July 9, 1940. R. E. DUNBAR 2,207,582

CLEANER FOR SURFACE COVERINGS

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Fig. 1.

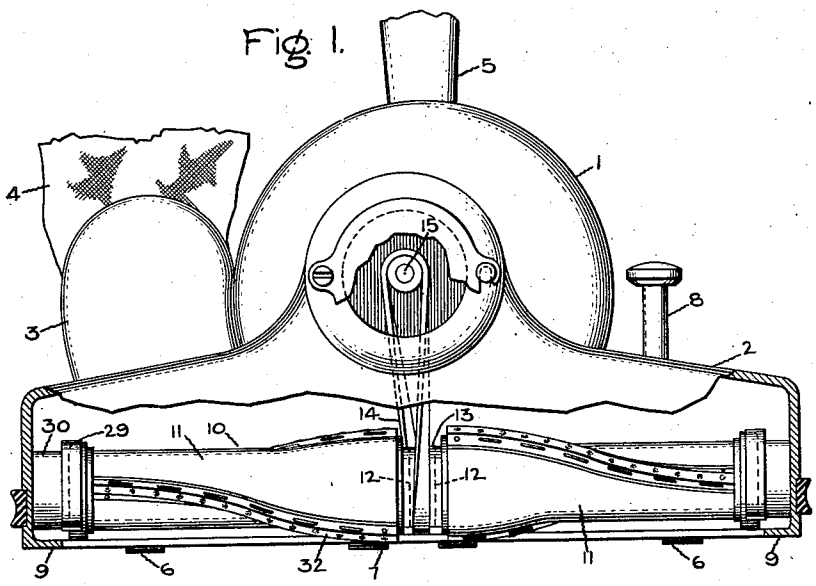


Fig. 2.

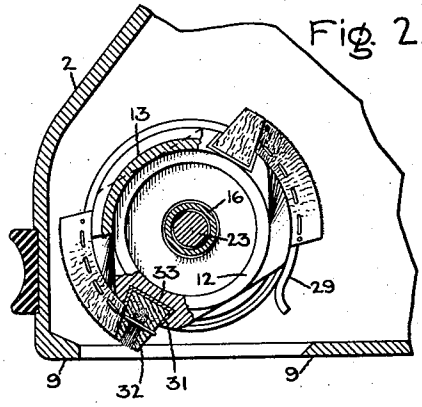


Fig. 3.

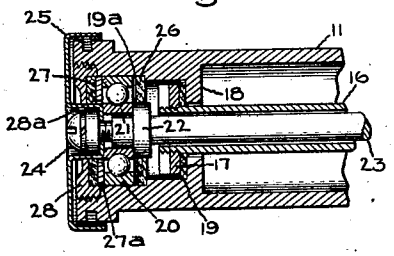


Fig. 5.

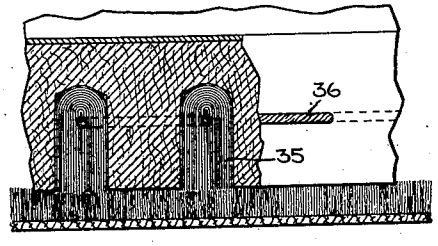
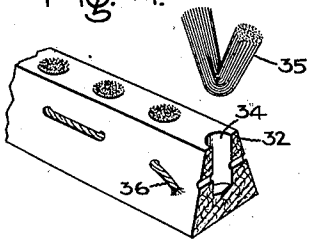


Fig. 4.



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Fig. 6.

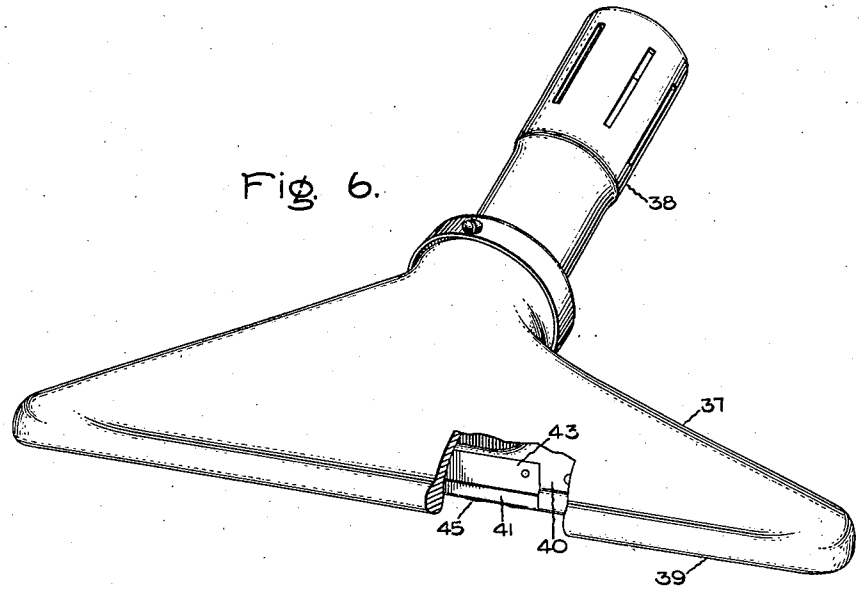


Fig. 7.

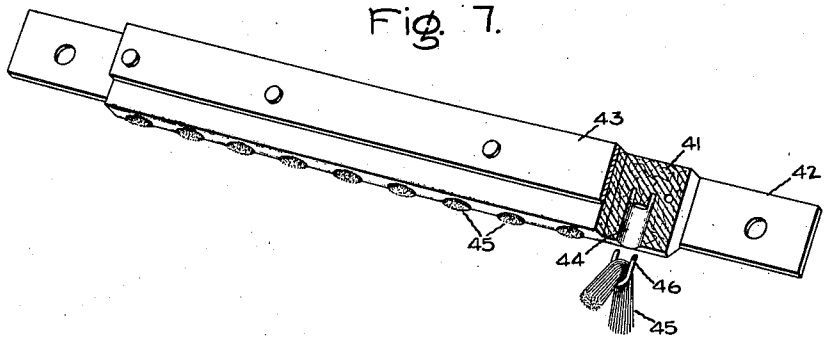
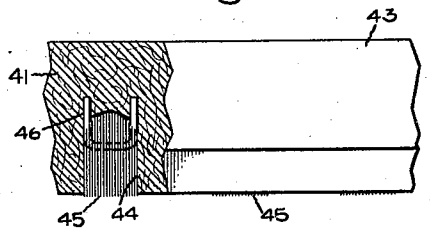


Fig. 8.



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UNITED STATES PATENT OFFICE

2,207,582

CLEANER FOR SURFACE COVERINGS

Ralph E. Dunbar, East Cleveland, Ohio, assignor to Electric Vacuum Cleaner Company, Inc., Cleveland, Ohio, a corporation of New York

Application March 31, 1937, Serial No. 134,052

1 Claim. (Cl. 15—158)

The present invention relates to brushes for floor coverings and the like, and particularly to brushes which are suitable for use in vacuum cleaners or other cleaners for surface coverings and the like.

The object of my invention is to provide an improved brush of this type and in particular to provide an improved brush construction in cleaners for surface coverings.

In the accompanying drawings, Fig. 1 is a front elevation partly in section of a vacuum cleaner having a rotating brush embodying my invention, Fig. 2 is a sectional view taken through the center of the suction nozzle at right angles to the length of the suction nozzle, Fig. 3 is a sectional view showing the construction for rotatably supporting the rotating brush, Fig. 4 is a fragmentary perspective view of the brush element showing the manner of securing the bristles therein, Fig. 5 is a fragmentary view showing the brush engaging a floor covering, Fig. 6 is a perspective view of a suction nozzle equipped with a brush embodying my invention, Fig. 7 is a perspective view of the brush partly broken away to show the manner of securing the bristles therein, and Fig. 8 is a fragmentary sectional view of the brush.

Referring to the drawings, I have shown my invention in connection with a vacuum cleaner having an outer casing 1 which is provided with a suction nozzle 2 and a discharge conduit 3. A suitable bag 4 for receiving dirt is attached to the discharge conduit. A motor driven fan within the casing creates a suction at the nozzle which draws dirt from the surface being cleaned through the suction nozzle and discharges the dirt through the discharge conduit 3 and into the bag 4. A handle 5 is provided at the rear of the casing. The cleaner is supported on front supporting wheels 6 and rear supporting wheels 7. The elevation of the suction nozzle with respect to the surface being cleaned is adjusted by a member 8 having a suitable connection for raising and lowering one of the sets of wheels.

The suction at the nozzle raises the floor covering or other material being cleaned against the bottom edges or lips 9 of the suction nozzle. While held in this position the floor covering is subjected to a beating and sweeping action by a rotatable agitating element or brush 10 arranged in the suction nozzle. The body of the brush comprises two metal castings 11 having cylindrical flanges 12 projecting from the adjacent ends which extend inside a sleeve 13. The sleeve 13 forms a pulley by means of which the agitating element is rotated by a belt 14 passing over the motor shaft 15. The parts 11 are held in assembled relation by a tube 16 having nuts 17 threaded on the ends thereof which cooperate with inwardly extending flanges 18 to clamp the parts 11 together. A suitable sealing washer 19 is placed between the nuts 17 and the flanges 18. In the outer end of each of the parts 11 is a cylindrical recess 19a in which is secured the outer raceway 20 of a ball bearing. The inner raceway 21 of the ball bearing is clamped against a collar 22 on a shaft 23 by means of a screw 24 threaded into the end of the shaft. The screw 24 also secures a guard 25 to the shaft 23. A grease sealing washer 26 is arranged between the collar 22 and the recess 19a and another grease sealing washer 27 is arranged between a plug 28 threaded into the end of the casting and a flange 28a on the guard 25. These seals also keep dust from the ball bearing. A steel retaining washer 27a holds the washer 27 in place.

The rotating brush is mounted in the suction nozzle by spring clips 29 which grip the periphery of the guard 25. With this arrangement, the guard 25 and the shaft 23 are held stationary within the suction nozzle and the brush is rotatably supported on the shaft. The particular construction for supporting the brush within the suction nozzle is not important and the arrangement for carrying the clips 29 is therefore shown diagrammatically in elevation at 30.

In the outer surface of the rotor are two dovetail grooves 31 which spiral helically along the length of the rotor. These grooves hold strips 32 of felt which project beyond the body of the rotor. The felt strips are flexible so that they may be inserted by sliding lengthwise into the dovetail slots. If necessary, the portion of the felt strips within the slot may be provided with a metal backing 33 which reenforces the portion of the felt within the dovetail slot.

In the outer face of the felt strips 32 are sockets 34 in which are tufted bristles 35. In the manufacture of the brush, a thread 36 is extended through the body of the felt strip forming a loop which projects above the upper end of the socket 34. The bristles 35 are then bent over the loop and pulled into the socket by drawing the thread tight. This construction permits the securing of a number of tufts of bristles in the felt strip by means of a continuous piece of thread. The length of the bristles is such that the ends of the bristles project slightly beyond the surface of the felt. The bristles are in effect substan-

tially flush with the felt. The sides of the socket exert a lateral compression on the bristles, holding the bristles in intimate contact and preventing any substantial flexing.

During the use of the cleaner, the floor covering is drawn against the lips 9 of the suction nozzle, and the part of the floor covering between the lips is bowed upwardly. As the brush rotates successive portions of the felt strips 32 strike the bowed portion of the floor covering and force it downward in opposition to the air flow through the suction nozzle thereby subjecting the floor covering to a beating and sweeping action. The felt being a homogeneous material presents a relatively smooth surface to the floor covering and therefore has no tendency to dig into the nap of the floor covering. The felt, therefore, can be quite rigid without increasing the wear on the floor covering. Its rigidity is particularly effective in producing a beating action on the floor covering. As the felt strips are drawn across the floor covering, due to the rotation of the brush, the ends of the bristles 35 sweep across the nap of the floor covering and remove any particles of dirt which are held therein. Since the bristles 35 are substantially flush with the felt and are supported substantially throughout their whole length the bristles are quite stiff. There is, however, no tendency for the bristles to dig into the nap of the floor covering and the sweeping action of the brushes therefore results in less wear than in the conventional rotating brush construction in which the bristles project a relatively great distance from the brush body. The present construction provides the brushing effect of stiff bristles without the increased wear which usually results from the use of stiff bristles. The felt strips are also somewhat effective in brushing particles of dirt from the nap of the floor covering. For example, the felt strips alone have been found to be effective in removing particles of lint. This action of the felt strips is due to the fibrous nature of the felt.

The operation of the rotating brush does not change materially with use. The felt being a homogeneous material wears evenly and the nature of the surface presented to the floor covering remains the same. The felt wears at a rate which is substantially the same or slightly greater than the rate of wear of the bristles. The ends of the bristles therefore remain substantially flush with the outer surface of the felt at all times. From a broad aspect it is not essential that the strips 32 be made of felt. Any material which wears at a rate equal to or somewhat greater than the rate of wear of the bristles would be satisfactory. The materials substituted for the felt need not be of a fibrous nature although such materials will pick up lint and are therefore desirable. In fact, if the maximum lift of the brush is not important, the strips 32 may be made of a material which wears at a rate substantially less than the rate of wear of the bristles.

In Figs. 6 to 8 inclusive my invention is shown applied to a suction nozzle 37 having a swivel coupling 38 for connecting it to a suction hose. The lips 39 of the suction nozzle are preferably bowed upward at the center so that when the nozzle is used for cleaning a floor covering, the portion of the floor covering between the ends of the nozzle will be raised from the floor against the bowed portions of the lips. In the rear wall 40 is secured a brush which comprises a felt strip 41 clamped between metal plates 42 and 43. The plate 42, which is longer than the plate 43, is secured to the rear face of the wall 40. The felt strip 41 fits in an opening in the wall 40, the abutting edges of the strip and opening being in tight enough engagement so that no air leaks therebetween. The opening in the wall 40 extends upwardly therein from the plane of the lips and transversely through the wall to provide a passage to the interior of the nozzle extending transversely through the wall and bounded on the top and sides by the edges of the opening and open at the bottom. The plate 43 and the felt strip are substantially flush with the inner surface of the wall 40. The brush is therefore in effect mounted in the rear wall of the suction nozzle as distinguished from constructions in which the brush is attached to the rear face of the wall. In the lower edge of the felt strip are sockets 44 in which tufts of bristles 45 are secured by staples 46. The felt is compressed between the plates 42 and 43 and the bristles are accordingly securely held in the sockets by the staples. The lower edge of the felt strip projects slightly below the lip 39 of the wall 40. The length of the bristles 45 is such that the ends of the bristles project slightly beyond the felt. As in the previously described construction the bristles are substantially flush with the felt.

In the use of the suction nozzle the floor covering being cleaned is drawn upward against the lips of the suction nozzle by the suction within the nozzle. As the nozzle is moved across the floor covering, the portion of the floor covering beneath the ends of the bristles 45 is subjected to a brushing action which dislodges dirt held in the nap of the floor covering. Since the major portion of the length of the bristles is held against lateral movement by the walls of the sockets 44, the ends of the bristles are quite stiff. However, since the bristles are substantially flush with the surface of the felt, the bristles cannot dig into the nap and cause objectionable wear. The increased brushing effect of stiff bristles is therefore obtained without a corresponding increase in wear. One advantage of this construction is that the bristles are located in the position for most effective brushing action. Another advantage of the construction is that the brush causes no loss of suction. This is due in part to the fact that the edges of the felt strip are held tightly against the edges of the opening in the wall 40 of the suction nozzle and there is, therefore, no leakage around the edges of the felt. Also, since the bristles are substantially flush with the felt, the floor covering between the bristles is held against the felt by the suction. This tends to decrease the leakage of air between the bristles. Due to its fibrous nature, the felt is also somewhat helpful in removing lint from the nap of the floor covering. The felt wears down at a rate which is equal to or slightly greater than the rate of wear of the bristles. The surface presented to the floor covering therefore remains substantially constant throughout the life of the brush. From a broad aspect it is not necessary that the bristles be held in a strip of felt. It is merely desirable that the material in which the bristles are held be of one which will wear down at a rate equal to or slightly greater than the rate of wear of the bristles.

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

In a cleaner for surface covering or the like, a suction nozzle having walls providing surface contacting lips, an opening in one of said walls extending upward in said wall from the plane of the lips thereof and transversely through the wall to

provide a passage to the interior of the nozzle extending transversely through said wall and bounded on the top and sides by the edges of said opening and open at the bottom, a strip of felt secured in said opening, the abutting edges of the felt and said opening being in sealing engagement and one edge of the felt forming a part of said lips, and bristles secured in the felt, the free ends of the bristles being substantially flush with said lips and the remaining portion of the bristles being embedded in the felt.

RALPH E. DUNBAR.