July 13, 1954 D. N. OLSEN 2,683,276

CLEANING HEAD FOR SUCTION TYPE CARPET SWEEPERS

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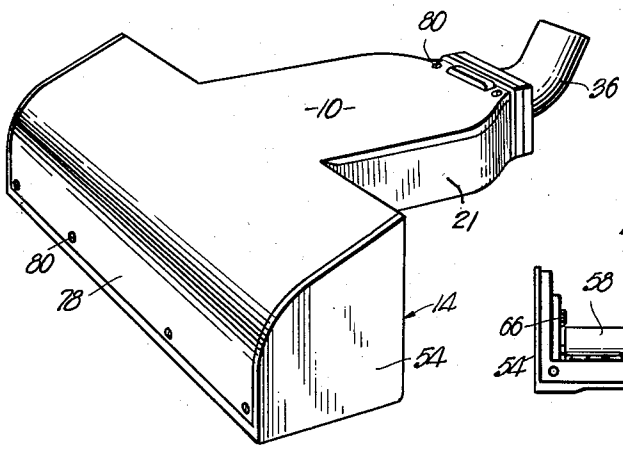

Fig. 1.

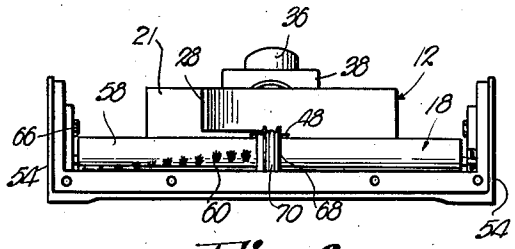

Fig. 2.

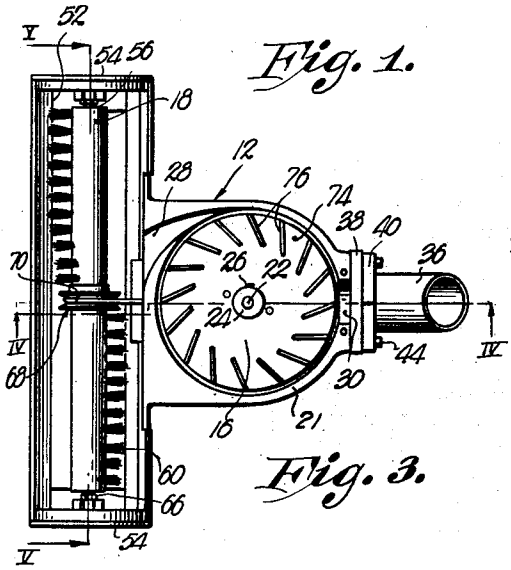

Fig. 3.

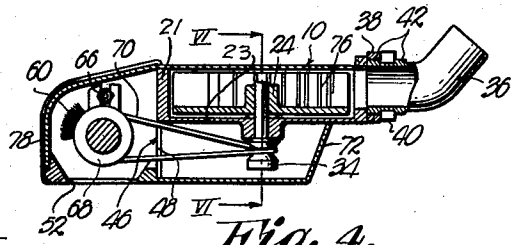

Fig. 4.

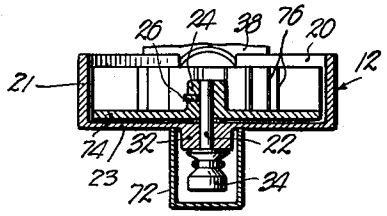

Fig. 6.

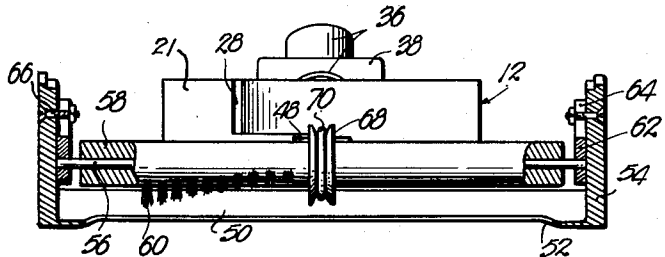

Fig. 5.

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CLEANING HEAD FOR SUCTION TYPE CARPET SWEEPERS

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1 Claim. (Cl. 15—387)

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This invention relates to vacuum cleaners having suction means as a part thereof and has to do more particularly with a cleaning head for vacuum cleaners of such character, the head being provided with a rotatable turbine within the path of travel of air currents through the head induced by the vacuum cleaner itself and being operably connected with a rotatable brush also mounted within the head.

It is the most important object of this invention to provide a vacuum cleaner head that combines the functions of cleaners of the suction type with those of cleaners operating principally on the rotatable brush principle, the head being so formed and arranged to utilize the flow of air currents to rotate the brush.

Other objects of this invention include the way in which the rotatable brush and turbine are arranged and interconnected to present a relatively small, inexpensive, light-weight, universal attachment for suction type vacuum cleaners; the way in which the turbine is formed and disposed within the path of air currents to present sufficient acceleration without deleterious effects upon the function of the stream of air in picking up particles of dirt and dust; and many other more minor objects, all of which will be made clear or become apparent as the specification progresses, reference being had to the accompanying drawing, wherein:

Fig. 1 is a perspective view of a cleaning head for suction type carpet sweepers made pursuant to my present invention.

Fig. 2 is a front elevational view with the cover plate of the head entirely removed.

Fig. 3 is a top plan view with said cover plate removed.

Fig. 4 is a vertical section taken on line IV—IV of Fig. 3.

Fig. 5 is a cross sectional view taken on line V—V of Fig. 3, looking in the direction of the arrows; and

Fig. 6 is a transverse, cross sectional view taken on Line VI—VI, of Fig. 4 looking in the direction of the arrows.

As above indicated, the cleaning head hereof, broadly designated by the numeral 10, is adapted for releasable attachment to and use with various types of conventional vacuum cleaners of the type having a tubular suction conduit. This type of vacuum cleaner is distinguished from the usual brush type of cleaner in that suction alone is utilized in the cleaning process.

While these cleaners have been provided with brush elements to loosen and stir up the dirt and dust in rugs, carpets and the like, so far as

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I am aware, no satisfactory head has been provided with a rotatable brush similar in form and operation to those of vacuum cleaners of conventional character that operate on the rotatable brush principle.

Cleaning head 10 includes a turbine housing 12 and a brush case 14 for rotatably receiving a rotatable turbine 16 and a brush 18 respectively. The turbine 16 is rotatably mounted within a circular cavity or turbine chamber 20 formed in the housing 12 through the medium of a vertical spindle 22 releasably secured to hub 24 of turbine 16 by means of a set screw or the like 26. Cavity 20 is defined by an annular, vertical wall structure 21 and horizontal wall structure 23.

Housing 12 is provided in addition to cavity 20 with an elongated groove or passage 28 in wall structure 21 providing an air inlet and having its longitudinal axis tangential to the peripheral inner walls of cavity 20 in the manner illustrated in Fig. 3 of the drawing. An outlet 30 formed in the wall structure 21, and also communicating with cavity 20, is disposed substantially in diametrically-opposed relationship to the inlet end of tangential groove 28.

A bearing 32 depending from the wall structure 23 and preferably integral therewith rotatably receives the spindle 22 that depends from turbine 16, and the lowermost end of spindle 22 below bearing 32 is provided with a sheave 34. A substantially L-shaped, tubular adaptor 36 is rotatably secured to the housing 12 at one end thereof in direct communication with outlet 30 through the medium of a ring 38 on housing 12 in co-axial registering relationship with outlet 30 and a two-section clamp 40, both of which circumscribe the proximal end of adaptor 36.

The tubular adaptor 36 is provided with a pair of spaced-apart, annular, external ribs 42, the inside diameter of clamp 40 being less than the outside diameter of ribs 42 and the clamp 40 being disposed between the ribs 42 as shown in Fig. 4. A plurality of screws or the like 44 releasably secure the clamp 40 to ring 38 and/or housing 12.

That end of the housing 12 opposite to adaptor 36 is provided with a depending flange or vertical wall structure 46 having a slot 48 therein for mounting the brush housing 14. Housing or case 14 comprises a closed polygonal frame 50 presenting a rectangular inlet 52 disposed in a plane below the lowermost extremities of sheave 34. The polygonal frame 50 is provided with an upstanding plate 54 at each end respectively thereof, and one of the longitudinal stretches of the frame 50 is releasably secured or integrally

joined with the flange 46 at the lowermost edge thereof as desired. Accordingly, this last-mentioned stretch traverses the slot 48 and closes the lowermost end thereof.

Brush 18 spans the distance between the end plates 54 for rotation upon a normally-horizontal axis. An elongated shaft 56 is provided with a circumscribing tube 58 that, in, turn, spirally mounts a plurality of outwardly-extending bristles 60. The ends of the shaft 56 extend beyond proximal ends of the tube 58 and are each rotatably mounted within a bracket 62. There is a bracket 62 on the innermost face of each end plate 54 respectively, and each is provided with a slot 64 that receives a bolt and nut assembly 66 serving to adjustably mount the bracket 62 and, accordingly, the brush 18 upon the corresponding end plate 54.

A pulley 68 circumscribing the tube 58 intermediate the ends thereof and rigidly secured thereto is in alignment with the slot 48 of depending flange 46, as is clear in Figs. 2, 4 and 5. The vertical spindle 22 and sheave 34 thereon are, likewise, in alignment with the slot 48, and the latter is operably joined with the pulley 68 by means of a continuous belt 70, twisted slightly as shown in Fig. 4.

A closure member 72 that is U-shaped in cross section in the manner illustrated by Fig. 6 underlies the wall structure 23 in covering relationship to a portion of belt 70, the sheave 34 and the bearing 32 presenting a chamber for sheave 34. It is to be preferred that closure 72 be releasably mounted in place such as by attachment to the outer face of flange 46.

The turbine 16 includes a flat bottom plate 74 that has hub 24 thereon together with a plurality of angularly-disposed vanes 76 integral with the uppermost face thereof. The angularities of the vanes 76 with respect to the diameter of circular plate 74 are preferably all the same, and it is noted that the innermost ends of the vanes 76 terminate in a circular path concentric with and spaced outwardly from the hub 24. The turbine chamber 20 and the brush case or vacuum cleaner 14 are provided with a common shield or cover plate 78 releasably secured thereto through the medium of a plurality of screws or the like.

Cover plate 78 is, also, provided with a pair of depending portions (not shown) in opposite sides of the housing 12 that spans the distance between the ends of flange 46 and the end plates 54. It is noted that the inlet end of tangential groove 28 communicates directly with the brush case 14 above the brush 18 and immediately below the inner face of shield 78. In other words, the top wall of the groove 28 is defined by cover plate 78.

In operation, the cleaning head 10 is secured to the tubular suction conduit of a conventional vacuum cleaner by means of adaptor 36. By virtue of the rotatable interconnection between adaptor 36 and the housing 12, head 10 is rendered freely swingable as the suction tube of the vacuum cleaner is used as a handle in positioning the head 10 along the carpet or other article to be cleaned. Consequently, the lower face of frame 50 slides easily along the carpet and remains flatly thereagainst as the head 10 is placed in use.

Suction from the vacuum cleaner induces air currents to flow into the case 14 by way of the rectangular opening 52, and such air currents escape from the case 14 into the cavity 20 of housing 12 by way of tangential groove 28. As soon as these air currents impinge upon the angled vanes 76 of turbine 16, the latter will be caused to rotate at a relatively high rate of speed on its axis 22.

The currents of air, together with their entrained dirt and dust particles, thereupon pass from the cavity 20 directly into outlet 30, adaptor 36 and the tubular suction handle of the vacuum sweeper for deposit in the collection chamber of the latter in the usual manner. Simultaneously with the rotation of turbine 16, brush 18 is caused to rotate on its substantially horizontal axis 56 by virtue of the operable interconnection between turbine 16 and brush 18 afforded by spindle 22, sheave 34, belt 70 and pulley 68.

Obviously, the outer ends of the bristles 60 of brush 18 extend through the rectangular inlet 52 as the brush 18 is rotated, and the force at which such bristles 60 come into contact with the article being cleaned may be easily and quickly adjusted by removing cover plate 78, loosening bolt and nut assembly 66 and reciprocating the bracket 62 vertically to a desired selected position.

It can now be appreciated that the entire head 10 forming the subject of this invention can be made inexpensively and that, through use of suitable materials such as case aluminum, head 10 may be made light in weight, sturdy in its construction and in such a manner as to not likely become out of order, even after extensive use.

Very little force is required to rotate a turbine 16 of this character, particularly when the same is connected with the brush 18 in the manner above described; and, consequently, the usual function of the air currents in forcibly drawing the foreign matter from the carpet or rug into the vacuum cleaner is not materially affected. Rotating brush 18 cooperates with the flow of air in producing a satisfactory end result, in that the dirt and dust particles are loosened and motivated by bristles 60 for complete removal from the article being cleaned by the suction action of the sweeper.

While many details of construction of the head 10 may be changed or varied, it is clear that such changes as fairly come within the spirit of this invention are contemplated hereby; and it is, therefore, desired to be limited only by the scope of the appended claim.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

A turbine powered, vacuum cleaning and brushing head for use with a suction tube, said head comprising a hollow housing; normally vertical, wall structure separating the interior of the housing into a vacuum chamber and a compartment, there being a cleaning inlet in the housing communicating with the vacuum chamber; normally horizontal, wall structure separating the compartment into a sheave chamber and a cylindrical, turbine chamber, there being a suction outlet in the housing communicating with the turbine chamber radially of the latter and adapted for communication with said tube, a passage in the vertical wall structure communicating with the vacuum chamber and the turbine chamber tangentially of the latter, and a slot in the vertical wall structure placing the sheave chamber in communication with the vacuum chamber; a spindle rotatably mounted in the horizontal wall structure and extending therethrough into the turbine and sheave chambers; a turbine wheel rigidly mounted on the spindle

within the turbine chamber; a sheave rigidly mounted on the spindle within the sheave chamber; a brush rotatably mounted within the vacuum chamber and adapted to extend partially through the cleaning inlet; a pulley rigidly mounted on the brush; and an endless belt passing through the slot and operably coupling the pulley with the sheave, whereby, when a vacuum from said suction tube is applied to the suction outlet, the brush is rotatively driven by means entirely internal to the housing.

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