

June 24, 1941.

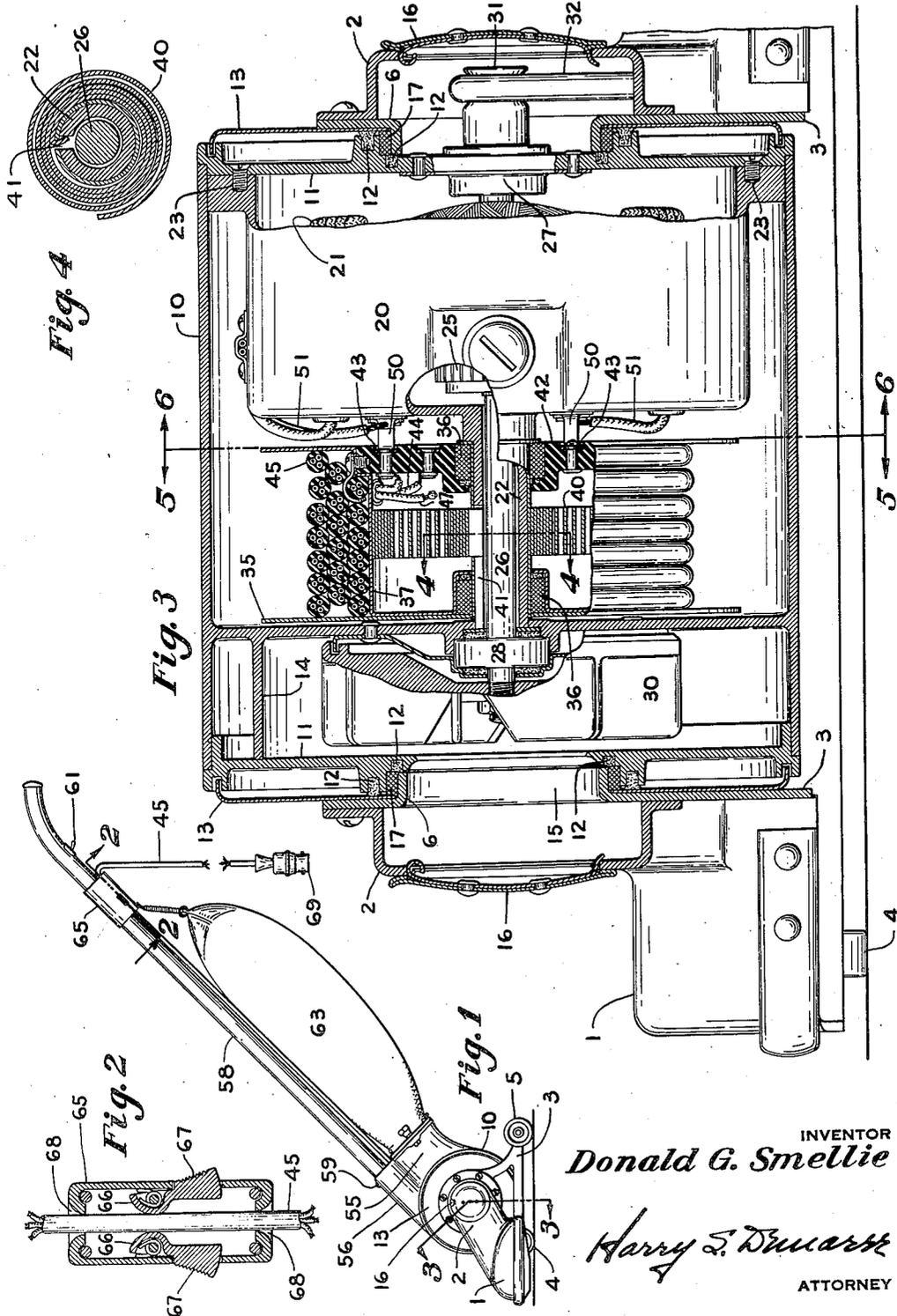
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2,246,863

SUCTION CLEANER

Filed Dec. 10, 1937

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

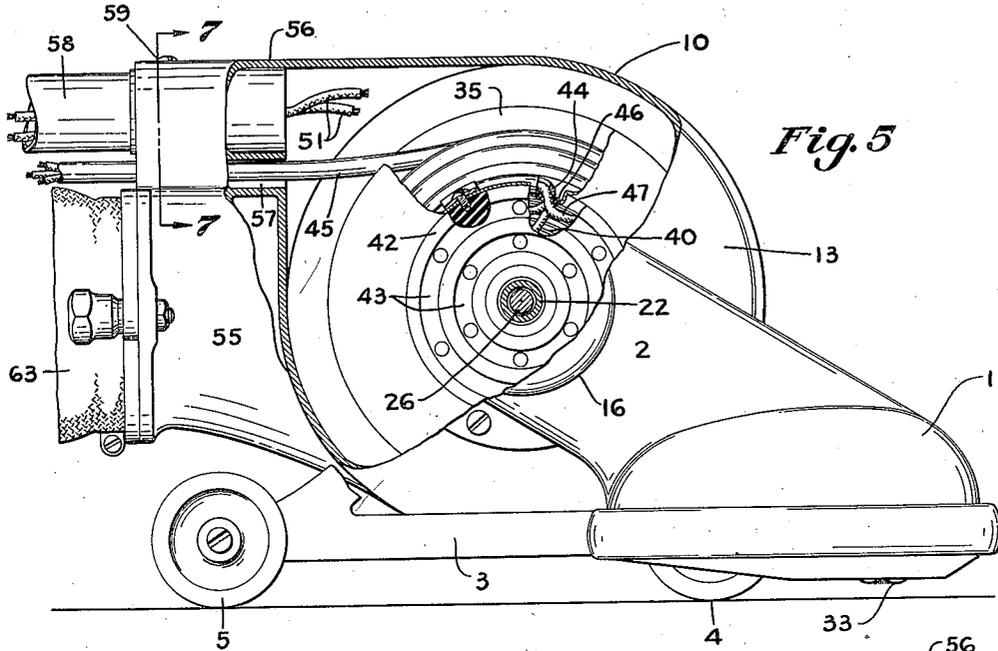


Fig. 5

Fig. 6

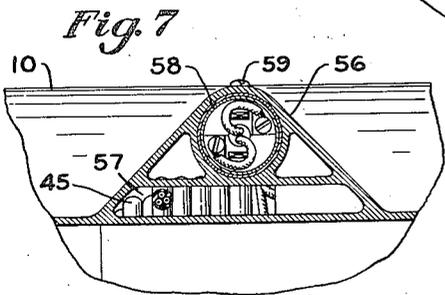
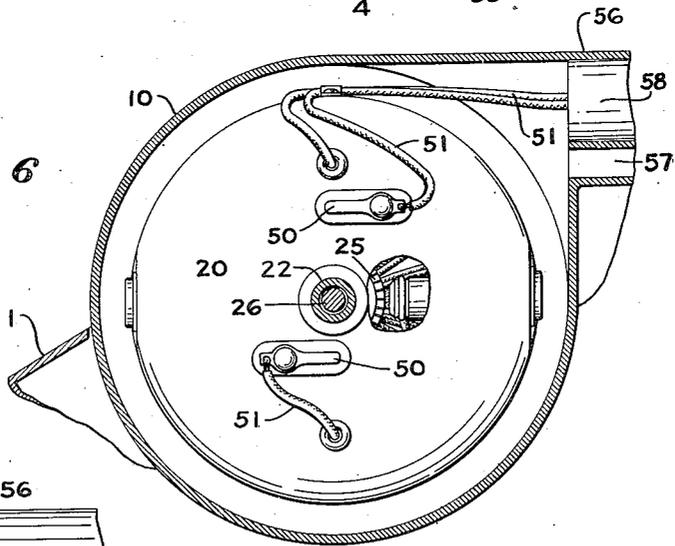


Fig. 7

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4 Sheets-Sheet 4

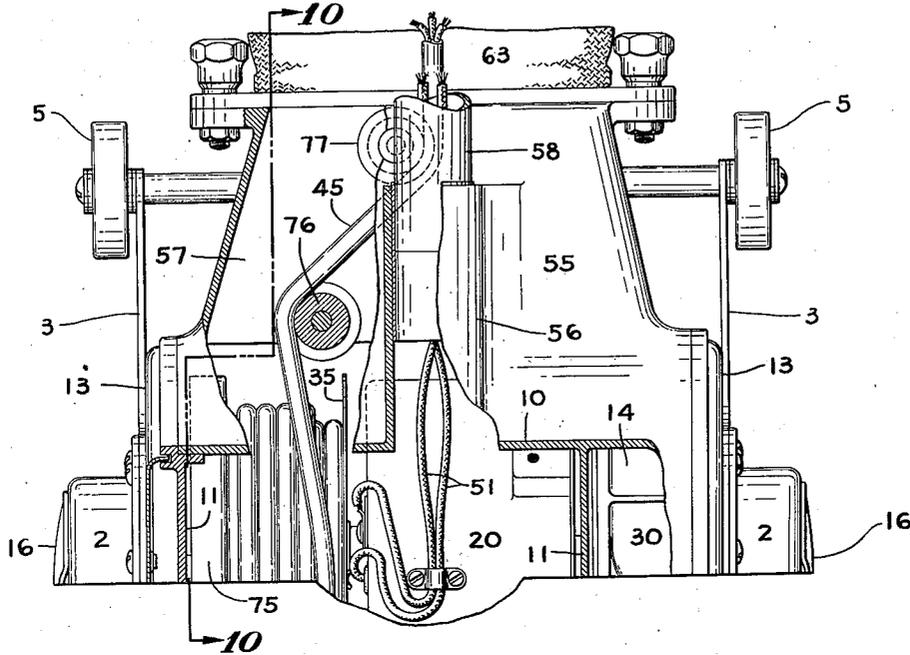


Fig. 9

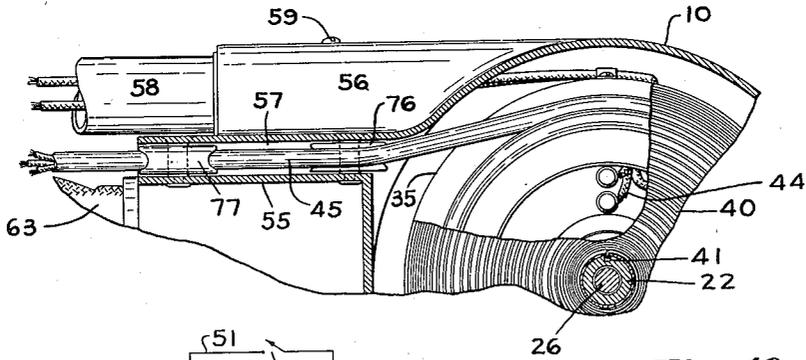


Fig. 10

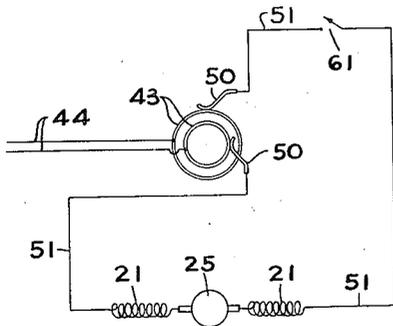


Fig. 11

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2,246,863

SUCTION CLEANER

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18 Claims. (Cl. 15—16)

The present invention relates to suction cleaners in general and particularly to a suction cleaner provided with new and improved electrical connections. More specifically the invention comprises a new and novel cleaner structure embodying a conductor cord take-up.

It is an object of the present invention to provide a new and improved suction cleaner. It is another object of the invention to provide a suction cleaner embodying improved electrical connections. Still another object is to provide a suction cleaner with an automatic cord take-up. A still further object of the invention is to provide a suction cleaner in which the conductor cord take-up is carried by the body proper of the cleaner. Still another object of the invention is to provide a suction cleaner in which manually operable means controlled by the operator cause the electric conductor to be wound upon a reel concentric with the axis of the driving motor. These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which preferred embodiments of the present invention are disclosed:

Figure 1 is a side view of a suction cleaner embodying the present invention;

Figure 2 is a partial section upon the line 2—2 in Figure 1 and shows the manually operable control means for the cord take-up;

Figure 3 is a transverse section through the cleaner body upon the line 3—3 of Figure 1, and discloses the relationship of the driving motor, the suction-creating fan and fan chamber, and the cord take-up;

Figure 4 is a partial section upon the line 4—4 of Figure 3 and shows the actuating spring of the cord take-up;

Figure 5 is a side elevation of the cleaner embodying the present invention, a partial section being shown through the cleaner body upon the line 5—5 of Figure 3 which shows the contact rings carried by the rotatable cord take-up;

Figure 6 is a section upon the line 6—6 of Figure 3 and shows the wiper contacts which cooperate with the contact rings illustrated in Figure 5;

Figure 7 is a section through the cleaner handle and shows the cord inlet slot, being taken upon the line 7—7 of Figure 5;

Figure 8 is a section similar to Figure 3 and shows a second preferred embodiment of the invention;

Figure 9 is a top view of a cleaner constructed in accordance with the second embodiment with part of the top of the cleaner casing broken away to show the position of the cord take-up therein;

Figure 10 is a partial section upon the line 10—10 of Figure 9;

Figure 11 is a diagrammatic illustration of the electrical circuit common to both embodiments of the invention.

Suction cleaners are generally unprovided with means to accommodate the elongated conductor cord necessary to connect the cleaner to a source of current other than simple winding posts upon the handle on which the cord can be wrapped. In a few cleaners cord take-ups have been embodied in the handle structure. Such take-ups, either hand operated or motor operated, have been objectionable in that their weight has been excessive and, through being positioned on the handle, that weight has been transmitted to the operator who holds the upper end thereof.

In the improved cleaner constructed in accordance with the present invention the objectionable features of the earlier prior art structures have been eliminated through the incorporation of the cord take-up into the body proper of the cleaner. The cleaner constructed in accordance with the present invention combines an improved cleaner construction with a novel arrangement of a cord take-up in a manner which necessitates a minimum of parts and which results in a functional operation not heretofore known. By positioning the cord take-up concentric with the motor axis, about which the handle also pivots, and by having the motor casing as well as the cord take-up casing rotate and pivot with the handle, a compact and completely efficient cleaner has been produced.

Referring again to the drawings and to Figures 1 to 7, inclusive, in particular, the first preferred embodiment of the invention is disclosed. A chassis, comprising a nozzle 1 with rearwardly and upwardly extending passageways 2, 2 at the sides thereof, and a frame 3, is movably supported upon front wheels 4 and rear wheels 5. The rearward extremity of each passageway 2, 2 carries a circular bearing plate 6 on its inner side, the plates being formed with aligned inner flanges.

A motor-fan casing 10 is positioned between the passageways 2, 2 with its side walls 11, 11 rotatably seated upon the bearing plates 6, 6 thereof. Ring seals of felt or similar material, indicated at 12, 12, etc., are provided at each of the joints and appearance plates 13, 13 carried

by the passageways extend adjacent the end walls to cover the entire assembly.

Bearing rings 17, 17 are interposed at the joints and provide a smoothly rotatable unit.

Interiorly the motor-fan casing 10 is formed at one end as a fan chamber 14 which is open through the eye or opening 15, formed in the adjacent bearing plate 6 into the adjacent passageway 2 leading to the nozzle 1. A removable cover plate 16 in the passageway 2 opposite the eye 15 permits of the attachment of dusting tools, if desired. A similarly positioned removable cover plate 16 is provided in the opposite passageway 2 which gives ready access to the driving belt positioned therein, as will be hereinafter set forth.

At the opposite end from the fan chamber 14 the motor-fan casing 10 is interiorly provided with a motor housing 20 which comprises the stator of the motor and which carries the field windings 21. Housing 20 is formed with an extended hub portion 22 which reaches to the inner side wall of fan chamber 14 for a purpose which will hereinafter become apparent. The outer side wall of motor housing 20 is formed by the enclosing motor-fan casing 10 side wall 11, the side wall and the housing being secured together by removable screws 23, 23, etc.

The motor armature 25 is mounted upon the rotatable shaft 26 which is supported by bearings 27 and 28 located at the motor housing outer wall 11 and at the inner wall of the fan chamber 14. Shaft 26 extends through, and is housed by, the extended hub portion 22 of the motor casing and within the fan chamber 14 it carries the suction-creating fan 30. At its opposite end it extends through the supporting bearing 27 into the adjacent passageway 2 where it carries a belt pulley 31 to which is connected a belt 32. Belt 32 extends down the passageway 2 into the nozzle 1 where it rotates in a common and well known manner a rotary agitator the lower surface-contacting elements of which can be seen in Figure 5. The agitator is indicated by the reference character 33. Pulley 31 is opposite the removable cover 16 thereby permitting easy attachment and detachment of the belt.

Positioned axially at one end of the motor casing 20 and between the latter and the fan chamber 14 is a cord reel 35 which is within the radial peripheral dimension of the motor casing 20 and is mounted for independent rotation upon bearings 36, 36 carried by the extended hub 22 of motor casing 20. The cylindrical seat 37 of reel 35 is spaced at a considerable distance from the supporting hub 22 and encloses a coiled flat spring 40 the inner end of which is fixed to the hub 22, through being inturned to seat within a slot 41 formed in that hub, and the outer end of which is suitably fixed to the cylindrical seat 37. Spring 40 at all times exerts a rotating force upon the reel 35 which is clockwise when viewed from the motor end of the casing 10.

One side wall of cord reel 35 includes a section 42 formed of suitable insulation material such as "Bakelite." Inset in the outer surface of this insulation are concentric rings 43, 43 of current-conducting material the terminals of which extend to the inside of the reel where the leads 44, 44 of the conductor 45 are attached. A third lead 47 grounds the reel 35 and the cleaner. The conductor extends from the terminals through an opening 46 in the seat 37 to encircle that element.

Stationary wiper contacts 50, 50 are mounted

upon the inside wall of motor casing 20 adjacent the cord reel, one for each of the conducting rings 43 and suitable leads 51, 51 convey the current from the wiper contacts to the motor and to other parts of the machine.

The motor fan casing 10 additionally includes an exhaust outlet 55, a handle socket 56, and a slot or port 57 for the conductor 45. The usual suction cleaner handle 58 removably seats within the socket 56 where it is held by a screw 59, leads 51, 51 extending upwardly therethrough to a manually operable switch 61 so that the circuit through the machine can be opened and closed. The upper end of the handle supports a dust bag 63 which is removably attached to the exhaust outlet 55 in a common and well known manner.

The upper end of the handle is also provided with a cord controller which comprises two opposed spring-pressed eccentrics 66, 66 formed with knurled lever portions 67, 67 which extend outwardly through the controller casing 65. The conductor 45 passes directly through the controller housing through openings 68, 68 which are curved and rounded to prevent injury to the conductor surface. The conductor is of such width and the eccentrics 66, 66 are so positioned that the spring action of the eccentrics tends to clamp the conductor therebetween. This clamping action is increased by the downward pull exerted upon the conductor by the spring 40 which tends frictionally to rotate the eccentrics. A pressure exerted upon the levers 67, 67 forcing them together functions to rotate the eccentrics 66, 66 in a direction to move them away from the cord 45 and to permit that element to be drawn toward the machine under the impetus imparted to the reel by the spring 40. The cord can continue to wind upon the reel 35, in the manner illustrated in Figure 3, until such time as the plug 69 at the outer end of the conductor contacts the controller housing 65.

The electrical circuit of the machine is perhaps best understood by reference to Figure 11 which comprises a diagrammatical illustration thereof. The incoming leads 44, 44 of the conductor 45 are shown attached to the rotatable rings 43, 43 which are contacted by the motor-carried wiper contacts 50, 50. The handle switch 61 is in series with one of these contacts through the leads 51, 51 extending through the handle thereto and back. The motor field windings 21, 21 and the armature 25 are shown in the circuit and the switch 61 is seen to control the flow of current through the field windings and armature of the motor.

The operation of the cleaner constructed in accordance with the present embodiment of the invention is quite simple. With the plug 69 at the outer end of cord 45 attached to an outlet the machine is ready to be operated. The conductor 45 has been drawn out to the necessary length without depressing the levers 67, 67 for the frictional force exerted by the moving cord 45 pivots the eccentrics 66, 66 into non-clamping relationship. With the plug connected the motor switch 61 is closed and current passes to the motor in the manner described above in connection with the electrical circuit illustrated in Figure 11. In the cleaner operation the angular position of the handle 58 relative to the cleaner chassis will change and this angular adjustment is accomplished by the rotation of the motor-fan casing 10, together with the fan chamber 14 and motor housing 20, about the axis of

the motor which is concentric with the pivotal axis formed by the bearing plates 6, 6 upon which the casing pivots. In this pivotal movement of the handle there is no relative rotation between the reel 35 and the motor or fan housing, the entire structure pivoting as a unit.

Upon the conclusion of the cleaner operation it is desirable to store the length of the cord. The plug 69 at the outer end of cord 45 is disconnected and the operator compresses the levers 67, 67, immediately the coil spring 40 causes the reel 35 to rotate and the conductor 45 to be drawn into the casing 10 and to wrap thereabout, in the manner illustrated in Figure 3. The movement of the cord back and forth across the reel is a natural result and is permitted without hindrance by the elongated opening 57 through which the conductor enters the casing. The current is conducted to the electrical circuit of the motor in all angular positions of the reel as the wiper contacts 50, 50 at all times connect the conductor 44, 44 to the motor leads.

Referring now to Figures 8, 9, and 10, a second preferred embodiment of the present invention is disclosed. Functionally this embodiment is very similar to that first described but differs therefrom in the arrangement of the parts. According to this embodiment the fan chamber 14 is positioned as in the first embodiment but the motor casing 20 no longer uses an outer wall 11 of the motor-fan casing 10 as a side wall; it has instead been shifted over to a point immediately adjacent the fan chamber. The conductor take-up in this embodiment is positioned axially at one end of the motor housing and within the radial peripheral dimension of the latter and not between the motor and the fan chamber as in the first embodiment.

In this second embodiment the armature 25 of the motor is again carried by the motor shaft 26 which also supports the suction-creating fan 30 in the fan chamber 14. The shaft itself is rotatably supported in the bearings 72 and 73 which are carried by the side wall 74 of the motor housing 20 adjacent the fan chamber and by the elongated hub 22 at the opposite side of the motor which in the present embodiment has been enlarged in diameter to house the bearing 73. As in the first embodiment the end of the motor shaft 26 opposite the fan 30 carries the pulley 31 which seats the power-transmitting belt 32.

The cord take-up constructed in accordance with the second embodiment is quite similar to that of the first embodiment in that the reel 35 is rotatably carried by sleeve bearings 36, 36 upon the extended hub 22 of the motor casing, and in that the insulation side 42 of the reel is again provided with the ring contact plates 43, 43 which contact the wiper contacts 50, 50 carried by the motor casing. The actuating spring 40 of the reel, however, is in this embodiment positioned at the side of the reel where its size is not restricted by the internal diameter of the cylindrical seat 37. The spring is fixedly secured to the hub 22 as illustrated in Figure 4 in connection with the first embodiment, and is secured to the reel 35 by an enclosing flange 75 which is fixed to the reel and by which it is enclosed. Spring 40 performs the function in this embodiment, as in the first embodiment, of rotating the reel to wind the cord conductor thereon.

Because of the off-set relationship of the reel 35 with respect to the handle, guide pulleys 76

and 77 have been provided which are mounted adjacent the reel 35 and adjacent the end of the cord port 57 and which serve to guide the conductor 45 from the central position on the casing at which it enters the port to a position adjacent the center of the reel 35 so that it naturally winds back and forth thereon as the reel rotates.

The operation of this form of the invention is functionally the equivalent of that first described and the control means at the upper end of the handle is identical in both embodiments.

I claim:

1. In a suction cleaner, an ambulatory chassis, a handle pivoted on said chassis, a driving motor including a rotor and a stator, the rotational axis of said motor extending in the direction of the pivotal axis of said handle, a cord take-up comprising a reel positioned at the side of and within the peripheral dimensions of said motor and independently rotatable about said motor axis, means to rotate said reel, and a cord wound on said reel, electrically connected to said motor and extended along said handle.

2. In a suction cleaner, an ambulatory chassis, a handle pivoted on said chassis, a driving motor including a rotor and a stator, the rotational axis of said motor extending in the direction of the pivotal axis of said handle, a cord take-up comprising a reel positioned at the side of and within the peripheral dimensions of said motor and independently rotatable about said motor axis, means to rotate said reel, a cord wound on said reel, electrically connected to said motor and extended along said handle and manually operable means on said handle to control the winding of said cord on said reel.

3. In a suction cleaner, an ambulatory chassis, a handle pivoted on said chassis, a driving motor including a rotor and a stator, the rotational axis of said motor extending in the direction of the pivotal axis of said handle, a cord take-up comprising a reel positioned at the side of and within the peripheral dimensions of said motor and independently rotatable about an axis extended in the direction of the pivotal axis of said handle, means tending at all times to rotate said reel in one direction, a current-conducting cord connected to said motor and extended along said handle and wound upon said reel, and manually operable means to limit the movement of said cord under the winding impetus of said reel.

4. In a suction cleaner, an ambulatory chassis, a handle pivoted on said chassis, a driving motor including a rotor and a stator, the rotational axis of said motor extending in the direction of the pivotal axis of said handle, a cord take-up comprising a reel positioned at the side of and within the peripheral dimensions of said motor and independently rotatable about an axis extended in the direction of the pivotal axis of said handle, means tending at all times to rotate said reel in one direction, a current-conducting cord connected to said motor and extended along said handle and wound upon said reel, and manually releasable cord-clamping means on said handle to fix the position of said cord and thereby to prevent rotation of said reel.

5. In a suction cleaner an ambulatory chassis including a nozzle, a handle pivoted upon said chassis, a casing rotatable upon said chassis about an axis extended in the direction of the pivotal axis of said handle, a nozzle-connected

fan chamber and a motor housing rotatable with said casing, a fan in said chamber, a motor in said housing connected to said fan, and a cord take-up comprising a reel carried by said casing and rotatable independently about the axis thereof, said reel being positioned within the peripheral dimensions of said motor and between said fan chamber and said motor housing, and a current-conducting cord wound upon said reel and electrically connected to said motor.

6. In a suction cleaner an ambulatory chassis including a nozzle, a casing rotatable upon said chassis, a handle connected to and rotatable with said casing, a nozzle-connected fan chamber and a motor housing in and rotatable with said casing, a fan in said chamber, a motor connected to said fan in said housing, a cord take-up within said casing independently rotatable about the axis of said casing and positioned axially at one side of said motor housing, and a current-conducting cord connected to and windable upon said reel, said cord being electrically connected to said motor.

7. In a suction cleaner an ambulatory chassis including a nozzle, a casing rotatable upon said chassis, a handle connected to and rotatable with said casing, a nozzle-connected fan chamber and a motor housing in and rotatable with said casing, a fan in said chamber, a motor in said housing connected to said fan, a cord take-up within said casing independently rotatable about the axis of said casing and positioned between said fan chamber and motor housing, and a current-conducting cord wound upon said reel and electrically connected in the circuit of said motor.

8. In a suction cleaner an ambulatory chassis including a nozzle, a casing rotatable upon said chassis, a handle connected to and rotatable with said casing, a nozzle-connected fan chamber and a motor housing in and rotatable with said casing, a fan in said chamber, a motor in said housing connected to said fan, a cord take-up within said casing independently rotatable about the axis of said casing and positioned between said fan chamber and motor housing, a cord passageway in said casing near the connection of said handle thereto, a cord guide and control on said handle, and a current-carrying cord extended through said guide and control, through said passageway and onto said reel and into electrical connection with said motor.

9. In a suction cleaner, an ambulatory chassis, a propelling handle pivoted on said chassis, a motor mounted on said chassis with its axis extended transversely of said handle, a cord take-up including a rotatable reel positioned axially at the side of said motor, a current-conducting cord wound upon said reel, and relatively slidable contacts upon said reel and said motor to connect said cord electrically to said motor in all rotational positions of said reel, and means to actuate and control said reel.

10. In a suction cleaner, an ambulatory chassis, a handle pivoted on said chassis, a motor mounted on said chassis with its axis extended transversely of said handle, a cord take-up including a rotatable reel positioned axially at the side of said motor, cooperating current-conducting rings and wiper contacts on said reel and on said motor to conduct current therebetween, spring means within said reel tending to rotate it, a current conductor wound upon said reel and extended along said handle, and cord locking means on said handle.

11. In a suction cleaner, an ambulatory chassis,

a casing carried by said chassis, a conductor take-up within said casing including a reel rotatable about a transverse axis, a handle axially at one side of said reel, a conductor passageway slot adjacent said handle, pulleys to guide a conductor to a position adjacent said reel, and a conductor extended along said handle, over said pulleys and onto said reel.

12. In a suction cleaner, an ambulatory chassis, a suction-creating unit including a motor carried by said chassis and rotatable relative thereto, a pivoted handle connected to said unit with its pivotal axis coincidental with the axis of rotation of said unit, a cord take-up rotatable about the pivotal axis of said handle and positioned axially adjacent said motor, and a current-carrying cord carried by said take-up and connected to said motor.

13. In a suction cleaner, an ambulatory chassis, a suction-creating unit including a motor and a fan chamber carried by said chassis and rotatable relative thereto, a pivoted handle connected to said unit with its pivotal axis coincidental with the axis of rotation of said unit, a cord take-up positioned between the motor and fan chamber, and a current-conducting cord carried by said take-up and connected to said motor.

14. In a suction cleaner, an ambulatory chassis, a suction-creating unit including a motor carried by said chassis, a casing enclosing said unit and rotatable relative to said chassis, a pivoted handle connected to said casing with its pivotal axis coincidental to the axis of rotation of said casing, a cord take-up within said casing and axially adjacent said motor, and a current-conducting cord carried by said take-up and connected to said motor.

15. In a suction cleaner, an ambulatory chassis, a suction-creating unit including a motor carried by said chassis and rotatable relative thereto, a pivoted handle connected to said unit with its pivotal axis coincidental with the axis of rotation of said unit, a cord take-up axially at the side of said motor including a cord-seating reel rotatable about the said axis and a spiral actuating spring at the side thereof, and a current-carrying cord carried by said take-up and connected to said motor.

16. In a suction cleaner, an ambulatory chassis, a suction-creating unit including a motor carried by said chassis and rotatable relative thereto, a pivoted handle connected to said unit with its pivotal axis coincidental with the axis of rotation of said unit, a cord take-up axially at the side of said motor including a cord-seating reel rotatable about the said axis and a spiral spring within said reel, and a current-carrying cord carried by said take-up and connected to said motor.

17. In a suction cleaner, an ambulatory body, a motor mounted on said body, a cord reel rotatably supported on said body and within the radial peripheral dimensions of said motor, and a current-conducting cord wound upon said reel and electrically connected to said motor.

18. In a suction cleaner, an ambulatory body, a fan chamber in said body, a motor mounted on said body and spaced from said fan chamber, a cord reel rotatably supported on said body and positioned between said spaced motor and fan chamber, and a current-conducting cord wound upon said reel and electrically connected to said motor.