FLOW CONTROL VALVE SYSTEM FOR AN UPRIGHT VACUUM CLEANER WITH A CLEANING HOSE

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ABSTRACT

A vacuum cleaner having a cleaning head engagable with a floor and a first suction nozzle and a brush roller mounted therein; a housing connected to the cleaning head, the housing having a dirt storage container and a first passageway leading from the cleaning head to the storage container; a cleaning hose having an at least partially flexible second passageway in communication with the first passageway and having a second suction nozzle at one end; a suction motor mounted in the housing and operatively associated with the storage container for drawing dirt laden air from the cleaning head through the first passageway and from the hose through the second passageway, into the storage container; a flow control valve having a generally cylindrical body mounted for rotation in the housing with one end of the cylindrical body having an opening in constant communication with the suction motor, a first opening in a side portion of the cylindrical body which can be brought into and out of alignment with the first passageway upon rotation of the cylindrical body, a second opening in another side portion of the cylindrical body offset circumferentially from the first opening and which can be brought into and out of alignment with the second passageway upon rotation of the cylindrical body, the first and second openings being in constant communication with the opening in the end of the cylindrical body and the suction motor, and the first opening being sealed off from the first passageway upon rotation of the valve so that the second opening is in communication with the second passageway and the second opening being sealed off from the second passageway when the valve is rotated so that the first opening is in communication with the first passageway.
FLOW CONTROL VALVE SYSTEM FOR AN UPRIGHT VACUUM CLEANER WITH A CLEANING HOSE

BACKGROUND OF THE INVENTION

[0001] The present invention relates to upright vacuum cleaners and, more particularly, to an upright vacuum cleaner having a floor cleaning nozzle and an above-floor cleaning nozzle with a valving system to switch the path of a vacuum source between the two nozzles.

[0002] Upright vacuum cleaners that are convertible from floor cleaning to above-floor cleaning are well known in the art. They generally provide some means for changing the suction flow path from a suction source to either the floor cleaning nozzle or the above-floor cleaning nozzle in order to increase the air flow through the nozzle being used. Many newer upright vacuum cleaners also carry an above-floor cleaning hose permanently mounted on the main body of the vacuum cleaner for added convenience. In addition, they generally provide some means for disabling the brush roller on the floor cleaning nozzle when the above-floor nozzle is being utilized so that the brush roller will not damage the floor while the vacuum cleaner is setting during use of the above-floor nozzle.

[0003] One common means for changing the suction flow path from the floor cleaning nozzle to the above-floor cleaning nozzle and shutting off the brush roller are automatic based on the positioning the handle of the upright vacuum cleaner in an upright position. This is sometimes inconvenient for the operator who may wish to continue moving the vacuum cleaner while cleaning overhead. Also, many of the manual means for changing the suction flow and shutting off the brush roller are inconveniently located and hard to reach for some operators.

SUMMARY OF THE INVENTION

[0004] The present invention provides several advantages over prior art vacuum cleaner designs by providing, in some embodiments, a manually operated way of changing the flow path from the floor cleaning nozzle to the above-floor cleaning nozzle that is conveniently located for the operator and which simultaneously controls the brush roller operation.

[0005] A preferred embodiment of a vacuum cleaner in accordance with the present invention, comprises a cleaning head engageable with a floor and having a first suction nozzle and a brush roller mounted therein; a housing connected to the cleaning head, the housing having a dirt storage container and a first passageway leading from the cleaning head to the storage container; a cleaning hose having an at least partially flexible second passageway in communication with the first passageway and having a second suction nozzle at one end thereof; a suction motor mounted in the housing and operatively associated with the storage container for drawing dirt laden air from the cleaning head through the first passageway and from the hose through the second passageway, into the storage container; a flow control valve having a generally cylindrical body mounted for rotation in the housing with one end of the cylindrical body having an opening in constant communication with the suction motor, a first opening in a side portion of the cylindrical body which can be brought into and out of alignment with the first passageway upon rotation of the cylindrical body, a second opening in another side portion of the cylindrical body offset circumferentially from the first opening and which can be brought into and out of alignment with the second passageway upon rotation of the cylindrical body, the first and second openings being in constant communication with the opening in the end of the cylindrical body and the suction motor, and the first opening being sealed off from the first passageway upon rotation of the valve so that the second opening is in communication with the second passageway and the second opening being sealed off from the second passageway when the valve is rotated so that the first opening is in communication with the first passageway.

[0006] In a further preferred embodiment, the flow control valve is manually operable. Also, the cylindrical body of the flow control valve is preferably disposed in an upper portion of the vacuum cleaner housing in easy reach of the operator. In one aspect of a preferred embodiment, the cylindrical body of the flow control valve includes a larger portion and a smaller portion with the first passageway being in the larger portion and the second passageway being in the smaller portion. In addition, a handle is preferably mounted to the cylindrical body adjacent the vacuum cleaner housing for manual rotation of the handle and cylindrical body. In a further aspect of a preferred embodiment, a drive motor is mounted in the cleaning head for rotating the brush roller and a first switch operatively associated with the drive motor for turning it on and off is mounted adjacent the flow control valve cylindrical body and is engageable by the cylindrical body when the cylindrical body is moved to where the second opening is aligned with the second passageway such that the switch turns the drive motor off when the cylindrical body is in that position. In addition, the cylindrical body preferably includes an extension which engages the switch to turn off the motor associated with the brush roller.

[0007] In a still further aspect of a preferred embodiment, the housing of the vacuum cleaner has a handle for moving the vacuum cleaner along the floor during floor cleaning use and the housing is pivotally connected to the cleaning head for movement between a substantially vertical position and some other position; a second switch is mounted in either the housing or the cleaning head and is engageable by a lever mounted in the other of the housing or cleaning head when the housing is moved to the substantially vertical position, the second switch being operatively connected to the drive motor so that when it is engaged by the lever it turns the drive motor off if it is on and when the lever is not engaged with the switch the drive motor may be activated. Also, there is preferably a main switch mounted on the handle which can be manually actuated for turning off the drive motor if it is on and for allowing the drive motor to be activated.

[0008] Still other aspects of the present invention will become apparent to those skilled in this art from the following description wherein there is shown and described a preferred embodiment of this invention, simply by way of illustration of one of the modes best suited to carry out the invention. As it will be realized, the invention is capable of other different embodiments and its several details are capable of modification in various aspects all without departing from the invention. Accordingly, the drawings and descriptions will be regarded as illustrative in nature and not as restrictive.
BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a front pictorial view of a preferred embodiment of the present invention;

[0010] FIG. 2 is a right side view of the preferred embodiment;

[0011] FIG. 3 is a left side view of the preferred embodiment;

[0012] FIG. 4 is a bottom view of the preferred embodiment;

[0013] FIG. 5 is a rear pictorial view of the preferred embodiment;

[0014] FIG. 6 is a rear view of the preferred embodiment;

[0015] FIG. 7 is a front pictorial view with some covers and other parts removed to show internal parts of the preferred embodiment;

[0016] FIG. 8 is a cross-sectional view along line 8-8 of FIG. 6; and

[0017] FIG. 9 is an expanded pictorial view showing portions of the air flow passage ways and flow control valve in the back of the preferred embodiment; and

[0018] FIG. 10 is an enlarged pictorial view of the valve body of the flow control valve of the preferred embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0019] Referring to FIG. 1, an upright vacuum cleaner 10, constituting a preferred embodiment of the present invention, is shown having a handle 12 extending out of and connected to an upright housing 14. The housing 14 is pivotally connect to a cleaning head 16 so that the handle 12 can be pivoted between a generally horizontal position to a generally vertical position, as is generally well known in the art, in order to maneuver the cleaning head 16 over a surface to be cleaned. The vacuum cleaner 10 is supported by a pair of front wheels 18 and 20 (see FIGS. 2, 3 and 4) and a pair of back wheels 22 and 24.

[0020] A partially flexible cleaning hose 30 is attached to the back of the housing 14 and carries a nozzle 32 (see FIG. 5) for above-floor cleaning. Removably carried on the back of housing 14 are above-floor cleaning attachments 34 which are adapted to be fitted to the end 36 of nozzle 32 for cleaning various above-floor surface configurations and materials in a well known manner. The outer end 36 of nozzle 32 is removably received in a holster 38 formed in the back of the housing 14 for storage of the nozzle 32 when not in use. The holster 38 is essentially a sleeve which receives the outer end 36 of nozzle 32.

[0021] With reference to FIG. 7, a portion of an airflow path within the vacuum cleaner 10 is illustrated with several sets of arrows showing the direction of air flow. The preferred embodiment of the vacuum cleaner 10 has two motor and fan units which produce suction in the air flow passage ways described below, however, the valve system of the present invention can be used with a single motor and fan unit as well. In the preferred embodiment, a first suction motor and fan unit 42 and its associated airflow passageway is positioned in the upright housing 14 near the cleaning head 16. First motor and fan unit 42 draws dirty air in the direction of arrows A from the nozzle portion 17 of the cleaning head 16 surrounding the beater bar 44 (see FIG. 4). The dirty air from nozzle portion 17 is drawn through a spiral housing 46 containing an impeller driven by motor and fan unit 42. The air flows through the spiral housing 46 in the direction of arrows B as shown in FIG. 7. The air then flows up into a duct 48 (see FIG. 8) formed in the rear portion of housing 14. Duct 48 extends up the housing 14 and opens into the top of a dirt storage container 49 which is mounted to the flange 50 concealed within the housing 14. Dirt storage container 49 is of conventional construction and is made of sufficiently porous material to allow air to pass through it but retain dirt in the container. Air flow through duct 48 and into the dirt storage container 49 is shown by arrows C. Motor and fan unit 42 also drives brush roll 44 through a drive belt 45 extending between pulleys on an end of the motor drive shaft and an end of the brush roll support shaft.

[0022] A second motor and fan unit 52 (see FIG. 7) is mounted in the lower portion of housing 14 and draws clean air out through the porous walls of dirt storage container 49 through a filter 54 as shown by arrows D, and causes a suction in duct 48 as a result of the air being drawn from dirt storage container 49 which, in turn, draws dirty air from the nozzle portion 17 of cleaning head 16. The air being drawn from dirt storage container 49 by motor and fan unit 52 flows through a cylindrical housing 56 containing fan blades and is then expelled outside the housing 14 through a filter 58. As a general matter, all of the ducts and air flow passages associated with both motor and fan unit systems are preferably substantially air tight and are provided with seals where necessary to provide an essentially air tight flow path for clean and dirty air through the vacuum cleaner 10.

[0023] The fans of the two motor and fan units 42 and 52 can be any one of several standard designs such that they permit the proper flow of air through the system passageways. In the case of the motor and fan unit 42, the fan must be able to allow the dirty air to pass through it without suffering substantial damage over time. It is believed squirrel-cage fans and impeller type fans are just a couple of well known fan types that can be used in one or both of the motor and fan units 42 and 52. The motor and fan units used in the preferred embodiment are discussed in further detail below.

[0024] The air flow of the two motor and fan units 42 and 52 is preferably about the same so that air flow from one motor and fan unit does not interfere with the air flow of the other. In this situation the air flow produced by the two motor and fan units is preferably in the range of 80-200 CFM (cubic feet per minute) and more preferably in the range of 95-105 CFM. In a further aspect, some embodiments of the present invention the first motor and fan unit 42 preferably produces suction in the range of 10-40 IOW (inches of water) and the second motor and fan unit 52 preferably produces suction in the range of 50-120 IOW, and more preferably the first motor and fan unit 42 produces suction in the range of 20-30 IOW and the second motor and fan unit 52 produces suction in the range of 60-100 IOW.

[0025] Alternatively, the suction caused by motor and fan unit 52 can be greater than that of motor and fan unit 42 so that the suction of motor and fan unit 52 assists in drawing air from motor and fan unit 42 into the dirt storage container 49.
FIGS. 5, 6 and 8, show a duct 60 which allows air to flow in the direction of arrows E from the nozzle 32 of cleaning hose 30 to a vacuum source flow direction control valve 70. A portion of duct 60 is formed along the outer rear surface of the vacuum cleaner housing 14 by a conduit 62 which extends up the back of the housing. Conduit 62 extends from an attachment point 63 (see FIG. 6) of the end 64 of flexible cleaning hose 30 to the vacuum source flow direction control valve 70.

Referring again to the duct 48 that allows air to flow from the cleaning head 16 to dirt storage container 49, it includes a conduit 80 (see FIG. 8), also formed in the back of the housing 14 of the vacuum cleaner, running parallel to and inward of conduit 62 from the lower portion of the housing in communication with the floor cleaning nozzle 17 in the cleaning head 16, up to the control valve 70. Control valve 70 is used to manually change the air flow path into the dirt storage container 49 between the cleaning head 16 and the cleaning hose 30. In a first position, the control valve 70 allows air to flow from the cleaning head 16 into the dirt storage container 49 while shutting off air flow from the cleaning hose 30 into the dirt storage container 49. In a second position, the control valve 70 allows air to flow from the cleaning hose 30 into the dirt storage container 49 while shutting off air flow from the cleaning hose 30 to the dirt storage container 49.

Referring to FIGS. 8 and 9, duct 60 is formed between an inner wall 82 secured, such as by screws, to the back panel 84 forming the back of the housing 14 of the vacuum cleaner, and an outer wall 86 secured, such as by screws, to the inner wall 82. The back panel 84 and the inner wall 82 are internally configured to form conduit 80, which is a portion of duct 48, coming from the cleaning head 16 to the control valve 70.

As shown in FIGS. 8, 9 and 10, control valve 70 includes a generally cylindrical valve body 90 having a larger cylindrical portion 92 and a smaller cylindrical portion 94, as shown in FIGS. 9 and 10. One end 96 of valve body 90 is provided with an opening. In a preferred embodiment, the end 96 of cylindrical portion 92 is completely open with the opening being defined by the cylindrical wall 91 of body portion 92. An opposite end 98 of cylindrical body portion 92 is also open and, in the preferred embodiment, this opening is defined by the transition in the internal walls of the larger cylindrical portion 92 and the smaller cylindrical portion 94, as best seen in FIG. 10. The outer end 100 of smaller cylindrical portion 94 is closed off.

In the outer cylindrical wall 91 (see FIG. 10) an opening 102 is defined which can be aligned with duct 48 (see FIG. 8) when the valve body 90 is properly positioned. The cylindrical wall 104 of smaller cylindrical portion 94 defines an opening 106 which, when properly positioned, can be aligned with duct 60. Opening 106 is offset circumferentially from opening 102 so that when opening 102 is aligned with duct 48 opening 106 is out of alignment with conduit 60 and vice versa. In a preferred embodiment, openings 102 and 106 are approximately 130 degrees circumferentially offset from one another. The outer end 100 of smaller cylindrical portion 94 is fitted to receive a manually rotatable cap 108 having a grip 110. The valve body 90 is fitted for rotation in the housing 14 of the vacuum cleaner. The larger cylindrical portion 92 is mounted for rotation with its open end 96 received in the back panel 84 and its opposite end in an opening in wall 82. Cylindrical seals (not shown) are mounted in the panel 84 and wall 82 to prevent leakage around the ends of the larger cylindrical portion 92. The smaller cylindrical portion 94 of valve body 90 is mounted for rotation within the outer wall 86 and a cylindrical seal (not shown) prevents leakage from around the outer end of valve body 90.

Cap 108 is fixedly secured, such as by a screw 109 (see FIG. 9), to the outer end 100 of valve body 90 for rotation therewith. Grip 110 is formed by two generally rectangular cross-sectioned extensions on the top of cap 108 which can be easily grabbed with fingers to rotate the cap 108 and thus valve body 90. Two arcuate extensions 120 and 122 (see FIG. 9) are formed as extensions of the plastic cap 108. Arcuate extensions 120 and 122 (see FIG. 9) act as stops for rotation of cap 108 and valve body 90 by engaging shelves 124 (see FIG. 9) and 126 (see FIG. 5), respectively, formed in the outer surface of outer wall 86, at each end of the rotational movement of cap 108. In addition, arcuate extension 122 engages a micro switch 128 fixed in the rear panel of the housing 14 of the vacuum cleaner 10 when extension 122 engages shelf 126. Switch 128 turns off motor and fan unit 42 when engaged by extension 122 and allows motor and fan unit 42 to operate when extension 122 is rotated out of engagement with switch 128, subject to the position of other switches described below.

Referring again to FIG. 1, two switches, 140 and 142 are mounted in handle 12. The two switches are connected to a printed circuit board (not shown) which controls operation of the two motor and fan units 42 and 52. Switch 140 is an on/off switch which turns the two fan and motor units 42 and 52 on or off when pressed under certain conditions and comprises a master switch for turning the vacuum cleaner 10 on and off. If the handle 12 is in the upright position as shown in FIG. 1 and switch 140 is activated, the circuit will only turn on motor and fan unit 52 and not motor and fan unit 42 since motor and fan unit 42 would operate the brush roll 44 which could damage flooring that the vacuum cleaner is setting on and since, with the handle in the upright position, it is likely that the nozzle 32 will be utilized for above floor cleaning. If handle 12 is moved out of the up right position a micro-switch 144 (see FIG. 6) positioned in the housing and engaging a projection on the cleaning head 16 only when handle 16 is in the upright position, will send a signal to the circuit that will allow the first motor and fan unit 42 to be also activated when switch 140 is activated. Putting the handle 16 in another than the upright position usually indicates that nozzle 17 in cleaning head 16 will be utilized to clean flooring. Switch 142 can be utilized to turn motor and fan unit 42 on or off when the handle 12 is not in the upright position so that, for example, cleaning head 16 can be utilized to clean flooring that might be damaged by brush roll 44.

When the vacuum cleaner 10 is being used as an upright vacuum to clean floors, both motor and fan units 42 and 52 are preferably operated simultaneously to provide maximum suction so that air is drawn up through cleaning head 16 (see FIG. 7) through motor and fan unit 42 and up through duct 48 and into the dirt storage container 49 through its mounting flange 50. During this operation valve 70 is manually positioned, as shown in FIGS. 6 and 8, to allow dirty air to pass from duct 48 through opening 102 in
valve body 90 and then out through the opening in end 96 of valve 90 as shown by the arrows in FIG. 8. With valve 90 in this position, duct 60 is closed off by wall portion 94 of valve 90 so that there is no suction force on duct 60 and thus no air is drawn through flexible cleaning hose 30.

[0034] When it is desired to use cleaning hose 30, valve 90 is manually rotated clockwise until the extension 120 engages stop 124 formed in the side of outer wall 86. Moving the valve to this position aligns opening 104 in valve 90 so that air can flow from hose 30 through duct 60 and valve 90 into dirt storage container 49 through its mounting flange 50.

[0035] When introducing elements of the present invention or the embodiment(s) thereof, the articles a, an, the, and said are intended to mean that there are one or more of the elements. The terms comprising, including, and having are intended to be inclusive and mean that there may be additional elements other than the listed elements.

[0036] As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A vacuum cleaner, comprising:
   a cleaning head engagable with a floor and having a first suction nozzle and a brush roller mounted therein;
   a housing connected to the cleaning head, the housing having a dirt storage container and a first passageway leading from the cleaning head to the storage container;
   a cleaning hose having an at least partially flexible second passageway in communication with the first passageway and having a second suction nozzle at one end thereof;
   a suction motor mounted in the housing and operatively associated with the storage container for drawing dirt laden air from the cleaning head through the first passageway and from the hose through the second passageway, into the storage container;
   a flow control valve having a generally cylindrical body mounted for rotation in the housing with one end of the cylindrical body having an opening in constant communication with the suction motor, a first opening in a side portion of the cylindrical body which can be brought into and out of alignment with the first passageway upon rotation of the cylindrical body, a second opening in another side portion of the cylindrical body offset circumferentially from the first opening and which can be brought into and out of alignment with the second passageway upon rotation of the cylindrical body, the first and second openings being in constant communication with the opening in the end of the cylindrical body and the suction motor, and the first opening being sealed off from the first passageway upon rotation of the valve so that the second opening is in communication with the second passageway and the second opening being sealed off from the second passageway when the valve is rotated so that the first opening is in communication with the first passageway,
   the housing having a handle for moving the vacuum cleaner along the floor during floor cleaning use and the housing being pivotally connected to the cleaning head for movement between a substantially vertical position and some other position;
   a second switch mounted in the housing or the cleaning head and operatively associated with the drive motor so that when it is engaged by the lever it turns the drive motor off when the cylinder body is in that position.
   2. The vacuum cleaner of claim 1 wherein the flow control valve is manually operable.
   3. The vacuum cleaner of claim 2 wherein the cylindrical body of the flow control valve is disposed in an upper portion of the vacuum cleaner housing.
   4. The vacuum cleaner of claim 3 wherein the cylindrical body of the flow control valve includes a larger cylindrical portion and a smaller cylindrical portion with the first passageway being in the larger portion and the second passageway being in the smaller portion.
   5. The vacuum cleaner of claim 2 wherein a grip is mounted to the cylindrical body adjacent the vacuum cleaner housing for manual rotation of the handle and cylindrical body.
   6. The vacuum cleaner of claim 5 wherein a drive motor is mounted in the cleaning head for rotating the brush roller and a first switch operatively associated with the drive motor for turning it on and off is mounted adjacent the flow control valve cylinder body and is engageable by the cylindrical body when the cylindrical body is moved to where the second opening is aligned with the second passageway such that the switch turns the drive motor off when the cylindrical body is in that position.
   7. The vacuum cleaner of claim 6 wherein the cylindrical body includes an extension which engages the switch to turn off the motor associated with the brush roller.
   8. The vacuum cleaner of claim 6 including:
   a main switch mounted on the handle and being manually actuated for turning off the drive motor if it is on and for allowing the drive motor to be activated.
   9. The vacuum cleaner of claim 8, including:
   a housing engaged with a floor and having a first suction nozzle and a brush roller mounted therein;
   a housing connected to the cleaning head, the housing having a dirt storage container and a first passageway leading from the cleaning head to the storage container;
   a cleaning hose having an at least partially flexible second passageway in communication with the first passageway and having a second suction nozzle at one end thereof;
   a suction motor mounted in the housing and operatively associated with the storage container for drawing dirt laden air from the cleaning head through the first passageway and from the hose through the second passageway, into the storage container;
a flow control valve including a cylinder having a central passageway therethrough the cylinder being mounted for rotation in the housing with one end of the cylinder being open with the opening being in constant communication with the suction motor and the central passageway, a first opening in a side portion of the cylinder in communication with the central passageway and which can be brought into and out of alignment with the first passageway upon rotation of the cylinder, a second opening in another side portion of the cylinder offset circumferentially from the first opening and also in communication with the central passageway and which can be brought into and out of alignment with the second passageway upon rotation of the cylinder, and the first opening being sealed off from the first passageway upon rotation of the valve so that the second opening is in communication with the second passageway and the second opening being sealed off from the second passageway when the valve is rotated so that the first opening is in communication with the first passageway.

11. The vacuum cleaner of claim 10 wherein the flow control valve is manually operable.

12. The vacuum cleaner of claim 11 wherein the cylinder of the flow control valve is disposed in an upper portion of the vacuum cleaner housing.

13. The vacuum cleaner of claim 12 wherein the cylinder of the flow control valve includes a larger portion and a smaller portion with the first passageway being in the larger portion and the second passageway being in the smaller portion.

14. The vacuum cleaner of claim 11 wherein a handle is mounted to the cylinder adjacent the vacuum cleaner housing for manual rotation of the handle and cylinder.

15. The vacuum cleaner of claim 14 wherein a drive motor is mounted in the cleaning head for rotating the brush roller and a first switch operatively associated with the drive motor for turning it on and off is mounted adjacent the flow control valve cylinder and is engagable by the cylinder when the cylinder is moved to where the second opening is aligned with the second passageway such that the switch turns the drive motor off when the cylinder is in that position.

16. The vacuum cleaner of claim 15 wherein the cylinder includes an extension which engages the switch to turn off the motor associated with the brush roller.

17. The vacuum cleaner of claim 15 including:

the housing having a handle for moving the vacuum cleaner along the floor during floor cleaning use and the housing being pivotally connected to the cleaning head for movement between a substantially vertical position and some other position;

a second switch mounted in either the housing or the cleaning head and engageable by a lever mounted in the other of the housing or cleaning head when the housing is moved to the substantially vertical position, the second switch being operatively connected to the drive motor so that when it is engaged by the lever it turns the drive motor off if it is on and when the lever is not engaged with the switch the drive motor may be activated.

18. The vacuum cleaner of claim 17, including:

a main switch mounted on the handle and being manually actuated for turning off the drive motor if it is on and for allowing the drive motor to be activated.

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