

June 19, 1962

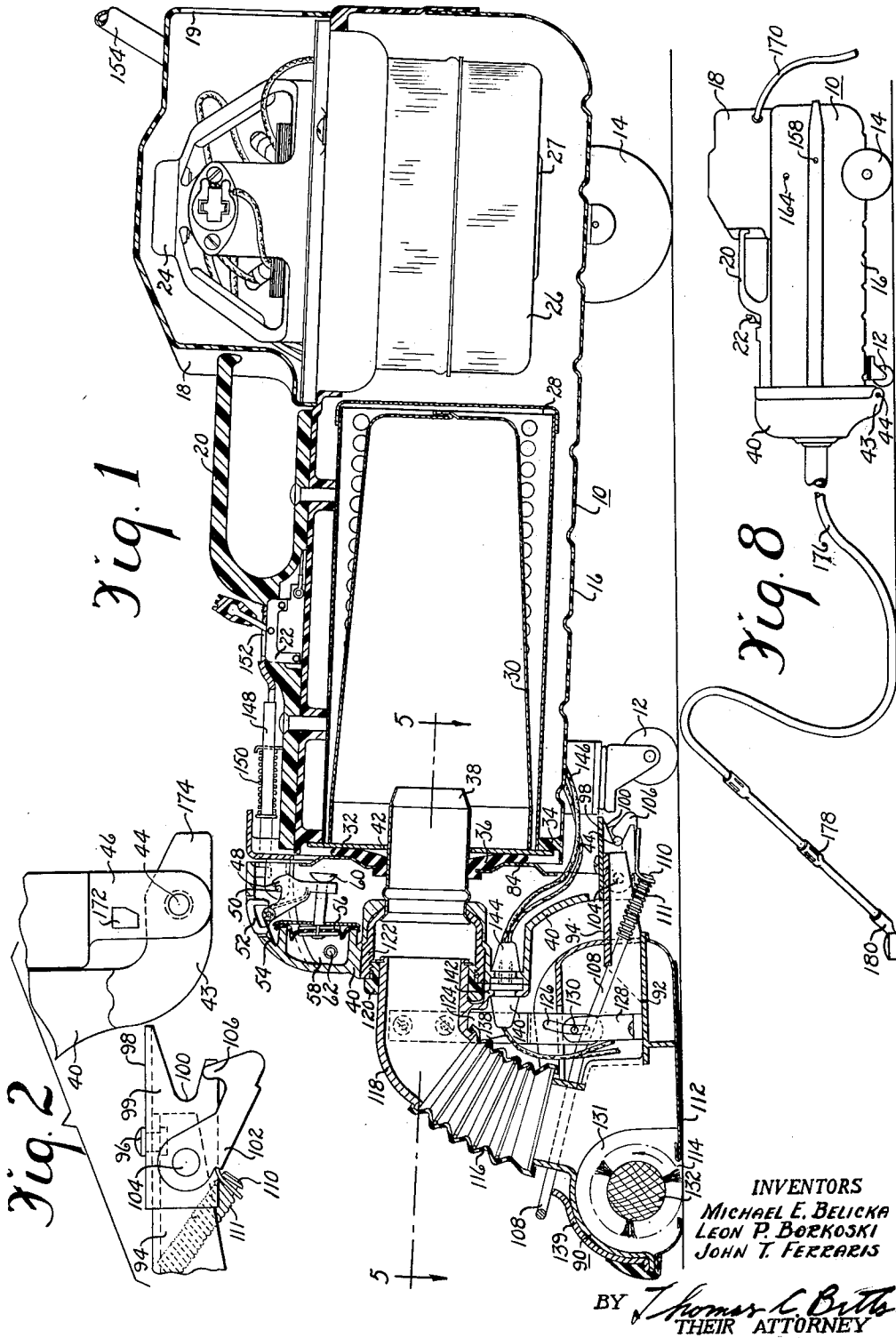
M. E. BELICKA ET AL

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VACUUM CLEANERS

Filed Dec. 28, 1959

4 Sheets-Sheet 1



June 19, 1962

M. E. BELICKA ET AL

3,039,129

VACUUM CLEANERS

Filed Dec. 28, 1959

4 Sheets-Sheet 2

Fig. 3

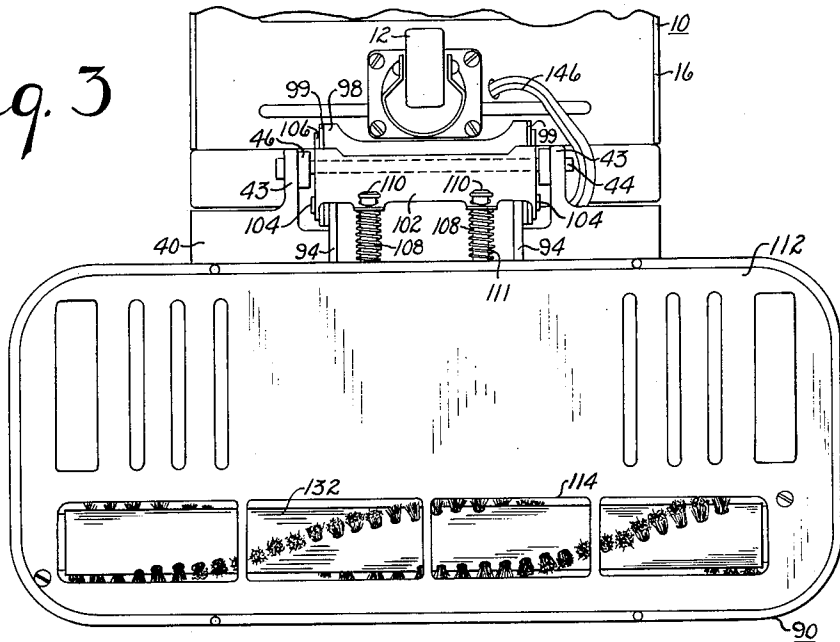
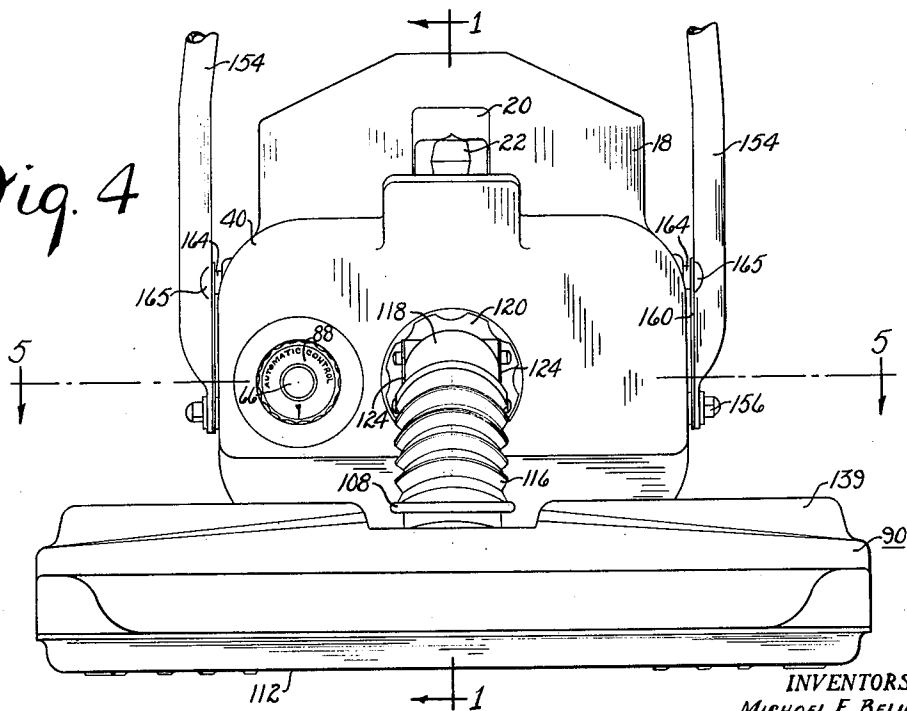


Fig. 4



INVENTORS
MICHAEL E. BELICKA
LEON P. BORKOSKI
JOHN T. FERRARIS

BY *Thomas C. Britts*
THEIR ATTORNEY

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4 Sheets-Sheet 3

Fig. 7

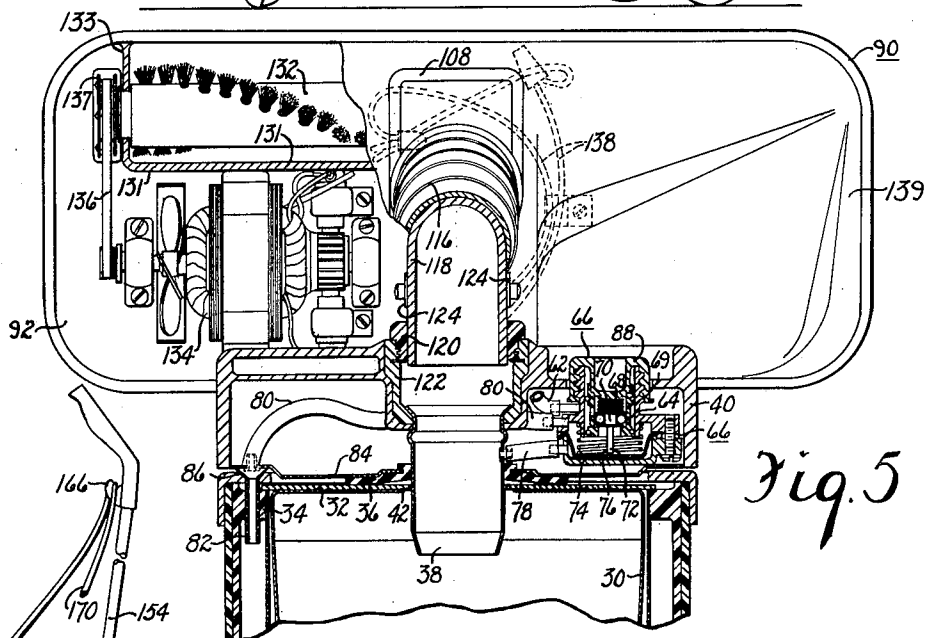
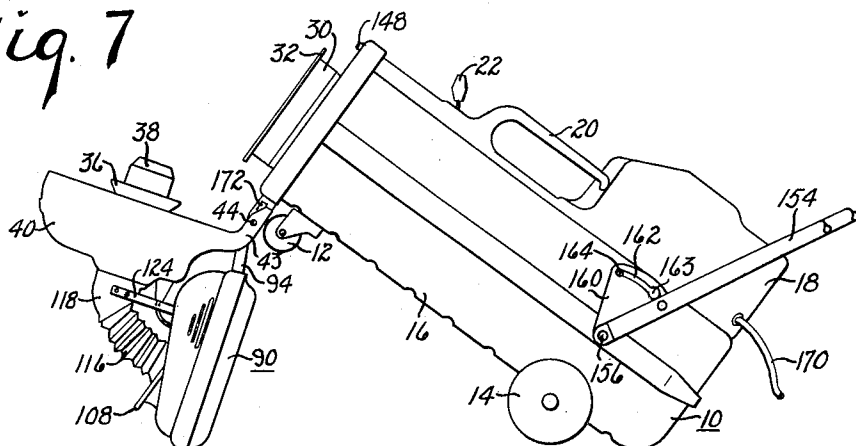


Fig. 5

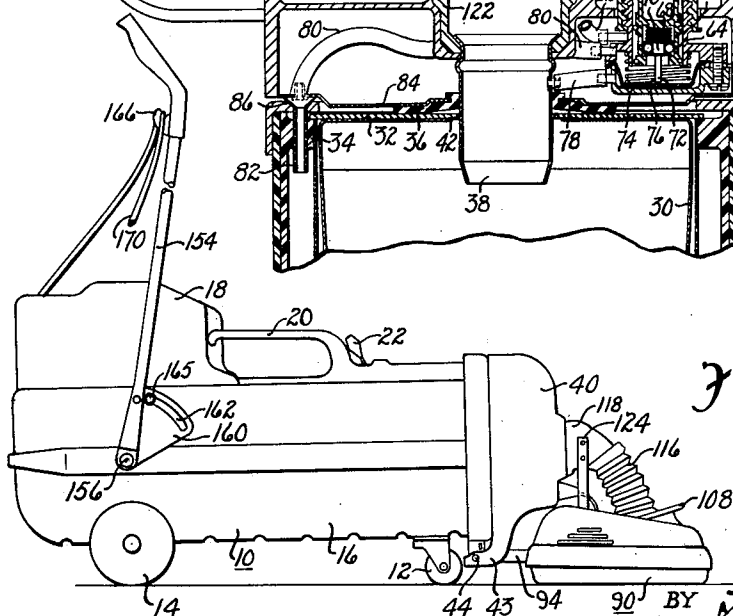


Fig. 6

INVENTORS
MICHAEL E. BELICKA
LEON P. BORKOSKI
JOHN T. FERRARIS

BY *Thomas C. Betts*
THEIR ATTORNEY

June 19, 1962

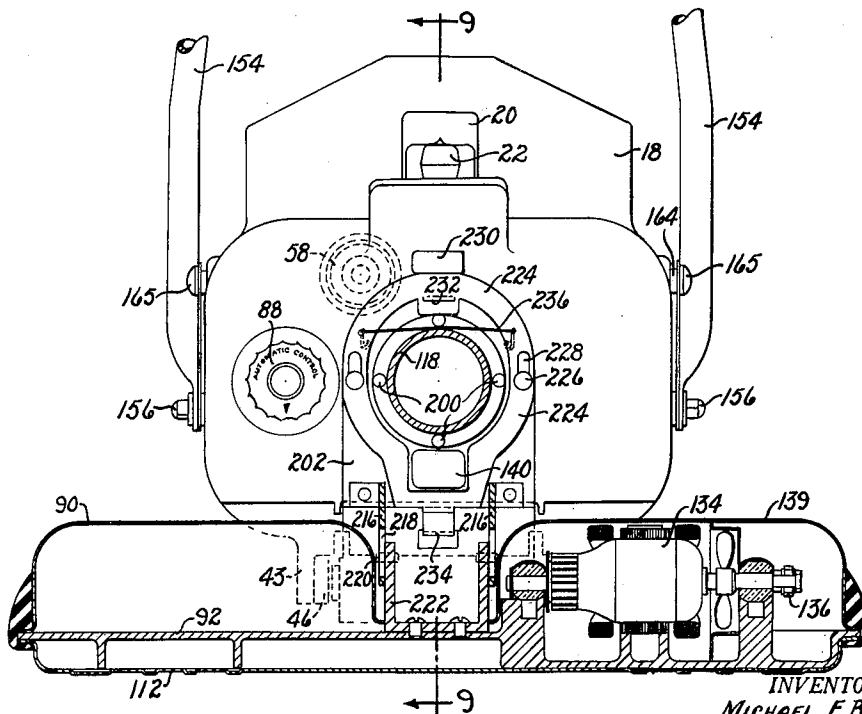
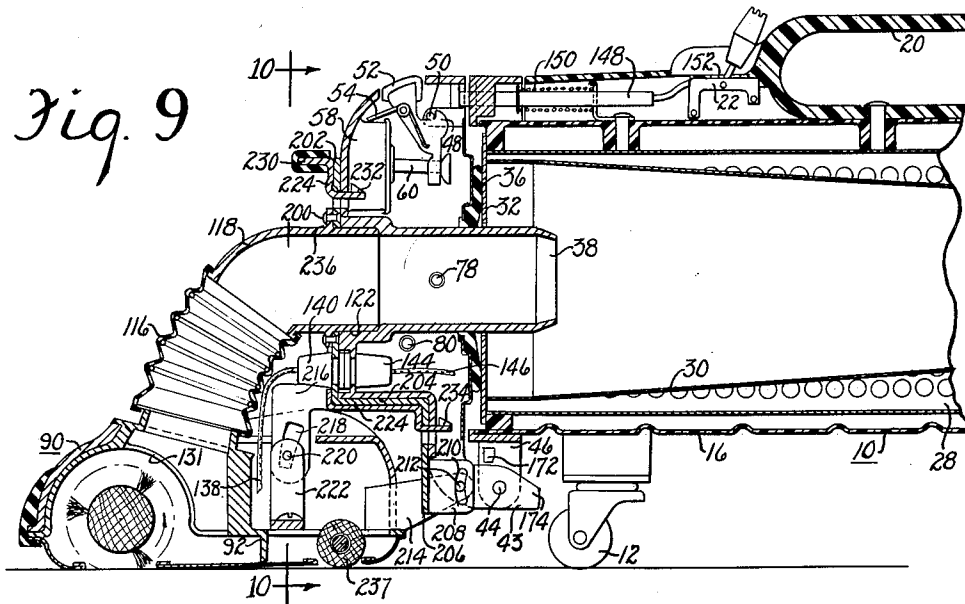
M. E. BELICKA ET AL

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4 Sheets-Sheet 4



INVENTORS
MICHAEL E. BELICKA
LEON P. BORKOSKI
JOHN T. FERRARIS

BY *Thomas C. Betts*
THEIR ATTORNEY

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3,039,129

VACUUM CLEANERS

Michael E. Belicka, Greenwich, and Leon P. Borkoski and John T. Ferraris, Stamford, Conn., assignors to Electrolux Corporation, Old Greenwich, Conn., a corporation of Delaware

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18 Claims. (Cl. 15—331)

Our invention relates to vacuum cleaners and more particularly to cleaners of the enclosed bag type in which the air passes through the dust separating member before entering the fan. A cleaner of this type may employ a fan which is designed to handle only clean air, inasmuch as the dirt is separated before the air reaches the fan, and such a fan is capable of producing a much higher suction than is one which is able to pass dirty air without becoming fouled.

The nozzle of such a vacuum cleaner is usually connected to the dust bag and fan unit by means of two sections of rigid pipe, which also serve as a handle for manipulating the nozzle, and a flexible suction hose. Thus in cleaning it is necessary to move only the nozzle and pipe sections back and forth over the surface being cleaned, the heavier dust bag and fan unit remaining stationary at the end of the flexible hose, the unit being moved only as the cleaning operation progresses from one end of the surface to the other. Also, it is convenient for above the floor cleaning to connect a suitable suction nozzle directly to the end of the hose.

With a cleaner of this nature it has been common practice to rely on straight suction at the nozzle for removing dirt from the surface being cleaned, aided sometimes by stationary or floating brushes in the nozzle. However, with the advent of rugs made of various synthetic fibers, certain of these rugs have proved to be difficult to clean with straight suction, mechanical agitation being helpful for releasing the dirt adhering to the fibers. In order to provide such agitation it has been proposed to employ either an air turbine in the nozzle for driving a rotary brush or other agitator, or to provide an electric motor in the nozzle for this purpose. The disadvantage of the first arrangement is that there is not sufficient air power available for both operating a turbine and producing a suitable air stream for picking up dirt, because if the air is passed through a turbine a pressure drop results, which reduces by this amount the suction available at the nozzle mouth to produce airflow. The disadvantage of an electric motor is that it requires a complicated and cumbersome arrangement of electric conductors to convey electricity from the dust separating and fan unit to the nozzle. A separate electric cord lying on the floor and running to the nozzle is so inconvenient as to be totally impractical. Consequently, it is necessary to have the conductors extend along or through the hose and the pipe sections. However, due to the fact that there are at least four separable joints and usually at least two swivel joints, where the conductors would have to be separable and turnable, respectively, this has proved impracticable.

It has also been common practice to provide a suction nozzle with a mechanically driven agitator connected directly and permanently to the dust separating and fan unit, the agitator being driven by the motor that drives the fan. Such an arrangement is entirely feasible if the fan is located ahead of the dust separating member, but this means that the fan must be able to handle dirty air and, as above stated, such a fan is not capable of producing a high suction. On the other hand, if the dust bag or other dust separating member is located ahead of the fan, it is between the nozzle and the fan and fan motor and therefore interferes with the transmission of mechanical motion from the motor to an agitator in the nozzle.

Finally, it has been proposed to provide a nozzle having an agitator driven by an electric motor in the nozzle, the nozzle being rigidly and detachably connected directly with the dust bag and fan unit, the bag being located ahead of the fan so that the latter may be of the high suction type. Separable electrical contacts on the nozzle and the unit are arranged to be automatically connected together when the nozzle is secured to the unit. A detachable pivoted handle is provided for manipulating the combined unit and nozzle over the surface being cleaned. When it is desired to use the dust separating and fan unit in connection with a flexible hose, the above mentioned nozzle may be removed and a hose connected in its place, and the handle removed.

In accordance with the present invention we utilize a similar combination of nozzle and dust bag and fan unit, but the nozzle is removably secured to the unit in such a way that it may move up and down with respect thereto and to the surface being cleaned while being moved with the unit in all other directions. This up and down or floating movement of the nozzle enables it to better accommodate itself to the surface being cleaned. Thus, it is not only able to conform to changes in the contour of the surface, such as might be caused by adjacent rugs of different thicknesses, but also the nozzle may seek the proper level on rugs having different degrees of softness. For example, the wheels or other supporting means for the unit tend to sink deeper into a soft rug than into a hard one, while the nozzle itself should ride on the surface in both cases, which it may do because of its floating connection.

In one embodiment of our invention the nozzle is pivotally secured to the unit, while in another it may move substantially straight up and down as well as pivot. In both embodiments a short flexible conduit is employed to establish a fluid connection between the nozzle and the unit, while flexible conductors provide an electrical connection, the separable contacts of the nozzle being carried by the end of the conduit which is connected to the unit so that an electric circuit is automatically established when the conduit is connected.

Further objects and advantages of our invention will be apparent from the following description considered in connection with the accompanying drawings which form part of this application and of which:

FIG. 1 is a cross-sectional view of a vacuum cleaner in accordance with the present invention and is taken on the line 1—1 of FIG. 4;

FIG. 2 is a detail on an enlarged scale of a portion of the device shown in FIG. 1 with certain of the parts separated from each other;

FIG. 3 is a bottom view of the nozzle and the adjacent portion of the dust bag and fan unit of the vacuum cleaner shown in FIG. 1;

FIG. 4 is a front view of the vacuum cleaner illustrated in FIG. 1;

FIG. 5 is a cross-sectional view taken on the line 5—5 of FIG. 4;

FIG. 6 is a side elevational view of the vacuum cleaner shown in the preceding figures;

FIG. 7 is a side elevational view of the cleaner shown in FIG. 6, but with the front cover in opened position for the removal and insertion of a dust bag;

FIG. 8 is a side elevational view of the dust bag and fan unit shown in the preceding figures, but with a flexible hose, wand and nozzle connected thereto in place of the nozzle shown in the preceding figures;

FIG. 9 is a cross-sectional view similar to that of FIG. 1, but showing another embodiment of our invention and is taken on the line 9—9 of FIG. 10; and

FIG. 10 is a cross-sectional view taken on the line 10—10 of FIG. 9.

3

Referring to the drawings, reference character 10 designates generally a vacuum cleaner unit including a hollow housing mounted on a front caster wheel 12 and a pair of rear wheels 14. The housing comprises an elongated horizontal portion 16 at the rear end of which is secured vertically extending portion 18 having an outlet 19. A carrying handle 20 is secured to the upper part of housing portion 16 and an electric switch 22 is located directly in front of the handle.

As is shown in FIG. 1, a blower unit comprising an electric motor 24 and a centrifugal fan 26 having an inlet 27 is disposed partially within the vertical housing 18 and extends into the rear portion of the horizontal housing 16. The forward part of the horizontal housing comprises a dust bag a chamber within which is disposed a perforated inner body 28 adapted to removably receive a dust bag 30. As shown, the latter comprises a porous bag portion secured to a relatively stiff disc 32 having an outwardly extending flange portion adapted to be clamped against a flange 34 of housing portion 16 by means of a sealing ring 36 mounted on an inlet conduit 38 of a front cover 40. The disc 32 is formed with an inlet opening 42 through which the conduit 38 extends when the cover is in place.

As shown more particularly in FIGS. 2, 3, 6, 7 and 8, cover 40 is formed with a pair of downwardly and rearwardly extending arms 43 pivotally secured at 44 to a pair of projections 46 extending downwardly from the housing portion, the cover being pivotal between the closed position shown in FIG. 6 and the open position shown in FIG. 7. For securing the cover in closed position it is provided with a latch member 48 which is engageable with a keeper 50 mounted on the housing portion 16. The latch is provided with a button 52 which is accessible from the exterior of the cover 40 for manually disengaging the latch from the keeper against the force of a latch spring 54.

The latch 48 may also be disengaged from the keeper 50 by the movement of a diaphragm 56 forming one wall of a diaphragm chamber 58, the diaphragm being operatively connected to the latch by means of a pin 60. A conduit 62, shown in FIGS. 1 and 5, connects diaphragm chamber 58 with the valve chamber 64 of a differential pressure control valve designated generally by reference character 66. A valve 68 is slidably positioned in an apertured sleeve 69 in the valve chamber 64 and is urged towards closed position by means of a spring 70. The valve has a stem 72 which extends into a diaphragm chamber in which is disposed a pressure differential diaphragm 74 which is urged downwardly, as seen in FIG. 5, by a loading spring 76. The space below the diaphragm is connected to inlet conduit 38 by means of a conduit 78, while the space above the diaphragm is connected by means of conduits 80 and 82 with the space in the dust bag compartment outside the dust bag 30 and which is in direct communication with the inlet 27 of the fan 26. As is shown in FIG. 5, conduit 80 terminates at an opening in a plate 84 forming part of the front cover 40, while conduit 82 extends through flange 34 and is formed with a funnel shaped end 86 which seals around the opening in plate 84 when the cover is closed.

Diaphragm 74 is thus subjected to the difference in pressures existing inside and outside, respectively, of the dust bag 30 and hence is subjected to a pressure difference which is equal to the pressure drop through the dust bag. As dirt accumulates within the bag this pressure drop increases and when the pressure difference acting on the diaphragm 74 exceeds the force exerted by the spring 76 the diaphragm moves upwards to contact the valve stem 72 and further movement of the diaphragm lifts the valve 68 from its seat formed in sleeve 69. This in turn establishes communication between the valve chamber 64 and the space above the diaphragm 74. Consequently, the partial vacuum created by the fan and existing in the dust bag compartment is communicated through the con-

4

duits 82 and 80, the open valve 68, the apertured sleeve 69 in valve chamber 64 and the conduit 62 to the diaphragm chamber 58. This causes the diaphragm 56 to move to the left, as viewed in FIG. 1, which motion is transmitted by the pin 60 to pivot the latch 48 out of engagement with the keeper 50, thus releasing the cover 40. The pressure differential required to open the valve 68 may be varied by means of the knob 88 secured to sleeve 69 and which has threaded engagement with the housing of pressure control valve 66. Thus, turning of the knob 88 shifts the entire valve assembly, including the sleeve 69, valve 68 and spring 70, within the valve housing 64, thus decreasing or increasing the amount of travel of the diaphragm 74 which is required to unseat the valve 68.

Reference character 90 designates generally a suction nozzle which is arranged to be removably secured to the housing 10. The nozzle includes a base member 92 having a bracket member 94 secured thereto or integral therewith, which bracket extends rearwardly from the rear edge of the base, as is shown particularly in FIGS. 1 and 3. Rigidly secured to bracket 94, as by rivets 96 is a member 98 having a pair of flanges 99 each formed with rearwardly opening V-shaped notch 100 therein. A member 102 is pivotally mounted at 104 on flanges 99 and is provided at opposite ends with hook-shaped arms 106. A U-shaped manipulating handle 108 has its ends 110 operatively connected to member 102, as is shown particularly in FIGS. 1 and 3, and extends to the forward part of the nozzle where it may be grasped by an operator. A pair of springs 111 surrounding the legs of U-shaped member 108 tends to pivot the member 102 in a counter-clockwise direction, as viewed in FIGS. 1 and 2. As shown in FIG. 1, pivot pin 44, on which the cover 40 is pivotally connected to the housing 10, is shown as being received in the bottom of the V-shaped notches 100, where it is retained by the hook-shaped members 106 which are pivoted to the position shown in FIG. 1 by the springs 111. Consequently, the nozzle 90 is pivotally secured to the housing 10. In order to disengage the nozzle from the housing, the handle 108 may be grasped and pulled to the left, as viewed in FIG. 1 so as to pivot the hook members 106 to the position shown in FIG. 2, whereupon pin 44 is free for disengagement from the V-shaped notches 100.

The bottom of base member 90 is provided with a surface contact plate 112 which is formed with an elongated suction opening 114 near its forward edge. A flexible conduit 116 is secured to the nozzle in communication with the slot 114. The opposite end of the conduit is connected to a rigid elbow 118 which carries a rotatable coupling member 120 which has threaded engagement with an inlet opening 122 in the cover 40 with which inlet conduit 38 communicates. Fixed to elbow 118 are arms 124 which extend downwardly on either side of the elbow, the lower ends of the arms being formed with arcuate slots 126. Extending upwardly from the base 92 of the nozzle is a pair of brackets 128 carrying pins 130 which engage within the slots 126. The center of curvature of the slots 126 coincides with the pivot pin 44 when the latter is received in the V-shaped notches 100. Consequently, the nozzle is free to pivot about the pin 44 even through the elbow 118 and the arms 124 are rigidly fixed with respect to the housing 10. The purpose of the connection between the elbow 118 and the base 92 provided by the arms 124 and pins 130 is to limit the movement of the elbow with respect to the rest of the nozzle so that it will be in approximately the proper position for the coupling 120 to engage the inlet 122 when the base 92 is pivotally connected to the housing, and also to limit the pivotal movement of the nozzle relative to the unit 10 if, for instance, the unit is lifted off the floor.

Base 92 is formed with a semi-cylindrical tunnel 131 which extends transversely of the nozzle in alignment with slot 114 in plate 112. As is shown in FIG. 5 a brush 132 is disposed in tunnel 131 and has a shaft ro-

tatably mounted in the end walls 133 of the tunnel. An electric motor 134 is mounted on base 92 behind the tunnel and drives the brush through a belt 136 which engages a pulley 137 secured to the end of the brush shaft which extends through one of the end walls 133. The brush 132 is so positioned that the bristles thereof extend outwardly through the suction slot 114 so as to contact the surface being cleaned. Inasmuch as the brush is in the path of flow from slot 114 to conduit 116, dirt dislodged from the surface by the rotation of the brush will be carried along by the air stream. Motor 134 and belt 136, on the other hand, are isolated from the path of flow by the walls of tunnel 131. The motor and the top of base 92 are covered by a decorative casing 139.

The motor is supplied with electric current through a pair of flexible leads 138 connected to a plug 140 supported by a member 142 extending downwardly from elbow 118. A receptacle 144 is supported by the front cover 40 in position to receive the prongs of the plug 140 when the elbow 118 is properly aligned so that coupling member 120 will engage intake opening 122. Receptacle 144 is connected by means of flexible conductors 146 with the circuit which supplies electric motor 24. The switch 22 is connected in this circuit so as to control the flow of current to both the motors 24 and 134.

Switch 22 may be opened and closed manually in order to start and stop the motors as desired, but in addition it is automatically opened whenever the front cover is opened. For this purpose a rod 148 is slidably mounted on the exterior of housing portion 16 and is urged to the left, as viewed in FIG. 1, by the spring 150. The left end of rod 148 is arranged to be contacted by the cover 40 when the latter is closed and moved to the right by the cover against the force of spring 150. The opposite end of the rod is provided with a slot 152 through which extends the handle of switch 22. The length of the slot is sufficient to permit the switch handle to be moved back and forth when the rod 148 is held in its right-hand position by the closed cover 40. However, when the cover is opened, either by manual actuation of the button 52 or automatic operation of the diaphragm 56, the spring 150 moves the rod 148 to the left, thus causing the handle of switch 22 to be pivoted in a counter-clockwise direction to its off position. Hence, both the motors 24 and 134 are automatically stopped whenever the cover is opened. Incidentally, the spring 150 acting through the rod 148 opens the cover slightly whenever the latch 48 is disengaged.

A manipulating handle 154 is removably secured to the housing 10. This handle is forked and the lower ends of the fork carry pins 156 which engage recesses 158 formed in the opposite sides of the housing. The resiliency of the forked handle permits the lower ends to be sprung apart sufficiently to place the pins 156 in the recesses 158 and to remove them therefrom. Secured to the lower ends of the handle are segment shaped plates 160 formed with arcuate slots 162 each terminating in an enlarged opening 163 at one end which are adapted to engage pins 164 extending outwardly from opposite sides of the housing. The pins have heads 165 of greater diameter than the width of slots 162, but less than the diameter of openings 163 so that when the pins are in the slots the heads prevent the forked handle from being accidentally sprung apart, but they may be intentionally separated when the pins are aligned with the openings. When the handle is pivoted about the pins 156, the slots 162 move along the pins 164 so as to limit the pivotal movement of the handle. As is shown in FIG. 6, movement in one direction is limited to a portion just beyond the vertical, while movement in the other direction is limited to an angle of about 45° from the vertical. The upper part of the handle is formed with a hooked-like projection 166 over which the electric cord 170, which supplies current to the vacuum cleaner, may be looped in order to keep the cord off the floor immediately to the

rear of the cleaner and hence out of the way of the operator's feet.

In operation the combined vacuum cleaner unit and nozzle may be moved back and forth over the surface to be cleaned by means of the handle 154. The vacuum cleaner unit itself is supported by the caster 12 and the rollers 14, while the nozzle is supported on the surface by its lower plate 112. By virtue of the pivotal connection between the nozzle and the vacuum cleaner unit, the former may pivot in a vertical direction in order to properly accommodate itself to the surface being cleaned. Thus, if the surface is a soft rug into which the caster 12 and wheels 14 sink a substantial distance, while the nozzle by virtue of its greater surface area does not tend to sink, it may pivot upwardly to accomplish this proper positioning.

If during operation of the cleaner the dust bag 30 accumulates sufficient dirt, the differential pressure control member 66 causes the diaphragm 56 to release the latch 48 as previously described, whereupon the cover is opened slightly by means of the force exerted through the rod 148 by the spring 150. In opening, the cover pivots about the pin 44, which it is able to do by virtue of the flexible conduit 116 and the pin and arcuate slot connection between arms 124 and brackets 128. As described above, this automatically interrupts the current to both the fan motor 24 and the nozzle motor 134. In order to remove the bag 30 and replace it with a clean one the front cover 40 and nozzle 90 may be pivoted to the position shown in FIG. 7 where it will be noted that the wheels 114 are lifted off the surface. Consequently the vacuum cleaner and nozzle will remain in this position and the filled bag 30 may be removed and replaced by a new one, whereupon the cover may be closed. Stops 172 are provided on projections 46 in the proper position to be contacted by the projecting ends 174 of the pivot arms 43 of the cover 40 so as to limit the pivotal movement between the cover and the housing 10 to that shown in FIG. 7.

If it is desired to use the vacuum cleaner unit 10 without the power nozzle 90, the latter may be disconnected by first unscrewing the coupling 120 to disengage it from the inlet 122. Thereafter, a pull on the handle 108 will first pivot the latches 106 to the position shown in FIG. 2, thus disengaging them from the pivot pin 44, whereupon the nozzle may be pulled away from the vacuum cleaner unit 10, the electric plug 140 being thus disengaged from the receptacle 144. As is shown in FIG. 8 a flexible suction hose 176 may be connected to the inlet of the front cover 40 and to a pair of wands 178 to which is connected nozzle 180. The handle 154 may be removed by pivoting it to the extreme position shown in FIG. 6 in which the headed pins 164 are aligned with openings 163 and then spreading the legs sufficiently to disengage the pins 156 from the recesses 158, whereupon the cleaner may be used as a regular tank type.

In FIGS. 9 and 10 there is illustrated a different embodiment of our invention, the main difference being in the manner in which the nozzle 90 is attached to the cleaner unit 10. In this embodiment the attachment is such that the nozzle may move vertically in a substantially straight line with respect to the unit 10 and the surface being cleaned, as well as in a pivotal direction with respect to the unit.

In this embodiment the unit 10 and the nozzle 90 are substantially the same as in the previously described embodiment and the same reference characters have been used to designate corresponding parts. Consequently, the unit and the nozzle will not be again described in detail.

As is shown more particularly in FIG. 9, the elbow 118 of the nozzle 90 is rigidly secured, as by rivets 200, to a member 202 which has an upper vertical portion to which the elbow is attached, an intermediate horizontal portion 204 and a lower vertical portion 206. Electric

plug 140 is carried by the upper vertical portion of this member, while the lower vertical portion 206 is provided with a pair of rearwardly extending ears 208, each of which is provided with an arcuate slot 210. Pins 212 carried by brackets 214 mounted on base 92 of the nozzle extend into slots 210 and have sliding movement therein. A pair of arms 216 is rigidly connected to member 202 and the arms are formed with arcuate slots 218 which are wider at their upper ends than at their lower ends. These slots are engaged by pins 220 mounted on a U-shaped bracket 222 secured to the base 92.

A latching member 224 is slidably secured to member 202 by means of headed screws 226 which extend through slots 228 in the opposite branches of member 224 which extend on either side of elbow 118, as is shown more particularly in FIG. 10. Member 224 is provided with a hand grasp portion 230 disposed at its upper end and it carries latches 232 and 234 which engage within openings formed in the cover 40. A spring 236 has its opposite ends connected to member 224 while its central portion bears against the upper surface of elbow 118 and hence the spring tends to raise the member 224 and consequently the latches 232 and 234 to latching position.

In the embodiment just described the elbow 118, instead of being provided with a rotatably coupling member as in the first embodiment, is constructed to have a close fit within the inlet passage 122 of the front cover. Also, the nozzle is provided with a roller 237 rotatably mounted in base 92 and extending through a slot in plate 112 for providing rolling contact with the surface being cleaned.

When it is desired to disconnect the nozzle 90 from the unit 10, the handle 230 is pushed downwardly against the force of spring 236, thus releasing latches 232 and 234 from engagement with the cover 40. Thereupon the nozzle may be moved to the left, as viewed in FIG. 9, to withdraw the end of elbow 118 from the inlet passage 122 and to separate the electric plug 140 from the receptacle 144. The pin and slot connections between the nozzle and the member 202 maintain the elbow 118 in approximately proper alignment with the inlet 122 and hence when it is desired to connect the nozzle to the unit 10, this may be done by inserting the end of the elbow into the inlet opening and moving the nozzle to the right, as viewed in FIG. 9, whereupon the plug 140 engages the receptacle 144 and the inclined surfaces of the latches 232 and 234 move the member 202 downwardly until the latches are within the apertures in the cover, whereupon the spring 236 lifts the member 202 to latching position.

With the nozzle attached to the unit 10 the entire combination may be moved back and forth over the surface to be cleaned by means of the handle 154 in the manner previously described in connection with the first embodiment. However, during this movement the nozzle 90 by virtue of the two pin and slot connections with the front cover may move straight up and down with respect to the surface being cleaned and consequently may accommodate itself to such surface without tilting. Inasmuch as none of the weight of the nozzle is carried by the unit 10, it is preferable to provide the roller 237. When the front cover is automatically opened by the pressure responsive mechanism, it may pivot about the pin 44 with respect to the unit 10 and may also pivot with respect to the nozzle 90 by virtue of the flexible conduit 116 and the pin and slot connections. Inasmuch as slots 218 are wider at the top than at the bottom, the cover may pivot relative to the nozzle regardless of the position of pins 212 in slots 210. Also, the cover 40 and nozzle 90 may be pivoted to a position such as that shown in FIG. 7 when it is desired to remove a dust bag and replace it with a clean one.

While we have shown and described two embodiments of our invention it is to be understood that this has been done for the purposes of illustration only and that the scope of our invention is not to be limited thereby but is to be determined from the appended claims.

What we claim is:

1. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a suction nozzle movably secured to said body in a position to be supported by said surface and moved thereover with said body, a flexible conduit forming part of said nozzle and providing a fluid connection to said inlet, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on the end of said flexible conduit remote from said nozzle and on said body, respectively, in relative positions so as to be automatically connected together when said conduit is connected to said inlet.

2. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a suction nozzle pivotally mounted with respect to said body about an axis substantially parallel to said surface, said nozzle bearing against said surface and being movable thereover with said body, a flexible conduit forming part of said nozzle and providing a fluid connection to said inlet, an agitator on said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on the end of said flexible conduit remote from said nozzle and on said body, respectively, in relative positions so as to be automatically connected together when said conduit is connected to said inlet.

3. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a suction nozzle, means for movably and detachably connecting said nozzle to said body in a position to bear on said surface and be movable thereover with said nozzle, a flexible conduit forming part of said nozzle and providing a fluid connection to said inlet, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on the end of said flexible conduit remote from said nozzle and on said body, respectively, in relative positions so as to be automatically connected together when said conduit is connected to said inlet.

4. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a pivot pin secured to said body and extending substantially parallel to said surface, a suction nozzle, means on said nozzle for releasably engaging said pin to pivotally secure said nozzle to said body, said nozzle bearing against said surface and being movable thereover with said body, a flexible conduit forming part of said nozzle and providing a fluid connection to said inlet, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on the end of said flexible conduit remote from said nozzle and on said body, respectively, in relative positions so as to be automatically connected together when said conduit is connected to said inlet.

5. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a pivot pin secured to said body and extending substantially parallel to said surface, a suction nozzle, means on the rear of said nozzle for

releasably engaging said pin to pivotally secure said nozzle to said body, said nozzle bearing against said surface and being movable thereover with said body, a manually operable member accessible from the front of said nozzle connected to the engaging means for releasing the latter from engagement with said pin, a flexible conduit forming part of said nozzle and providing a fluid connection to said inlet, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on said nozzle and on said body, respectively, connectable together when said conduit is connected to said inlet.

6. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a pivot pin secured to said body and extending substantially parallel to said surface, a suction nozzle, a pair of jaws on said nozzle for releasably engaging said pin to pivotally secure said nozzle to said body, one of said jaws being rigidly fixed to said nozzle and the other being pivotally secured thereto, resilient means urging the pivoted jaw towards the fixed jaw, a manually operable member connected to said pivoted jaw for pivoting the latter away from said fixed jaw to disengage the jaws from said pin, a flexible conduit forming part of said nozzle and providing a fluid connection to said inlet, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on said nozzle and on said body, respectively, connectable together when said conduit is connected to said inlet.

7. In a vacuum cleaner, a body having a hollow portion formed with an opening, means for movably supporting said body on a surface to be cleaned, a dust container insertable into and removable from said hollow portion through said opening, said body including a cover for said opening hinged to said hollow portion and formed with an inlet communicating with said dust container, a motor-fan unit for inducing flow of air through said inlet, a suction nozzle movably secured to said body in a position to be supported by said surface and moved thereover with said body, a conduit forming part of said nozzle and providing a fluid connection to said inlet, said conduit being flexible whereby said nozzle may move with respect to said hollow portion and said cover may pivot with respect to said nozzle, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on said nozzle and on said body, respectively, connectable together when said conduit is connected to said inlet.

8. In a vacuum cleaner, a body having a hollow portion formed with an opening, means for movably supporting said body on a surface to be cleaned, a dust container insertable into and removable from said hollow portion through said opening, said body including a cover for said opening hinged to said hollow portion and formed with an inlet communicating with said dust container, releasable means for retaining said cover in closed position, a motor-fan unit for inducing flow of air through said dust container, means responsive to increasing pressure drop of the air through said container for releasing the retaining means, a suction nozzle movably secured to said body in a position to be supported by said surface and moved thereover with said body, a conduit forming part of said nozzle and providing a fluid connection to said inlet, said conduit being flexible whereby said nozzle may move with respect to said hollow portion and said cover may pivot with respect to said nozzle when said retaining means is released, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on said nozzle and on said body, respectively, connectable together when said conduit is connected to said inlet.

9. In a vacuum cleaner, a body having a hollow portion formed with an opening, means for movably supporting said body on a surface to be cleaned, a dust container insertable into and removable from said hollow portion through said opening, said body including a cover for said opening hinged to said hollow portion and formed with an inlet communicating with said dust container, a motor-fan unit for inducing flow of air through said inlet, a suction nozzle movably secured to said body in a position to be supported by said surface and moved thereover with said body, a conduit forming part of said nozzle and providing a fluid connection to said inlet, said conduit being flexible whereby said nozzle may move with respect to said hollow portion and said cover may pivot with respect to said nozzle, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on the end of said flexible conduit remote from said nozzle and on said cover, respectively, connectable together when said conduit is connected to said inlet.

10. In a vacuum cleaner, a body having a hollow portion formed with an opening, means for movably supporting said body on a surface to be cleaned, a dust container insertable into and removable from said hollow portion through said opening, said body including a cover for said opening hinged to said hollow portion and formed with an inlet communicating with said dust container, releasable means for retaining said cover in closed position, a motor-fan unit for inducing flow of air through said dust container, means responsive to increasing pressure drop of the air through said container for releasing the retaining means, a suction nozzle movably secured to said body in a position to be supported by said surface and moved thereover with said body, a conduit forming part of said nozzle and providing a fluid connection to said inlet, said conduit being flexible whereby said nozzle may move with respect to said hollow portion and said cover may pivot with respect to said nozzle when said retaining means is released, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on the end of said flexible conduit remote from said nozzle and on said cover, respectively, connectable together when said conduit is connected to said inlet.

11. In a vacuum cleaner, a body having a hollow portion formed with an opening, means for movably supporting said body on a surface to be cleaned, a dust container insertable into and removable from said hollow portion through said opening, said body including a cover for said opening hinged to said hollow portion and formed with an inlet communicating with said dust container, a motor-fan unit in said hollow portion for inducing flow of air through said inlet, a suction nozzle pivotally secured to said hollow portion about a common axis with said cover, a conduit forming part of said nozzle and providing a fluid connection to said inlet, said conduit being flexible whereby said nozzle may pivot with respect to said hollow portion and cover may pivot with respect to said nozzle, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, electric contacts on the end of said flexible conduit remote from said nozzle and on said cover, respectively, connectable together when said conduit is connected to said inlet, said cover and nozzle being pivotal together through approximately ninety degrees about said common axis with respect to said hollow portion to open said cover and support said hollow portion in an inclined position on said surface with said opening facing upwardly for facilitating insertion and removal of said dust container.

12. A vacuum cleaner as defined in claim 11 in which the supporting means includes a wheel extending below said hollow portion adjacent to the end thereof remote from said opening but spaced from said end a distance sufficient so that said end contacts said surface to lift said wheel therefrom when said hollow portion is inclined.

13. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a suction nozzle movably secured to said body in position to be supported by said surface and moved thereover by said body, a flexible conduit for connecting said nozzle to said inlet, one end of said conduit being secured to said nozzle, means including lost motion linkage connected to said nozzle for supporting the other end of said flexible conduit in the neighborhood of said inlet and permitting movement of said nozzle relative to said body when said other end of the conduit is connected to said inlet, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on said other end of said conduit and on said body, respectively, automatically connectable together when said conduit is connected to said inlet.

14. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a suction nozzle slidably secured to said body for floating movement relative thereto in a vertical direction, said nozzle being supported on said surface and being movable thereover with said body, a flexible conduit forming part of said nozzle and providing a fluid connection to said inlet, an agitator in said nozzle, an electric motor in said nozzle for driving said agitator, and electric contacts on the end of said flexible conduit remote from said nozzle and on said body, respectively, in relative positions so as to be automatically connected together when said conduit is connected to said inlet.

15. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a suction nozzle including a mounting member and a nozzle member, a rigid conduit carried by said mounting member, means for removably securing said mounting member to said hollow body with said rigid conduit communicating with said inlet, means for slidably securing said nozzle member to said mounting member for floating movement relative thereto in a vertical direction, said nozzle member being supported on said surface and being movable thereover with said mounting member and said body, a flexible conduit connected between said nozzle member and said rigid conduit, an agitator in said nozzle member, an electric motor in said nozzle member for driving said agitator, and electric contacts on said mounting member and on said body, respectively, in relative positions so as to be automatically connected together when said mounting member is secured to said hollow body.

16. In a vacuum cleaner, a hollow body, means for movably supporting said body on a surface to be cleaned, dust separating means in said body, a motor-fan unit for inducing flow of air through said dust separating means, said body being formed with an inlet communicating with said dust separating means, a suction nozzle including a mounting member and a nozzle member, a rigid conduit carried by said mounting member, a latching member slidably secured to said mounting member and having latching engagement with said hollow body at a plurality of spaced points for removably securing said mounting member to said hollow body with said rigid conduit communicating with said inlet, means for slidably securing said nozzle member to said mounting member for floating movement relative thereto in a vertical direction, said

nozzle member being supported on said surface and being movable thereover with said mounting member and said body, a flexible conduit connected between said nozzle member and said rigid conduit, an agitator in said nozzle member, an electric motor in said nozzle member for driving said agitator, and electric contacts on said mounting member and on said body, respectively, automatically connectable together when said mounting member is secured to said hollow body.

17. In a vacuum cleaner, a body having a hollow portion formed with an opening, means for movably supporting said body on a surface to be cleaned, a dust container insertable into and removable from said hollow portion through said opening, said body including a cover for said opening hinged to said hollow portion and formed with an inlet communicating with said dust container, a motor-fan unit for inducing flow of air through said inlet, a suction nozzle including a mounting member and a nozzle member, a rigid conduit carried by said mounting member, means for removably securing said mounting member to said cover with said rigid conduit communicating with said inlet, means for slidably securing said nozzle member to said mounting member for floating movement relative thereto in a vertical direction, said nozzle member being supported on said surface and being movable thereover with said mounting member, a flexible conduit connected between said nozzle member and said rigid conduit, an agitator in said nozzle member, an electric motor in said nozzle member for driving said agitator, and electric contacts on said mounting member and on said cover, respectively, automatically connectable together when said mounting member is secured to said hollow body.

18. In a vacuum cleaner, a body having a hollow portion formed with an opening, means for movably supporting said body on a surface to be cleaned, a dust container insertable into and removable from said hollow portion through said opening, said body including a cover for said opening hinged to said hollow portion and formed with an inlet communicating with said dust container, a motor-fan unit for inducing flow of air through said inlet, a suction nozzle including a mounting member and a nozzle member, a rigid conduit carried by said mounting member, a latching member slidably secured to said mounting member and having latching engagement with said cover at a plurality of spaced points for removably securing said mounting member to said cover with said rigid conduit communicating with said inlet, means for slidably securing said nozzle member to said mounting member for floating movement relative thereto in a vertical direction, said nozzle member being supported on said surface and being movable thereover with said mounting member, a flexible conduit connected between said nozzle member and said rigid conduit, an agitator in said nozzle member, an electric motor in said nozzle member for driving said agitator, and electric contacts on said mounting member and on said body, respectively, automatically connectable together when said mounting member is secured to said cover.

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