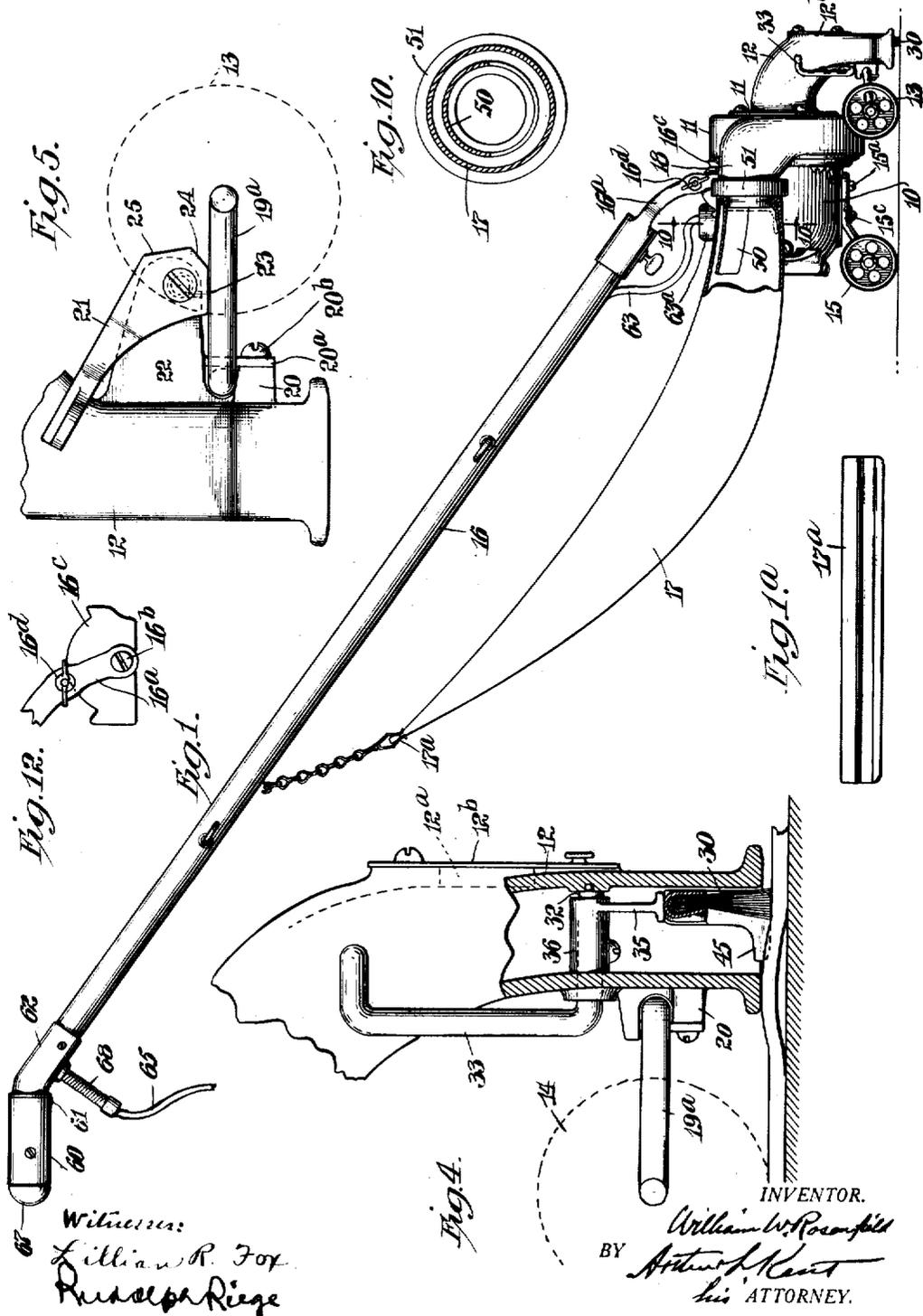


W. W. ROSENFELD.  
 SUCTION CLEANER.  
 APPLICATION FILED SEPT. 19, 1916.

1,348,585.

Patented Aug. 3, 1920.

3 SHEETS—SHEET 1.



Witness:  
 Lillian R. Fox  
 Rudolph Riege

INVENTOR.  
 William W. Rosenfeld  
 BY Arthur H. Kent  
 his ATTORNEY.

1,348,585.

W. W. ROSENFELD.  
SUCTION CLEANER.  
APPLICATION FILED SEPT. 19, 1916.

Patented Aug. 3, 1920.

3 SHEETS—SHEET 2.

Fig. 2.

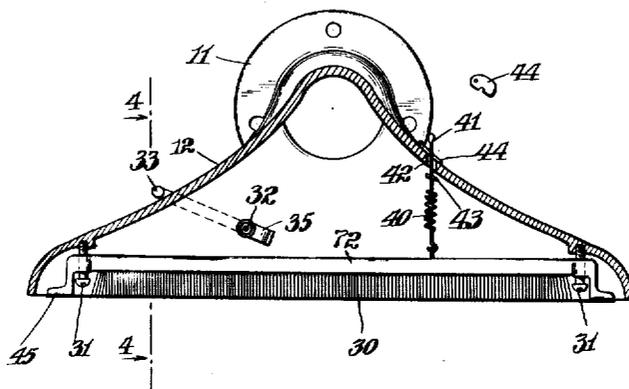
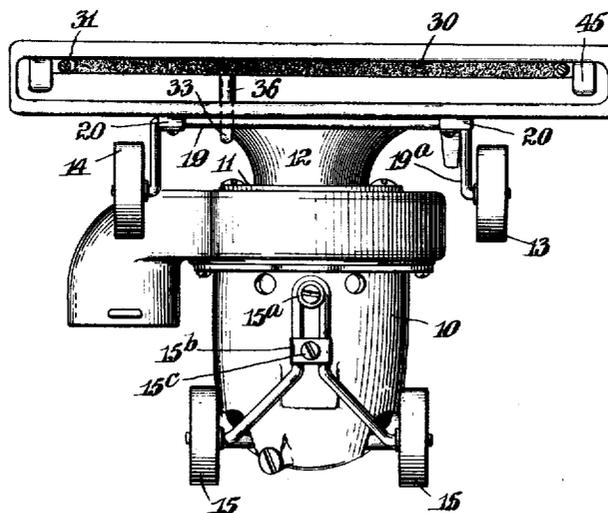


Fig. 3.



WITNESSES:  
Lillian R. Fox  
Rudolph Riege

INVENTOR.  
William W. Rosenfeld  
BY Arthur K. Kent  
his ATTORNEY

Fig. 6.

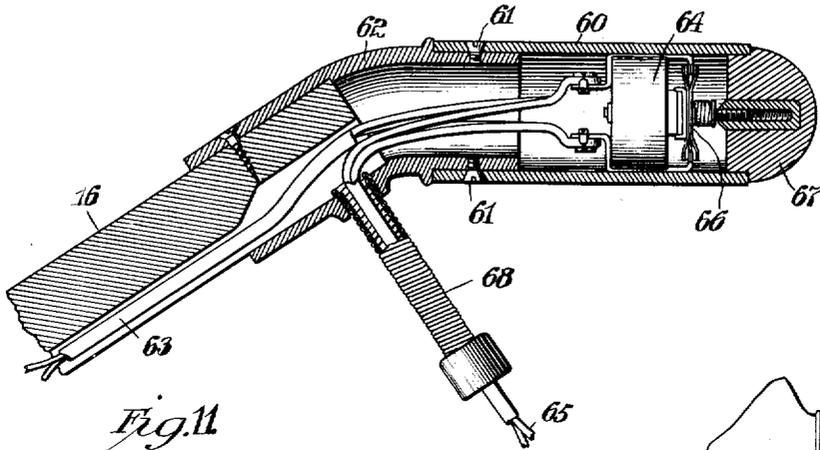


Fig. 11



Fig. 7.

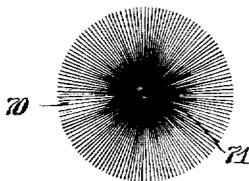


Fig. 4.

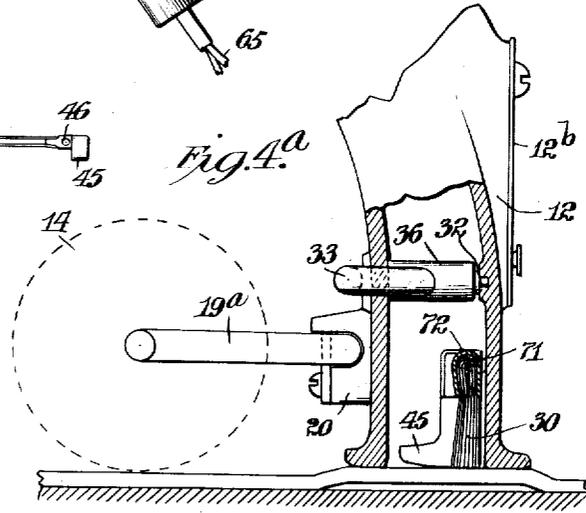


Fig. 8.

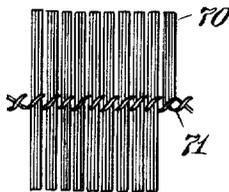
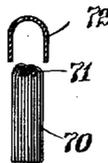


Fig. 9.



WITNESSES:  
 Lillian R. Fort  
 Rudolph Reize

INVENTOR.  
 William W. Rosenfeld  
 BY Arthur H. Kern  
 ATTORNEYS.

# UNITED STATES PATENT OFFICE.

WILLIAM W. ROSENFELD, OF NEW YORK, N. Y.

## SUCTION-CLEANER.

1,348,585.

Specification of Letters Patent.

Patented Aug. 3, 1920.

Application filed September 19, 1916. Serial No. 121,077.

*To all whom it may concern:*

Be it known that I, WILLIAM W. ROSENFELD, 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.

Among the special objects of the invention are the following:—to provide a 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; to provide means for adjusting the nozzle of the cleaner in relation to the surface to be cleaned according to the character of such surface or of the work to be done; to provide an improved discharge valve to prevent dirt or dust in the dust receptacle from reëntering the discharge conduit; to provide an improved construction of the hand end of the handle rod including an improved mounting for the circuit controlling switch; and to provide an improved nozzle brush of simple and cheap construction which is efficient in action.

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. 1<sup>a</sup> is a side view of the spring clamp

for closing and holding the upper end of the dust bag;

Fig. 2 is a front sectional elevation of the cleaner nozzle and the parts contained therein;

Fig. 3 is a bottom plan view of the cleaner;

Fig. 4 is an enlarged sectional view taken on line 4—4 of Fig. 2 and showing the nozzle and brush adjusted to one position in relation to the surface of the carpet;

Fig. 4<sup>a</sup> is a view similar to Fig. 4 but showing the nozzle and brush adjusted to different positions in relation to the surface of the carpet;

Fig. 5 is an enlarged partial side elevation of the cleaner nozzle and adjacent parts showing the adjusting means for positioning the nozzle;

Fig. 6 is an enlarged view in section of the upper end of the handle rod showing the hand grip and the stitch and electrical connections therein;

Figs. 7, 8 and 9 illustrate the details of the brush, and the method of assembling the parts;

Fig. 10 is an enlarged sectional view taken on line 10—10 of Fig. 1 showing the discharge valve;

Fig. 11 is a bottom plan view showing the runners attached to the back of the brush;

Fig. 12 is a detail view showing the means for attaching the handle and the handle locking means to the cleaner.

Referring to the drawings, the suction cleaner shown has a body formed by 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 downward 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. The body is mounted on a pair of running wheels 13 and 14 located adjacent and to the rear of the nozzle and a pair of rear wheels 15. 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 backward from the fan casing, the upper end of the bag being supported by a connection 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 on or undue slackness of the bag results in any position of the handle rod through its normal range of movement.

The nozzle 12 has an opening 12<sup>a</sup> shown in dotted lines in Fig. 4, provided for attaching the end of a hose leading to a hand tool when it is desired to clean furniture, walls etc. which are inaccessible to the nozzle 12, this opening being normally closed by a pivoted cover plate 12<sup>b</sup>.

The handle rod 16 is pivoted to the casing 11 by means of a yoke 16<sup>a</sup> and pivots 16<sup>b</sup> as shown in Fig. 12, one of which pivots also holds securely in place a plate 16<sup>c</sup> to which the yoke may be locked in any position of its movement about its pivotal axis by the thumb nut and clip 16<sup>d</sup>.

The upper end of the bag which is formed with an opening for removing the dust, is closed by a clamp 17<sup>a</sup> which is most desirably a spring clamp formed as shown in Figs. 1 and 1<sup>a</sup> of sheet spring metal to slide over the end of the bag and tightly grip or clamp it.

One of the pairs of running wheels is mounted so as to be vertically adjustable for raising and lowering the nozzle with relation to the surface to be cleaned, and also for adjusting the brush with relation to the surface to be cleaned when it is in its depressed or operative position. In the construction shown, the front running wheels 13 and 14 are so mounted, being carried by a bent axle rod 19 which is mounted to turn in bearings 20 formed on the rear side of the nozzle, and held in the bearings by clips 20<sup>a</sup> and screws 20<sup>b</sup>, and which has beyond the bearings rearwardly extending portions 19<sup>a</sup>, from which extend outwardly bent ends on which the running wheels are mounted. The portions 19<sup>a</sup> of the axle rod thus form pivoted supporting brackets for the wheels. For controlling and determining the position of the wheels, and thereby the elevation of the nozzle and the brush, a cam lever 21 is pivoted on a lug 22 extending from the nozzle and having its cam face formed with a plurality of flattened bearing portions or faces 23, 24 and 25 adapted to bear against one of the rearwardly extending portions of the axle rod or supporting brackets 19<sup>a</sup>, said bearing faces being at different distances radially from the pivotal axis of the cam lever. When the cam lever is in the position shown in Fig. 5, with the bearing face 23 bearing against the nozzle rod and limiting the upward movement of the wheels, the wheels will be in their highest position relatively to the nozzle and the nozzle will be in its lowest position, in which most desirably its lips

are in or slightly above the normal plane of the surface to be cleaned. By turning the cam lever to bring its face 24 in contact with axle rod 19, the nozzle is raised to an intermediate position, and by further turning the cam lever to bring its face 25 into engagement with the axle rod the wheels are thrown farther down relatively to the nozzle, and the nozzle is thereby raised to the highest of the three positions of adjustment provided by the means shown. The cam lever is so formed and positioned that it may be conveniently operated by the foot of the operator, so as to avoid the necessity of bending over to effect the desired adjustment of the nozzle. It is frictionally held against free turning movement, and in addition by reason of its flat engaging faces against which the pressure is exerted perpendicularly it tends to remain in any one of its three positions to which it has been moved. The rear wheels 15 may be mounted upon a wire axle bent as shown in Fig. 3, and attached to the casing by the screw 15<sup>a</sup>, the tie clip 15<sup>b</sup> and the screw 15<sup>c</sup> passing through the tie clip and into the casing.

Mounted within the mouth of the nozzle 12 is a thread disturbing member 30 which, in order to secure all the advantages of the invention, should be of such character as to permit the passage of air through it. Such member may be of any suitable material and form, but I find it best, instead of using a strip or strips of felt or rubber or other suitable material with a slitted or serrated edge, to use a brush, as shown, which extends longitudinally of the nozzle. This brush 30 or other disturbing member is adjustably mounted so that it may be moved downward to project slightly below the plane of the nozzle lips to frictionally engage the carpet or other surface being cleaned and disturb and loosen threads, lint and other fibrous or other material which tends to stick to the carpet and resist the action of a cleaning current of air when not disturbed by some mechanically acting means. To most efficiently perform this work the disturbing member or brush should make good brushing contact with the surface or nap of the carpet, but should not press down too hard on the nap, as too great pressure would force threads, lint etc., into the nap, increase the labor of running the machine and possibly injure the carpet. The brush is mounted, as shown, close to one of the walls of the nozzle in such manner that it may be moved vertically into and out of operative position, being for this purpose held in position by vertical studs 31 which extend downward from lugs formed in the nozzle, such studs passing freely through holes in the back of the brush and having heads which limit the downward movement of the brush, permitting it to

have a limited vertical movement between a lower position in which the operating edge of the brush projects a suitable distance below the nozzle lips and an upper position in which the brush does not interfere with or prevent sealing contact of the nozzle lips with the carpet or other surface being cleaned. The guiding and supporting studs 31 are desirably screw studs, being thus readily adjustable for slightly varying the operative position of the brush and independently adjustable for alining the brush with the nozzle lips.

For pressing the brush down into its operative position, there is provided in the construction shown a short shaft 32 which has an end bearing in the front nozzle wall and extends across the nozzle through the rear wall and carries outside the nozzle an operating arm 33, bent at its outer end as shown, the bent portion being formed to contact with the casing 12 in extreme positions and acts as a stop. This form of lever arm and its position are such that it may be conveniently operated by the foot, and the casing 12 acts as a guide to the foot. The shaft 32 carries within the nozzle a short arm or stud 35 which is adapted to engage the back of the brush between the supporting and guiding studs 31 and, when the shaft 32 is turned, to force the brush down into operative position. When thus forced down by the turning of the shaft 32, the position of the brush and its horizontal alinement with the nozzle lips is determined by its coming into engagement with the heads on the studs 31, so that the proper positioning of the brush is not affected by the fact that the arm 35 engages it only at a single point or that such point of engagement is nearer one end of the brush than the other. This arrangement permits of the use of simple brush controlling means positioned for convenient access by the operator. The brush engaging arm 35 is most desirably of such length that when it has moved the brush down into operative position, this arm may spring the back of the brush somewhat and go slightly past the vertical, so that, the operating arm 33 having then come into engagement with the nozzle neck or other suitable stop, the brush will be locked in operative position. The brush is easily removed by simply removing the screws 31. In the present instance arm 35 is shown as being formed as an integral part of a sleeve 36 which fits over shaft 32 and is fastened thereto by a set-screw.

The operating arm 33 extends from the shaft in the direction opposite to that of the brush engaging arm or stud 35, so that the brush is moved down into operative position by upward movement of arm 33. This is of advantage since the operation of throwing the arm 33 upward exerts a slight lifting action on the nozzle, thus lightening the opera-

tion of moving the brush down into operative position. If the lever 33 were arranged so as to move the brush down by a downward movement of the lever, then the pressure exerted in operating the lever to project the brush would be added to the weight of the cleaner, requiring the exertion of more power to move the brush into operative position, and at the same time placing an undue pressure on the brush, which might injure it. It will be noted that the operating arms 33 and 35 have no connection with the brush which interfere with the easy removal of the brush.

Fig. 4 shows the position of the brush and the brush operating means when the brush has been pushed down into operative position. When the lever 33 is thrown over and down from this position to move the arm 35 up to release the brush, the bent end of the arm will contact with the casing and act as a suitable stop. When the brush is thus released, it may be left free to move upward under pressure of the carpet or other surface being cleaned against the lower edge of the brush, the brush then being free to rest under its own weight on the surface to be cleaned. This does not interfere with the desired operation of the cleaning nozzle with its lips in close or sealing contact with the surface being cleaned, but is found to be an advantage, as the light frictional disturbance of the nap of the carpet by the brush aids in the removal of dust and other contained dirt. It is, however, sometimes desirable to provide means for preventing even such light pressure of the brush against the surface being cleaned and for holding it in its uppermost or inoperative position. A suitable spring, tending to move the brush upward, serves such purpose, and in Fig. 2 of the drawings there is shown for this purpose a spiral spring 40 having its lower end connected to the back of the brush and its upper end to a wire rod 41 which passes through an opening 42 in the upper wall of the nozzle 12 and by which the spring 40 may be placed under tension by pulling up on the wire until an enlargement or stop 43 on the wire is drawn through the opening and engaged with a notched cover 44 pivotally attached to the nozzle casing, and which cover normally closes the opening. By releasing the wire, permitting it to fall down to the position shown in Fig. 2, the tension of the spring is released and the operation of the brush is as though no spring were provided.

When the brush is in operative position, as shown in Fig. 4, it operates because of its position, closely adjacent to the front nozzle wall and lip to hold the carpet slightly away from and prevent its coming in close contact with this nozzle lip while allowing contact of the carpet with the rear lip of the

nozzle, thereby causing a strong inrush of air under the action of the fan against the surface of the carpet and beneath the front nozzle lip, which surface cleaning current in conjunction with the disturbing action of the brush is highly efficient in taking from the surface of the carpet all surface litter, including threads, lint and other fibres which tend to stick to the surface. Having the brush positioned closely adjacent to one of the nozzle lips is furthermore of advantage because a wider free passage between the brush and the other nozzle lip is left than is the case where the brush is placed midway between the nozzle lips, and especially because with the brush in this position the inrushing current of air must pass largely through and beneath the brush. With the brush located midway between the nozzle lips, the inrushing air passes up on each side of the brush and there is very little if any current passing through the brush or past its engaging edge or face, with the result that the brush is apt to become quickly more or less clogged up with threads, etc. taken up from the surface of the carpet. With the brush located closely adjacent to one of the nozzle lips, in accordance with the present invention, the rush of air through the brush and past its bottom edge largely avoids this trouble by carrying the threads, etc. away from the brush and up through the nozzle passage.

I find it of some advantage to provide the brush with one or more runners operated with the brush to extend slightly below the plane of the nozzle lips when the brush is in operative position and to move upward with the upward movement of the brush. Ordinarily two such runners, one at each end of the brush, give good results, and such an arrangement is shown in the drawings, in which the runners extend downward from the ends of the back of the brush. These runners by bearing against the carpet when the brush is in operative position cause a somewhat more pronounced draft passage to be maintained between the nozzle lip and the carpet at and near the ends of the brush, for the passage of the desired surface cleaning current of air. The runners are desirably extended backward toward the lip of the nozzle from which the brush is spaced away, so that there may also be some holding of the carpet away from this lip of the nozzle toward the ends of the nozzle, so that at the ends of the nozzle a surface cleaning current of air may flow in from both front and rear and also from the ends. Such entrance of air at the ends of the nozzle is found to be of advantage in providing an inward sweep of the air over the carpet from the ends of the nozzle toward the central uptake passage. These runners also operate to secure easier running of the

cleaner by lessening somewhat the pressure of the carpet against the end portions of the brush.

The runners are formed with upwardly extending portions which are attached to and form the ends of the brush back 72, as shown in Fig. 11. The end pieces thus provided on the brush serve to support and guide the brush on the studs 31.

When the brush is not set down into operative position, the carpet is free to make contact with both lips of the nozzle, and will be sucked up to the nozzle lips as shown in Fig. 4<sup>a</sup> when the nozzle is adjusted to stand slightly above the normal plane of the surface of the carpet, provided the carpet is not too heavy and stiff to be so lifted.

In operating the cleaner on thick or heavy carpet with the brush in operative position, the nozzle adjusting lever 21 will usually be set to position the nozzle in its uppermost position, and for thin carpets or bare floors the nozzle will be adjusted usually to its intermediate position. When the brush is in its inoperative position, the nozzle will usually be adjusted to its intermediate position for thick carpets and in its lower position for thin carpets or for cleaning uncarpeted floors.

I find that to obtain results it is necessary to position the brush with considerable precision with relation to the surface being cleaned, and the usual two-position adjustment of the nozzle found in suction cleaners of this type is not sufficient to give the best results on all thicknesses and character of carpet. With the three-position adjusting means shown, however, I am able to position both the nozzle and the brush, so as to give the proper brushing contact with the surface or nap of the carpet to do the most effective work.

It is desirable to provide for a free open passage for the discharge of air and dust from the discharge conduit 18 into the receptacle or bag 17 at all times when the cleaner is in operation, and at the same time to provide against the dust and other matter reëntering the fan from the bag when the fan is not running, and interfere with freedom of movement of the bag under all movements of the operating handle. To accomplish this I provide a valve formed of a short piece of flexible fabric 50 which is secured to an annular fitting 51 secured to the lower end of the dust receptacle and which has locking engagement with the conduit 18. As seen in Fig. 10 the end of this piece of fabric is secured to and extends about half way around the upper part of the annular fitting 51, so as to be of the form of a half tube adjacent the fitting. As the fabric is relatively of light weight, it is blown up to about the position shown by the full lines in Fig. 1 when the fan starts run-

ning, leaving a free and unobstructed passage from the discharge conduit 18 into the receptacle and when the fan stops, the fabric falls as indicated by the dotted line in Fig. 1 and closes the passage into the conduit, effectively preventing the return of dirt or dust from the bag into the conduit.

The upper or hand end of the handle rod is provided with a hollow cylindrical grip or handle piece 60 of fiber or other insulating material secured by screws 61 to a bent ferrule 62 which may be of metal or other suitable material into which the end of the handle rod 16 extends and is secured, as by screws, as shown. The ferrule is bent so that the grip 60 will extend at a suitable angle to the handle rod, and is hollow to receive the electrical conductors. A conductor cable 63 for supplying current to the motor extends from a plug 63<sup>a</sup> detachably attached to the casing 11 and having electrical connections to the motor, upward along the handle rod, being housed in a groove in the under side of the rod, and from the upper end of the handle rod the cable connects through a controlling snap switch 64 to a cable 65 leading off to the source of supply. The controlling switch 64 is mounted within the fiber handle 60, and its rotating member 66 has a threaded connection to an insulating piece 67 which may be termed the switch button, and which forms the end of the handle grip and is desirably of substantially hemispherical form as shown and of slightly less diameter than the diameter of the ferrule 60 so that when operating the cleaner, pushing it back and forth on the floor, there is little liability of accidentally turning the switch button 67 such as might be the case if this button were of the same or larger diameter than the handle 60. This forms a very convenient switch operating means easily operated by the hand which grips the handle 60.

A coiled supporting spring 68 is provided as a guard for the cable 65 where it enters the ferrule to support the cable and prevent its being sharply bent and injured. This coiled guard spring may be merely forced into a hole in the ferrule 62 through which the cable 65 is led off to the source of supply, being held in place by the expansion of the end coils in the opening.

The brush shown in Figs. 2 and 3 may be most simply and preferably formed in the manner illustrated in Figs. 7, 8 and 9. The bristles 70 are engaged between wires 71 twisted together spirally, the bristles extending radially outward from the wires to form, as shown by Figs. 7 and 8, a cylindrical brush such as is commonly known as a chimney brush, for cleaning glass chimneys, bottles, etc. The bristles are then separated along one side and bent over and together as shown in Fig. 9; and a metal channel back

72 is then forced over the back edge of the brush and the sides of the back 72 are bent inward, securely clamping the bristles and wires and forming a flat narrow brush, as shown in Figs. 3 and 4. There is thus provided very simply and of a small number of parts at minimum expense, a brush which is well adapted for the purpose.

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 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.

What is claimed is:

1. The combination with a suction cleaning nozzle having lips which lie all in the same plane, of a rigid, non-rotatable thread-disturbing member within the nozzle adjacent one of its longitudinal edges, means supporting said member whereby it may have a limited amount of vertical movement, means operable from outside the nozzle for forcing said member to its lowermost position and rigidly holding it there, means located in the nozzle which is movable with said member to a position where it projects slightly beyond the plane of the nozzle lips and serves to hold the fabric being cleaned from sealing engagement with one lip of the cleaner nozzle, rollers for supporting said nozzle in spaced relation to the surface to be cleaned, and means for adjusting said rollers to bring the nozzle toward and away from the surface to be cleaned.

2. The combination with a suction cleaning nozzle having lips which all lie in the same plane, of a rigid, non-rotatable thread-disturbing member within the nozzle adjacent one edge thereof, means supporting said member whereby it may have a limited amount of vertical movement, means operable from outside the nozzle for forcing said member to its lowermost position and positively holding it there, runners located in the nozzle adjacent the ends of said member, said runners being movable with said member to positions where they project slightly beyond the plane of the nozzle lips and serve to hold the fabric being cleaned from sealing engagement with one lip of the cleaning nozzle, rollers for supporting said nozzle in spaced relation to the surface to be cleaned, and means for adjusting said rollers to bring the nozzle toward and away from the surface to be cleaned.

3. The combination with a suction cleaning nozzle of a thread-disturbing member within the nozzle adjacent one of its longitudinal edges, means supporting said mem-

ber whereby it may have a limited amount of vertical movement, spring means connected to said member which biases it to its uppermost position, and means operable from outside the nozzle for forcing said member to its lowermost position against the action of said spring means.

4. The combination with a suction cleaning nozzle, of a thread-disturbing member mounted within the nozzle and movable into and out of operative position, operating means for moving and holding the thread-disturbing member down in operative position, a spring for raising the thread-disturbing member when it is released by said operating means, and means for adjusting said spring to make it operative or inoperative as desired, the thread-disturbing member being free to fall or to be moved upward by engagement with the surface being cleaned when the spring is inoperative.

5. The combination with a suction clean-

ing nozzle, of a thread-disturbing member within the nozzle mounted to move approximately parallel to the side of the nozzle into and out of operative position, lower spaced stops for limiting the downward movement of the thread-disturbing member, upper spaced stops for limiting the upward movement of the thread-disturbing member, operating means adapted to engage the thread-disturbing member between said stops to force it down into operative position against the lower stops, and a spring connected to the thread-disturbing member between the stops to lift it up against the upper stops when released by said operating means.

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

WILLIAM W. ROSENFELD.

Witnesses:

A. L. KENT,

RUDOLPH RIEGE.

It is hereby certified that in Letters Patent No. 1,348,585, granted August 3, 1920, upon the application of William W. Rosenfield, of New York, N. Y., for an improvement in "Suction-Cleaners," errors appear in the printed specification requiring correction as follows: Page 1, line 78, for the word "stitch" read *switch*; page 4, line 95, after the word "obtain" insert the words *the best*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 14th day of September, A. D., 1920.

[SEAL.]

M. H. COULSTON,  
*Acting Commissioner of Patents.*