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RUG NOZZLE WITH VARIABLE OPENING

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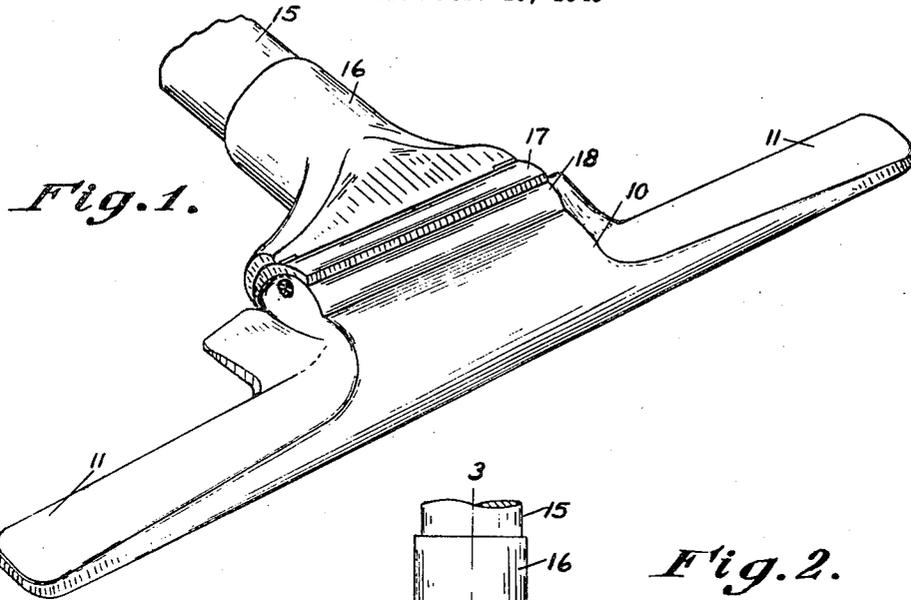


Fig. 1.

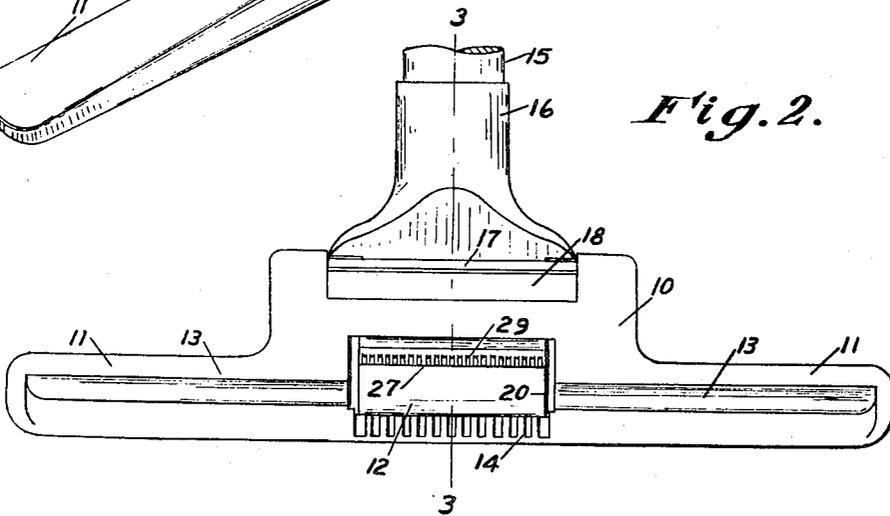


Fig. 2.

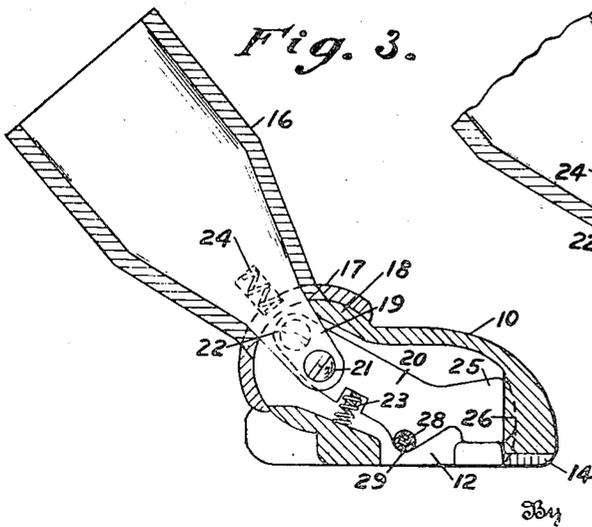


Fig. 3.

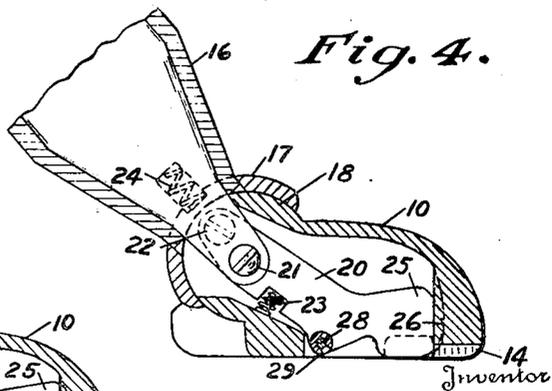


Fig. 4.

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RUG NOZZLE WITH VARIABLE OPENING

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5 Claims. (Cl. 15-373)

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This invention relates to suction cleaners and is particularly concerned with cleaners for rugs or similar flat pile fabric surfaces.

In the cleaning of rugs or the like it has been found that for adequate cleaning of the major area of the surface, a simple nozzle having an elongated narrow suction opening and smooth opening lips, is adequate and may be used with a minimum of wear and deterioration of the surface being cleaned. However, it is quite frequently found that certain areas of the surface require more intensive cleaning action in order to remove such foreign matter as embedded hairs, threads, and other materials which do not respond to the normal suction action applied by the plain lipped elongated opening of the conventional cleaner. For the cleaning of such surfaces it has been suggested that nozzles be provided having a more restricted opening such that the air velocity moving therethrough is greatly in excess of that common to the normal elongated opening and it has further been proposed that such restricted opening be provided with lip modifications such as serrations which provide for an agitation of the pile of the fabric being cleaned so that the suction may become more effective. And it has further been proposed to provide rakes or combs with teeth-like formations which may engage and remove hairs, threads, and the like from enmeshment with the threads of the pile fabric.

Cleaners formed in line with the above proposals are effective for intense cleaning of rugs and the like but their continued use subjects the surface to deterioration due to friction and agitation in bending and turning the bristles of the rug and it is therefore not desirable to continuously use such nozzles on the entire rug surface.

It has further been proposed that nozzles be provided which combine an elongated smooth lipped nozzle opening with a separate more restricted opening provided with a comb or rake or the like, such nozzles providing for the selective use of either of the openings. Such nozzles, however, require a manipulation by the operator in order to selectively provide for the application of suction to one or the other of the nozzle openings and/or to apply the selected opening relation to the surface being cleaned.

The present inventive concept provides a rug cleaning nozzle having a single suction opening the major portion of the lip of which is of smooth configuration and the dimension of which is such as to provide for the suction normally

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adequate to remove ordinary dirt and litter. The concept, however, further embraces the provision of means for diminishing the effective suction area of the nozzle opening, together with means for presenting in operative position a comb operable at the restricted opening. Such an arrangement provides a single nozzle opening for normal operation as well as intense cleaning action at the will of the operator.

The inventive concept further embraces the provision of means substantially automatic in effect for reducing the area of the opening and for moving to operative position a comb in such a manner that the normal physical reaction of the operator to an area requiring intense cleaning will adjust the nozzle for such type of cleaning.

It is therefore among the objects of the present invention to provide a novel and improved nozzle which may be selectively operable to apply a normal cleaning action over an extensive area or an intense cleaning action over a more limited area.

A further object of the invention is to provide a cleaning device in which the suction area may be automatically reduced without specific manual manipulation of valves or similar controlling means.

Further object of the invention is to provide a cleaning nozzle with a comb or the like which may be selectively actuated for application to the surface to be cleaned without specific manual manipulation or adjustment of the nozzle.

Further object of the invention is to provide a suction nozzle with means automatically responsive to the pressure applied by an operating handle for adjusting the nozzle for intensive cleaning action.

Numerous other objects and features of the present invention will be apparent from consideration of the following specification taken in connection with the accompanying drawings in which:

Fig. 1 is a perspective view of one embodiment of the present inventive concept;

Fig. 2 is a bottom plan view of that form of the invention shown in Fig. 1;

Fig. 3 is a vertical transverse sectional view taken on lines 3-3 of Fig. 2 with the nozzle parts arranged for normal mild cleaning action, and

Fig. 4 is a similar view of a nozzle in position for intensive and concentrated cleaning action.

Referring now more particularly to the drawings in the present embodiment of the invention,

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the nozzle body comprises a central hollow housing 10 and extending side arms 11. The lower surface of both the housing 10 and the arms 11 are open to form a suction opening having an enlarged central portion 12 and outwardly extending narrow elongated side openings 13. The openings 12 and 13 jointly form a long suction opening the lips of which are smooth except for the provision of serrations 14 on the forward lip adjacent the central enlarged opening 12.

Suction is preferably applied to the nozzle through a hollow handle or wand 15 which constitutes the actuating and controlling member for the nozzle. The wand 15 is received within a socket 16 which is outwardly flared adjacent the housing 10 and has applied thereto a semi-cylindrical bearing member 17 which is slidably received upon the cylindrical outer surface 18 of the central housing 10 of the nozzle. The socket 16 is itself pivoted with respect to the nozzle body by a pair of socket ears 19 which are integral with the socket and extend inwardly within the housing 10 and are pivotally mounted upon levers 20 by means of socket fulcrum pins 21, while levers 20 are pivotally mounted directly on the body by pins 22. The member 17 is not rigidly secured to the socket 16, but is formed with an opening through which the ears 19 pass with sufficient clearance to permit limited movement of the socket relative to the bearing member 17. A spring 24 is compressed between the socket and the bearing member in order to maintain the latter in contact with the surface 18. By this construction it will be noted that the wand and its socket may freely pivot about the socket fulcrum pins 21 without any disturbance of the position of the levers 20, such levers being biased in a raised position as shown in Fig. 3 by compression springs 23. It will also be noted in Fig. 3 that in the normal operating position of the wand the fulcrum pins 21 and 22 are in line with the axis of the wand and thus when pressure is applied in an axial direction for moving the nozzle over the surface to be cleaned no turning moment is applied to the levers 20 and such moment as may be incidently applied when the wand is pivotally moved from the normal position shown in Fig. 3, is counteracted by the force applied by the springs 23 so that in normal operation no pivotal movement of the levers 20 takes place. A normal tension upon the fulcrum pins 21 and 22 and a snug embracement of the surface 18 by the bearing member 17 is maintained by springs 24 located between the socket 16 and the bearing 17.

The forward ends of the levers 20 terminate in the valve plates 25 which move through valve guide grooves 26 on either side of the enlarged opening 12. The arrangement is such that when the levers 20 are pivotally moved from the normal position of Fig. 3 to the intense cleaning position of Fig. 4 the valve plates interrupt the flow of air to the enlarged opening 12 from the narrow elongated side openings 13, thus confining the suction action to the central enlarged opening 12. The levers 20 also carry mounted therebetween a comb or the like which is preferably formed as a cylindrical shell mounted upon a carrier bar 28, the ends of which are secured to the levers 20. The comb itself is provided with apertures which encircle teeth 29 so that when the comb is in operative position the teeth will act to engage fine threads and hair, lifting them from the pile of the fabric so that they may be subsequently entrained by the high ve-

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locity air flow through the restricted opening 12. It will, of course, be noted that the relation of the comb 27 with the valve plates 25 is such that when the levers 20 are moved in clockwise direction against the force of the springs 23 to position the valve plates across the entrance of the opening 13, the comb will be moved to a position in the plane of the lips of the nozzle so as to be effectively positioned for cleaning action.

With the construction herein set forth it will be seen that while the wand and socket may be freely pivoted on the socket fulcrum pins 21, the upward biasing action of the springs 23 on the levers 20 prevents pivotal movement of the levers as a consequence of such movement of the wand. A positive downward thrust applied to the wand and socket in a direction having a component transverse to their axes will, however, impose a thrust on the levers 20 which will overbalance the biasing of the levers 20, causing them to pivot in clockwise direction to the position shown in Fig. 4. In such a position the suction is confined to the central opening 12 and the comb is positioned within the plane of the nozzle lips whereby intense cleaning action may be applied to the surface being cleaned.

In the operation of this nozzle for normal cleaning action, the parts are in the position illustrated in Fig. 3 and the required force applied through the wand when moving the nozzle back and forth over the surface is not sufficient to overcome the upward biasing of the levers by their springs 23 and this is true even when the wand and socket are pivotally moved from the normal position shown in Fig. 3. When, however, the operator notes that threads, hairs, or other foreign matter at a particular area of the surface to be cleaned are not removed by the normal cleaning action resulting from the suction as applied to the entire nozzle opening including the side openings 13, it is a natural tendency to bear down upon the wand in what may be defined as a scrubbing action in which the wand is usually gripped by both hands and pressure is exerted by a thrust on the wand in a direction substantially transverse to its axis. This thrust slightly displaces the wand and socket laterally in a direction normal to their axes, such movement being possible because of the non-rigid connection between the socket and the member 17, the latter pivoting slightly in a counter-clockwise direction on the surface 18. This lateral movement of the socket 16 and ears 19 exerts a clockwise turning moment on the levers 20 below their fulcrum pins 22 so that the levers are pivotally moved against their springs 23, thus moving downwardly the valve plates 25 and bringing the comb 27 into operative position. It will also be noted that such pivotal movement of the comb has a rearward component as well as a downward one, thus moving the comb out of the suction path so the width of the path is increased to permit the passage through the nozzle of the enlarged pieces of foreign matter which might otherwise be obstructed by the position of the cleaner during the normal cleaning operation.

From the foregoing it will be seen that the present cleaner provides a nozzle with a single opening of substantial area surrounded in the main by smooth lips together with means by which the opening may be restricted and a comb or the like may be brought into action at the restricted area and as a result of the normal re-

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action of the operator to the presence of foreign matter which will not respond to normal suction applied through the entire nozzle opening.

Throughout the present specification, the term comb has been used to identify the means for engaging and disentangling surface litter such as hairs, textile fibers and the like from the piles of a rug or similar floor covering. It will be understood, however, that the term is here used in its broadest sense and refers to a general class of such instrumentalities and embraces flexible pile agitating means such as brushes or the like which will accomplish this purpose.

Obviously, numerous changes and modifications and the full use of equivalents may be resorted to in the practice of the present invention without departure from the spirit or scope thereof as outlined in the appended claims.

What I claim is:

1. In a vacuum cleaner nozzle, a hollow nozzle body having an elongated suction opening therein, valve means comprising a pair of valves supported on arms pivotally mounted within said body and movable to position the valves across the suction opening to confine the suction to a limited section of the opening, and a wand receiving coupling having arms pivotally mounted upon said valve carrying arms.

2. In a vacuum cleaner nozzle, a hollow nozzle body having an elongated suction opening therein, valve means comprising a pair of valves supported on arms pivotally mounted within said body and movable to position the valves across the suction opening to confine the suction to a limited section of the opening, a wand receiving coupling having arms pivotally mounted upon said valve carrying arms, and spring means for normally retaining said valve carrying arms in inoperative position.

3. In a vacuum cleaner nozzle, a hollow nozzle body having an elongated suction opening therein, valve means comprising a pair of valves supported on arms pivotally mounted within said body and movable to position the valves across the suction opening to confine the suction to a limited section of the opening, a wand receiving coupling having arms pivotally mounted upon

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said valve carrying arms, and a comb carried by said valve carrying arms and movable therewith to operative position when said valve carrying arms are so moved.

4. In a vacuum cleaner nozzle, a hollow nozzle body having an elongated suction opening therein, valve means comprising a pair of valves supported on arms pivotally mounted within said body and movable to position the valves across the suction opening to confine the suction to a limited section of the opening, a wand receiving coupling having arms pivotally mounted upon said valve carrying arms, spring means for normally retaining said valve carrying arms in inoperative position, and a comb carried by said valve carrying arms and movable therewith to operative position when said valve carrying arms are so moved.

5. In a vacuum cleaner nozzle, a hollow nozzle body having an elongated suction opening therein, lever means pivotally mounted within said body, valve means comprising a pair of spaced valves movable by pivoting of said lever means to position the valves across said suction opening for confining the suction to a limited section of the opening, and a wand receiving coupling pivotally mounted on said lever means.

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