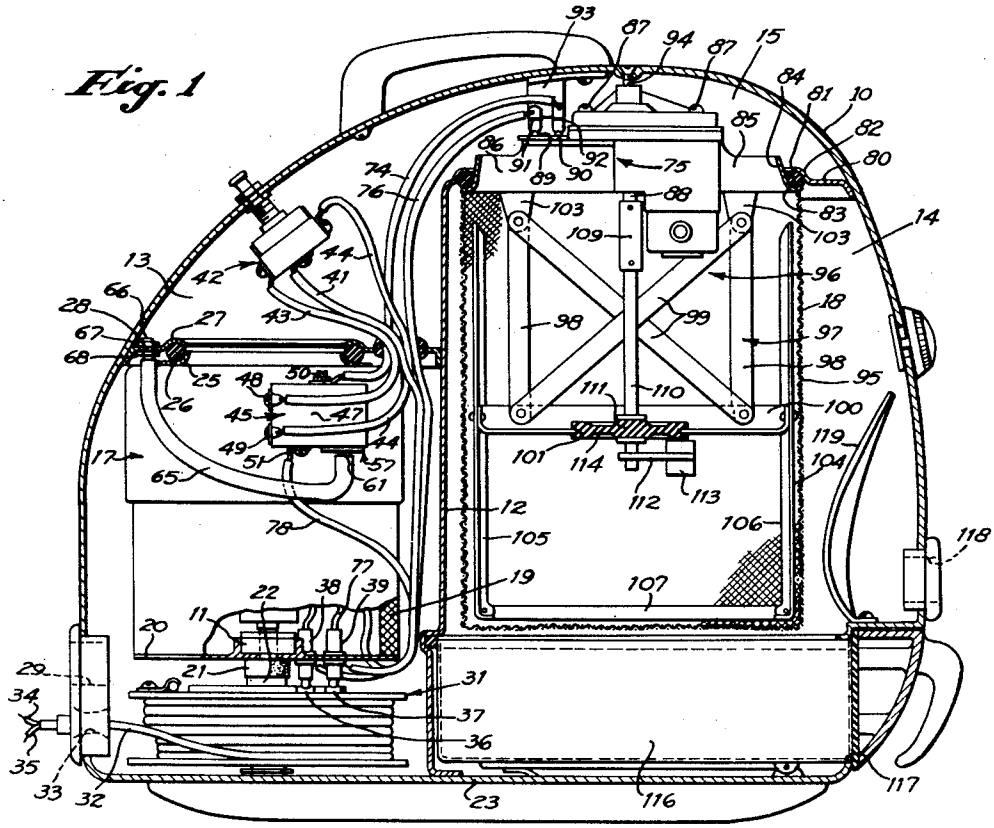
Feb. 27, 1951 O. W. TIMM 2,543,343

SUCTION CLEANER CONTROL

Filed March 5, 1946

Fig. 1



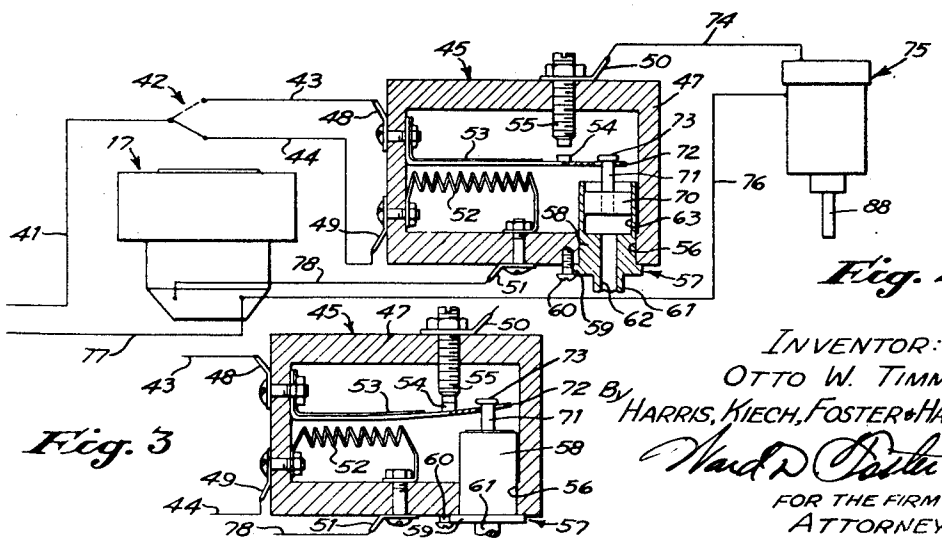


Fig. 2

Fig. 3

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SUCTION CLEANER CONTROL

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13 Claims. (Cl. 183—54)

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My invention relates to the suction cleaner art and, more particularly, to a suction cleaner adapted for household or hotel use or the like and having a number of improvements over standard types of such devices. Specifically, the present invention pertains to an improved means for controlling the operation of suction cleaners of the type disclosed in my prior application for United States patent entitled "Suction Cleaner With Switch Circuit," Serial No. 611,787, filed August 21, 1945.

It is common in the art to provide a vacuum cleaner of the suction type with a motor and a dust collecting chamber enclosed in a housing, the device having supporting runners and adapted to be moved from place to place in operation by a suction hose connected to the suction opening of the device. Such suction cleaners commonly are provided with the motor and dust chamber in horizontal axial alignment, which provides a very low construction which is awkward for an operator to pick up, as must frequently be done in moving the device from room to room for operation. It is therefore an object of my present invention to provide a wholly enclosed suction cleaner of sufficient height to permit the handle thereof to be grasped by an operator without requiring a substantial stooping movement of the operator, thus relieving the physical effort required to move many of the suction cleaners of the prior art. I prefer to accomplish this object by providing an enclosed housing separated by a partition into a vertical motor chamber and a vertical filter chamber, a motor and fan unit being disposed in the motor chamber and a vertical filter bag being disposed in the filter chamber, and this is a further object of the invention.

Still another object of my invention is to provide a suction cleaner in which dust and foreign materials are filtered from incoming air on the outside of a suitable filter bag, with improved means provided for agitating the bag as desired to remove dust therefrom and thus clean the filtering surface.

A further object is to provide such a device in which the filter bag is agitated by agitating mechanism contained within the bag, preferably including an auxiliary electric motor for actuating the agitating mechanism. To accomplish this purpose, the elements of the agitating mechanism, described hereinafter, are of a significance.

A further object of my invention is to provide with a suction cleaner having a main motor for drawing air through the device and an auxiliary

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motor for agitating a filter bag to remove dust from the filtering surface thereof, an electric circuit whereby the auxiliary motor is energized only when the main motor is de-energized. I prefer to provide such a circuit whereby the auxiliary motor is so energized for a predetermined period and then is automatically de-energized, and this is another object of the invention.

A still further object of my invention is to provide a suction cleaner of the type referred to in which the momentary operation of the auxiliary motor for agitating the filter bag is controlled by the degree of suction occurring in the suction cleaner, in addition to the de-energization of the main motor, so that the initiation of operation of the auxiliary motor will be delayed until the degree of suction is reduced to a predetermined value to thus control the period of operation of the auxiliary motor.

Other objects of the invention reside in additional construction features to be pointed out hereinafter, and will be evident from the following specification and the drawing, which is for illustrative purposes only and in which:

Fig. 1 is a longitudinal vertical view, partly in cross section, taken through my suction cleaner;

Fig. 2 is a side elevational view of the improved controlling device of my invention, partly in section and showing the device connected in the electric circuit which is shown diagrammatically; and

Fig. 3 is a view similar to Fig. 2 showing the contacts of the controlling device closed to effect energization of the circuit for the auxiliary electric motor.

Referring to the drawing, I show a housing 10 divided by a vertical partition wall 12 into a motor chamber 13 and a filter chamber 14, the upper ends of which communicate through an upper chamber 15 of the housing. Disposed in the motor chamber 13 is an electric motor 17, constituting the main motor unit of the invention, and disposed in the filter chamber 14 is a filter unit 18.

The electric motor 17 is vertically disposed in the motor chamber 13, being supported by a bearing 11 on a circular plate 20, which in turn is supported by a resilient rubber washer 21 on the upper end of a reel shaft 22 which engages a detachable bottom wall 23 of the housing 10. The electric motor 17 is enclosed by a cylindrical porous filter element 19. The upper end of the electric motor 17 is provided with an annular collar 25 which engages an annular sealing ring

26, preferably formed of rubber or other resilient material, which in turn engages an annular collar 27 formed on a horizontally disposed flange 28 which is suitably secured to the inner wall of the housing 10 and to the partition wall 12, as by welding or otherwise. As will be evident, the rubber washer 21 and the sealing ring 26 provide a resilient mounting for the electric motor 17, adapted to absorb vibration thereof. As will also be understood, the drive shaft (not shown) of the electric motor 17 extends downwardly into the vertical filter element 19 and is provided with suitable fan blades (not shown) thereon adapted to draw air from the upper chamber 15 and through the motor chamber 13 to expel it from a suitably disposed discharge opening 29 formed in the lower portion of the housing 10, the filter element 19 removing any traces of dust from the air circulated therethrough.

In the motor chamber 13 beneath the electric motor 17 is a reel device 31, which may be of any form well known in the art, which is rotatably mounted on the reel shaft 22 and is adapted to carry a power cord 32, one end of which extends out of the housing through a suitable power cord opening 33, the power cord being of the conventional form consisting of two wires 34 and 35, one of which is connected electrically to an inner collector ring 36 and the other of which is electrically connected to an outer collector ring 37, as is well known in the art. The collector rings 36 and 37, which are fixed to the reel device 31 and rotate therewith relative to the housing 10, are engaged by conventional brushes 38 and 39, respectively. The brush 38 is connected by a wire 41 to a pole of a single-pole, double-throw main switch 42, as best shown diagrammatically in Fig. 2, the contacts of which are connected by wires 43 and 44 to an auxiliary switch 45.

The auxiliary switch 45 may be mounted within the suction cleaner housing 10 in any manner and preferably it is secured to the side of the main electric motor 17 as shown in Fig. 1. The auxiliary switch 45 includes a housing 47 constructed from dielectric material and provided with electrical contacts 48 and 49 to which the wires 43 and 44 are connected, respectively. The housing 47 is also provided with electrical contacts 50 and 51. The contacts 49 and 51 are connected by a resistance wire 52, which, when current is flowing therethrough, is designed to heat a bimetal strip 53 connected to the electrical contact 48 so as to flex the bimetal strip 53 to adapt a contact 54 thereon to engage the lower end of a contact screw 55 electrically connected to the electrical contact 50. The housing 47 is provided with an aperture 56 in its lower side to receive the cylindrical portion 58 of a member 57. The member 57 has a peripheral flange 59 adapted to abut the lower surface of the housing 47 and the flange may be held thereagainst by the head of a screw 60 threaded into a tapped hole in the lower portion of the housing. Below the flange 59, the member 57 is provided with a reduced stem 61. The member 57 has an axial bore 62 and a counterbore 63 in its upper end, said counterbore constituting a cylindrical suction chamber. A flexible tube 65 has one of its ends enclosing the stem 61 of the member 57 and its other end joined to the end of a tubular sleeve 66 having external threads and passing through a hole in the flange 28 of the housing 10. Nuts 67 and 68 screwed onto the threads of the sleeve 66 and set up against the opposite sides of the flange 28 serve to secure the sleeve in place. It is apparent from the above that the chamber 63 of the member 57 will be subjected to suction created within the chamber 13 when the main motor 17 is in operation. Arranged to slide axially in the suction chamber 63 is a piston 70 having an upwardly projecting piston rod 71. The rod 71 extends upwardly through an elongated opening 72 in the bimetal strip 53 and its end is flattened to provide a head 73 adapted to engage the upper surface of the bimetal strip to depress the strip when suction is created in the chamber 63.

The electrical contact 50 is connected by a wire 74 to one side of an auxiliary electric motor unit 75, the other side of which is connected by a wire 76 to the brush 39, the brush 39 also being connected by a wire 77 with one side of the main electric motor 17. The other side of the main electric motor 17 is connected by a wire 78 to the electrical contact 51 of the auxiliary switch 45.

Integrally connected with the top of the vertical partition wall 12 is a horizontal plate 80 provided with a rectangular opening 81, the inner edge of the plate being curved to form a lip 82 adapted to be engaged by a sealing ring 83, preferably formed of rubber or other resilient material, which is supported in a cupped flange 84 of rectangular shape, which, together with the sealing ring 83, closes the rectangular opening 81, the flange being provided with openings 85 and 86 at each end thereof and being secured to the auxiliary electric motor unit 75, preferably by screws 87.

The auxiliary electric motor unit 75 is of any suitable design, including a vertical drive shaft 88 and an electric motor (not shown in detail). The auxiliary electric motor unit 75 is provided with a pair of electrical contacts 89 and 90 supported on insulated contact arms 91, the electrical contacts 89 and 90 being adapted to engage contacts 91 and 92 supported by a bracket 93 suitably secured to the inner wall of the top of the housing 10, the contacts 91 and 92 being electrically connected to the wires 76 and 74, respectively. The auxiliary electric motor unit 75, together with the cupped flange 84 secured thereto, is suspended by means of a screw 94 from the housing 10. It will thus be observed that upon removal of the screw 94 and the removable bottom wall 23, the filter unit 18 may be removed downwardly through the housing 10, which breaks the electrical connection between the contacts 89 and 91 and the contacts 90 and 92, to permit the auxiliary electric motor unit 75 and its associated mechanism to be readily removed from the housing for cleaning or repair, and this is a feature of the invention.

Secured to and depending from the cupped flange 84 is a bag member 95, comprising a portion of the filter unit 18, and preferably formed of a filter fabric material suitable for filtering dust and dirt from air passing therethrough. Disposed in the hollow bag member 95 is the agitating means 96 of the invention, which includes a framework 97 consisting of four vertical members 98 interconnected by four brace members 99, the lower ends of which are secured to a rectangular flange member 100 having a circular central opening 101 therein. The members 98 and 99 are preferably made of resilient material, such as spring steel, and the upper ends thereof are secured to four depending ears 103

preferably integrally formed on the cupped flange 84. Rigidly secured to the rectangular flange member 100 is an agitator element 104 comprising vertical end members 105 and 106 and a pair of bottom straps 107. As will be apparent, the agitator element 104 is spaced but slightly from the inner wall of the bag member 95, so that upon lateral movement of the agitator element it will contact the bag member to agitate the same.

Connected to the drive shaft 88 of the auxiliary electric motor unit 75 by a resilient coupling 109, preferably formed of rubber or other resilient material, is a vertical rotatable shaft 110 which passes through a bearing 111 and has secured to the lower end thereof a cross-pin 112, to the outer end of which is fastened an eccentric weight 113. The bearing 111 is supported in a resilient diaphragm 114, preferably formed of rubber or other resilient material, which snaps into the central opening 101 of the rectangular flange member 100.

Disposed in the filter chamber 14 below the filter unit 18 is a removable tray 116 which passes through a rectangular opening 117 in the housing 10. Also communicating with the filter chamber 14 is a suction opening 118, and between the suction opening 118 and the filter unit 18 is disposed a deflection plate member 119 which directs air entering the filter chamber around the inner wall thereof and prevents it from impinging directly upon the bag member 95.

In operation, which will be best understood by preliminary reference to Fig. 2, when the main switch 42 is closed so as to close the circuit between the wires 41 and 44, current flows therethrough, through the resistance wire 52, and the wire 78 to the main electric motor 17 to energize the same, the other side of the motor being at all times connected by the wire 77 to the power supply. When the main electric motor 17 is energized, the blower unit connected therewith (not shown) draws air through the suction opening 118 into the filter chamber 14, through the filter unit 18 to filter all dust and dirt particles therefrom, through the upper chamber 15 and the motor chamber 13, through the motor 17, and forces it through the filter element 19 and out through the discharge opening 29.

As will be apparent, when the main electric motor 17 is thus energized, current flowing through the resistance coil 52 will cause it to heat the bimetal strip 53. Heating of the bimetal strip tends to flex it upwardly to cause its contact 54 to approach the lower end of the contact screw 55. However, such flexing is resisted by the piston 70 which, after the main motor 17 has been started and suction created in the chamber 13, is drawn downwardly under the influence of suction effected in the tube 65 and suction chamber 63. It is thus seen that the contact 54 of the bimetal strip 53 is withheld from engagement with the lower end of the contact screw 55 during the entire operation of the main motor 17. It will also be understood that so long as the main switch 42 remains in its closed position above described, in which the main electric motor 17 is energized, no curren will flow through the switch 42 to the wire 43 and, consequently, the auxiliary electric motor unit 75 could not be energized even if the contact 54 was in engagement with the lower end of the contact screw 55.

When the main electric switch 42 is opened, i. e., when its pole is moved to the position indicated by dotted lines in Fig. 2, after having energized the main electric motor 17 for a sufficient period of time to heat the bimetal strip 53, the wire 43 will be connected to the wire 41 to permit electric current to pass through the contact 48 to the bimetal strip. As the speed of the main electric motor is retarded, the degree of suction in the chamber 13 will gradually lessen and eventually the suctional pull exerted upon the piston 70 will become less than the tension of the heated bimetal strip 53. When this condition exists the bimetal strip 53 will be permitted to flex upwardly to cause its contact 54 to engage the lower end of the contact screw 55 as shown in Fig. 3, thereby completing the circuit to the auxiliary electric motor unit 75 through the wire 74. Since the other side of the electric motor unit 75 is connected at all times to the other side of the main power supply by the wire 76, the electric motor unit 75 will be energized.

Energization of the auxiliary electric motor 75 causes rotation of its vertical drive shaft 88 and, through the coupling 109, the rotatable shaft 110. The eccentric weight 113 unbalances the rotating shaft 110, causing it to oscillate the agitator element 104 to cause the element to sharply engage and agitate the inner wall of the bag member 95. Such agitation of the bag member 95 shakes the dust accumulated on the outside thereof, the dust settling into the removable tray 116.

Cooling of the resistance wire 52, due to the de-energizing thereof, allows the bimetal strip 53 to cool, and after a relative short predetermined period of time, for example, three to five seconds, the bimetal strip moves downwardly thus breaking electrical contact between the contact 54 and the contact screw 55, which opens the circuit to the auxiliary electric motor unit 75 to de-energize the same.

The cycle of operation just described is of primary importance in the invention, although it is to be understood that it may be modified without departing from the spirit of the invention. Due to the relatively small surface area of the bag member 95, it will rapidly become clogged with dust during operation unless the dust is removed therefrom at relatively frequent intervals. Although separate manually operable switches may be provided for the main electric motor 17 and the auxiliary electric motor unit 75, I have found that the average housewife will either forget to operate the auxiliary motor at sufficiently close intervals to maintain the surface of the bag member 95 adequately free from dust, or will merely neglect to do so, or will operate it for an unnecessarily long period when she does operate it. Since in normal household use an electric suction cleaner is frequently energized and de-energized, and since in my invention the bag member 95 is agitated every time that the main motor is de-energized, it will be apparent that dust deposited on the outer surface of the bag member will be shaken off and collected in the tray 116 almost as soon as deposited on the bag member, thus maintaining the bag member adequately pervious to the air stream flowing therethrough. Also, since the auxiliary electric motor unit 75 is actuated in each instance for a predetermined time interval, it is insured that the bag member 95 is shaken sufficiently to accomplish this purpose, but substantially no more. Thus, the present invention provides means for automatically maintaining the filter unit 18 in satisfactory operating condition over long periods of use, the only requirement on the user being that the tray 116

must be emptied of its collected dust and dirt at intervals.

The construction of the agitating means 96 is also a particularly important feature of the invention, as it provides efficient means for agitating the bag member 95 as desired. Flexibility of the framework 97 permits the agitator element 104 to oscillate smoothly in response to the unbalanced oscillation of the rotatable shaft 110 caused by the eccentric weight 113, which contributes to the desired result.

As an outstanding feature of the present invention, the actuation of the auxiliary switch 45 is controlled by two factors, i. e., the de-energization of the main electric motor 17 and also the suction created within the suction chamber 13 of the suction cleaner. Through the provision of the suction controlled piston 78 the closing of the auxiliary electric circuit is delayed until such time as the suction created by the fans driven by the main electric motor 17 is substantially reduced to insure that the bag member 95 will be agitated only after a suction cleaning operation has been completed. The suction piston 78 further serves to reduce the period of agitation of the bag member 95 to a minimum so that excessive operation of the agitation means 96 is avoided. The improved auxiliary switch 45 constitutes an important improvement over a similar auxiliary switch disclosed in my prior application, referred to previously, and employing a bimetal strip as the sole means for closing and opening the circuit to the auxiliary electric motor and in which the period of energization of the auxiliary motor unit is dependent entirely upon the heating and cooling of said bimetal strip.

It will be apparent to those skilled in the art that many of the elements of my device, as illustrated and described hereinabove, may be replaced by other elements having substantially the same mode of operation without departing from the spirit of my invention, and consequently I do not desire to be limited to the specific form illustrated and described, but desire to be afforded the full scope of the following claims.

I claim as my invention:

1. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor device in said housing and adapted when energized to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; an electrical circuit for said main motor device; means for energizing said main motor device; suction controlled means for energizing said auxiliary motor automatically after said main motor device is deenergized; and means in said circuit operative to control the duration of energization of said auxiliary motor.

2. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor device in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; an electrical circuit for said main motor device; means for energizing said main motor device; means controlled by the suction in said housing for energizing said auxiliary motor automatically; and means in said circuit operative automatically upon de-energization of said main electric motor device for maintaining said auxiliary electric motor energized for a predetermined period of time after said main motor device is de-energized.

3. In a device of the character described, the combination of: filter means for filtering a flow of air passing therethrough; electrical power means for creating suction within said device to cause a flow of air through said filter means; electrical agitating means for agitating said filter means; means for electrically energizing said power means to cause a flow of air through said filter means; energizing means for automatically energizing said electrical agitating means after said power means is de-energized; and means electrically connected to said power means for controlling the duration of energization of said energizing means, said suction responsive means being adapted to withhold said energizing means from operation until the suction in said device is substantially reduced.

4. In a device of the character described, the combination of: filter means for filtering a flow of air passing therethrough; electrical power means for creating suction in said device to cause a flow of air through said filter means; electrical agitating means for agitating said filter means; means for electrically energizing said power means to cause a flow of air through said filter means; means responsive to the suction in said device for automatically energizing said electrical agitating means; and thermal means electrically connected to said power means and operative to maintain said energizing means energized for a predetermined period of time after said power means is de-energized.

5. In a device of the character described, the combination of: filter means for filtering a flow of air passing therethrough; electrical power means for creating suction in said device to cause a flow of air through said filter means; electrical agitating means for agitating said filter means; a first electrical circuit adapted to supply current to said power means; a second electrical circuit adapted to supply current to said agitating means, said second circuit including switch means; means responsive to suction within said device for closing said switch means; and thermal means in said first electrical circuit for opening said switch after a predetermined period of time.

6. In a device of the character described, the combination of: filter means for filtering a flow of air passing therethrough; electrical power means for creating suction in said device to cause a flow of air through said filter means; electrical agitating means for agitating said filter means; a first electrical circuit adapted to supply current to said power means, including a main switch; and a second electrical circuit connected to said main switch and adapted to supply current to said agitating means, said second circuit including auxiliary switch means, said first and second circuits being adapted to be selectively energized by operation of said main switch; and means responsive to suction in said device for delaying the energization of said second circuit by said auxiliary switch means until the suction has been reduced to a predetermined value.

7. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor device in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; a first electrical circuit connected with said main electric motor means and adapted to supply current thereto, including a main switch; a second electrical circuit connected with said auxiliary electric motor and adapted to supply current thereto, including auxiliary switch means; switch closing means adapted to be operated in response to flow of current through said first circuit to close said auxiliary switch means; and means responsive to suction in said housing for withholding said switch closing means from operation until the suction in said housing is substantially reduced following de-energization of said first circuit.

8. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor means in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; a first electrical circuit connected with said main electric motor means and adapted to supply current thereto, including a main switch; a second electrical circuit connected with said auxiliary electric motor and adapted to supply current thereto, including auxiliary switch means, said auxiliary switch means being of the thermally responsive type; switch closing means responsive to flow of current through said first circuit when said main switch is closed and adapted to close said auxiliary switch means; and means responsive to suction within said housing for withholding said switch closing means from operation until the suction in said housing is reduced to a predetermined value following de-energization of said main motor.

9. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor means in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; a first electrical circuit connected with said main electric motor means and adapted to supply current thereto, including a main switch; a second electrical circuit connected with said auxiliary electric motor and adapted to supply current thereto; auxiliary switch means included in said second electrical circuit, said auxiliary switch means including a thermally controlled element connected in said first electrical circuit and responsive to a flow of current through said first circuit to adapt it to close said second circuit when said main switch is opened; and a second element connected to said thermally controlled element and responsive to suction within said housing for withholding said thermally controlled element from operation until the suction within said housing is reduced to a predetermined value following de-energizing of said main electric motor means.

10. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor means in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; a first electrical circuit connected with said main electric motor means and adapted to supply current thereto, including a main switch; a second electrical circuit connected with said auxiliary electric motor and adapted to supply current thereto; auxiliary switch means connected in said second electrical circuit and including a stationary contact element and a thermally controlled contact element adapted when heated to engage said stationary contact element to close said second circuit, said main switch being movable to a first position to close said first circuit and to a second position to supply current to said thermally controlled contact element; a heating element included in said first circuit and adapted to heat said thermally controlled contact element when said first circuit is closed; and means responsive to suction within said housing for withholding said thermally controlled contact element from engagement with said stationary contact element until said suction is reduced to a predetermined value following movement of said main switch from said first position to said second position.

11. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor means in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; a first electrical circuit connected with said main electric motor means and adapted to supply current thereto, including a main switch; a second electrical circuit connected with said auxiliary electric motor and adapted to supply current thereto; auxiliary switch means connected in said second electrical circuit and including a stationary contact element and a thermally controlled contact element adapted when heated to engage said stationary contact element to close said second circuit, said main switch being movable to a first position to close said first circuit and to a second position to supply current to said thermally controlled contact element; an electrical resistance element included in said first circuit and adapted to heat said thermally controlled contact element when said first circuit is closed; and suction responsive detaining means connected to said thermally controlled contact element and operated by suction within said housing to withhold said thermally controlled contact element from engagement with said stationary contact element during normal operation of said suction cleaner, said suction responsive means being adapted to release said thermally controlled contact element when said suction is reduced to a predetermined value following move-

ment of said main switch from said first position to said second position whereby to permit said thermally controlled contact element to engage said stationary contact element to close said second circuit.

12. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor means in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; a first electrical circuit connected with said main electric motor means and adapted to supply current thereto, including a main switch; a second electrical circuit connected with said auxiliary electric motor and adapted to supply current thereto; auxiliary switch means connected in said second circuit and including a stationary contact element and a thermally controlled contact element adapted when heated to engage said stationary contact element to close said second circuit said main switch being movable to a first position to close said first circuit and to a second position to supply current to said thermally controlled contact element; an electrical resistance element included in said first circuit and disposed adjacent said thermally controlled contact element to heat the same when said first circuit is closed; a tubular member having walls defining a suction chamber; a piston adapted to move in said chamber and connected to said thermally controlled contact element; and a tubular conduit communicating between said suction chamber and the interior of said housing between said suction opening and said discharge opening to subject said piston to suction during normal operation of said suction cleaner to withhold said thermally controlled contact element from engagement with said stationary contact element, said piston acting to release said thermally controlled contact element when said suction is reduced to a predetermined value following movement of said main switch from said first position to said second position whereby to permit said thermally controlled element to engage said stationary contact element to close said second circuit during the period of time in which said thermally controlled contact element remains heated.

13. In a suction cleaner, the combination of: an enclosed housing having a suction opening and a discharge opening; filter means in said housing between said openings and adapted to filter air passing therebetween; a main electric motor means in said housing and adapted when energized to create suction in said housing to move air between said openings and through said filter means; an auxiliary electric motor in said housing and adapted when energized to agitate said filter means; a first electrical circuit connected with said main electric motor means and adapted to supply current thereto, including a main switch; a second electrical circuit connected with said auxiliary electric motor and adapted to supply current thereto; auxiliary switch means connected in said second circuit and including a casing; a contact screw adjustable in said casing; a thermally controlled contact strip in said casing and adapted when heated to engage an end of said contact screw to close said second circuit, said main switch being movable to a first position to close said first circuit and to a second position to open said first circuit and supply current to said contact strip; an electrical resistance element disposed within said casing adjacent said contact strip and included in said first circuit, said resistance element being adapted to heat said contact strip when said first circuit is energized; a member on said casing having walls defining a suction chamber; a piston adapted to move in said chamber and connected to said contact strip; and a tube extending between said suction chamber and the interior of said housing between said suction opening and said discharge opening to subject said piston to suction during normal operation of said suction cleaner to withhold said contact strip from engagement with said contact screw, said piston being adapted to release said contact strip when said suction is reduced to a predetermined value following deenergization of said first circuit by said main switch whereby to permit said contact strip to then engage said contact screw to energize said second circuit during the period of time in which said contact strip remains heated.

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