and will thence move upwardly through the nozzle head 2 past the lugs 17 to the passage 48. During its movement through the lower portion of this passage, the incoming air will cool the motor 6 but no air or dirt will enter either the motor or the fan. The air passing through the passage 48 will move downwardly as indicated by the arrows in Figure 2 through the dust bag or filter 33 to the fan 7 and will then be forced outwardly through the outlet 24. It will be understood that the fan 7 may merely comprise a single stage fan or more than the two stages illustrated in the drawings.

The degree of suction exerted at the floor tool 18 may be varied by operation of the valve 49.

If the machine is used as a blower, the air blown outwardly through the outlet 24 will be entirely clean since it will have been passed through the filter 33. In many of the suction cleaners used at the present time, the outlet for air is directly adjacent the fan and since the dust laden air which enters such a machine when it is used as a suction cleaner passes directly through this fan and dust gathers thereon to some extent, the use of the machine as a blower is very apt to cause particles of dust which have settled upon the fan, to be blown outwardly. This difficulty is entirely obviated by the present machine.

In assembling the present machine, the motor and fan unit 5 is first inserted in the casing 4, the inward movement of the unit into the casing being limited by the projections 29. The plate 6 which closes the end of the motor chamber is then placed in position. The gasket 26 is positioned about the inner end of the outlet collar 24 of the outer casing 1 and spacing blocks 28 are then placed in proper position upon the inner casing 4. The entire casing 4 can later be inserted in the outer casing 1. The gasket 15 may then be placed in position on the lower plate 6 and the nozzle head 2 secured to the outer casing 1, holding the entire inner casing in proper position.

When it is desired to remove the dust bag or filter 33 from the inner casing 4, it is only necessary to remove the cap 3 and the dust bag may then readily be withdrawn.

From the above, it will be observed that the machine of the present invention may be readily manufactured and assembled and provides an extremely compact structure which is nevertheless so arranged that it eliminates a number of difficulties present in suction cleaners now generally used.

The cleaner of the present invention is also designed to permit ease of handling and may be used for any of the cleaning operations performed by suction cleaners, its design permitting it to be operated in any position, either with a floor tool or any other tool of well known type. The cleaner may obviously be used as a blower as well as a suction tool.

It will be understood that the invention is not limited to the details of construction shown in the drawings and that the examples of the use of the machine which have been given do not include all of the uses of which it is capable; also, that the phraseology employed in the specifica-

tion is for the purpose of description and not of limitation.

I claim:

1. The combination in a cleaner of an outer casing, an inner casing supported within said outer casing to form a suction passage between said casings, an enclosed motor closing one end of said inner casing and projecting into the suction passage, a fan in said inner casing positioned inwardly of and driven by said motor, a head provided with an inlet fitted on the corresponding end of the outer casing, means to close the opposite end of said outer casing, an outlet passage for said fan closed to the suction passage, said fan drawing air through the inlet into the suction passage and past the motor to cool the latter, and thence drawing the air into the inner casing and discharging the same through the outlet passage.

2. The combination in a cleaner of an outer casing, an inner casing supported within said outer casing to form a suction passage between said casings, an enclosed motor closing one end of said inner casing and projecting into the suction passage, a fan in said inner casing positioned inwardly of and driven by said motor, a head provided with an inlet fitted on the corresponding end of the outer casing, a filter within the opposite end of said inner casing, removable means to close the corresponding end of said outer casing, an outlet passage for said fan closed to the suction passage, said fan drawing air through the inlet into the suction passage and past the motor to cool the latter, and thence drawing the air into the inner casing and discharging the same through the outlet passage.

3. The combination in a cleaner of an outer casing, an inner casing, said casings being tubular and arranged substantially concentrically to form an annular suction passage therebetween, a motor including a casing closing one end of said inner casing, a fan in said inner casing positioned inwardly of and driven by said motor, a head provided with an inlet fitted on the corresponding end of said outer casing, means to close the opposite end of said outer casing, an outlet passage for said fan extending transversely of and closed to the suction passage, said fan drawing air through the inlet into the suction passage and past the motor to cool the latter, and thence drawing the air into the inner casing and discharging the same through the inlet passage.

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