F. C. DE REAMER.

ELECTRIC SWITCH.

APPLICATION FILED NOV. 6, 1919.

1,393,509. Patented Oct. 11, 1921.

Fig. 1.

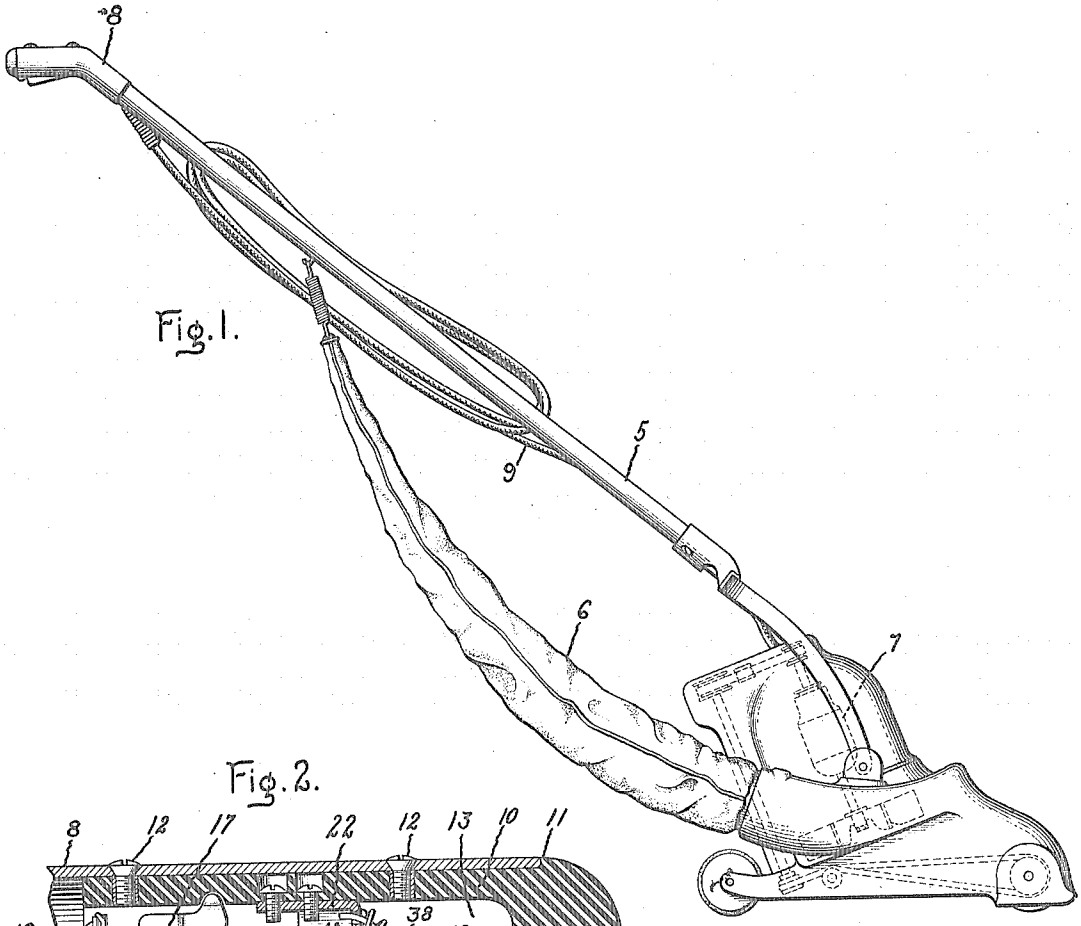



Fig. 2.

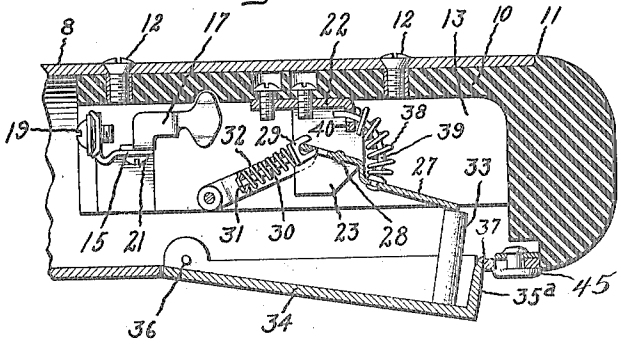



Fig. 3.

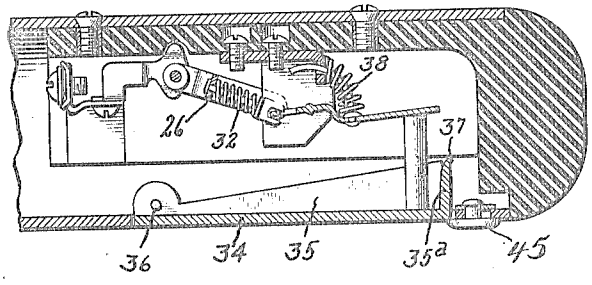
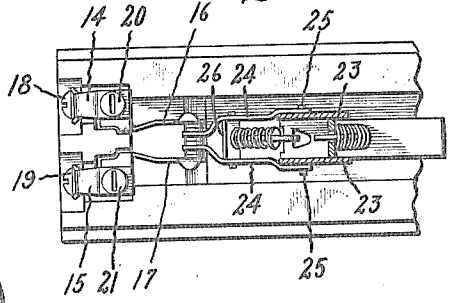



Fig. 4.




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# UNITED STATES PATENT OFFICE.

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## ELECTRIC SWITCH.

1,393,509. Specification of Letters Patent. Patented Oct. 11, 1921.

Application filed November 6, 1919. Serial No. 336,080.

*To all whom it may concern:*

Be it known that I, FRANK C. DE REAMER, a citizen of the United States, residing at Schenectady, in the county of Schenectady, in the State of New York, have invented certain new and useful Improvements in Electric Switches, of which the following is a specification.

The present invention relates to electric switches and has for its primary object to provide an improved switch which is especially well adapted for the handle of a vacuum cleaner or other similar apparatus. In the following specification the invention is particularly described as applied to a vacuum cleaner but it is to be understood that it is not necessarily limited thereto.

In certain types of electric vacuum cleaners the motor drives not only the suction fan but also a brush located in the nozzle of the cleaner and with such an arrangement it is desirable when the cleaner is not moving over the floor that the brush should not be running. A further object of my invention is to provide an improved switch which is arranged in the grip of the handle of a vacuum cleaner and is normally biased toward open position so that whenever the operator removes the hand from the grip the switch will automatically open to stop the driving of the fan and brush.

A still further object of my invention is to provide an improved arrangement in a switch of the character referred to which requires appreciable effort to close it but when once closed may be held in such position with little effort. For a consideration of what I believe to be novel and my invention, attention is directed to the accompanying description and the claims appended thereto.

In the drawing, Figure 1 is a side elevation of an electric vacuum cleaner having its handle equipped with a switch embodying my invention; Fig. 2 is a longitudinal sectional view through the switch showing the same in open position; Fig. 3 is a view similar to Fig. 2 but showing the switch in closed position, and Fig. 4 is a bottom plan view of the switch mechanism.

Referring to the drawing, 5 indicates the handle, 6 the dust bag, and 7 the electric motor of a vacuum cleaner which as to its detail structure may be of any suitable design. In the present invention the motor is shown as driving a suction fan $7^a$ and a brush $7^b$, the latter being located in the suction inlet of the cleaner.

Mounted on the outer end of the handle is a curved tube 8 which forms a grip for the operator's hand. Tube 8 telescopes over the end of the handle for a short distance and is suitably fastened thereon. Located within tube 8 is the switch mechanism which forms the subject matter of the present application and such switch mechanism is connected to the motor 7 by a cord 9.

Referring now particularly to Figs. 2, 3 and 4, in the end of tube 8 is fastened a short base member comprising a piece of insulating material 10 provided with a shoulder 11 which abuts against the end of tube 8. The outer end of member 10 is rounded to give a finished appearance to the end of the grip. The member 10 may be fastened in tube 8 by means of screws 12 as shown, and it is cut away longitudinally throughout the greater portion of its length to form a recess 13 in which the switch parts are located. Fastened to the inner end of member 10 are spaced switch contacts 14 and 15 having flexible arms 16, 17 between which the switch blade passes, and contact terminals 18 and 19 to receive the circuit wires. The contacts 14 and 15 are shown as being fastened to member 10 by screws 20 and 21. Fastened to the bottom of recess 13 and spaced away from the ends of arms 16 and 17 is a base plate 22 provided at its edges with spaced projecting side plates or flanges 23. Pivoted to side plates 23 is a switch blade comprising two arms 24 held in spaced relation to each other by a cross-piece 26. Arms 24 are pivoted at one end, as indicated at 25, to side plates 23 and the other ends of arms 24 are suitably fastened together and arranged to pass between arms 16 and 17 to bridge the same.

27 indicates a switch lever pivoted between ears 23 and 28. At its one end lever 27 engages between furcations on a head 29 carried on the end of pin 30. Pin 30 passes through an opening in cross-piece 26 and has a head 31 which engages against one side of it. Between head 29 and cross-piece 26 is arranged a spring 32 which normally holds head 31 against cross-piece 26. In lever 27 is a suitable opening to accommodate the ends of the furcations on head 29. The other end of lever 27 rests against a post

of insulating material 33 carried by an actuating lever 34. Lever 34 is in the form of a rectangular plate having side flanges 35 and an end flange 35ª. It is pivoted at the end remote from flange 35ª, as shown at 36, in a slot in tube 8. The actuating lever 34 is of substantially the same length as the slot and at its free end, flange 35ª is provided with an outwardly turned tip 37 which prevents such end from moving entirely out of the slot. Inward movement of lever 34 is limited by the surface of member 10 against which tip 37 strikes. The extent of the movement of lever 34 is thus defined and the arrangement is preferably such that when the switch is open and lever 34 is in its outer position as shown in Fig. 2, side flanges 35 and end flange 35ª always close access to the slot in which the lever moves to prevent the entrance of foreign matter, while when lever 34 is moved inward to close the switch as shown in Fig. 3 the surface of lever 34 is just flush with the surface of tube 8.

Bearing against lever arm 27 on the side of the pivot on which post 33 is located is a spring 38 guided by a curved pin 39 which at one end is fastened to lever 27 and its other end is passed through an opening in an inturned lug 40 which forms a part of plate 22. One end of spring 38 bears against lever 27 and the other end bears against lug 40 and such spring acts to hold the end of lever 27 against post 33 and to bias the switch toward open position.

When the switch is in the open position as shown in Fig. 2 the inner end of lever 27 is located above the pivot 25 of the switch blade so that spring 32 tends to hold the switch open as does also spring 38 as is obvious. In other words, the two springs act in conjunction with each other, the spring 32 assisting spring 38. If now the actuating lever 34 is pressed inward by a hand gripping tube 8 switch lever 27 will be turned on its pivot 28 against the action of springs 38 and 32. Spring 38 will be compressed as will also 32, the compression of the latter being due to the fact that the left hand end of lever 27 is moving downward toward pivots 25. As soon as the left-hand end of lever 27 passes pivots 25, spring 32 will then act on lever 27 in a direction to assist in moving it so that it then acts in opposition to spring 38. While the left hand end of lever 27 is passing to a point in line with pivots 25, thus putting spring 32 under compression the switch blade comprising arms 16 and 17 remains stationary. As soon as the end of lever 27 passes below such pivots, however, spring 32 will act to quickly force the switch blade from the position shown in Fig. 2 to that shown in Fig. 3 where the switch is closed. The arrangement of the switch is such that when closed as shown in Fig. 3 the action of spring 38 on lever 27 is but little greater than that of spring 32 so that although the switch will open when the pressure on lever 34 is relieved, yet it requires but a small amount of pressure to keep the switch closed. As is obvious when the pressure on lever 34 is relieved spring 38 will turn lever 27 to snap the switch open, the operation being the same as that described for closing it except in the opposite direction.

It may sometimes be desirable to fasten the switch closed, for example, when the cleaner is being used with a hose attachment, and for this purpose I provide a catch in the form of a button 45 which can be slid from the position shown in Fig. 2 to that shown in Fig. 3 so as to catch over the end of lever 34 to fasten the switch closed. When the switch is closed the actuating lever is flush with the wall of tube 8, so the hand has an even surface to grip in running the cleaner.

It will be noted that the switch mechanism proper is all carried by the insulating base member 10 and lies entirely within the outline of its outer surface. This enables the base member with the switch mechanism thereon to be slid axially into grip 8 and fastened by screws 12. In sliding into place, lever 27 rides along the end of post 33 and brings actuating lever 34 to correct position as shown in Fig. 2. This makes a very simple assembling operation.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention may be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. The combination with a handle provided with a tubular grip portion having an open end and an elongated slot extending along its side, of a base member of insulating material adapted to slip axially into said grip and close its open end, switch mechanism including a spring-pressed switch blade and a switch lever for actuating it carried by said base member, and an actuating lever pivoted in said elongated slot and having a part with which the switch lever engages when the base member is slipped into said tubular grip portion.

2. The combination with a handle provided with a tubular grip portion having an open end and an elongated slot extending along its side, of a base member of insulating material adapted to slip axially into said grip and close its open end, switch mechanism including a plate having a switch blade

and a switch lever pivoted thereon fastened to said base member and located entirely within the confines of its outer surface, an actuating lever pivoted in said elongated slot, and a post carried by the actuating lever and projecting inwardly whereby when the base member is slipped axially into said tubular grip the switch lever will be brought into engagement with said post.

3. The combination with a handle provided with a tubular grip portion having an open end and an elogated slot extending along its side, of a base member of insulating material adapted to slip axially into said grip and close its open end, switch mechanism including a plate having a switch blade and a switch lever pivoted thereon fastened to said base member and located entirely within the confines of its outer surface, an actuating lever pivoted in said elongated slot, a post carried by the actuating lever and projecting inwardly whereby when the base member is slipped axially into said tubular grip the switch lever will be brought into engagement with said post, and spring means which normally biases said switch to open position and said actuating lever to a position where it projects beyond the confines of the tubular grip.

In witness whereof I have hereunto set my hand this 1st day of November, 1919.

FRANK C. DE REAMER.