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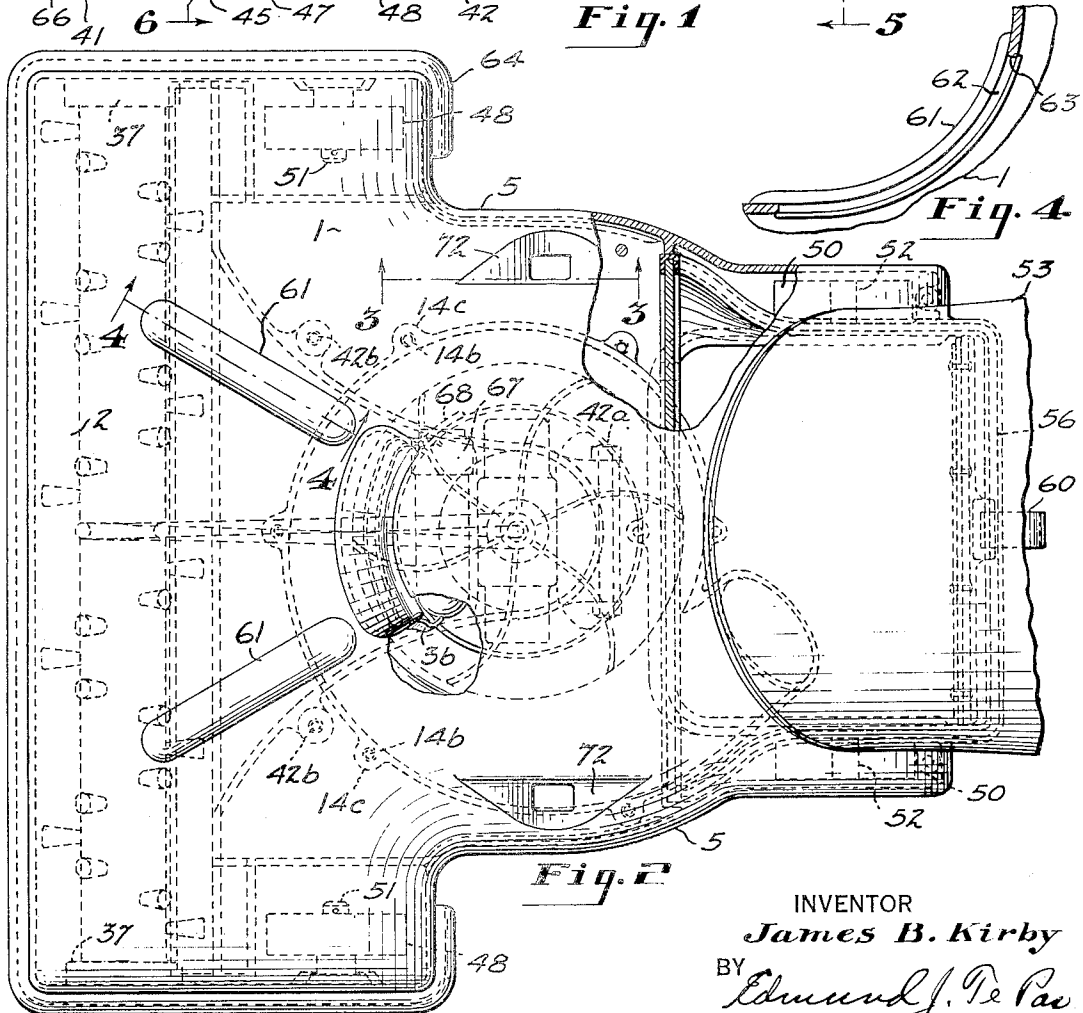
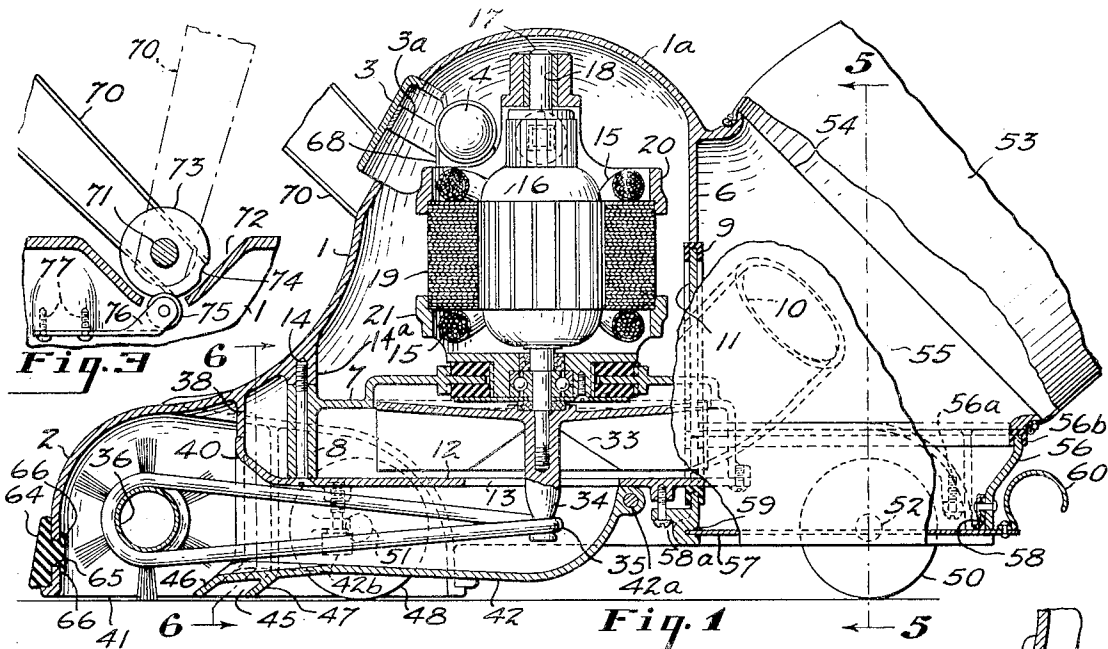
J. B. KIRBY

2,221,745

SUCTION SWEEPER

Filed Dec. 27, 1933

3 Sheets-Sheet 1



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Nov. 12, 1940.

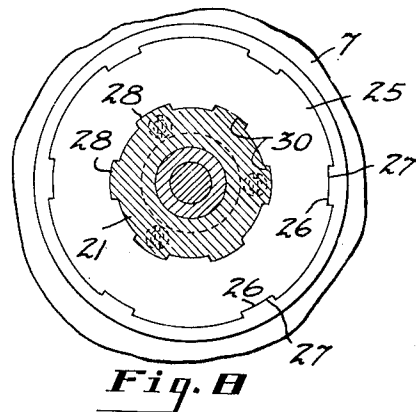
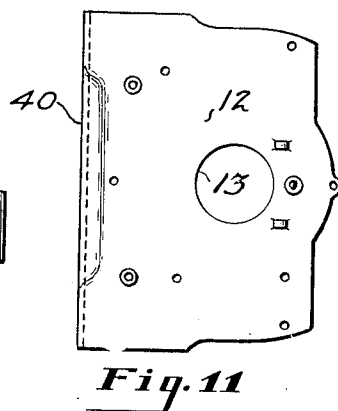
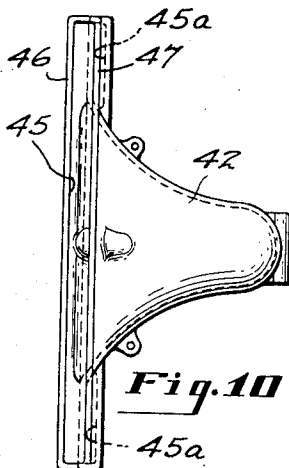
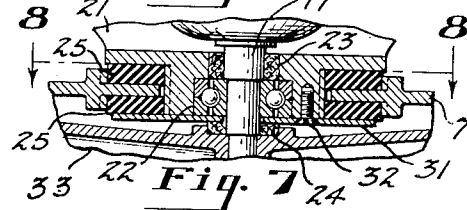
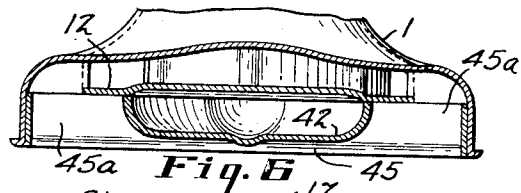
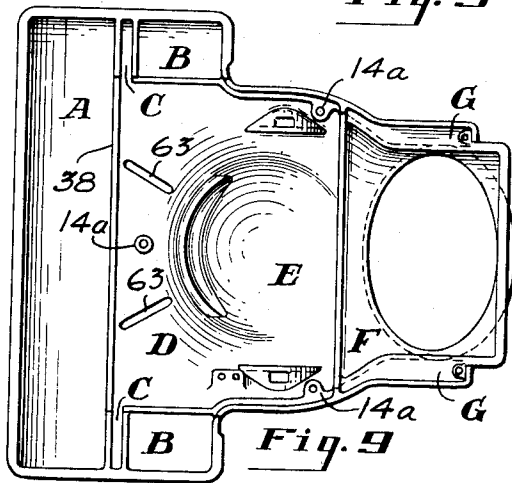
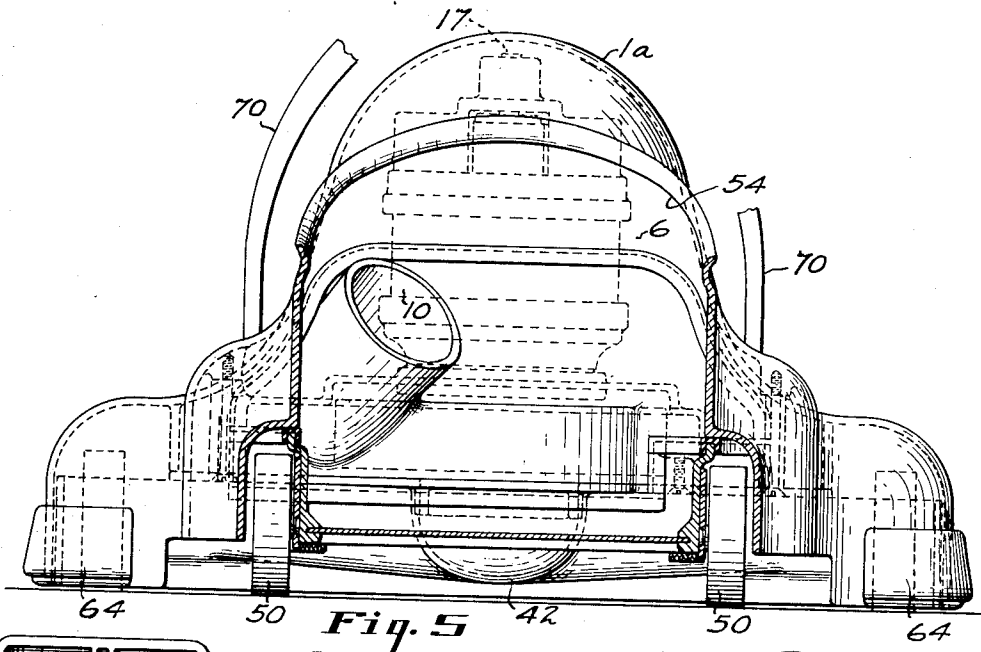
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SUCTION SWEEPER

Filed Dec. 27, 1933

3 Sheets-Sheet 2



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2,221,745

SUCTION SWEEPER

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Application December 27, 1933, Serial No. 704,108

1 Claim. (Cl. 15—8)

This invention relates to suction or vacuum cleaners and it is primarily directed to certain refinements by means of which a quieter, more efficient, less expensive and better looking device can be produced.

One of the objects of the invention is that of forming a cleaner casing from a plurality of sections which include an exposed exteriorly finished shell to which the other sections of the casing are secured to form the compartments and passageways of the cleaner casing and in which the parts associated with the shell are generally concealed by the shell as also are the means required for the securement of such parts to the shell.

Another object of the invention is that of providing a cleaner casing in which the motor, fan, fan casing and certain of the wall parts of the suction chamber are separately attached beneath an outer shell to form the completed cleaner casing.

Another object of this invention is that of providing in an electrically driven suction sweeper employing a power driven brush, a form of casing construction comprising an exposed exteriorly finished shell beneath which all of the operating elements of the sweeper are located.

Another object of the invention is that of providing in a suction cleaner, a casing construction having provision for receiving and storing accumulated dust and litter, such casing having provisions for readily removing such dust and litter.

Another object of the invention relates to the provision of a suction cleaner casing construction in which the various sections of the casing may be readily formed from die castings.

Another object of the invention relates to the provision of certain electrical insulating and sound deadening provisions by means of which the device is rendered quiet in operation and the hazard of electrical shocks by reason of short circuits in the motor is greatly lessened.

Another object of the invention is that of utilizing the suction pressure at the mouth of the cleaner for drawing a current of cooling air over the motor whereby the cooling of the motor is effected without sacrifice to the efficiency of the cleaner.

Another object of the invention is that of providing means for preventing the casing of the cleaner from marring and scratching articles of furniture and the like which means also serve to enhance the appearance of the machine.

A further object of the invention is that of providing a suction cleaner or sweeper in which

the various elements of the device can be readily and inexpensively formed and assembled by modern factory production methods.

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 claim.

Referring to the drawings,

Figure 1 is a central sectional view of a suction sweeper illustrating one embodiment of the invention.

Figure 2 is a plan view of the suction sweeper shown in section in Figure 1. In Figures 1 and 2 the sweeper is shown with the handle removed.

Figure 3 is an enlarged sectional view of the sweeper casing taken on line 3—3, Figure 2, with the bail of the sweeper handle in place and showing the details of the handle adjustment of the device.

Figure 4 is a sectional view taken on line 4—4, Figure 2, showing the details of the bumper strips provided on the top part of the casing shell.

Figure 5 is a rear sectional view taken on line 5—5, Figure 1, showing some of the details of the rear part of the cleaner casing.

Figure 6 is a reduced sectional view taken on line 6—6, Figure 1, showing some of the details of certain of the air ports and passageways provided for the cooling of the cleaner motor.

Figure 7 is an enlarged detail sectional view of the motor support corresponding in section to the showing in Figure 1.

Figure 8 is a sectional view of the motor support taken on line 8—8, Figure 7.

Figure 9 is a reduced plan view showing the underside of the casing shell.

Figure 10 is a reduced plan view of the bottom side of the removable cover plate by means of which access is had to the brush and brush driving belt.

Figure 11 is a reduced plan view of the bottom side of the plate which forms the bottom wall of the fan case.

Figure 12 is a sectional view taken on line 12—12, Figure 13 of a modified form of suction sweeper in which a traction driven motor is used to drive the cleaner fan and brush; and

Figure 13 is a modified plan view of the device shown in Figure 12 taken on line 13—13, Figure 12.

Referring now particularly to Figures 1 and 2, the casing of the suction sweeper or vacuum

cleaner shown in these figures comprises an outer shell indicated generally by the numeral 1, preferably integrally formed and having a raised upper part 1^a which provides in part the walls of a housing for the driving motor of the device. The forward part 2 of the casing shell forms in part the walls of the brush chamber and suction nozzle of the cleaner. At the upper part of the forward side of the motor housing there is provided an opening in which is received a removable apertured guard 3 behind which is located a work illuminating lamp 4. A spring member 3^a having kinked ends 3^b, engageable with the side edges of the aforesaid opening is carried by the guard 3 to permit its detachable securement to the casing shell.

The casing shell has side wall parts 5-5 which extend downwardly to a point closely adjacent to the surface upon which the device rests. These wall parts serve to generally conceal the supporting wheels and some of the other elements of the device. Interiorly of the casing at the upper rearward portion thereof there is provided a depending wall 6 which forms in part the housing for the cleaner motor. At the bottom of the motor housing there is a horizontal wall member 7 having a depending vertical wall part 8 which forms the peripheral part of the fan case.

The peripheral wall 8 of the fan case is of snail-shaped contour and at one side this wall is extended to form a tangential outlet conduit 10 as is customary in suction pumps of the impeller type. The lower edge of the depending wall part 6 of the casing shell is of arcuate or curved outline and this part of the wall 6 contacts with an upstanding wall part 11 of complementary marginal outline formed integrally with the fan case wall member 7. A gasket 9 is interposed between the contacting wall parts just described to insure an air tight seal at their jointure.

A generally flat horizontal plate 12 having a central aperture 13 is secured against the bottom of the peripheral fan case wall 8 and to the casing shell by means of a plurality of screws 14 which are received in threaded bosses 14^a of the shell. The upper fan case section is initially secured to the plate 12 by means of screws 14^b which are received in drilled and threaded bosses 14^c provided by the peripheral fan case wall 8. It should be here noted that the plate 12 extends beyond the margin of the fan case peripheral side wall 8 and that it cooperates with certain of the aforesaid shell and wall parts to complete the motor housing.

The cleaner motor comprises a stator 19, stator windings 15 and an armature 16 which is carried by a shaft 17 journaled at its upper end in a suitable bearing 18 carried by the upper stator frame part 20. In the lower part 21 of the stator frame as is best shown in Figure 7, there is carried an anti-friction or ball bearing 22 for the lower end of the armature shaft 17. Suitable packing washers 23 and 24 are provided above and below the ball bearing 22. The lower part 21 of the stator frame rests upon the upper part of one of a pair of yielding flexible washers 25 which may be conveniently formed from a relatively soft rubber.

The washers 25 contact with the opposite sides of the marginal part of the fan case wall 7 forming at this point an opening for the armature shaft 17. As best shown in Figure 8, this part of the fan case wall has opposite annular flanges which are fluted as at 26 and these flutings are arranged to be received in corresponding notches

27 which are formed in the washers 25. The motor frame part 21 is also provided with flutings 28 which are received in similarly formed notches 30 provided at the inner margin of the washers 25. The flutings 26 and 28 and the corresponding notches 27 and 30 cooperate to prevent the frame of the motor from turning during the operation of the motor.

The electric motor and its supporting washers 25 are secured to the fan case wall 7 by means of a plate 31 which is pressed against the lower washer 25 and is securely held thereat and in engagement with the motor frame part 21 by any suitable means such as the screws 32. In assembling the power unit of the cleaner the motor is first secured to the plate 7 as described. An impeller fan 33 is then screwed onto the armature shaft 17. The plate 12 is then secured to the fan case wall 8 by the screws 14^b and the assembled unit can then be secured to the casing shell by the screws 14.

The fan 33 is provided with an axially extending shaft 34, suitably grooved to provide a pulley for a brush driving belt 35 which is provided for driving a brush 36 carried in a combined suction nozzle and brush chamber formed in part by the forward end of the casing shell. The brush 36 is rotatably supported at its ends by suitable bearings 37 carried by the casing shell. The combined brush chamber and suction nozzle is formed by the shell wall part 2, a depending wall part 38 integral with the shell, the forward upturned end part 40 of the plate 12, and the wall part 46 of a cover plate 42 which is pivoted at 42^a to the fan case wall 12.

The plate 42 is of dished or hollowed-out construction and it cooperates with the plate 12 to define a suction passageway between the fan case inlet 13 and the working mouth 41 of the combined brush chamber and suction nozzle. The forward end of the cover plate 42 is of a peculiar construction in that it is provided with a rear wall part 47 which is spaced from and parallel to the wall 46 and which defines therewith a channel 45 communicating at its ends with the interior of the motor housing by way of passageways 45^a one of which is formed at each side of the cover plate by upward extensions of the wall parts 46 and 47. The motor housing, as previously described, communicates with the surrounding atmosphere by way of the opening in which is fitted the guard-member 3.

The openings and passageways just referred to are provided to insure the proper cooling of the electric motor. During the operation of the motor and the suction fan, a large part of the air drawn into the suction nozzle from under the rear lip 46 of the suction mouth is supplied by way of the opening provided in front of the lamp 4 which is protected by the removable guard member 3. The air entering the cleaner casing at this point circulates over and around the motor and then passes by way of the end passageways and the channel defined by the wall parts 46 and 47 to the brush chamber of the cleaner and in so doing this air functions in the cleaning operation in much the same manner as if it had been drawn directly from outside the working mouth.

By reason of this mode of operation a flow of cooling air is provided around the motor which does not require the useless expenditure of energy as would be required if a separate cooling fan were provided for the motor or if the motor chamber were connected directly to the inlet or low pressure side of the fan chamber, both of which

methods of cooling electric motors have been extensively used in devices of this sort.

The cleaner is supported for movement by means of front casters 48—48 and rear casters 50—50. These casters are journaled respectively for rotation on suitable bearing pins 51—51 and 52—52 which are rigid with the cleaner casing. A suitable dust filter 53 is clamped about a discharge outlet opening 54 of the cleaner casing.

The opening 54 to which the cleaner bag is secured communicates with the fan case discharge conduit 10 which is spaced a considerable distance above the bottom of a dust and litter storage compartment 55 defined by this part of the cleaner casing. The shell of the cleaner casing has a generally rectangular opening at the bottom of its rear portion and a correspondingly shaped wall member is secured by screws 56^a about this opening.

The upper edge of the wall member 56 is presented to the casing shell and to the rear part of the plate 12. A gasket 56^b is interposed between the aforesaid parts where they come together to provide an air tight seal at this place. The wall member 56 defines the lower side wall portion of the dust and litter compartment 55. The bottom of the litter compartment is closed by means of a slide 57 which is received in suitable grooves 59 formed in the wall part 56 which at its inner rear side is provided with a sealing strip 58 contacting with the slide 57. A suitable handle 60 is provided for the manipulation of the slide 57.

At the forward top part of the shell and to each side thereof as shown in Figures 2, 4, and 9, there is provided a bumper 61 which may be in the form of a rubber strip longitudinally grooved as at 62 so that it may be readily and removably inserted in suitable slots 63 which are formed in the shell of the casing. A third bumper strip 64 is removably secured around the lower front and forward side wall portions of the casing shell.

The bumper strip 64 is secured to the shell in much the same manner as are the bumper strips 61. This is accomplished in the case of the strip 64 by providing slots 65 at spaced intervals around the part of the shell covered by the bumper strip 64 and by forming the bumper strip by projecting flanged offset parts 66, the edges of which are of slightly larger size than the slots 65 and by reason of their yielding character the flanged parts 66 of the strip can be forced through the slots 65 and they will thus serve to hold the bumper strip 64 in place.

The cleaner lamp 4 is connected by means of a suitable socket 67 in series with the motor circuit so that during the operation of the motor the lamp will be in operation. The lamp socket is secured to the upper frame part 20 of the motor by means of a bracket 68. The frame part 20 terminates in an upper, annularly reduced section whereby space is provided for the lamp above the motor without changing the symmetrical contour of the casing shell for its accommodation.

The suction sweeper is manipulated by means of a handle (not shown), the lower end of which is provided with a bail 70 pivoted at 71 in suitable notches 72 formed in the side of the casing shell. The lower ends of the bail are provided with hardened washers 73 having notches 74 which co-operate with a roller 75 which is pressed against the washer 73 by means of a spring 76 which is secured by any suitable means such as the screws 77 to the shell of the casing.

The cleaner handle is held in its vertical position by the roller 75 contacting with the forward notch in the washer 73 and at an intermediate lower position of the handle, the engagement between the roller and the other notch permit the forward end of the cleaner to be raised a slight amount as is sometimes necessary in advancing the cleaner over the edge or fringe of a rug or over other slight obstacles.

The modified form of suction sweeper shown in Figures 13 and 14 refers to a traction driven type of suction sweeper in which the rear wheels 80 of the sweeper are connected to a fan 83 by suitable speed increasing gearing and a one-way clutch (not shown) which mechanisms may be of the type disclosed in my prior Patents 1,362,011, 1,421,957, and 1,421,958, showing gearing whereby the fan of the cleaner can be driven at high speed through a relatively slow motion of the traction wheels 80 and in which the fan will freely rotate by reason of the provision of a suitable clutch, as shown in my earliest mentioned patent, at such times when the cleaner is stopped or its movement reversed after a forward movement thereof.

Speed increasing gears driven by the traction wheels 80 are shown at 81, 82, the latter being directly connected to the impeller fan 83. The aforesaid gears are located in a suitable housing 84 which is located at the rearward underside portion of the cleaner casing shell part 85 which forms the major exposed part of the cleaner casing. This part of the casing may be conveniently formed from a die casting as this type of casting readily lends itself to the polishing and finishing operations required for the exterior parts of a cleaner casing.

The forward end of the shell 85 has a downturned part 86 which forms the forward wall of a chamber in which a rotatable brush 87 is housed. This brush is connected by means of a belt 88 to a hollow pulley 89 having a pinion gear 92 fixed thereto at one side thereof. A stub shaft 90 carried by an arm 91^a is provided to support ball bearings 91 over which the hollow pulley is fitted and by means of which it is rotatably supported. The pinion gear meshes with an enlarged driving gear 93 which is fixed on the axle 80^a of the traction wheels 80. A two-piece belt guard 88^a is secured at its rear end to a drilled and threaded boss 89^a of the casing shell by means of the screw 89^b. At its forward end the belt guard contacts with the casing shell 85 and the nozzle wall 96 which has an offset part 90^a surrounding the lower end part of the belt guard.

The axle 80^a and the traction wheels 80 are fixed with respect to each other so that the axle turns when the wheels 80 are rotated. Suitable supporting wheels 91^b are provided for the forward end of the cleaner and a bumper strip 92^a similar to that shown in connection with the cleaner earlier described is provided for preventing the cleaner casing from marring articles of furniture and the like.

The brush 87 is mounted to rotate in ball bearings 93^a, provided at each end of the brush. Beneath the casing shell 85 there is secured a wall member 94 which forms in part one of the side walls of a fan case for the fan 83 and in this member there is provided an aperture 95 which constitutes an inlet of the fan case.

The forward part 96 of the wall member 94 forms the rear wall of the combined brush chamber and suction nozzle. The lower edge of the wall part 96 forms the rear edge of the suction mouth, where as the lower edge of the shell part

86 forms the front and side edges of the suction mouth. A suitable handle 97 having a ball 98 is pivoted at 100—100 to the sides of the shell 85 of the casing. This handle is provided for manipulating the cleaner and for supporting the upper end of a dust bag 104.

The housing 84 for the gearing motor of this cleaner is provided with wall parts 101 and 102 which cooperate with the wall 94 and a part of the shell 85 to form the casing for the fan 83. The shell 85 is provided with a rear wall part 103 which has an aperture at its upper end. This aperture constitutes the outlet of the fan case and it communicates with the dust-bag 104 which is secured to an annular collar 105 pivoted at 106 to the rearward part of the casing shell 85. A locking screw 107 is provided to hold the collar 105 in contact with the wall part 103.

The discharge outlet of the fan case is located a considerable distance above the bottommost edge of the inlet end of the bag, so that storage space is provided in the bottom of the bag for the reception of accumulated dust and litter. After first removing the securement screw 107, the collar 105 can be swung away from the casing wall 103, whereupon the accumulated litter in the bag can be discharged onto a piece of paper with the cleaner in operative position on the floor.

The lever 108 is provided for adjusting the elevation of the forwardly located casing supporting wheels 91^b. These wheels are carried on shafts 112—112, of cranks 110—110, fixed to the shaft 111 to which the member 108 is also fixedly secured. The lever 108 has a lug 113 which engages with suitable notches formed in slot 113^a of the cleaner casing wall whereby the lever 108 and the wheels 91^b may be held in various adjusted positions.

The shell of the casing of both forms of the cleaner shown herein forms the major part of the casing and in the case of the shell 1, integral wall parts are provided to define in part at least the nozzle A, the forward supporting wheel compart-

ments B, the motor cooling air passageways C, the suction chamber D, the motor chamber E, the dust compartment F and the rear supporting wheel compartments G. The cover plate 42 is displaceably secured to the bottom of the cleaner by means of a pivotal pin 42^a and the removable screws 42^b. The upper end of the bag 53 is supported in the same manner as is the bag 104.

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 explanation and that various modifications of said apparatus and procedure can be made without departure from this invention as described in the appended claim.

Having thus described my invention what I claim is:

In a motor driven portable suction cleaner for cleaning floor coverings and the like, a casing structure comprising normally concealed wall means and a hollow shell open at its underside and having provisions for receiving said wall means, said wall means forming normally unexposed oppositely located spaced walls of a dust box, a fan case and a communicating suction chamber in said shell, means for securing said wall means to said shell, said wall means defining in part at least the lips of a downwardly presented working mouth communicating with the suction chamber, said shell having a front wall, a top wall and side walls forming exposed portions of the casing and constituting in part at least the walls of the suction chamber, dust box and a motor chamber, said wall means including an element forming in part at least the sides of said fan case and said dust box, a fan in the fan case of said casing, a brush operably carried in the working mouth of said casing, means including a motor in said motor chamber for driving said fan and brush, and floor engaging wheels for supporting said casing.

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