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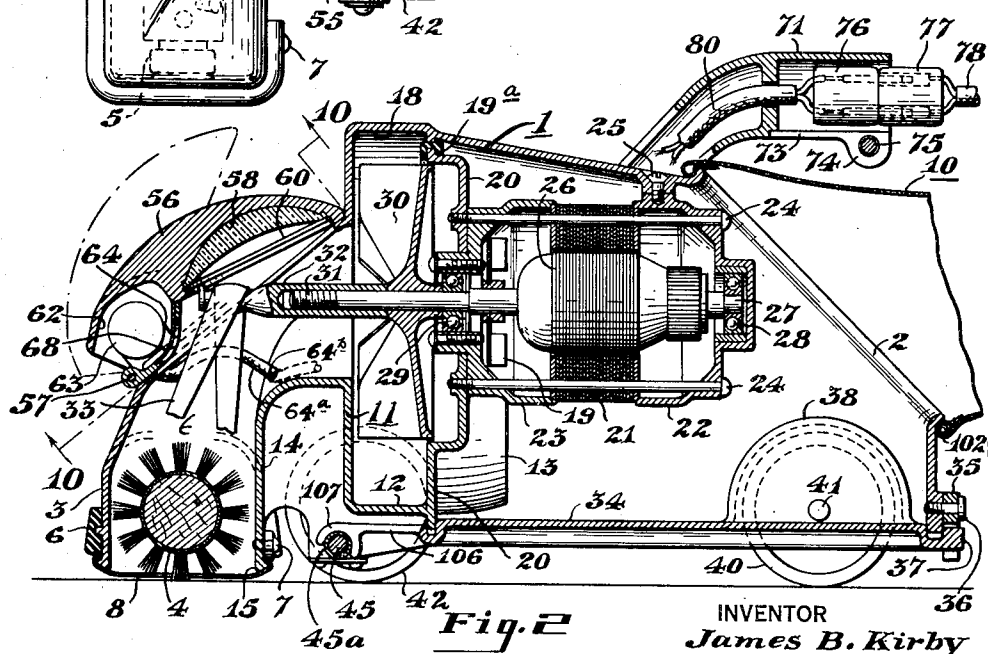
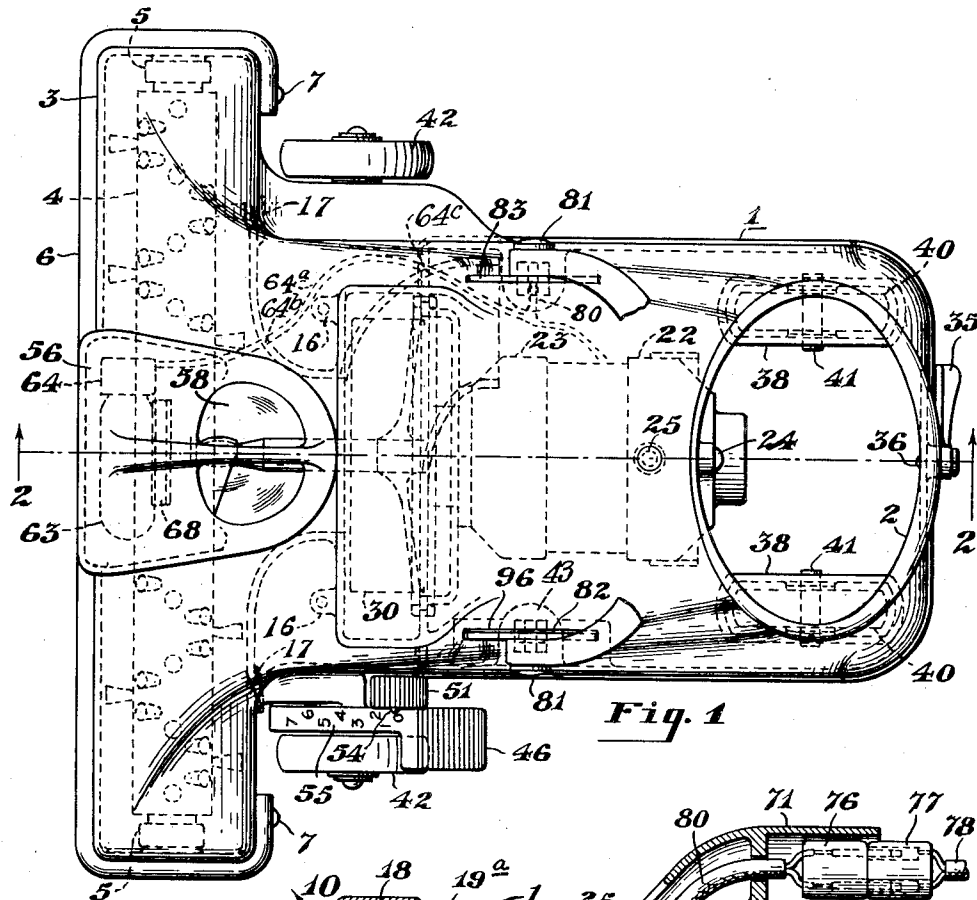
J. B. KIRBY

2,221,746

VACUUM CLEANER

Filed May 8, 1935

3 Sheets-Sheet 1



INVENTOR
James B. Kirby
BY *Edmund J. De Pass*
his ATTORNEY

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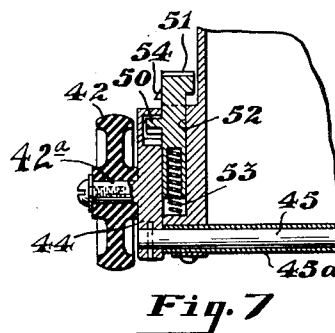
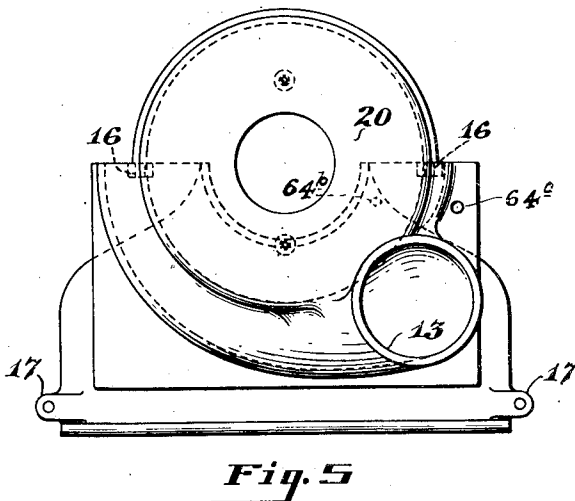
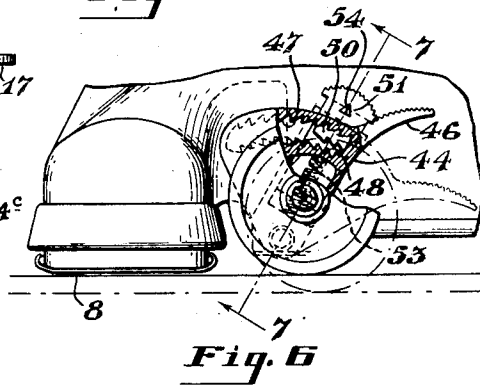
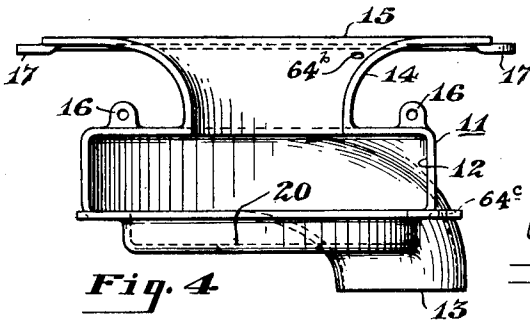
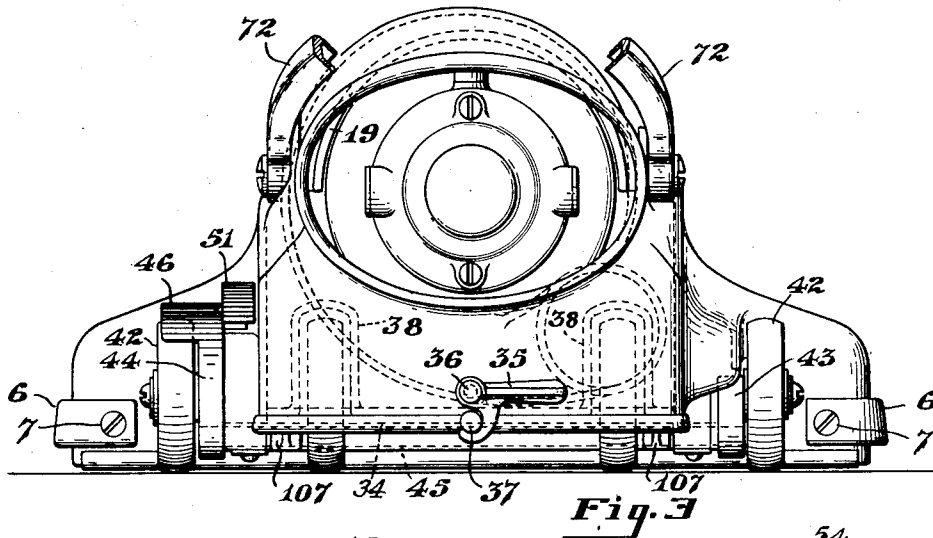
J. B. KIRBY

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VACUUM CLEANER

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3 Sheets-Sheet 2



INVENTOR
James B. Kirby
BY *Edmund J. De Paz*
his ATTORNEY

UNITED STATES PATENT OFFICE

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VACUUM CLEANER

James B. Kirby, West Richfield, Ohio

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7 Claims. (Cl. 15—8)

This invention relates to vacuum cleaners and in particular to cleaners of the type employing a horizontally disposed motor.

During recent times, there has been a decided movement on the part of manufacturers of appliances of all sorts to improve the artistic appearance of their products. Vacuum cleaners of the type commonly referred to as the horizontal type cleaner, in which the operating motor and fan of the cleaner are arranged with their axis located horizontally, have presented certain practical difficulties to the designing of a handsome and artistic cleaner casing, by reason of the arrangement and disposition of the various elements of the machine, and for this reason, not much has been done in the way of improving the design and appearance of this particular type of cleaner.

One of the objects of this invention is the provision of a generally simplified form of casing construction for a vacuum cleaner of the type employing a horizontally disposed motor; the casing being made up of a plurality of sections which may be readily die-cast or cast by the permanent mold process, without the use of expensive or complicated cores.

Another object of the invention relates to the provision of a sectional form of cleaner casing construction in which the casing parts are configured so as to accommodate the operating elements of a horizontal type cleaner, while at the same time being of handsome and graceful appearance.

Another object of the invention relates to the provision of a suction cleaner having a sectional casing including a shell which forms the major exposed part of the casing, the other elements of such casing being concealed by the shell and adapted to be readily and easily attached thereto.

Another object of the invention relates to the provision in a vacuum cleaner, of an improved arrangement for facilitating the removal of dust and litter collected during the operation of the device.

Another object of the invention relates to the provision of an improved form of vacuum cleaner handle adjustment control.

Another object of the invention relates to the provision of improved means for concealing the electric cord in the cleaner handle and introducing the same to the vacuum cleaner casing.

Another object of the invention relates to the provision of certain improvements whereby the handle shaft of a vacuum cleaner may be readily

detached from its bail, and connection and disconnection of an electrical cord carried within the handle may be readily effected.

A further object of the invention relates to the provision of a vacuum cleaner of relatively simple and inexpensive construction which is adapted for carrying out the aforesaid objects.

With these and other objects in view, the invention consists in the novel construction, arrangement and combination of parts, hereinafter illustrated and described in some of its embodiments in the accompanying drawings, and particularly pointed out in the appended claims.

In the drawings:

Figure 1 is a plan view of a vacuum cleaner, illustrating one form of the invention.

Figure 2 is a sectional view taken on line 2—2, Figure 1.

Figure 3 is an elevational view of the rear of the cleaner shown in Figure 1.

Figure 4 is a detail plan view of one of the sections of the cleaner casing.

Figure 5 is a side elevational view of the casing section shown in Figure 4.

Figure 6 is a detail view, partly in section, of the nozzle adjustment mechanism.

Figure 7 is a detail sectional view taken on line 7—7, Figure 6.

Figure 8 is a detail view, partly in section, of the wiring arrangement and stop mechanism provided for holding the cleaner handle in its various adjusted positions.

Figure 9 is a detail view of the handle stop mechanism shown in section in Figure 8.

Figure 10 is a detail view of the work illuminating lamp and the structure associated with it for permitting visual inspection of the interior of the cleaner casing during the operation of the cleaner.

Figure 11 is a side elevational view of reduced size, showing the cleaner in position for the discharge of accumulated dust and litter.

Figure 12 is a plan view of the filter bag of the cleaner shown in Figure 11.

Figure 13 is an end view of the filter bag shown in Figures 11 and 12.

Figure 14 is a sectional view taken on line 14—14, Figure 12, showing the relative position of the cleaner casing and its handle with respect to the bag when the handle is adjusted to its lower operating position; and

Figure 15 is a detail view, partly in section, of the handle hand-grip and associated operating switch.

The cleaner illustrated in the drawings, com-

prises a shell or casing section referred to generally by the numeral 1, defining a hollow chamber open at its underside and provided at its rear end with an opening 2 which forms the discharge outlet of the cleaner. At its forward end the casing shell widens out to form in part, a suction nozzle 3, in which there is located a rotatable brush 4 mounted in suitable bearings 5, 5 provided at the opposite ends of the nozzle. A bumper strip 6 is fitted around the outer edges of the lower portion of the nozzle and is secured in position thereon by any suitable means, such as, screws or rivets 7, 7.

At the underside of the nozzle there is provided a removable guard member 8 having spaced bars for preventing the carpet or other article being cleaned from being drawn up into the mouth of the suction nozzle. A filter bag 10 is attached at its lower end in communicating relation with the discharge outlet 2 of the casing shell 1.

A casing section or element, referred to generally by the numeral 11, is fitted at the forward end of the casing and there cooperates with certain portions of the casing shell 1 to complete the suction nozzle and fan chamber of the cleaner. The element 11 forms the bottom half 12 of the fan casing, and a communicating discharge outlet 13 at the rear thereof. At its forward side the element 11 is provided with a downwardly extending wall section 14 which forms the rear wall of the throat of the suction nozzle and terminates in a lower edge 15 forming in part the rear lip of the suction nozzle.

Attachment of the casing element 11 to the casing shell 1 is effected by screws or other suitable means which are received in the openings provided in ears 16 carried by the fan case section 12 of this element and also by screws or other means received in apertured extensions 17, 17 carried by the nozzle lip forming portion of the element 11.

The interior of the casing shell is formed with a hollowed-out portion 18 complementary to the fan chamber section 12 of the element 11, and a continuous snail-shaped fan chamber of customary shape is effected upon the assembly of these elements. The element 11 is provided with a wall part 20 which forms the rear wall of the fan case and also a supporting plate for the operating motor of the cleaner, comprising a stator 21 and associated frame or casing parts 22 and 23; all of which are secured to the plate 20 by any suitable means, such as, a pair of bolts 24, 24. The motor frame part 22 is secured to the casing shell section 1 by any suitable means, such as, a screw 25. The armature 26 of the motor is provided with a shaft 27 at the opposite ends of which there are provided bearings 28 and 29. At the edge of the plate 20 there is fitted a gasket 19^a to provide an air-tight joint at this point and similar sealing means may be provided along the vertical edges of the member along its line of contact with the casing shell 1.

The forward end of the armature shaft carries an impeller fan 30 located within the fan chamber defined by the casing parts 12 and 18. The armature shaft 27 is threaded at 31 for detachably receiving a belt pulley 32, provided for driving a belt 33 operatively engaging the brush 4 of the cleaner. The discharge outlet 13 of the fan case is at the lower level of the casing shell section 1, and beneath the outlet there is located a detachable or displaceable closure plate 34 pivoted to a tubular member 45^a at its forward end

and securely locked to the casing section 1 by any suitable means, such as, a latch 35 which is pivoted at 36 at the rear end of the cleaner casing.

The latch 35 engages with the knob 37 carried by the rearmost part of the closure plate 34. The closure plate is provided with a pair of recesses or pockets 38 of semi-circular contour, within which a part of the rear wheels 40 of the cleaner are received. Each of these wheels is carried on an axle pin 41, one of which is provided for each of the wheels.

The forward end of the cleaner is supported on wheels 42, 42 which are rotatably mounted upon the crank arms 42^a of corresponding cranks 43 and 44. These cranks are fixed with respect to a supporting shaft 45 extending transversely of the cleaner. Angular adjustment of the cranks 43 and 44 and the shaft 45 is effected by means of a foot-operated device which comprises a foot pedal 46 integrally formed with the crank arm 44.

The crank 44 is of triangular shape and adjacent to its wider edge it is provided with a channel or groove in which are formed oppositely disposed series of ratchet teeth 47 and 48 which cooperate with a toothed member 50 fixed to a foot-operated plunger 51 which is guided for movement in a suitable bearing groove or channel 52 formed in the casing shell 1. A spring 53 is provided to urge the plunger 51 to its uppermost position, as shown in Figures 6 and 7.

Movement of the cranks 43 and 44 and likewise the adjustment of the working mouth of the cleaner may be effected by depressing the pedal 46, in which case, the nozzle of the cleaner is raised with respect to the working surface. During the aforesaid operation, the bearing pins 42^a of the wheels 42, 42 provide fulcrum points for the raising operation of the cleaner casing.

As shown best in Figure 6, the axis of the wheels and the axis of the shaft 45 are located with respect to the pedal 46 so that it is not necessary to exert a great deal of pressure on the pedal to effect the desired adjustment of the height of the cleaner nozzle. Downward adjustment of the cleaner nozzle is effected in a step-by-step manner by gravity upon the actuation of the plunger 51.

The toothed member 50 of the plunger 51 engages alternatively with the ratchet teeth 47 and 48 in much the same manner as in the escapement mechanism of a clock, and under influence of gravity working through the cranks 43 and 44 the nozzle drops a distance corresponding to one of the ratchet teeth 47 each time the plunger 51 is depressed until the toothed member 50 engages with the end of the groove defined by the ratchet teeth 47 and 48. The plunger 51 is provided with an indicating arrow 54 which cooperates with the numbered portion 55 of the foot pad 46 to indicate the adjustment of the nozzle.

Forwardly on the cleaner casing there is provided a device for illuminating the space in front of the cleaner and also for lighting up the interior of the cleaner nozzle which may be viewed through a window which is provided in the nozzle for this purpose. The arrangement, as shown best in Figure 10, comprises a supporting plate 66 carried by a pivot pin 57 which is journaled in the casing section 1. A cover plate 56 is detachably secured to the supporting plate 66 by the screws 67. The cover plate is provided with an opening for receiving a lens or transparent piece of glass 58, held in place by means of a

circular spring 60 (see Figure 2) and guarded by means of a bar 61 integral with the plate 56.

At its lower end the plate 56 is provided with a downwardly opening recess 62. This recess constitutes a combined lamp guard, shade and reflector for a lamp 63 which is received in a lamp socket 64 detachably secured or held in place on the plate 66, by any suitable means, such as, the screws 65, 65. The lamp socket 64 is connected to a cord 64^a which is carried into the litter compartment by way of holes 64^b and 64^c in the casing section 11, as best shown in Figure 1, where it is spliced to a motor current supply cord 80. The plate 66 is provided with a window 68 having a transparent covering so that light from the lamp 63 is admitted through the window 68 to the interior of the suction nozzle, and during the operation of the cleaner, the dust and dirt moving through the nozzle may be observed through the window defined by the lens or glass 58 of the cover plate 56. In addition to lighting up the interior of the suction nozzle, the lamp 63 also illuminates the space in front of the cleaner.

The pivotal mounting of the cover plate allows it to be swung from the full line to the dotted position shown in Figure 2, permitting access to the belt 33 and also to the interior of the suction nozzle for cleaning and other purposes. With the cover plate in its open position, removal and replacement of the lamp may be effected upon removal of the screws 67, 67 whereupon the cover plate 56 may be detached from the supporting plate 66, thus exposing the lamp to view, and as the socket of this lamp is provided with a customary bayonet joint, the lamp may be removed and replaced without difficulty.

The cleaner is provided with a handle in the form of a section of tubing 70 which is detachably received in a socket 71 provided at the upper end of a bail 72. The bail socket is slotted at 73, and alongside this slot a pair of ears 74 are formed. A screw 75 engages with the ears to clamp the socket 71 tightly about the handle tube 70. Within the socket and tube a pair of complementary detachable electrical connector plugs 76 and 77 are loosely carried.

The attachment of the handle to the cleaner is effected by first connecting the plug elements 76 and 77 to each other. The cord 78 for the plug element 77 is long enough to permit this plug part to extend beyond the end of the tube a slight distance, so that the connection of the plug elements may be readily effected whereupon the tube 70 of the handle may be fitted into the socket 71, and upon tightening of the screw 75, the handle parts are securely fastened together. The excess length of the cord 78 is received within the handle tube 70 when the handle parts are assembled.

The handle may be taken apart in a reverse manner by simply loosening the screw 75 and separating the tubular part of the handle from the bail, whereupon the plug parts 76 and 77 are exposed to view and their disconnection may be readily effected. Neither one of the plug parts 76 or 77 are fixedly or permanently attached to the tube or bail and these elements are loosely carried within the handle.

The plug part 76 is connected to a cord 80 which is fixed and concealed in the channel of the bail 72 so that the cord normally is not exposed to view. The handle bail 72 is pivoted at its lower ends to the casing shell 1 by means of

screws 81, one of which is provided for each end of the bail.

Circular plates 82 and 83 are fixedly attached to the ends of the bail by any suitable means, such as, rivets 84. These plates are received within milled slots or notches 85 which are cut in the casing at the places where the bail is attached to the casing. At the bottom of the milled slots 85, there is provided an opening for reception of a square or rectangular plunger 86 having a roller 87 at its upper end and having a stem portion 88 at the lower end thereof. The plunger is urged to its upper position by means of a spring 90 which is held in place by means of a threaded plug member 91 which is provided with a suitable recess for receiving and guiding the stem portion 88 of the plunger.

The rollers 87 of the plungers are adapted for engagement with suitable notches 92 spaced about the edge or periphery of the plates 82 and 83, so that engagement of the roller in one or the other of these notches serves to hold the cleaner handle in one or the other of a plurality of adjusted positions, and the position of the handle may be readily changed by simply overcoming the effect of the rollers 87 on the plates 82 and 83. A pair of bosses 93 are formed inside the shell for reception of the plunger and its associated elements.

The disk 82 differs from the disk 83 in that it is provided at its upper end with a hole 94 for receiving the cord 80. Adjacent the opening 94 the casing shell 1 is formed with an arcuate slot 95 so that the cord may be carried into the interior of the cleaner casing; the slot 95 permitting movement of the handle and the cord which projects from the handle into the cleaner casing where it is connected to the motor 21.

The milled slot which is cut in the casing shell 1 for reception of the plate 82 is slightly wider than the slot which is provided for the plate 83. The extra width of this slot provides room for the reception of a washer 96 which may be formed from felt or other suitable material for providing an effective dust seal about the arcuate slot 95 which is exposed to the dust and dirt inside the cleaner casing at the discharge side of the suction fan. The hole 94 is of such size as to snugly yet slidably receive the cord 80.

The filter bag 10 is designed so that it may be constructed with a minimum amount of waste of material. This result is accomplished by having the top and bottom sides of the bag formed from substantially rectangular pieces of cloth 97 and 98 which are double seamed to a relatively narrow side strip 100 which forms substantially parallel wall sections at the opposite sides of the bag. At its lower end the bag is provided with an enlarged opening 101. About this opening, a spring 102 is sewed to the bag so that the bag may be readily connected or disconnected with respect to the outlet 2 of the cleaner casing.

Up to the present time, it has been conceded generally that a cloth filter bag is the most satisfactory and effective device for the separation of the dust and dirt from the air of a vacuum cleaner. Filter bags for this purpose, must of necessity, reduce the efficiency of the cleaner by reason of the back pressure they create at the discharge side of the fan case. This back pressure, of course, may be reduced by using a bag of coarse mesh in which case, however, the efficiency of the bag as a dust filter is greatly reduced as a great deal of dust and small particles of dirt are able to pass through a bag of coarse

mesh. For this reason, it is essential, for effective separation of the dust and dirt from the air handled by the cleaner, that the bag be made of material having relatively small pores.

The effectiveness of the cleaner, however, will not be greatly lessened if the bag has sufficient area to provide a large number of pores for the escape of the air. A bag of this sort, when under pressure, ordinarily tends to assume a cylindrical or spherical shape and for this reason, bags of the prior art cleaners have been kept within certain limits of size, for when the cleaner is operated with the handle substantially parallel with the floor, as is often necessary, the cleaner bag if of any size, would interfere with the handle and rub against the floor and would hamper the manipulation of the cleaner to a large extent.

In the present case, the filter bag disclosed is of relatively large size and means are provided for preventing the bag from assuming a cylindrical shape when it is inflated so that when the cleaner is in use, the bag is of much greater width than thickness, thereby permitting operation of the cleaner with the handle close to the floor without interference by the bag as shown best in Figure 12.

This highly desirable result is effected by sewing strips 103 and 104 lengthwise along the medial line of the bag in the interior thereof. A number of snap fasteners 105 are provided along the length of the strips 103 and 104 and these may be unfastened for emptying the bag and turning it inside out although the bag may be emptied without resorting to such procedure, which is usually followed when a thorough emptying and cleaning of the bag is desired.

Figure 11 shows the cleaner in position for emptying the dust and dirt which has collected in the bag and in the dust and litter compartment formed interiorly of the casing shell below the open end of the filter bag 10.

The plate 34 at its forward end is provided with a pair of extending arms 106, one at each side of the plate, having curved-over end portions 107 which partially embrace the tube 45^a and provide a pivotal and detachable connection between the plate 34 and the tube 45^a, so that the plate 34 may be swung downwardly away from the cleaner casing and entirely removed therefrom if desired.

Figure 14 shows the relative positions of the cleaner casing, bag and operating handle when the handle is in its lower position for cleaning under low articles of furniture, such as, beds and the like. It is clear from this illustration that by reason of the peculiar construction of the bag, it does not rub against the floor nor does it interfere with the handle of the cleaner.

All of the operating parts of the motor are sealed within the casing defined by the frame parts 22 and 23 and the stator 21. Air circulation inside the motor is provided by means of a small fan 19 carried by the armature shaft of the motor. Heat generated in the motor is dissipated by reason of its being located in the discharge passageway of the cleaner where it is exposed to a flow of relatively cool air which effectively accomplishes the cooling of the motor.

The handle grip and operating switch of the cleaner are shown in detail in Figure 15. The hand grip 110 is horn-shaped and extends downwardly of the handle tube 70 and it has an end 111 which is curved forwardly of the grip. The peculiar shape of the hand grip facilitates the use of the cleaner in that it is not necessary for the opera-

tor to tightly grip the handle in the use of the cleaner as the convex top side and the concave underside of the handle are designed for comfortable reception in the hand for both pushing and pulling operations on the handle.

A switch operating member 112 is associated with a switch mechanism 113 of conventional design which is connected at one side to one of the strands 114 of the extension cord 115 of the cleaner. This cord is adapted for connection to an electrical source of current supply and its other strand 116 is connected to one of the strands of the cord 78 which is connected at its lower end to the plug part 77 and thus to the motor of the cleaner.

The second strand 117 of the cord 78 is connected to the other side of the switch 113 so that when the switch is in its closed position, connection is effected between the strands 114 and 117 of the cords 115 and 78 respectively, and conversely when the switch operating member 112 is shifted to its open position, the aforesaid strands are disconnected from each other and in this manner the operation of the motor 21 is controlled by a simple and easily operated switch mechanism.

Furthermore, it is to be understood that the particular forms of apparatus shown and described, and the particular procedure set forth are presented for purposes of illustration and explanation and that various modifications of said apparatus and procedure may be made without departure from the invention as defined in the appended claims.

Having thus described my invention what I claim is:

1. In a suction cleaner, a casing structure comprising, a hollow exteriorly finished shell open at its underside and defining top and side wall parts of a suction nozzle, a fan case and motor housing, a fan in the fan case with its axis arranged horizontally, a single wall member secured inside said shell for completing the suction nozzle and fan case, another wall member attached adjacent to the bottom edge of said shell for completing said motor housing, and means for supporting said cleaner with the lower edge of said shell close to the supporting surface.

2. A suction cleaner comprising, a hollow exteriorly finished shell open at its underside and defining exposed wall parts of a suction nozzle, a fan case and a litter storage compartment arranged one behind the other in the order named, an electric motor in the litter storage compartment having a substantially horizontally disposed armature shaft, a fan in said fan case operatively connected to the armature shaft of said motor, said litter storage compartment having a discharge outlet opening, and a filter bag communicating with the litter storage compartment by way of the discharge outlet opening thereof, said litter storage compartment having a displaceable bottom wall part by means of which accumulated dust and litter may be readily discharged from the litter storage compartment.

3. A suction cleaner comprising, a hollow exteriorly finished shell open at its underside and defining exposed wall parts of a suction nozzle, a fan case and a litter storage compartment, an electric motor in the litter storage compartment having a substantially horizontally disposed armature shaft, a fan in the fan case operatively connected to the armature shaft of said motor, said litter storage compartment having a displaceable bottom wall part for permitting access

to the interior thereof, and supporting wheels for the cleaner rotatably carried by such wall part.

4. In a suction sweeper, a casing structure comprising a hollow exteriorly finished shell open at its underside and defining side and top wall parts of a suction nozzle, a fan case and a litter storage compartment, such litter storage compartment having a discharge outlet opening formed in a wall thereof, a filter bag communicating with the discharge outlet opening of the litter storage compartment, an operating handle pivotally attached at one end to said casing structure and having said filter bag attached to its other end, a motor in the litter compartment having a horizontally disposed armature shaft projecting through the fan case and into the suction nozzle, said motor having a dust-tight casing enclosing the working parts of the motor, a fan in the fan case operatively connected to the armature shaft of said motor, a brush rotatably mounted in the suction nozzle, and a power transmission belt connecting said brush to the armature shaft of said motor.

5. An electrically-operated suction cleaner comprising, a casing structure defining a suction nozzle, fan case and litter compartment, a fan in the fan case, a motor in the litter compartment operatively connected to said fan, a handle pivotally attached to the litter compartment of said casing structure, said handle comprising a bail and a shaft part extending upwardly therefrom, an electric cord carried by the shaft part and bail

of said handle, the litter compartment of said casing structure having an opening adjacent to the handle pivot and traversed by said cord, such opening being considerably larger than the diameter of said cord, and means movable with said cord and said handle bail forming an air seal for the opening of said casing traversed by said cord.

6. An electrically operated suction cleaner comprising, a casing structure, a motor therein, an operating handle pivotally connected to said casing structure, said operating handle comprising a bail and a shaft part attached thereto, and an electric cord fixed to and carried by said bail, said casing structure having an arcuate opening for receiving the cord, said cord being fixed for movement with said bail and relative to the casing structure at the point where it enters said casing structure.

7. An electrically operated suction cleaner comprising, a casing structure, a motor therein, an operating handle pivotally connected to said casing structure, said operating handle comprising a bail and a shaft part attached thereto, and an electric cord fixed to and carried by said bail, said bail having a part with an aperture for receiving the cord and introducing it into an arcuate cord receiving opening in said casing structure, said part serving to conceal the cord within the bail at the point where it enters the casing structure.

JAMES B. KIRBY.