APPARATUS FOR CLEANING FLOORS

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2 Claims

This invention relates to apparatus for cleaning floors and particularly relates to a floor brush and a mounting arrangement therefor to be used in combination with a vacuum cleaner.

It has been known in the past to employ floor brushes with a vacuum cleaner to improve the cleaning ability thereof. The floor brushes have been particularly effective in cleaning dirt which is of a nature such that it is not readily picked up by the vacuum cleaner nozzle.

The present invention relates to a vacuum cleaner with an improved floor brush and mounting arrangement capable of cleaning more effectively and for stirring stubborn dirt so that it can be readily picked up by the air entering the vacuum cleaner nozzle. Accordingly, a floor brush which extends the length of the nozzle is located preferably near a rear portion thereof and is mounted in a manner such that the brush produces a whisking action with the bristles continually tending to oscillate on the floor as the vacuum cleaner is moved forwardly. The brush preferably is resiliently mounted such that the bristles can move both up and down as well as transversely and are in a condition of imbalance as the vacuum cleaner is moved forwardly. The brush also preferably is positioned at an angle to the floor and slanting away from forward movement of the vacuum cleaner to produce the desired effect. With the oscillating or whisking action of the brush, dirt on the floor is more efficiently stirred up or disturbed so that it can be more readily picked up by the air entering the nozzle.

Further, with more stubborn dirt, the angle of the brush enables it to bear against such dirt more strongly when it is encountered. The brush also compensates more effectively for unevenness in the floor being cleaned.

It is, therefore, a principal object of the invention to provide a vacuum cleaner with an improved cleaning action.

Another object of the invention is to provide a vacuum cleaner with a brush mounted in a manner to provide a more effective whisking or oscillating action.

Still another object of the invention is to provide a vacuum cleaner with a vacuum cleaner brush resiliently mounted at an angle to the floor to more effectively stir stubborn dirt from the floor and to compensate for unevenness in the floor.

Other objects and advantages of the invention will be apparent from the following detailed description of a preferred embodiment thereof, reference being made to the accompanying drawing, in which:

FIG. 1 is a view in perspective, with parts broken away, of a vacuum cleaner embodying the invention;
FIG. 2 is a front view in elevation, with parts broken away and with parts in section, of a vacuum nozzle and brush combination of the vacuum cleaner of FIG. 1;
FIG. 3 is a further enlarged view in vertical cross section of a portion of the vacuum cleaner nozzle and brush, taken along the line 3—3 of FIG. 2; and
FIG. 4 is a still further enlarged view in perspective of a resilient brush holder which mounts the brush on the vacuum cleaner.

Referring to FIG. 1, a vacuum cleaner embodying the invention is indicated at 10 and includes a vacuum nozzle 12 communicating with a blower housing 14 in which is a blower (not shown) operated by a motor 16.

The blower pulls air through the nozzle 12 along with air inlet 18 and discharges the combination into a suitable bag or other receptacle 18. The vacuum cleaner 10, as shown, is of the large industrial type used to clean large surfaces such as walks and factory floors. The cleaner includes a push handle 20 extending beyond the bag 18 along with large wheels 22 which, in combination with casters (not shown) immediately behind the end 12 maintain the nozzle 12 just above a surface 24 (FIGS. 2 and 3) being cleaned. The vacuum nozzle 12 includes a rear wall 26 and a front wall 28 and further includes a pivotable nozzle door 30 which can be remotely controlled to open and shut. The door is normally shut to provide a relatively small air inlet designed to reduce as shown in FIG. 3, but can be swung open to accommodate larger debris, such as wads of paper or milk cartons. A door of this nature is disclosed and discussed more fully in our copending application, Ser. No. 560,671, filed June 27, 1966, and will not be discussed further here.

The nozzle also can include a removable cover 34 for the reception of a suction hose for auxiliary cleaning tools, as is known in the art.

In accordance with the invention, an elongate cleaning brush 36 extends substantially the full length of the air inlet 32 and preferably is located nearer the rear wall 26 of the nozzle than the front wall 28 of the nozzle 12. The brush is of known construction and includes a multiplicity of bristles 38 formed in a U-shaped configuration around a wire core 40 and held by a U-shaped strip 42 extending the full length of the brush.

The brush 36 is resiliently supported by the vacuum cleaner 10 and specifically the rear wall 26 of the nozzle 12 through resilient leaf springs 44. Each of the springs 44 includes a curved strip 46 having a concave upwardly facing surface. The strip terminates in an integral, generally U-shaped clip 48 having a long leg 59 extending upwardly from the end of the strip 46 and along the rear of the brush 36, with a web portion 52 extending over the top of the U-shaped strip 42, and a front, shorter leg 54 extending downwardly in front of the brush 36. The clip 48 preferably is positioned so as to maintain the brush 36 at an angle to the surface 24 and slanting away from the forward direction of movement of the vacuum cleaner 10. The angle is an important factor in attaining an effective cleaning action for the brush 36 and preferably is from ten to twenty degrees and particularly about fifteen degrees to the vertical.

With this position of the brush and the resilient mounting spring 44, the brush 36 can move in an oscillatory or transverse manner, to the left and right as shown in FIG. 3, and also move up and down. Further, with the particular angle of the brush 36, the bristles 38 individually tend to move transversely or oscillate as they move along the surface 24 and particularly where they meet increased resistance in the form of debris or dirt on the floor.

The bristles 38 and the entire brush 36 also tend to move in a counterclockwise direction as shown in FIG. 5, as the vacuum cleaner moves forwardly, to the left.

This produces a condition of imbalance in the mounting spring 44 and specifically in the strip 46 which tends to
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be forced to a straight position and thereby urges the brush 36 in a clockwise direction again since the strip 46 tends to revert to its original position. Thus, the spring 44 and the position of the brush 36 and the bristles 38 cooperate to cause the oscillation or whisking action of the bristles and the brush. This action of the brush is more effective than those heretofore known in tending to stir up dirt encountered by the brush tending to make it airborne and facilitating removal of the dirt from the floor by the air entering the inlet 32. Further, with this arrangement, more stubborn dirt will tend to cause the brush 36 to move counterclockwise more fully and thereby exert more pressure on the floor so as to be more effective in loosening the dirt.

The length of the bristles 38 is somewhat flexible. The bristles should be long enough to achieve the individual oscillating or whisking action of the bristles but yet should not be so long as to lack the stiffness necessary to loosen stubborn dirt. The longer bristles also enable the brush to have a longer life. The brush is mounted on the rear wall 26 of the vacuum cleaner in the form shown by bolts 56 and nuts 58 which extend through slots 60 in the upper end portions of the strips 46 to enable the brush to be moved downwardly as the bristles wear, if desired. In the form shown, approximately one to one-and-one-half inches of bristle extend downwardly below the clips 48.

The number of mounting springs employed is not critical and may vary from one for very short brushes to three or four for longer brushes and nozzles.

We claim:

1. A vacuum cleaner comprising a suction nozzle having an inlet near the floor, means establishing a vacuum to pull air through said inlet, an elongate floor brush near a rear portion of said nozzle inlet and extending substantially over the length of said nozzle inlet, means resiliently supporting said floor brush and comprising at least two, spaced leaf springs positioned with the concave sides extending upwardly away from the floor and having first end portions attached to the rear wall of said suction nozzle, each of said leaf springs having a U-shaped portion at the other end engageable with an upper edge portion of said brush, said springs holding said brush so that said brush is in pressure contact with the floor when the vacuum cleaner is in its normal position on the floor, said springs extending rearwardly from said brush generally in planes perpendicular to the longitudinal extent of said brush, said springs being the only supports for said brush for any position thereof, said brush being located at an angle between 10° and 20° to the surface whereby said brush moves both vertically and transversely to enable said brush to have a whisking action on the floor over which the vacuum cleaner is moved.

2. A vacuum cleaner according to claim 1 characterized by said first end portions of said leaf springs have slots extending longitudinally thereof, and fasteners extending through said slots and connecting said first end portions to said rear wall of said suction nozzle to enable said brush to be positioned closer to or further from the floor.

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