Oct. 3, 1961 J. H. BEACH 3,002,216

ELECTRICAL CONTROL FOR SUCTION CLEANERS

Filed Sept. 29, 1958 3 Sheets-Sheet 1

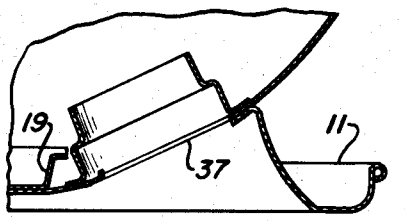


Fig. 2

Fig. 1

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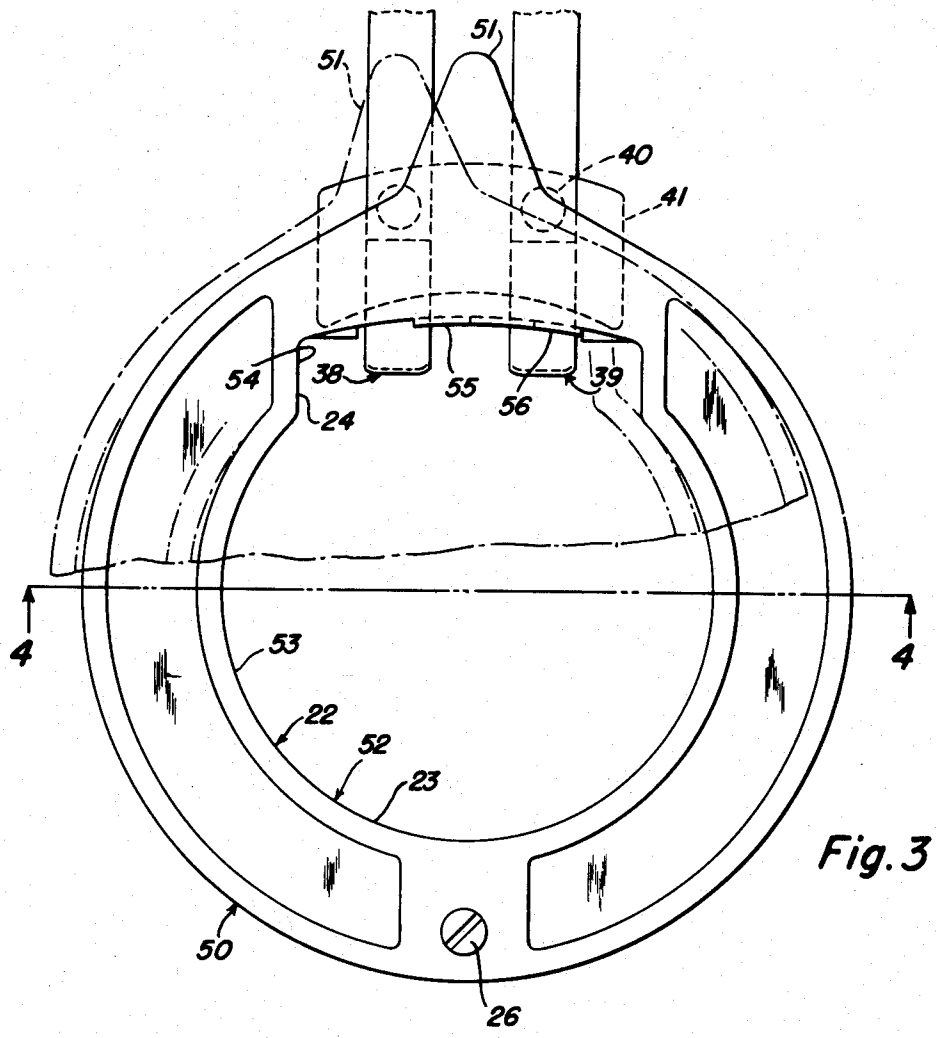


Fig. 3

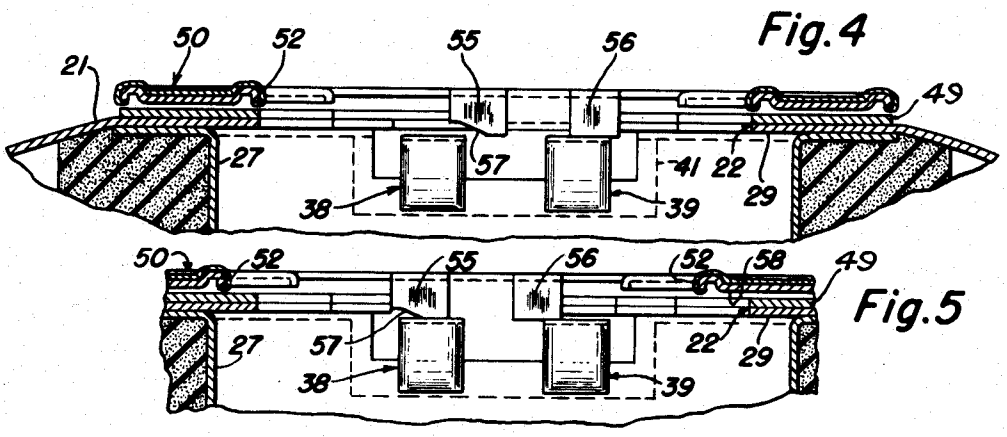


Fig. 4

Fig. 5

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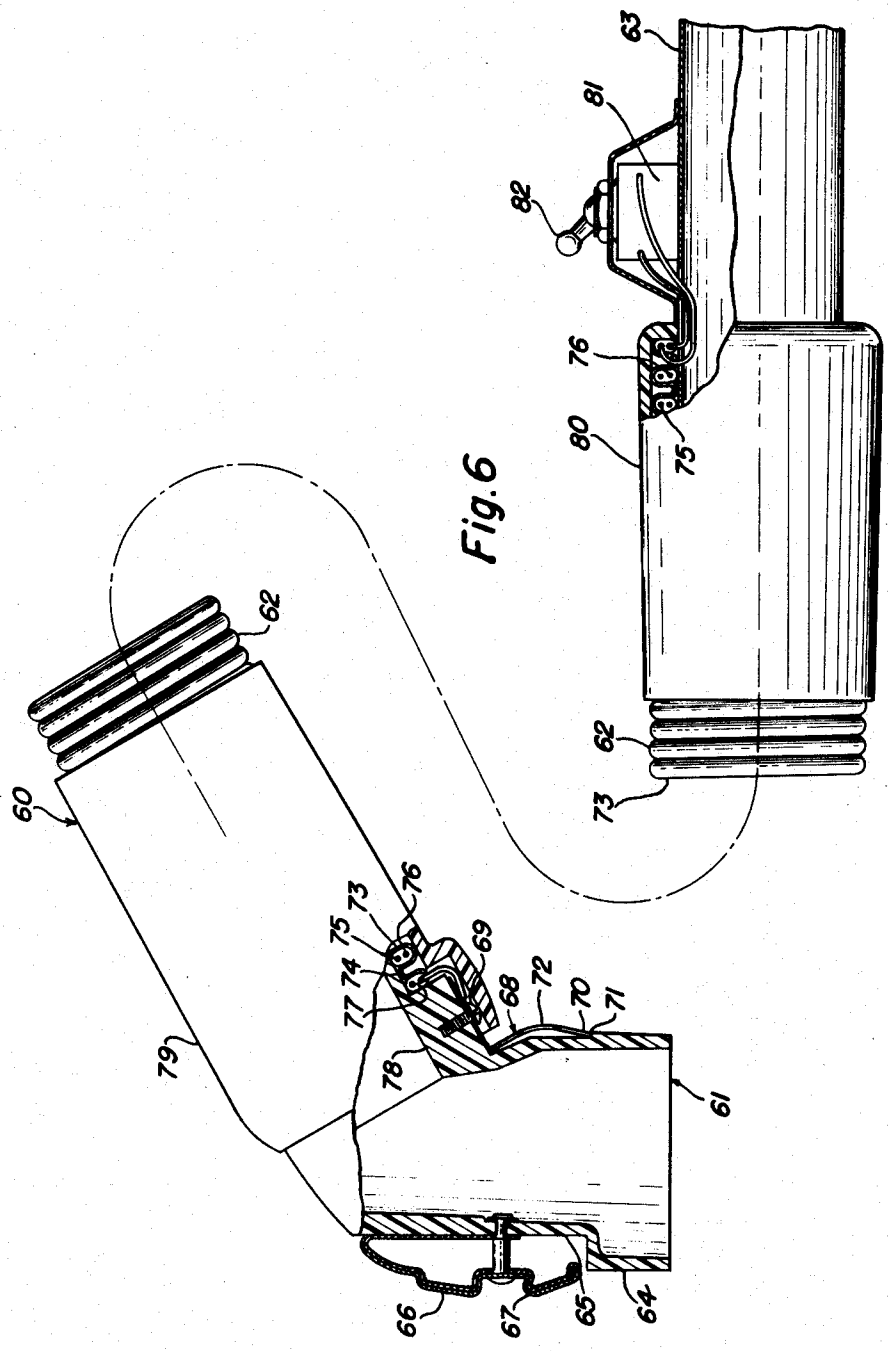


Fig. 6

United States Patent Office 3,002,216 Patented Oct. 3, 1961

3,002,216

ELECTRICAL CONTROL FOR SUCTION CLEANERS

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Filed Sept. 29, 1958, Ser. No. 763,875
3 Claims. (Cl. 15—327)

The present invention relates to suction cleaners and more particularly to a switch arranged with respect to the cleaner suction air inlet to control operation of the cleaner motor.

An object of the invention is to provide a suction cleaner with an electric motor switch which also controls removable insertion of a hose into the cleaner air inlet. Another object is to provide a suction cleaner with an electric motor switch which prevents attachment of the hose to the cleaner air inlet when the switch is in closed circuit position for cleaning surfaces by air discharged under pressure from the cleaner. A further object is to provide a suction cleaner with one motor switch maintained in open circuit position when a hose is attached to the cleaner air inlet and another motor switch on the hose for remotely controlling operation of the cleaner motor. Other objects and advantages of the invention will become apparent from the following description and drawings, wherein:

FIGURE 1 is an enlarged sectional view of the cleaner air inlet with the hose attached and the remainder of the cleaner casing shown on a reduced scale,

FIGURE 2 is a sectional view of the cleaner air discharge opening,

FIGURE 3 is a top plan view of the switch lever showing the switch in open circuit position in full lines and in closed position in dot and dash lines,

FIGURES 4 and 5 are sectional views taken on line 4—4 in FIGURE 3 and showing the switch respectively in open and closed positions, and

FIGURE 6 is a broken view partly in section of the cleaner hose detached from the cleaner.

The embodiment of the invention herein disclosed comprises a cleaner body having a supporting base 11 on which is suitably mounted the lower portion 12 of a spherical casing 13 the upper portion 14 of which is hinged at 15 to the lower casing section 12 and is secured thereto by a latch 16. A motor 17 and fan 18 are combined as a unit which is supported within the lower casing section 12 between a resilient cup 19 and a bulkhead 20 secured to the lower casing section 12.

Formed in the top wall 21 of the upper casing section 14 is a suction air inlet 22 defined by an arcuate wall portion 23 terminating in an offset portion 24. A metal sleeve 25 is secured to the casing top wall 21 by a bolt 26 and has an outwardly offset upper wall portion 27 defining an offset area 28 whereby the defining wall of the cleaner inlet 22 projects inwardly of the offset wall portion 27, and the lower portion 30 of the sleeve 25 is contoured to form a continuation of the inlet opening 22. Attached to the sleeve 25 is a sponge rubber ring 31 the lower surface 32 of which engages a mounting plate 33 of a filter bag 34 having an inlet 35. A suitable bracket 36, only partly shown, is mounted on the bulkhead 20 to support the bag mounting plate 33 relative to the sponge rubber ring 31. An air outlet 37 similar in contour to the inlet opening 22 is provided in the lower casing section 12 within the periphery of the base 11 as shown in FIGURE 2 for discharging air from within the casing 13.

Stationary cleaner switch contacts 38 and 39 for the motor 17 are arranged at the cleaner air inlet 22 and are mounted by rivets 40 to a terminal block 41 interposed between the sponge rubber ring 31 and a sheet of electric insulating material 42 along the inner surface 29 of the top wall 21 of the casing section 14. Each of the contacts 38—39 has a portion 44 projecting into the offset sleeve area 28 and terminates in an arcuate end 43 projecting inwardly of the cleaner air inlet opening 22 as clearly shown in FIGURES 1 and 3. The opposite end of the stationary contact 38 is connected by leads 45 and 46 through the cleaner motor 17 to an electric plug 47, and the other contact 39 is connected by a lead 48 to the plug 47 which is connectible to a source of electric current in a manner well known in the art.

Cooperating with the stationary contacts 38—39 is a switch ring lever 50 pivotally supported by the bolt 26 and has a projecting operating member 51. The switch ring 50 is provided with a coating of insulation and overlies a ring 49 of insulating material and is insulatably mounted on the bolt 26. The switch ring 50 has an opening 52 of the same configuration as the cleaner air inlet 22 and is defined by an arcuate wall portion 53 and an offset section 54 as shown in FIGURE 3. Two contacts 55—56 depend from the ring 50 and the contact 55 has an offset surface 57, whereby when the switch ring is rotated clockwise as viewed in FIGURE 3 to the full line position the contact 55 is disengaged from the stationary contact 38 and the switch is in open circuit position. In the open circuit position the opening 52 in the switch ring 50 is aligned with the suction air inlet 22. Movement of the switch counterclockwise to the dot and dash line position in FIGURE 3 brings the contacts 55—56 into closed circuit position relative to the stationary contacts 38—39, as shown in FIGURE 5, to energize the motor 17. When the switch ring 50 is in its closed circuit position a portion 58 thereof overlies the cleaner air inlet 22, as shown in FIGURE 5, to prevent the operator inserting the end of a suction cleaner hose.

The hose 60 employed with the suction cleaner is shown in FIGURE 6 and includes a connector 61, flexible hose portion 62 and metal wand 63 to which a suitable unshown surface cleaning tool may be attached. The connector 61 is formed of electric insulating material and has a portion 64 contoured complementary to the air inlet 22 and the lower portion 30 of the cleaner inlet sleeve 25 to prevent rotation relative to the air inlet 22. Mounted in a recessed portion 65 of the connector 61 is a spring latch 66 having a hook 67 engageable with the lip of the cleaner air inlet 22 as shown in FIGURE 1 to removably attach the hose to the cleaner body. The latch 66 is coated with insulation on its exterior surface. A pair of terminals 68 only one of which is shown is mounted on the connector 61 by screws 69. Each terminal 68 has one end 70 seated against a shoulder 71 to provide an arcuate contact engaging portion 72 normally spaced from the connector 61.

The flexible portion 62 of the hose 60 comprises a tube of plastic material 73 formed throughout its length with a spiral corrugation 74 and lodged within the inner facing folds of the corrugations are two electrical conductors 75—76 enclosed within a sheath 77 of electric insulating material. The slack material in the tube 73 between the electric conductors 75—76 allows the hose portion 62 to be extended. The inner end of the flexible hose 62 is suitably secured to the cylindrical portion 78 of the hose connector 61 and is enclosed by hand grip 79. The conductors 75—76 are attached to the connector contacts 68 by the screws 69.

The outer end of the flexible hose 62 is also suitably secured to the metal wand 63 and enclosed by a hand grip 80. A toggle switch 81 is mounted on the wand 63 and is connected to the electrical conductor 75—76. A switch operating lever 82 is provided to open and close

the circuit through the conductors 75—76 to the contacts 68 on the hose connector 61.

If it is desired to clean surfaces by means of a suction air stream the operator grasps the projection 51 on the switch ring 50 and rotates the latter to arrange the contacts 55—56 in open circuit position as shown in FIGURE 4 whereby the switch contact 55 is disengaged from the cleaner contact 38. When the switch ring is in open circuit position its opening 52 is aligned with the cleaner air inlet 22 to permit insertion of the hose connector 61 into the sleeve 25. The air inlet 22 and lower portion 30 of the sleeve 25 are formed complementary to the hose connector 61 so that their offset portions prevent rotation of the connector 61 relative to the cleaner casing. The offset portions also position the connector contacts 68 in engagement with the stationary contacts 38—39 to complete the electrical circuit from the electric plug 47 to the motor 17 and to the remote switch 81 on the hose 60. It will be noted that with the hose connector 61 inserted in the air inlet 22 the cleaner switch ring 50 remains in open circuit and the hose connector 61 prevents rotation of the switch ring 50 to closed position. Movement of the remote switch lever 82 to its "on" position closes the circuit to the cleaner motor 17 to energize the latter and operate the fan 18. Rotation of the fan 18 creates a suction air stream in the hose 60 whereby movement of the unshown cleaning tool over a surface removes dirt therefrom by suction and the dirt laden air passes through the hose 60 into the filter bag 34 which removes the dirt from the air stream and the latter is finally discharged under pressure through the outlet 37 to the atmosphere. When the suction cleaning operation is completed the switch lever 82 is moved to "off" position to de-energize the motor 17.

When it is desired to clean surfaces by the air discharged from the outlet 37 the cleaner casing is placed on its side to expose the outlet 37 and the hose connector 61 is removed from the air inlet 22 and inserted in the outlet 37. A rotative force is then applied to the projection 51 on the cleaner switch ring 50 to rotate the latter to its "on" position to move the contacts 55—56 into engagement with the cleaner contacts 38—39 as shown in FIGURE 5 to close the electrical circuit from the plug 47 to the cleaner motor 17 to energize the latter. In the closed circuit position of the ring switch 50 the portion 58 overlies the air inlet 22, as shown in FIGURE 5, to prevent insertion of the hose connector 61 into the air inlet 22 in the even the operator has neglected to previously insert the hose connector 61 in the air outlet 37. The rotating fan 18 draws air through the inlet 22 and discharges the air under pressure from the cleaner

casing 13 for passage through the outlet 37, hose 60 and the cleaning tool onto the surface to be cleaned.

While I have shown and described but one embodiment of my invention, it is to be understood that this embodiment is to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structure shown and described but to include all equivalent variations except as limited by the scope of the claims.

I claim:

1. A suction cleaner comprising: a casing having an air inlet open at all times to atmosphere and an air outlet, a motor-fan unit in said casing for drawing air through said inlet into said casing and discharging air through said outlet, a hose having a nozzle at one end for cleaning a surface, a connector at the opposite end of said hose insertable in said open air inlet for drawing air through said hose into said casing and insertable in said outlet for discharging air through said hose, first contact means mounted on said casing at said inlet and connected to the motor of said motor-fan unit, first switch means for said first contact means movably mounted on said casing and movable to open and closed circuit positions to control operation of the motor, said first switch means when in closed circuit position arranged with respect to said air inlet to prevent insertion of said connector whereby air passes directly through said open air inlet into said casing and is discharged through said outlet, and said first switch means when moved to open circuit position arranged with respect to said air inlet to permit insertion of said hose connector into said inlet, and second contact means mounted on said connector and engageable with said first contact means when said hose connector is inserted in said air inlet, and second switch means on said hose and electrically connected with said second contact means to open and close the circuit to said motor when said hose is attached to said air inlet.

2. A suction cleaner as described in claim 1, and said hose connector being formed of electric insulating material to provide a terminal block on which said second contact means are mounted.

3. A suction cleaner as described in claim 1, and means preventing movement of said first switch means to said closed circuit position when said hose connector is inserted in said air inlet.

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