Aug. 8, 1944. J. H. NUFFER ET AL 2,355,322

SUCTION CLEANER

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Fig. 4

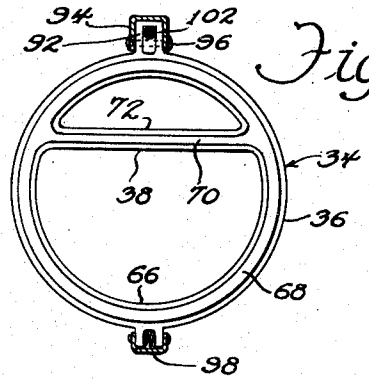

Fig. 5

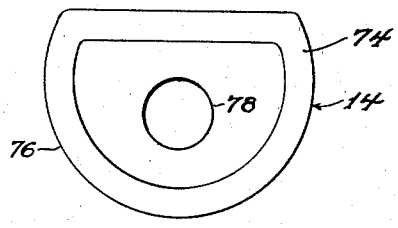

Fig. 2

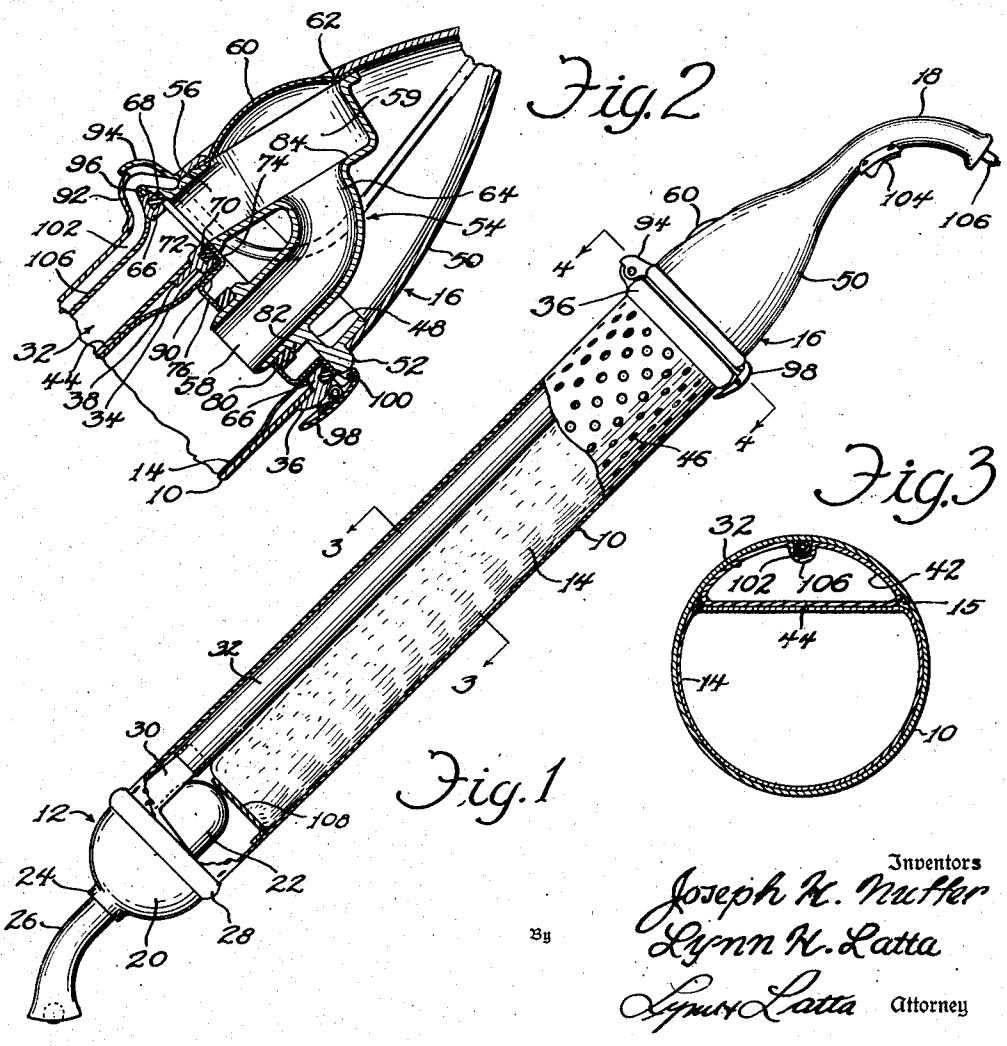

Fig. 3

Fig. 1

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Fig. 7

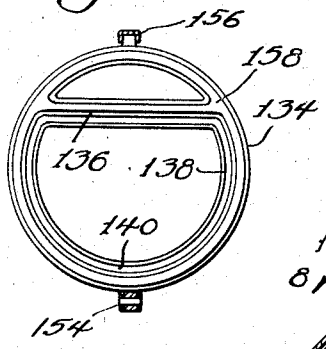

Fig. 6

Fig. 10

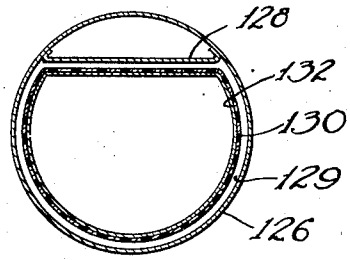

Fig. 8

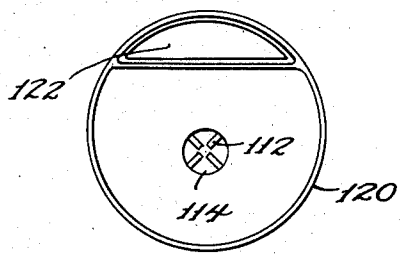

Fig. 9

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UNITED STATES PATENT OFFICE

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SUCTION CLEANER

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Application September 25, 1942, Serial No. 459,606

1 Claim. (Cl. 15—16)

This invention relates to suction cleaners of the type in which an elongated, relatively narrow diameter barrel, encasing a dust collecting receptacle, has attached to one end, which becomes the lower end in use, a cleaning tool, and, at its other, or upper end in use, is provided with a combined cover and handle unit normally closing a mouth in the upper end of the barrel, through which the dust collecting receptacle is inserted and removed.

A cleaner of this type also incorporates a delivery tube extending from the suction unit, which is associated with the cleaning tool at the lower end of the barrel, to a point at the upper end of the barrel from which it may deliver the dust laden air stream into the mouth of the receptacle which is located near the upper end of the barrel.

A primary object of the invention is to provide a cleaner of this type which is so constructed that the insertion and removal of the dust collecting receptacle may be accomplished with a maximum of ease and dispatch. More specifically, the invention aims to provide an arrangement, in a cleaner of the type indicated, wherein movement of the cover-handle unit to an open position will give access to the dust collecting receptacle which is left in the barrel with its upper end exposed at the mouth of the barrel and which may then be simply lifted out of the barrel and transferred to a waste receptacle. The invention further contemplates an arrangement, in a cleaner of the type indicated, wherein a new dust receptacle may be applied simply by inserting the same in the barrel and then moving the cover-handle unit to a closed position, this latter movement serving to simultaneously secure the mouth end of the receptacle in supported relationship in the barrel and to establish a connection between the dust delivery tube and the mouth of the receptacle.

Another basic object of the invention is to provide a cleaner of the type indicated in which the cleaning tube, suction unit and cover-handle unit form symmetrical, streamlined continuations of the barrel at the respective ends thereof, with all parts encompassed substantially within the extended cross sectional area of the barrel. Thus considering the cover-handle unit as an extension of the barrel, the invention contemplates an arrangement wherein the dust receptacle is exposed by "breaking" the barrel in a transverse plane intermediate its ends.

Another object of the invention is to provide, in a cleaner of the type indicated, an arrangement wherein the cover-handle unit incorporates an elbow duct one arm of which is adapted, when the cover-handle unit is closed, to establish a connection with the upper end of the dust delivery tube to receive the dust laden air current therefrom and the other arm of which terminates in a delivery nozzle adapted, when the cover-handle unit is closed, to establish a connection with the mouth of the receptacle for delivering the dust laden air downwardly therethrough into the receptacle.

One element of the streamlining achieved by the invention is the reception of the fan motor within the lower end of the barrel, with the fan casing forming, in effect, a cap for said lower end.

Another object of the invention is to provide, in a cleaner of the type indicated, an arrangement in which the suction unit motor cord is encased within the barrel and within the cover-handle unit, entering the cleaner through the end of the handle. To this end, the cord is threaded through the hinge which connects the cover-handle unit to the barrel so as to permit the cover-handle unit to be opened.

Other and further objects of the invention will occur to those skilled in the arts to which this invention pertains as the description proceeds which, taken in connection with the accompanying drawings, sets forth a preferred embodiment and selected modifications are not to be construed as limitations of the invention but only as illustrative thereof and any and all modifications, alterations and variations of structure coming within the spirit and scope of the appended claim which limit and define the instant invention are deemed to be included herein.

In the drawings:

Fig. 1 is a side elevation, partially in section, of a suction cleaner embodying the invention;

Fig. 2 is a longitudinal sectional view of adjacent portions of the barrel and cover-handle unit;

Fig. 3 is a transverse sectional view through the barrel taken as indicated by the line 3—3 of Fig. 1;

Fig. 4 is a transverse sectional view through the hinge, taken as indicated by the line 4—4 of Fig. 1;

Fig. 5 is a plan view of the receptacle end member;

Fig. 6 is a longitudinal sectional view of a cleaner embodying a modified form of the invention;

Fig. 7 is a transverse sectional view through the hinge thereof taken as indicated by the line 7—7 of Fig. 6.

Fig. 8 is a transverse sectional view thereof taken as indicated by the line 8—8 of Fig. 6.

Fig. 9 is an end view of the suction unit portion of the cleaner with the barrel removed, and

Fig. 10 is a detailed sectional view of adjoining portions of the delivery nozzle and barrel mouth.

As an example of one form in which the invention may be embodied, we have shown in Figs. 1 to 5 inclusive a suction cleaner including a barrel 10, a cleaning tool, suction unit 12, a dust receptacle 14 within the barrel 10, and a cover-handle unit 16, hinged to the upper end of the barrel. A handle 18 forms the upper end portion of the unit 16.

The cleaning tool suction unit 12 includes a fan casing 20, an electric motor 22 for operating the fan (not shown) which is disposed within the casing 20, an inlet boss 24 in the casing 20, and a cleaning tool 26 secured in the boss 24. The motor 22 and fan casing 20 are arranged coaxially, with the inlet 24 extending downwardly and forwardly and the motor 22 extending upwardly and rearwardly and received in the lower end of the barrel 10. The fan casing 20 has at its upper extremity a flange 28 in which the lower end of the valve 10 is received and secured.

Attached to the fan casing 20 is an outlet scroll terminating in an upwardly and rearwardly directed outlet 30 which is crescent shaped in cross section, lies above the motor 22, partially embracing the same, and is received within the lower region of the barrel 10. Attached to the outlet 30 is the lower end of a dust delivery tube 32 which in cross-section is the shape of a segment of a circle as shown in Fig. 3, the upper wall 32 thereof being arcuate and fitted against the inner surface of the barrel 10 while the lower wall 44 thereof is flat. The wall 44 cooperates with that portion of the wall of the barrel 10 which lies below the tube 32, to define a chamber 15 in which the receptacle 14 is encased.

The cover-handle unit 16 comprises a casting 48 and a dome member 50 secured thereto, the handle 18 being formed as an integral portion of the dome member 50. It is contemplated that the dome member 50 may be of molded, colored plastic composition while the casting 48 is of metal. The casting 48 includes a rim portion 52 and the elbow duct 54 one arm 56 of which merges with the rimmed portion 52 and the other arm of which is connected to the rim 52 by a web portion as shown. Said other arm terminates in a delivery nozzle 58 adapted to be received in the mouth of the dust receptacle 14. The intermediate portion of the elbow duct 54 may if desired be enlarged to form a vortex chamber 59 the top of which comprises a transparent disc 60 protruding through an opening 62 in the dome 50 and permitting the operator to observe the swirl of dust in the chamber 59. A curved tubular portion 64 connects the bottom of the chamber 59 to the discharge nozzle 58.

The upper end of the barrel 10 is provided with a spider including a peripheral flange portion 36 in which the upper end of the barrel is received and secured and a transverse web portion 38 which supports the lower wall 44 of the tube 32 at the upper end of the latter, said upper end being confined between the web 38 and the adjacent, opposed portion of the flange 36.

The flange 36 is formed with a peripheral channel 66 and the web portion 38 is formed with a channel 72. A sealing ring 68 of soft rubber or equivalent material is mounted in the channel 66 and has a transverse web portion 70 mounted in the channel 72. (See Fig. 4.)

The rimmed portion 52 of the cover-handle unit is adapted to seal against the ring 68, and the arm 56 of the elbow 54 is adapted to seal against the web 70 and the opposed portion of the ring 68, when the cover-handle unit is closed. Such sealing is accomplished partially by direct engagement of the cover-handle unit with the ring 68 and partially by engagement of a peripheral flange 74 of the end member 76 of the receptacle 14. The end member 76 has a mouth opening 78 to receive the nozzle 58. The nozzle 58 is encircled by and carries a sealing ring 80 of soft rubber, abutted against a shoulder 82 on the nozzle and serving to form a sealing connection between the nozzle and the end member.

The end member 76 is of relatively stiff, form retaining material and is preferably of inexpensive material such as stiff kraft paper, while the body portion of the receptacle 14 is of air porous paper, so that the entire receptacle may be disposed of when filled. The end member 76 is dished to provide a flange 90 which is received within the body portion of the receptacle and secured thereto as by stitching.

The cover-handle unit is hinged to the barrel 10 by means of a hinge including a portion 92 formed integrally with the spider flange 36 and a portion 94 formed integrally with the casting 48. A pintle 96 connects the two hinged portions. Diametrically opposite the hinge is a latch including a latching element 98 arranged to engage a hook 100 upon the casting 48, and pivoted to the spider member 36.

The motor cord 102 is extended from the motor 22 upwardly through a channel 106 formed in the upper wall 42 of the tube 32, is threaded through the hinge 92, 94 as shown in Fig. 2, is thence extended upwardly through the dome 50, and connects at its upper end with a switch 104 in the handle 18. A service cord 106 extends from the switch 104 through the end of the handle 18.

The barrel 10 is provided with apertures 46 through which the air escaping from the receptacle 14 is discharged. In the operation of the cleaner, dust laden air is drawn upwardly through the floor tool 26 into the suction unit 12 and thence discharged upwardly through the delivery tube 32. From the upper end of the tube 32 it is directed through the elbow 54 into the receptacle 14, wherein it falls to the lower end thereof. The lower end of the receptacle is supported on a partition 108 secured in the barrel 10.

In the form of the invention shown in Figs. 6 to 10 inclusive, the fan case 110 houses a fan 112 and the inlet 114 thereof is directed upwardly and communicates with the interior of the barrel 116 which is imperforate so that a sub-atmospheric pressure may be established in the barrel by the fan 112. The fan and fan case 110, 112 are mounted in a compartment 118 of the housing 120 attached to the lower end of the barrel. Formed in the housing 120, but not communicating with the compartment 118, is a duct 122 which communicates at its lower end with the cleaning tool 124 and at its upper end with the delivery duct 126 extending upwardly through the barrel 116. The duct 126 may in this instance be formed directly between the wall of the barrel 116 and a partition wall 128 extending transversely across the barrel in the upper region thereof and secured thereto as by welding. (Fig. 8.) Between the partition wall 128 and the lower portion of the barrel wall is formed the receptacle chamber

129, in which is mounted a screen 130 within which the dust receptacle 132 of porous paper is supported and maintained spaced away from the walls of the chamber 129.

To the upper end of the barrel 116 is secured a spider 134 having a webbed portion 136 for supporting the upper end of the partition 128. The webbed portion 136 and the lower portion of the spider 134 cooperate to provide a bag seat 138 encircled by a channel 140. (See Fig. 10.) The receptacle 132 has a mouth collar 142 of stiff paper including an outwardly folded flange 144 which is adapted to be received in the channel 140 to support the collar 142 with reference to the bag seat 138 while the delivery nozzle 146 is being moved into position to engage the collar 142 as shown in Fig. 10. The nozzle 146 forms one extremity of an elbow 148 the other end 150 of which is adapted to make connection with the upper end of the duct 126 when the combined cover and handle unit 152 is closed. The latter unit is hinged to the spider 134 by means of the hinge 154 and latched in place by means of the latch 156. A sealing ring 158, similar to that described in connection with the preferred form of the invention, seals the cover-handle unit to the spider 134 and seals the connection between the elbow 148 and the duct 126. The service cord 160 is shown, in this form of the invention, entering the cleaner through the wall of the barrel 116.

In the operation of the cleaner shown in Figs. 6 to 10 inclusive, the suction of the fan 112 is applied through a filter disc 162 to the lower end of the chamber 129, rarifying the air therein and causing the air to flow upwardly through the tool 124, the ducts 122, and 126 and elbow 148, into the receptacle 132. The receptacle is maintained away from contact with the wall of the chamber 129 by the screen 130, so that the suction may be applied to all sides of the bag.

Removal of a filled receptacle and replacement of the same by a fresh receptacle is substantially the same as in the preferred form of the invention, the only difference being that it is necessary to fit the flange 144 into the channel 140 in applying the new receptacle. This having been done, the collar 142 is maintained in proper position to receive the nozzle 146.

We claim as our invention:

In a suction cleaner, a barrel section and a handle section, pivotal means joining said sections to form an elongated slender body having an external surface of substantially continuous streamlined contour, a cleaning tool attached to said barrel section and forming one extremity of the body, said handle section terminating in a handle constituting the other extremity of said body, said barrel section including a passage for conveying a dust laden air stream from said tool to said handle section, and including a dust receptacle chamber lying alongside said passage, said chamber having a mouth disposed at the junction with said handle section, said handle section including a casting providing an inverted U-shaped conduit for conveying said dust laden air stream from said air passage to said chamber mouth, said handle section also including as a separate member a dome-shaped member secured to said casting and terminating in a reduced tubular handle portion, and a dust collecting receptacle in said chamber, having a mouth secured between said chamber mouth and the outlet of said conduit, said handle section comprising an end ring which constitutes the means for joining the handle section to the barrel section and which embodies said conduit, and a bell-shaped cap portion the large end of which is joined to said ring and the small end of which is extended to form said handle.

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