

[54] SUCTION CLEANER

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[21] Appl. No.: 15,376

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[51] Int. Cl. ....A47I 9/00  
[58] Field of Search.....15/319, 410, 411, 412, 332, 15/333, DIG. 10, 49 R, 49 C, 50 R, 50 C, 51, 52, 351; 200/157

[57] ABSTRACT

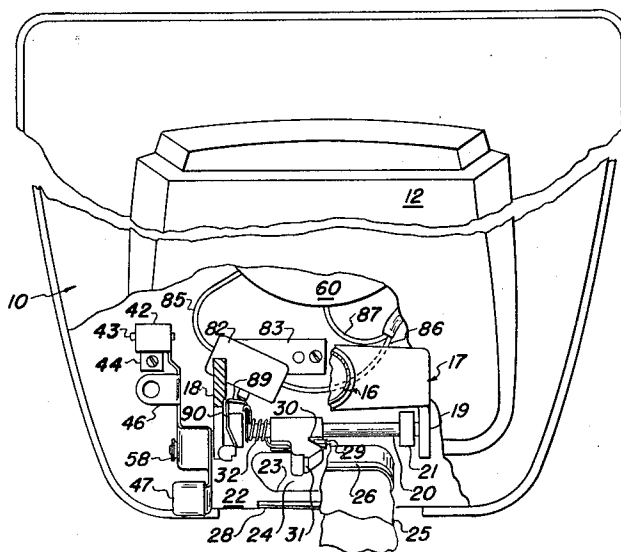
An upright type suction cleaner is provided with a switch actuator movable with the cleaner handle from and to its storage position to operate a switch for on-the-floor cleaning. When cleaning tools are attached to the cleaner for off-the-floor cleaning the switch actuator is movable relative to the handle to effect operation of the switch without movement of the handle. In addition, when the cleaner is upended to effect repairs a gravity-actuated member is actuated to prevent operation of the handle control so that it is impossible to move the handle from its storage position and effect operation of the switch.

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9 Claims, 9 Drawing Figures



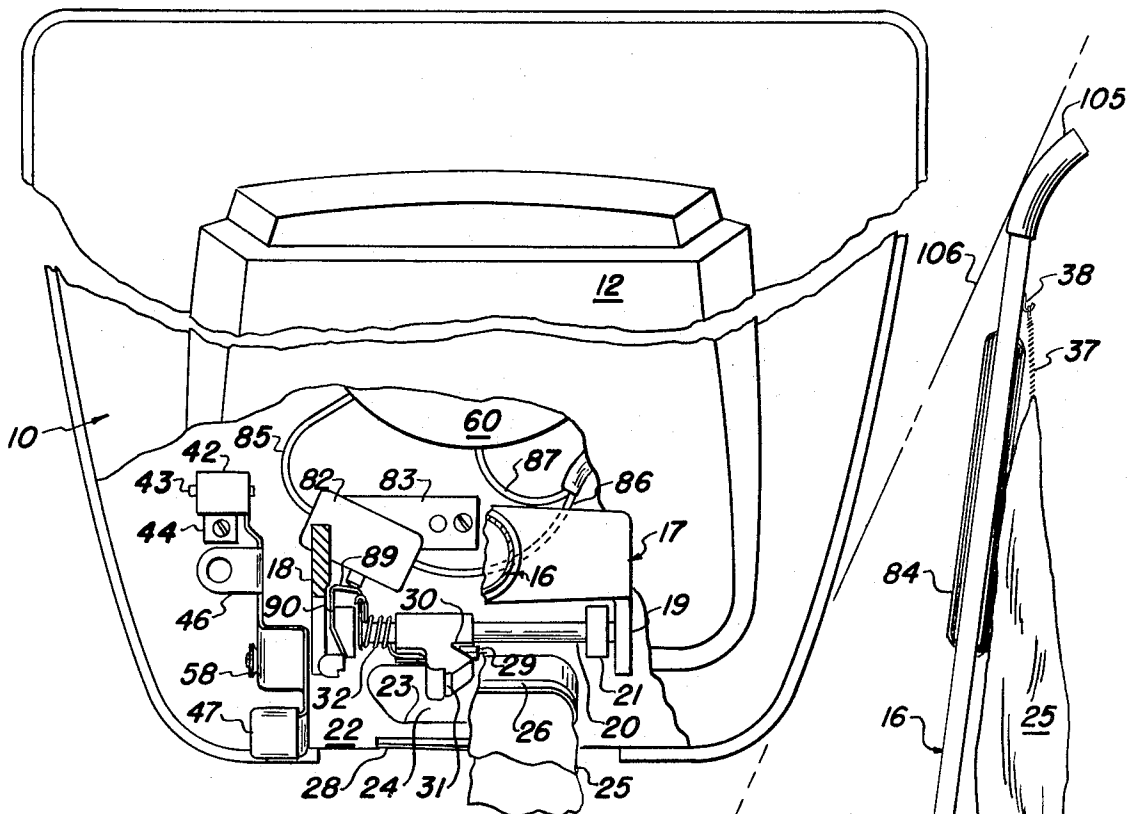


Fig. 2

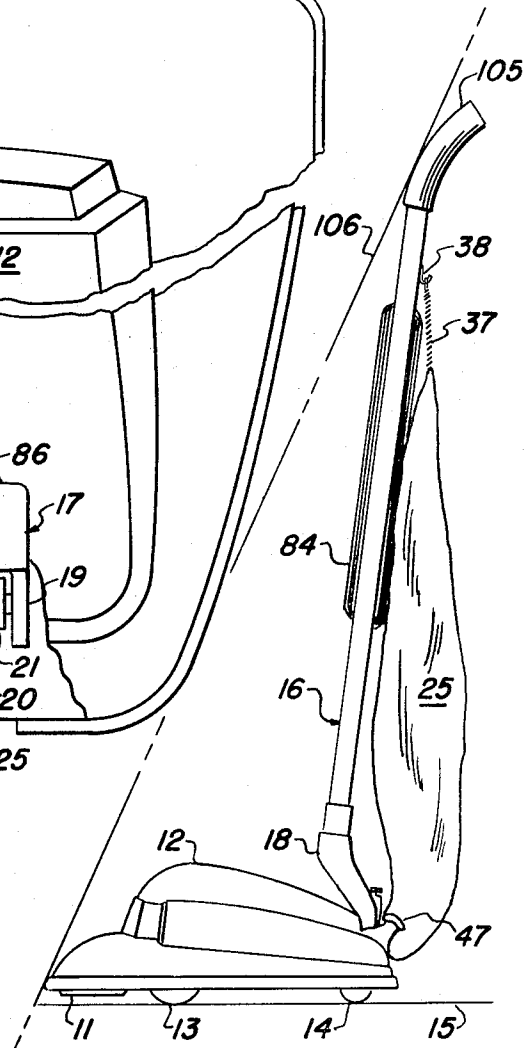


Fig. 1

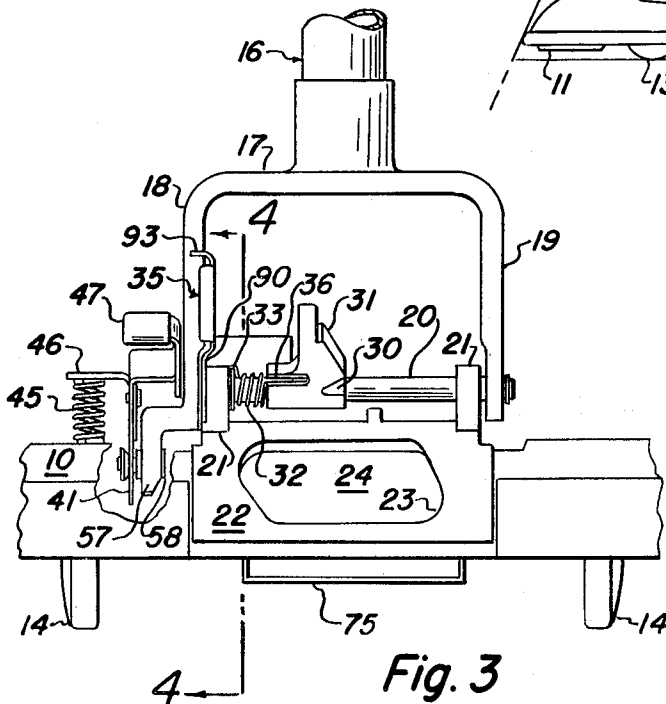


Fig. 3

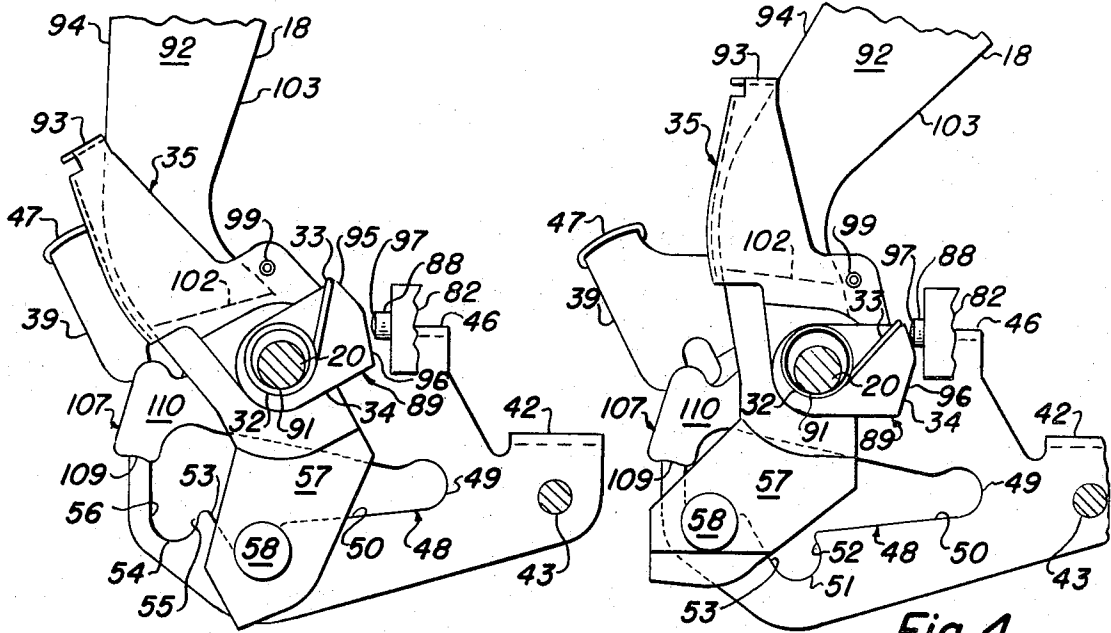


Fig. 5

Fig. 4

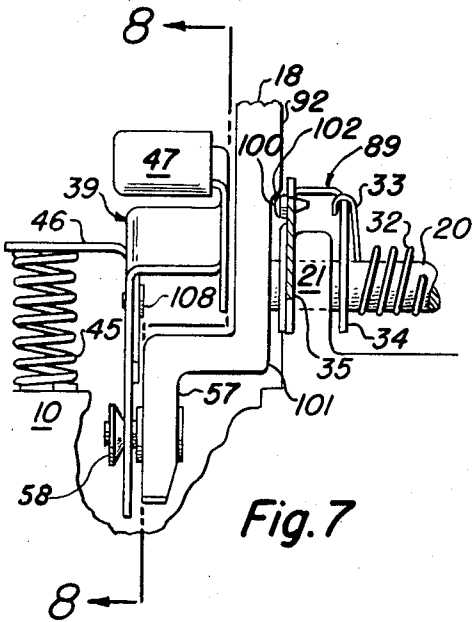


Fig. 7

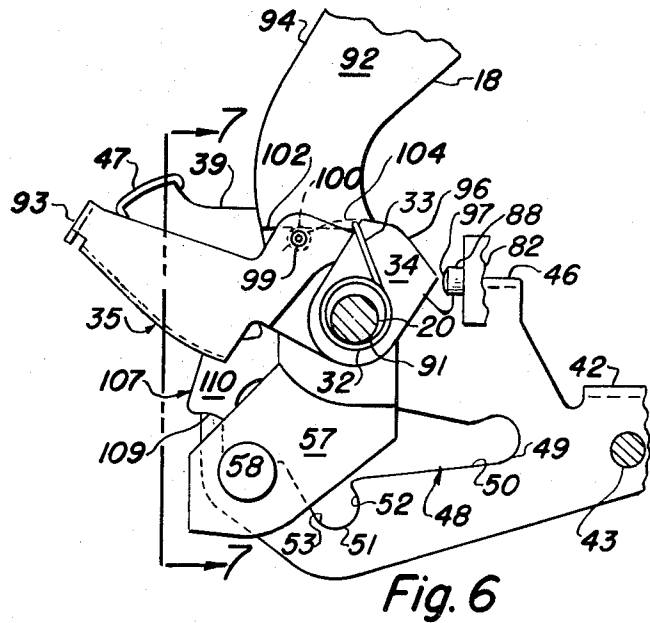


Fig. 6

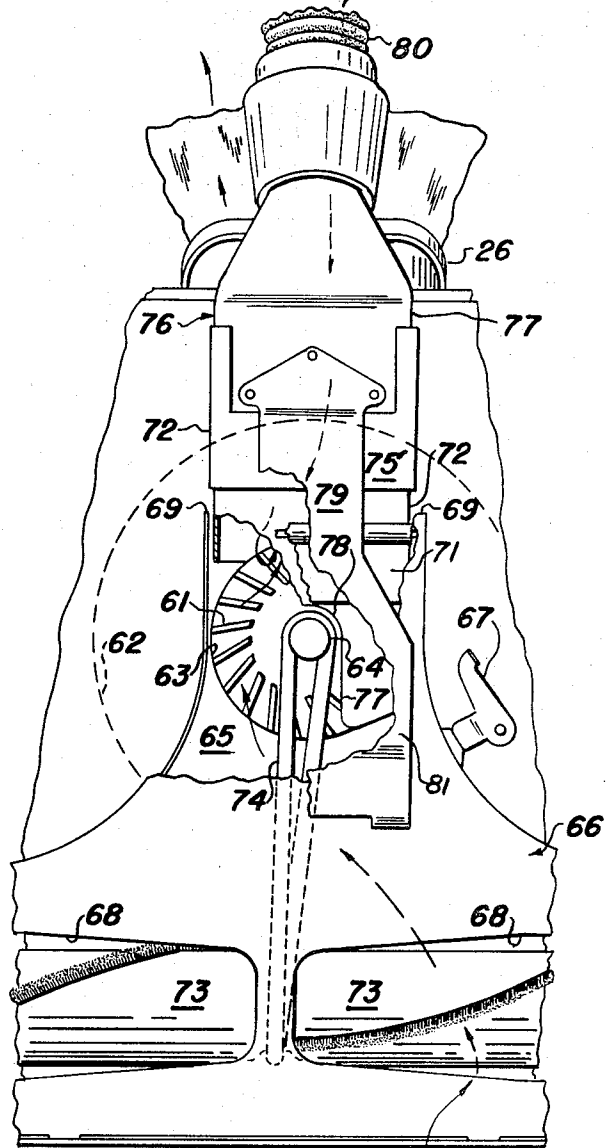
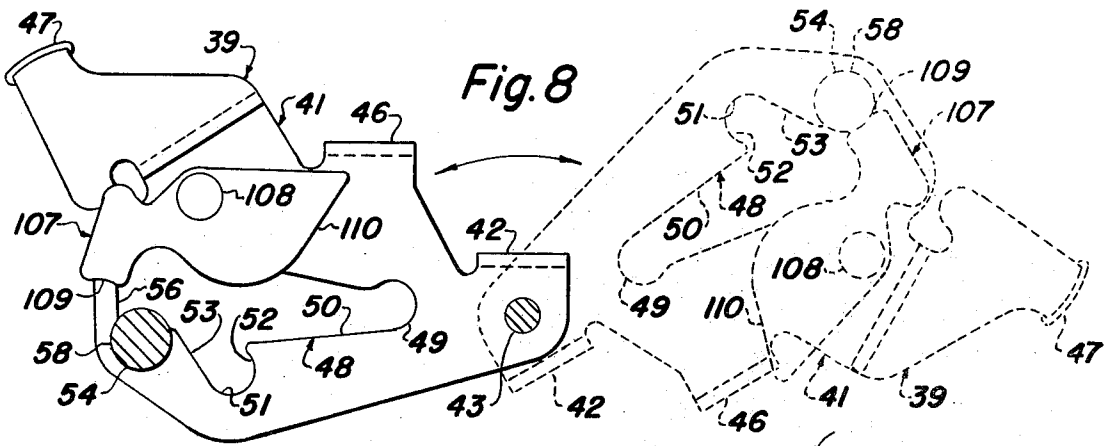


Fig. 9

## SUCTION CLEANER

## BACKGROUND OF THE INVENTION

This invention is directed to a suction cleaner of the upright type which is also adapted for off-the-floor cleaning.

In the prior Patent to G. R. Paulus, No. 1,447,814 the switch actuator 34 is movable with the cleaner handle but it cannot be moved relative to the handle to operate the switch and thus the cleaner for off-the-floor cleaning.

The handle control disclosed in the Patent to H. B. White, No. 2,008,376 includes a gravity-actuated member 15, however, it is movable to permit operation of the handle control and thus movement of the cleaner handle. Further, the gravity-actuated member in the prior art is not associated with a switch nor is it operated upon upending the cleaner body.

## DESCRIPTION OF THE DRAWINGS

One embodiment of the invention is shown in the following drawings, wherein:

FIG. 1 is a side elevational view of an upright type suction cleaner in which the invention is embodied showing the handle in its storage or one position,

FIG. 2 is a top view, partly broken away and in section, of the cleaner body,

FIG. 3 is a rear elevational view of the cleaner body with the filter bag removed,

FIG. 4 is a view along the line 4—4 in FIG. 3 showing the handle in its one position and the switch operating means maintaining the switch in its open, or OFF, position,

FIG. 5 is a view similar to FIG. 4, but showing the handle in another position and the switch operating means separated to shift the switch to its closed, or ON, position,

FIG. 6 is a view similar to FIG. 4, but showing the switch actuator of the switch operating means moved rearwardly of and independent of handle movement to place the switch in its closed, or ON, position,

FIG. 7 is a view taken along the line 7—7 in FIG. 6, showing the handle control and the latch means for securing the switch actuator to the handle to place the switch in its closed, or ON, position, as shown in FIG. 6,

FIG. 8 is a view along the line 8—8 in FIG. 7 illustrating in full lines the position of the handle control and gravity-actuated locking means when the handle is in its storage or one position and the cleaner rests on the supporting surface in its normal position, and the dotted lines show the relative positions of the handle control and gravity-actuated means when the cleaner is placed in upended position to expose the bottom face of the cleaner body, and

FIG. 9 is a partial view of the bottom face of the cleaner body with parts broken away.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The embodiment of the invention herein disclosed comprises a cleaner having a body 10 including a nozzle 11, motor housing 12, and front and rear wheels 13-14 respectively for supporting the cleaner on a surface 15. A handle 16 is provided with a bail 17 having arms 18-19 rotatably mounted on a shaft 20 supported in a pair of lugs 21 upstanding from the rear face 22 of the body above the outlet 23 of the exhaust passageway 24 which conducts dirt-laden air into a filter bag 25. The bag 25 at its lower end has an apertured flange 26 provided along its bottom periphery with a pair of unshown lugs which seat between the rear face 22 and an elongated spring wire 28 and the upper edge of the flange has a projecting lug 29 seated in the recess 30 of a bag latch member 31 slidably mounted for axial movement along the handle shaft 20. A torsion spring 32 is disposed about the shaft 20 and has one end 33 attached to an arm 34 of a switch actuator 35 and the other end 36 of the torsion spring 32 is secured to the bag latch member 31 and tends to rotate the latter downwardly as viewed in FIG. 2. The bag flange 26 is attached to the cleaner body 10 by inserting the unshown bag flange lugs between the wire 28 and body face 22, and the bag latch 31 is moved to the

left compressing the spring 32 so that flange upper lug 29 can be seated in the bag latch recess 30. The spring 32 when compressed by the attachment of the bag flange 26 increases the torsional stress of the spring 32 so that the latter exerts an increased force tending to rotate the switch actuator 35 upwardly as viewed in FIG. 2. The upper end of the bag 25 is attached by a spring 37 to a hook 38 on the handle 16.

In order to maintain the handle 16 in a plurality of positions relative to the body 10, a handle control indicated generally at 39 is provided and includes a lever 41 having a U-shaped portion 42 at its forward end pivotally mounted on a pin 43 in a bracket 44. A spring 45 is interposed between the body 10 and a shoulder 46 on the lever 41 to urge the latter upwardly as viewed in FIG. 3. The rear end of the control lever is provided with an offset pedal 47 which is depressed by the operator's foot against the force of the spring 45 to shift the lever 41 to its inoperative position. A sector 48 is formed in the control lever 41 by removing a portion of the latter, and includes a recess 49 at its forward end from which rearwardly extends a surface 50 terminating in a pocket 51 having front wall 52 and a rear edged surface 53 extending to a pocket 54 having a front surface 55 and an upwardly projecting rear surface 56. The handle bail arm 18 has a downwardly and rearwardly projecting portion 57 on which a recessed roller 58 is rotatably mounted for movement within the cut-out portion of the sector 48.

When the handle 16 is in its storage or one position shown in FIG. 1, the roller 58 seats in the sector rear pocket 54 and the front and rear surfaces 55-56 respectively prevent movement of the handle to other positions unless the lever 41 is moved downwardly by applying pressure to the pedal 47. When the roller 58 is released from the pocket 54 and pressure removed from the pedal 47, the roller 58 is free to move along the edged surface 53 between pockets 54-51, whereby the handle can be freely oscillated through other handle positions, such as the handle normal operating range. When the pedal 47 is again depressed the handle is movable downwardly until the roller 58 seats in the recess 49 which represents the lowest handle position. The handle 16 is movably upwardly from its low to storage positions without depressing the lever 41 due to the degree of inclination of the edges 50 and 53 relative to their recesses 49 and 51 respectively. It is necessary to depress the lever pedal 47 in order to shift the handle 16 from its normal operating range between the pockets 51-54 into its lower operating range extending from the pocket 51 and recess 49. The control lever 41 is enclosed by the motor housing 12 except for the pedal 47.

An electric motor 60 is mounted on the body 10 and has a vertically extending armature shaft on which is mounted a suction producing fan 61 positioned in a fan chamber 62, only partially shown. The armature shaft projects through the fan eye 63 of the fan chamber 62 and is provided at its lower end with a pulley 64 disposed in a suction air passageway 65 which is connected to the interior of nozzle 11. The bottom wall of the air passageway 65 is formed by a plate 66 removably secured to the body 10 by a pair of latches 67, only one of which is shown. The plate 66 has a pair of openings 68 at its front end for entrance of dirt-laden air, and the plate 66 extends rearwardly to the point 69 beyond the fan eye 63.

A converter valve 71 is pivotally mounted in the side walls 72 of a converter passageway 75 and is spring biased to closed vertical position to direct dirt-laden air from the nozzle 11 into the fan chamber eye 63. A surface agitating member 73 is suitably mounted in the nozzle 11 and a belt 74 extends from the pulley 64 to the agitator 73 to drive the latter. Access to the belt 74, pulley 64, fan chamber eye 63 and agitator 73 is obtained by releasing the latches 67 and removing the bottom plate 66.

The converter passageway 75 extends rearwardly from the converter valve 71 and receives a converter 76 which is inserted from the rear end of the cleaner beneath the bag flange 26 for off-the-floor cleaning as shown in FIG. 9. The converter 76 includes a tubular body 77 having a U-shaped cutout portion 78 which straddles the motor pulley 64, and belt 74 and

its top wall is open to the fan chamber eye 63 and thus the source of suction. Attached to the converter 76 is a downwardly and forwardly projecting support member 79, the front portion 81 of which engages the supporting surface 15 to raise the nozzle 11 to an inoperative cleaning position relative to the surface 15.

A hose 80 is secured to the rear end of the converter 76 and is provided at its opposite end with a cleaning tool suitable for the material being cleaned, such as drapes, upholstered furniture, etc. When the converter 76 is inserted for off-the-floor cleaning, the valve 71 is rotated downwardly against the bottom plate 66 to connect the converter to the source of suction and the portion 81 of the member 79 rests on the surface 15 to raise the nozzle to inoperative cleaning position.

The cleaner is also provided with an electric switch 82 which is operated by movement of the handle 16 when the latter is moved out of its storage position to other lower positions and returned upwardly into its storage position, or by movement of the switch actuating member 35 independently of handle movement from its one position. The switch 82 is supported on a bracket 83 which is adjustably mounted on the base of the motor 60. The switch 82 is suitably connected to the motor 60 and the service cord 84 stored on the handle 16 by leads 85, 86 and 87. The switch 82 is controlled by operating means including the switch actuating member 35 and a plunger or member 88 projecting from the switch housing. An unshown spring within the housing at all times urges the plunger 88 outwardly to its closed or ON position as shown in FIGS. 5 and 6 in a manner known in the art.

The switch actuating lever 35 has a U-shaped portion 89 at its lower end provided with the previously mentioned arm 34 and another arm 90 each having an opening 91 aligned for rotation about the handle shaft 20 with the arm 34 spaced from the bag latch 31 and the other arm 90 adjacent the inner surface 92 of the handle bail arm 18. The switch actuator 35 extends from the arm 90 of the U-shaped portion 89 and terminates in a shoulder or finger 93 which, for normal on-the-floor cleaning, engages the rear edge 94 of the handle bail arm 18. The bag latch spring 32 at all times urges the actuating member 35 to rotate clockwise as viewed in FIGS. 4 and 5 and maintains the finger 93 in abutment with the rear edge 94 of the handle bail 18 as the latter is oscillated to different positions.

The U-shaped portion 89 of the switch actuating member 35 has a two-part cam surface 95 and 96 arranged with respect to the outer end 97 of the switch plunger 88 so that when the handle is in its one position shown in FIG. 4 the cam surface 95 engages the end 97 of the plunger 88 to push the latter inwardly of the switch 82 to its OFF position and interrupt the circuit to the motor 60. Upon movement of the handle 16 from its one position to other positions for on-the-floor cleaning the switch actuator 35 is rotated counter-clockwise to arrange the cam surface 96 in spaced relation to the end 97 of the plunger 88 and since the latter is biased outwardly to its ON position the motor circuit is closed to effect operation of the cleaner for cleaning the surface 15.

During such cleaning operation the agitator 73 rotatably engages the surface 15 and the fan 61 creates suction which causes dirt loosened by the agitator 73 to be picked up by the nozzle 11 and pass into the suction air passageway 65, through the fan chamber 62 and exhaust passageway 24 into the bag 25 which removes the dirt and allows filtered clean air to pass therefrom into the atmosphere.

The invention also provides structure for operating the switch actuator 35 independently of handle movement for off-the-floor cleaning and comprises a rivet 99 mounted on the switch actuator arm 90 and has its headed portion 100 projecting toward the handle bail arm 18. The arms 34-90 of the switch actuator 35 are mounted relatively loosely on the handle bail shaft 20 so that the bag latch spring 32 urges the actuator 35 toward the handle bail arm 18. The handle bail arm 18 has an undercut surface 101 which forms a flange or shoulder 102 against which the rivet head 100 abuts as shown

in FIGS. 6 and 7 when the handle 16 is in its storage or one position and the switch actuator 35 is rotated to its ON position to close the motor circuit. In normal on-the-floor cleaning the switch actuator 35 is in the position shown in FIGS. 4 and 5 with the rivet head 100 arranged forwardly of the front edge 103 of the handle bail arm 18.

When the cleaner is to be operated to clean surfaces off the floor, the handle 16 is placed in its storage or one position shown in FIGS. 1 and 4 and the converter 76 is inserted in the converter passageway 75 as shown in FIG. 9 so that the cleaner is supported on the surface 15 by the rear wheels 14 and the projecting portion 81 of the support member 79 of the converter to thereby raise the nozzle 11 and agitator 73 out of engagement with the surface 15. A suitable cleaning tool is attached to the outer end of the hose 80 and a pull on the latter moves the cleaner along the surface 15.

The operator then grasps the finger 93 and rotates the switch actuator 35 counter-clockwise relative to the handle 16 from the OFF position in FIG. 4 to the motor circuit-closing position shown in FIG. 6 so that the head 100 of the rivet 99 rests against the undercut surface 101 and abuts the shoulder 102 on the handle bail arm 18. During such movement of the switch actuator the rivet head 100 passes along the thicker portion of the handle bail arm 18 in an arcuate path as indicated by the dotted line 104 to its ON position below the flange 102.

The cleaning tool attached to the free end of the hose 80 is then moved along the surface to be cleaned, and the suction pressure created by the fan 61 draws dirt-laden air from the surface through the tool, the hose 80, and converter 76 into the fan chamber 62 from which it is discharged into the filter bag 25 in a manner well known in the art. In order to open the switch 82 the operator grasps the finger 93 and rotates the switch actuator 35 clockwise as viewed in FIG. 6 until the rivet head 100 is positioned forwardly of the front edge 103 of the handle bail arm 18 as shown in FIG. 4. The rivet head 100 cooperates with the front edge 103 of the handle bail arm 18, the shoulder 102 and the bag latch spring 32 to provide releasable latch means permitting movement of the switch actuator 35 in opposite directions to open and close the switch 82 independently of movement of the handle 16.

It is desirable that the handle be maintained in its storage or one position during off-the-floor cleaning, however, in the event the handle control lever pedal 47 is depressed and the handle 16 rotated rearwardly toward a lower position the head 100 of the rivet 99 is released from beneath the flange 102 so that the force exerted by the spring 32 rotates the switch actuator 35 clockwise back to the position shown in FIG. 5 with the rivet head 100 forwardly of the handle bail arm 18 and the finger 93 abutting the rear edge 94 of the handle bail arm 18 for movement thereafter with the handle 16 in opposite directions.

If the operator should desire to examine the interior of the cleaner to determine if the agitator 73, belt 74 or fan 61 require replacement or cleaning, the cleaner must be upended so that he can release the latches 67 to remove the bottom plate 66 and expose such cleaner parts. In one upended position of the cleaner the operator might place the handle grip 105 and nozzle 11 on the supporting surface represented by the dot-dash line 106 in FIG. 1. It is important when the cleaner is upended to positively lock the handle 16 in its storage or one position to prevent movement of the switch actuator 35 with the handle to its switch ON position, so that the operator cannot come in contact with the rotating agitator 73, motor pulley 64 and the moving belt 74.

The structure provided to prevent movement of the handle 16 and thus the switch actuator 35 therewith comprises a detent 107 pivotally mounted by a pin 108 on the handle control lever 41. The detent 107 includes an arcuate surface 109 at one end, and the portion 110 on the other side of the pivot pin 108 is so weighted that it is influenced by gravity to rotate the detent 107 when the cleaner is upended onto the surface 106. FIG. 8 illustrates in full lines the position of the detent 107

relative to the control lever 41 and the roller 58 when the handle 16 is in storage position and the wheels 13-14 rest on the surface 15. It will be noted the handle control lever 41 can be depressed in a counter-clockwise direction about its pivot 43 to release the roller 58 from the handle storage sector pocket 54 so that the handle 16 can be lowered.

The dotted line portion of FIG. 8 illustrates the position of the detent 107 relative to the handle control sector pocket 54, roller 58 and the handle control lever 41 when the cleaner has been upended onto the surface 106. Upon upending the cleaner the heavier end 110 of the detent 107 pivots downwardly about the pin 108 and brings the arcuate surface 109 into engagement with the roller 58 disposed in the pocket 54 of the sector 48 and which represents the storage or one position of the handle 16. If the operator exerts pressure against the pedal 47 of the control lever 41 the latter cannot be moved because the arcuate detent surface 109 remains in contact with the roller 58 due to the influence of gravity at the end portion 110 of the detent. It will be noted the handle control lever 41 is positively immovable relative to the roller 58 so that the handle 16 cannot be shifted from its storage position and move the switch actuator 35 therewith to close the motor circuit and cause operation of the agitator 73, belt 74, pulley 64 and fan 61, and accordingly the operator is protected from contacting moving parts of the cleaner which might require attention.

It will be understood that the disclosed structure is for illustrative purposes only and is not to be taken in a limiting sense. The present invention includes all equivalent variations of the disclosed structure and is limited only by the scope of the claims.

I claim:

- 1. In a floor care appliance,
  - a. a body,
  - b. a propelling handle rotatably mounted on said body for movement to one position and to other positions relative to said body,
  - c. a motor for the floor care appliance,
  - d. an electric switch for said motor and having a member movable to positions which open and close said switch,
  - e. switch actuating means controlled by movement of said handle for moving said switch member to respectively open and close said switch member to respectively open and close said switch upon movement of said handle to its said one position and to its said other positions,
  - f. and said switch actuating means mounted for movement independently of said handle when said handle is in its said one position for shifting said switch actuating means relative to said switch member to control operation of the latter and thus said switch.
- 2. In a floor care appliance as described in claim 1, and cooperating latch means on said handle and switch actuating means operative after the latter has been moved in one direction independently of handle movement to latch said switch actuating means to said handle in closed switch position.
- 3. In a floor care appliance as described in claim 1, and resilient means urging said switch actuating means into operative relation with said handle for movement with the latter when said handle is moved to its said one position and to its said other positions to open and close said switch.
- 4. In a floor care appliance,
  - a. a body,
  - b. a filter for receiving dirt removed from the surface being cleaned,
  - c. a bag latch for securing said filter to said body and including resilient means to retain the latch in filter-securing position,

- d. a propelling handle rotatably mounted on said body for movement to one position and to other positions relative to said body,
  - e. a motor for the floor care appliance,
  - f. an electric switch for said motor,
  - g. switch operating means controlled by movement of said handle for moving said switch operating means to respectively open and close said switch upon movement of said handle to its said one position and to its said other positions,
  - h. and said bag latch resilient means connected to said switch operating means for urging at least a portion of the latter into operative relation with said handle for movement with said handle upon movement of said handle to its said one position and to its said other positions to open and close said switch.
5. In a floor care appliance as described in claim 4, and said bag latch including a movable portion which increases the force of said resilient means upon shifting said movable latch portion to its locked position relative to said filter, whereby said resilient means exerts a greater force on said switch operating means upon securing said filter to said body.
6. In a floor care appliance as described in claim 4, and said portion of said switch operating means being mounted for movement independently of said handle to control operation of said switch to its opened and closed positions.
7. In a floor care appliance,
  - a. a body,
  - b. means supporting said appliance body on a surface during normal operation of the appliance,
  - c. c. a handle for propelling the appliance on said supporting means along the surface, said handle rotatably mounted on said body for movement to one position and to other positions relative to said body,
  - d. a motor for said appliance,
  - e. an electric switch for said motor,
  - f. switch operating means controlled by movement of said handle to its said one position and to its said other positions to respectively open and close said switch,
  - g. handle control means for releasably maintaining said handle in said one position and in said other positions,
  - h. and lock means for preventing operation of said handle control means when said handle is in its said one position to thereby lock said handle in said one position, whereby the latter cannot move said switch operating means to shift said switch from its open position to its closed position.
8. In a floor care appliance as described in claim 7, and said body having means for providing access to cleaner parts on said body, and said lock means including means actuated by gravity into engagement with said handle control means to prevent operation of the latter when said handle is in its said one position to thereby lock said handle in said one position whereby the latter cannot shift said switch from its open position to its closed position, said gravity-actuated means becoming operative under the influence of gravity to engage said handle control means upon tilting the appliance body relative to the surface to expose said means for gaining access to appliance parts on said body.
9. In a floor care appliance as described in claim 7, and said lock means including gravity-actuated detent means arranged to become actuated by gravity upon tilting said appliance body from its normal position on the surface to effect movement of said detent means by gravity into engagement with said handle control means to prevent operation of the latter and thereby lock said handle in said one position whereby said handle cannot shift said switch from its open position to its closed position.

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