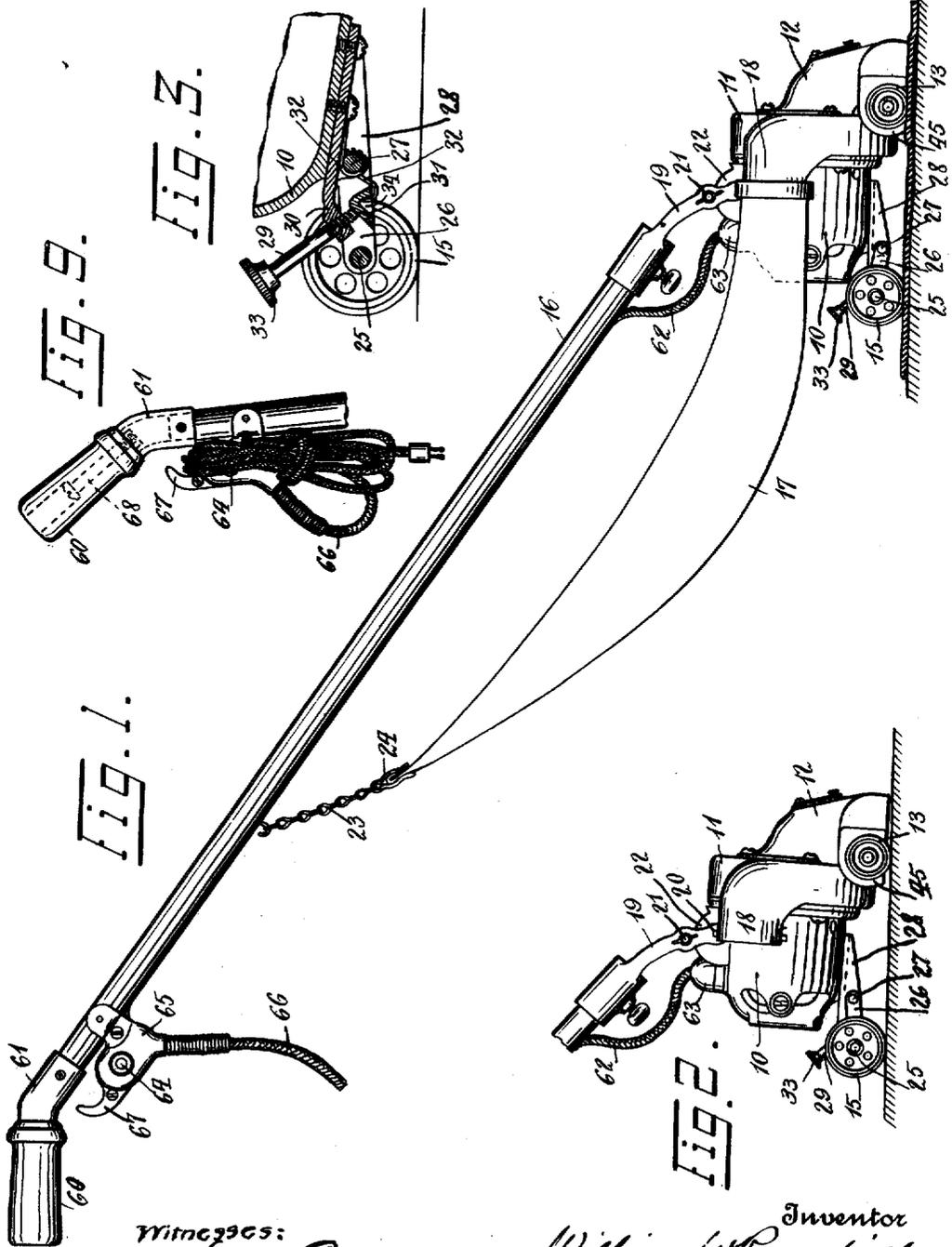


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 SUCTION CLEANER.  
 APPLICATION FILED OCT. 5, 1917.

1,348,586.

Patented Aug. 3, 1920.

2 SHEETS—SHEET 1.



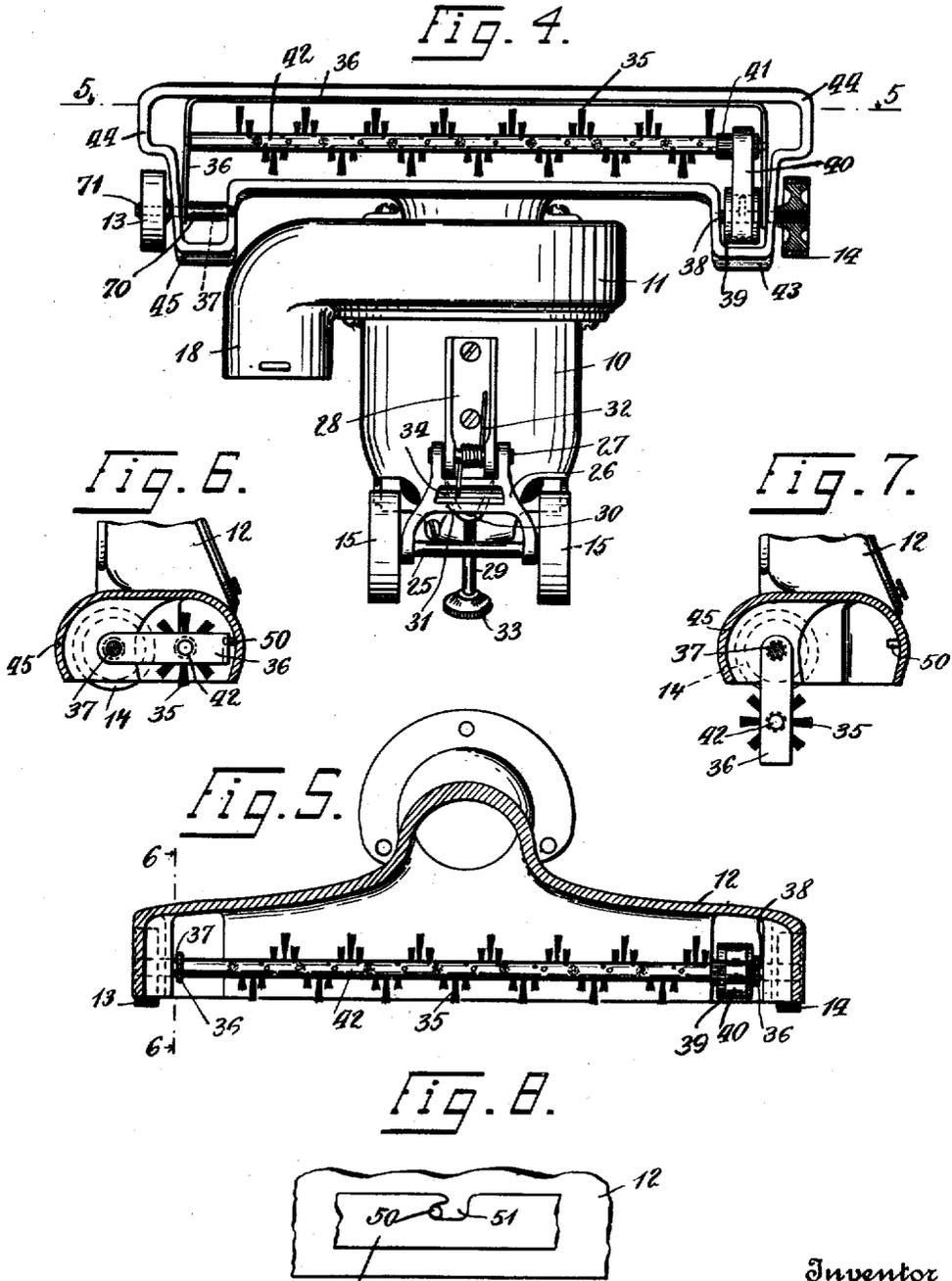
Witnesses:  
*Frederick Beckmann*  
*Lillian R. Fox*

Inventor  
*William W. Rosenfield*  
 By *Arthur H. Kent*  
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# UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFIELD, OF NEW YORK, N. Y., ASSIGNOR TO ELECTRIC VACUUM CLEANER COMPANY, INC., A CORPORATION OF NEW YORK.

## SUCTION-CLEANER.

1,348,586.

Specification of Letters Patent.

Patented Aug. 3, 1920.

Application filed October 5, 1917. Serial No. 194,851.

*To all whom it may concern:*

Be it known that I, WILLIAM W. ROSENFIELD, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Suction-Cleaners, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in suction cleaners, and more especially to suction cleaners of the self-contained type, that is, of the kind in which the motor, fan, dirt receptacle and cleaning nozzle are mounted to move together over the surface to be cleaned, although some of the features of the invention are suitable for use in connection with other forms of suction cleaning devices. The invention aims generally to provide an improved cleaner which shall be efficient in operation and convenient for use for the various purposes for which it is adapted.

One of the objects of my invention is to provide an improved suction cleaner which shall be efficient in cleaning carpets or surfaces of various character and in taking up threads, fibers and similar articles which tend to adhere to the surface being cleaned. In devices of this character heretofore known, a disturbing member has been provided in the mouth of the nozzle to loosen or disturb the threads, etc., so as to enable them to be readily picked up by the current of air entering the cleaner nozzle. The disturbing member, especially if in the form of a brush, soon becomes clogged with the threads, fibers, and other dirt, and its efficiency is accordingly greatly interfered with. My invention aims to provide a suction cleaner wherein a rotary or other disturbing member is capable of being rendered readily accessible to permit cleaning thereof, and to this end, it provides a mounting for the thread-disturbing member which is movable so as to be capable of supporting the said member in operative position in the mouth of the cleaner nozzle or to carry the same to a position out of the mouth of the nozzle. A further object of the invention is to provide in a suction cleaner with a movable disturbing member improved traction means for moving the disturbing member arranged to run over, and be driven

by its engagement with, the carpet or other surface to be cleaned without preventing the desired degree of sealing contact between the lips of the nozzle and the said carpet or material. Another object of the invention is the provision of an improved running support for the cleaner which is readily adjustable for varying the position of the nozzle with respect to the surface to be cleaned according to the character of such surface.

A full understanding of the invention can best be given by a detailed description of an illustrative embodiment of the same in the form now considered best, and such a description will now be given in connection with the accompanying drawings illustrating such an embodiment of the invention, and in which:—

Figure 1 is a side view in elevation of a self contained suction cleaner embodying the various features of the invention;

Fig. 2 is a partial view similar to Fig. 1 but showing the nozzle adjusted to a different position in relation to the surface to be cleaned;

Fig. 3 is an enlarged partial sectional elevation of one of the rear running wheels and of the means for adjusting the same to position the nozzle;

Fig. 4 is a bottom plan view of the cleaner;

Fig. 5 is a sectional elevation of the cleaner nozzle taken on the line 5—5 of Fig. 4;

Fig. 6 is a cross-sectional view of the nozzle taken on line 6—6 of Fig. 5 and showing the disturbing member supported in operative position in the nozzle;

Fig. 7 is a view similar to Fig. 6 showing the disturbing member supported out of the nozzle;

Fig. 8 is an enlarged partial elevation of the means for holding the supporting member for the thread-disturbing member in operative position within the nozzle; and

Fig. 9 is a detail side elevation of the upper end of the handle rod and the parts connected thereto, and illustrating the manner of holding the coiled conductor cable of the apparatus when the latter is not in use.

Referring to the drawings, the suction cleaner shown has a body formed of a motor casing 10 within which an electric motor is mounted, a fan casing 11 containing a centrifugal fan connected directly with and

driven by the motor, and a nozzle 12 extending downwardly from the front of the fan casing. The nozzle is as usual extended transversely at the bottom to provide a comparatively long and narrow suction inlet opening or mouth between the lips of the nozzle and is provided near the ends thereof, but at a slight distance therefrom, with rearwardly projecting hollow extensions 43 and 45, the object of which will appear more fully hereinafter. These extensions open at their fronts directly into the body portion of the mouth of the nozzle, and are open at the bottom, the lower edges thereof desirably forming parts of the lips of the nozzle. The body is mounted on a pair of running wheels or rollers 13 and 14 located adjacent to the nozzle and to the rear of the body portion thereof in a position which will be hereinafter more fully described, and a pair of rear running wheels or rollers 15, all of said wheels or rollers being arranged for running over the surface to be cleaned. All of the running wheels may be provided, as shown, with peripheral portions of suitable material, such as rubber, to reduce the noise and jar of the wheels as they run over the surface to be cleaned. The cleaner is operated by a pivoted handle rod 16 and is provided with a porous dirt receptacle or bag 17 connected at its lower end with the discharge throat or conduit 18 extending backwardly from the fan casing, the upper end of the bag being supported by a suitable connection, such as the chain 23 and spring clip 24, to the upper end of the handle rod. The end of the discharge conduit to which the bag is connected is approximately in the axis on which the handle rod is pivoted, so that no strain or undue slackness of the bag results in any position of the handle rod through its normal range of movement. The handle rod 16, as shown, is pivoted to the casing 11 by means of a yoke 19 (see Fig. 2) for movement about the axis of the pivot 20; and the yoke may be locked in any position of its movement about its pivotal axis by means of a thumb clip 21 coacting with a plate 22 on the casing 11.

One of the pairs of running wheels or rollers is mounted so as to be vertically adjustable for raising and lowering the nozzle with relation to the surface to be cleaned according to the character of such surface. In the construction shown, the rear running wheels 15 are so mounted, being carried by a shaft 25 supported in spaced bearings at the rear end of a frame 26. The said frame is pivoted at its forward end, as shown at 27, to downwardly extending lugs or projections on a plate 28 which is secured to the bottom of the casing 10. For adjusting the position of the frame 26 and the wheels carried thereby with respect to the cleaner body to vary the elevation of the nozzle with respect to the normal plane of the surface to be cleaned, a hand screw 29 is provided which is threaded through an extension 30 formed on the plate 28, and bears on a part 31 of the frame 26 between the ends thereof. The frame 26, as shown, is held by a spring 32 with the part 31 thereof in engagement with the end of the screw. As the weight of the cleaner body tends to hold the lower end of the screw 29 in engagement with the part 31 when the cleaner is supported on the surface to be cleaned, the spring 32 may be omitted; but I find it desirable to use the same to prevent the frame 26 and wheels from dropping away from the screw when the cleaner is lifted from the floor, carpet or other supporting surface. As shown in Fig. 4, the spring 32 is coiled about the pivot 27 and one end thereof bears against the under side of the plate 28, the other end bearing against the under side of the frame 26 and desirably projecting up into a recess 34 provided in the part 31 of the frame, as shown in Fig. 3. The screw 29, as shown, is inclined downwardly and forwardly under the rear end of the body of the cleaner and is arranged in close proximity thereto. When the adjusting member or screw 29 is in the position shown in Fig. 3, the rear end of the suction cleaner body will be substantially in its highest position with respect to the surface to be cleaned, and the nozzle will be in substantially its lowest position, in which most desirably its front lip is in or only slightly above the normal plane of the surface to be cleaned, as shown in Fig. 2. This position is suitable for cleaning hard surfaces such as uncarpeted floors or thin carpets, or the like. In operating on carpets or rugs, it is desirable for the most efficient cleaning that the nozzle be supported with its lips raised sufficiently so that the suction of the nozzle may act to lift the carpet up slightly from the floor and against the nozzle lips to provide an air space beneath the carpet under the nozzle. By turning the adjusting screw 29, the rear end of the cleaner body may be lowered and the nozzle thereby moved upward about the wheels or rollers 13 and 14 as a fulcrum to raise the lips of the body of the nozzle away from the normal plane of the surface to be cleaned. In Fig. 1, the cleaner is shown as operating upon the surface of a comparatively thick carpet or the like, the nozzle being lifted a substantial distance above the normal plane of the carpet, which is shown as drawn upwardly by the suction of the nozzle into engagement with the lips thereof. In this figure, the running wheels or rollers are shown as embedded slightly into the carpet. By turning the screw 29, any adjustment of the nozzle toward or away from the normal plane of the surface to be cleaned that may be desirable according to the char-

acter of such surface may be readily obtained.

Mounted normally within the mouth of the nozzle is the disturbing member 35. Such member may be of any suitable material and form, but I find it best to use a rotatable brush, as shown, which extends longitudinally of the nozzle throughout substantially the whole length thereof. The brush, as shown, is formed of a central core or shaft 42 carrying a row of tufts of suitable bristles extending spirally about the same, and is rotatably mounted in a frame 36 which is mounted so as to normally lie entirely within the mouth of the nozzle 12. The said frame, as shown, is of U shape, the rearwardly extending end portions thereof being respectively pivoted on aligned shafts 37 and 38 supported by the side walls of the nozzle extensions 43 and 45, respectively, the said frame thus being movable about the axes of the said shafts to carry the brush or disturbing member either into operative position in the mouth of the nozzle, as shown in Fig. 6, or to a position out of the mouth of the nozzle, as shown in Fig. 7, where it is accessible for cleaning. The mouth of the nozzle is desirably made of such shape that the brush fits comparatively closely therein and so that the brush is freely movable into and out of the mouth of the nozzle. With the construction shown, the distance between the brush and the axis of said shafts or pivots is sufficiently large to permit the brush to be carried by the frame 36 entirely out of the mouth of the nozzle (see Fig. 7). When the brush is in operative position in the mouth of the nozzle, the lowermost bristles normally project slightly below the nozzle lips. In the operation of the cleaner, these bristles bend so as to permit the carpet to rest flat against and in sealing engagement with the nozzle lips, the bristles scraping the top of the carpet and thereby disturbing or loosening the threads, etc., from the carpet.

The frame 36 is most desirably made of a resilient strip of sheet metal bent to U shape, the central portion thereof extending longitudinally of the mouth of the nozzle and in close proximity to the front wall thereof, the end portions thereof extending close to the inner surfaces of the outer walls of the extensions 43 and 45, respectively and engaging the latter at their inner ends. The end portion of the frame which is mounted on the shaft 37 is, as shown, held against inward movement on the said shaft by a spacing ferrule 70.

In order to detachably hold the frame 36 together with the disturbing member 35 in operative position within the nozzle, suitable fastening or latching means are provided. The means desirably employed by me and shown in the drawings, and par-

ticularly in Fig. 8, comprise a pin 50 projecting inward from the front wall of the nozzle to coact with the walls of an L-shaped or undercut notch 51 in the central part of the frame 36. In order to make possible longitudinal movement of the front part of the frame containing the said notch so as to permit relative movement between the pin 50 and the notch, the side portions of the frame, which as hereinbefore stated is resilient, are desirably inclined forwardly and inwardly away from the adjacent walls of the extensions 43 and 45; so that, with the rear ends of the frame engaging the outer side walls of the said extensions to hold the frame in position, the forward portion thereof may be moved longitudinally of the nozzle the desired extent for engaging and disengaging the same from the pin 50. The upper edge of the undercut portion of the notch 51 as well as the edge of the notch connecting said first-named edge with the top edge of the frame are most desirably beveled as shown in Fig. 8, so that it is possible by merely pressing inwardly or pulling outwardly on the frame to force the same into or out of operative latched position within the nozzle, the beveled edges of the notch coacting with the pin 50 to force the frame 36 longitudinally sufficiently to enable the pin 50 to enter or leave the notch, the resiliency of the frame then moving it longitudinally back to its normal position. Of course, if desired, the frame may be moved longitudinally of the nozzle as well as inwardly or outwardly by hand. Various means other than those described may obviously be used to secure the frame in position.

The brush or disturbing member 35 is most desirably driven from one of the front running wheels, and I have found that the said brush or disturbing member operates most efficiently to loosen the threads, fibers, etc., when it is caused to rotate in the same direction as the said running or traction wheel, but at a greater peripheral speed. In the construction shown, the traction wheel 14 is secured to and rotates the shaft 38, which latter has the grooved pulley 39 pinned or otherwise connected to turn therewith, the said pulley being connected by a belt 40 to drive the brush shaft 42. The belt 40 is most desirably made of elastic tension material, such as rubber, and runs on a small pulley 41 on the brush shaft which may be and desirably is formed of a short length of rubber tubing securely held on the shaft 42 by its own resiliency. If the shaft 42 is of sufficient size the pulley 41 may, if desired, be omitted, the belt 40 passing directly around the shaft 42. The pulley 39, as shown, is housed in the extension 43 entirely above the lower edge thereof, the latter being desirably made of such a size

as to accommodate within the same the said pulley and the adjacent end of the frame 36 substantially without leaving any excess space therein. The pulley 41 is desirably  
 5 of smaller diameter than the pulley 39 so that the brush or disturbing member 35 rotates with sufficient rapidity to produce a vigorous brushing action upon the carpet or other surface being cleaned to effectively  
 10 loosen the threads, lint, fibers and other material which tend to stick to the carpet and resist the action of the current of air when not disturbed by some other means. As the pulley 39 and the frame 36 move about the  
 15 same pivotal axis, there is no interference with the driving connection between the said pulley and the brush upon the pivotal movement of the said frame.

The shafts 37 and 38 project through the  
 20 outer side walls of the extensions 43 and 45, the running wheels or rollers 13 and 14 being mounted upon the outer ends thereof and arranged adjacent to the outer sides of the said extensions and to the end portions  
 25 44 of the body of the nozzle, the said wheels or rollers being arranged to the rear of the said end portions. The distance between the wheels 13 and 14 and the adjacent portions of the nozzle should be sufficient to enable  
 30 the carpet or other material to be cleaned to bend around the said wheels into substantial sealing engagement with the portions of the nozzle lips adjacent the respective  
 35 wheels. As shown, the distance between the inner face of the said wheels and the inner edge of adjacent portions of the nozzle is somewhat greater than the distance the said wheels project below the nozzle lips. This  
 40 is found to permit the necessary degree of sealing contact between the carpet and the nozzle lips to avoid any substantial loss of suction, and provides a very compact construction. The ends of the nozzle desirably  
 45 extend slightly beyond the wheels 13 and 14 so that the end portions of the nozzle form an effective protecting guard for the wheels. A firm driving connection between the pulley 14 and the shaft 36 is secured in a simple  
 50 way by knurling the outer end of the shaft, as shown in Fig. 4, and driving the pulley onto the knurled end. The shaft 37 on which the wheel or roller 13 revolves has its inner end threaded into the inner wall of the extension 45, the wheel or roller 13 being  
 55 held against outward movement on the shaft, as by the cotter pin 71.

It is frequently desirable in the operation of suction cleaners to tilt the cleaner by the  
 60 handle rod to lift one end of the nozzle away from the surface being cleaned and thereby produce a strong current of air over and against the said surface to pick up more readily threads, etc., which tend to adhere  
 65 obstinately to the said surface. The arrangement of the front running wheels 13

and 14 outside of the nozzle permits the cleaner to be tilted on one of the widely spaced front running wheels and one of the closely arranged rear running wheels without moving the nozzle into scraping engagement with the surface being cleaned. 70

The upper end of the handle rod 16 is, as shown, provided with a grip or handle piece  
 60 of wood or other poor conductor of electricity, secured, as by a screw 68 (see Fig. 75 9), to a bent hollow ferrule 61, which is desirably of metal and into which the upper end of the handle rod 16 extends and is secured, as by screws, as shown. The ferrule  
 80 is bent so that the grip 60 will extend at a suitable angle to the handle rod. The usual flexible conductor cable 62 for supplying current to the motor extends from a plug 63 detachably attached to the motor casing 11  
 85 and having electrical connections to the motor, said cable extending upward along the handle rod, being housed in a groove in the under side of the said rod. At the upper end of the handle rod near the grip 60 the  
 90 cable is connected to a switch 64 mounted within a casing 65. From the said switch extends the long flexible conductor cable 66 whereby the cleaner is adapted to be attached to the source of current supply. The  
 95 handle 16 is most desirably made of wood or other poor conductor of electricity and the casing 65 is most desirably made of metal. In order to minimize the danger of electric shocks to the user of the apparatus, the casing 65 is spaced from the ferrule 61;  
 100 so that even if there should be a short circuiting through the metal of the switch casing 65, the current will not be conveyed to the ferrule 61 and thence to the hand of the operator which may inadvertently engage  
 105 the said ferrule. For supporting and retaining the coiled cable 66 in convenient position on the upper portion of the handle rod, the switch casing 65 is provided with means, such as the upwardly extending hook  
 110 67 upon the upper end thereof on which the coiled cable may be hung, as shown in Fig. 9, when the cleaner is not in use. The said hook is most desirably formed integral with the switch casing. 115

It is to be understood that the invention is not to be limited to the exact construction, arrangement and combination of parts shown and to which the foregoing description has been largely confined, but that it  
 120 includes changes and modifications thereof within the claims, and that parts of the apparatus claimed may be used in combination with other parts differing from those shown, or in cleaners of other types and construction. 125

What is claimed is:

1. The combination of a suction cleaner nozzle provided with rearwardly projecting hollow extensions adjacent to its two ends, a 130

rotary disturbing member in said nozzle, and a support for said member comprising a frame pivoted in said extensions and extending forwardly into said nozzle, said rotary member being journaled at its ends in said frame and said frame being adapted to swing on its pivots to bring said rotary member outside the nozzle.

2. The combination of a suction cleaner nozzle provided with rearwardly projecting hollow extensions adjacent its two ends, a rotary disturbing member in said nozzle, a support for said member comprising a frame pivoted in said extensions and extending forwardly into said nozzle, said rotary member being journaled at its ends in said

frame and said frame being adapted to be swung on its pivots to bring the brush outside the nozzle, and means for rotating said member, said means comprising a traction wheel located outside of one of said extensions, and a member driven by said traction wheel and arranged inside of said extension and connected to drive the said disturbing member.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILLIAM W. ROSENFELD.

Witnesses:

ETHEL JOHNES,

FREDERICK BACHMANN.