Feb. 3, 1942. D. G. SMELLIE 2,271,553

SUCTION CLEANER

Filed Nov. 28, 1938 2 Sheets-Sheet 1

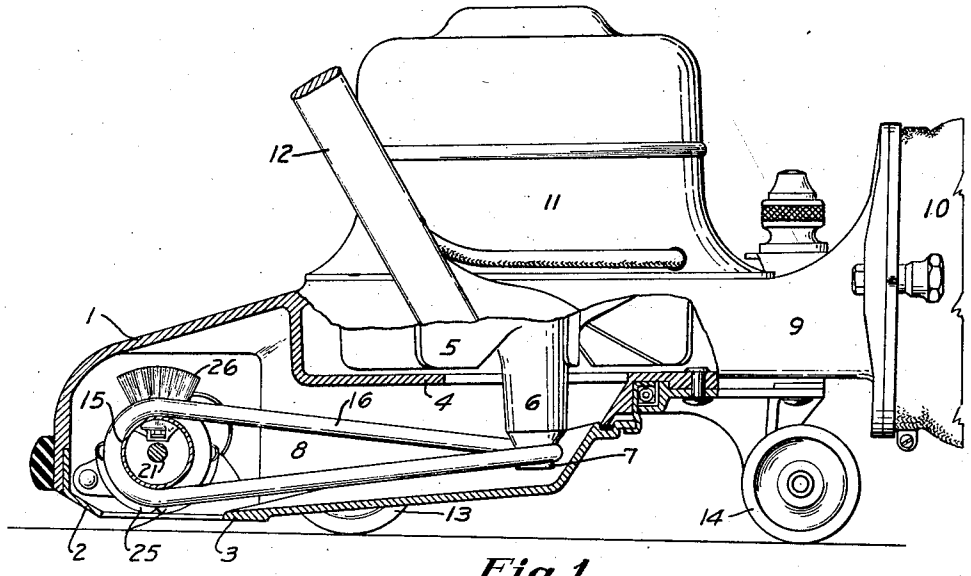

Fig. 1

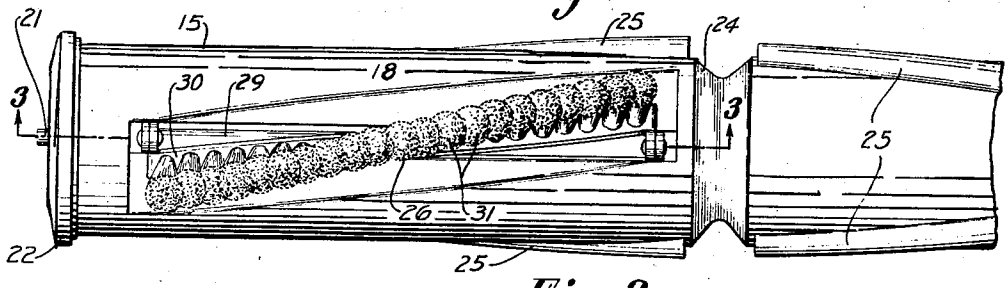

Fig. 2

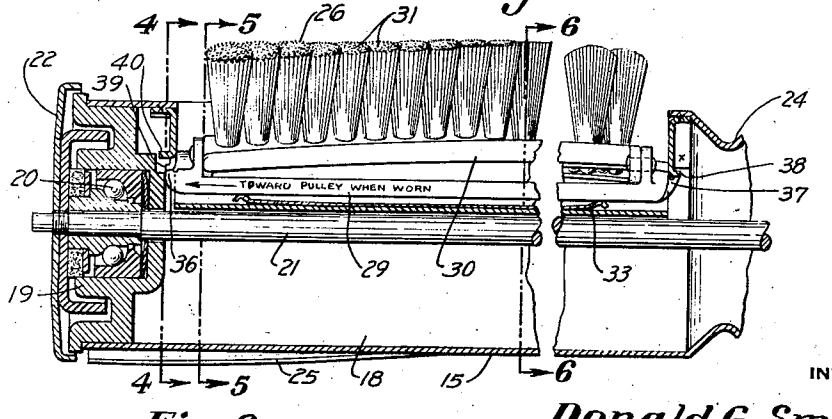

Fig. 3

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SUCTION CLEANER

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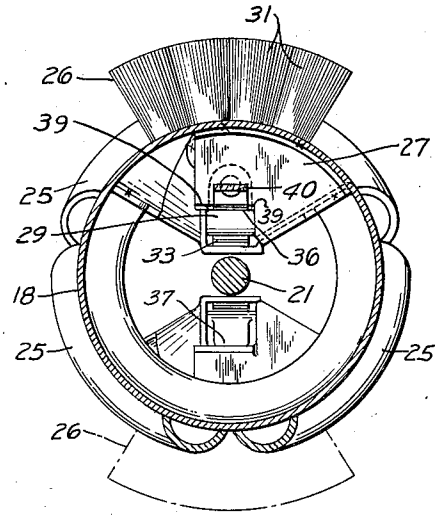

Fig. 4

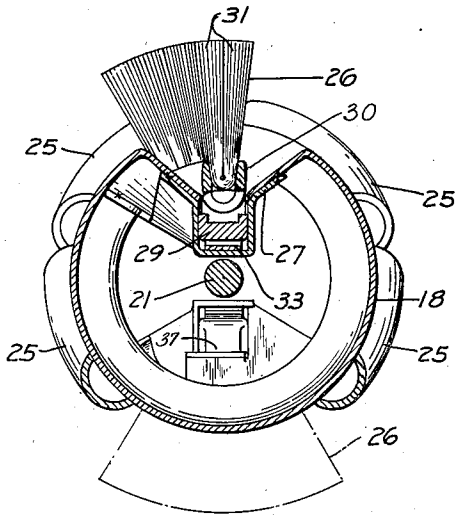

Fig. 6

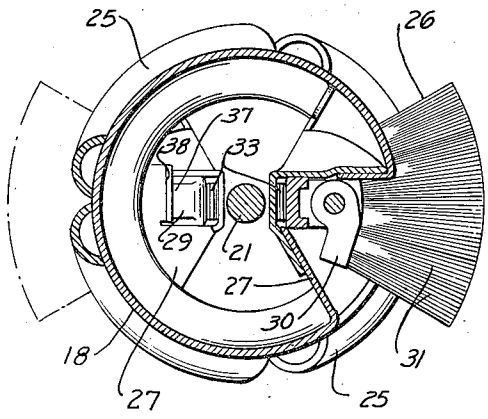

Fig. 5

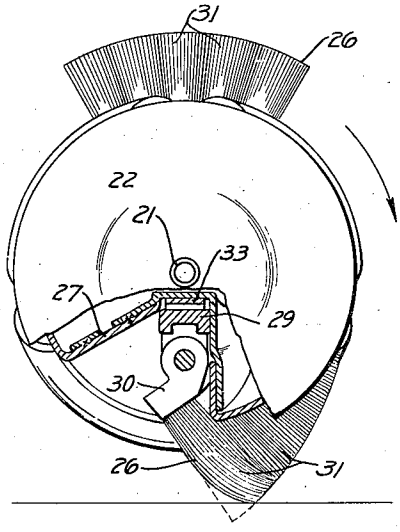

Fig. 7

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2,271,553

SUCTION CLEANER

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Application November 28, 1938, Serial No. 242,712

6 Claims. (Cl. 15—182)

The present invention relates to suction cleaners in general and particularly to new and novel improvements in suction cleaner rotary agitators. More particularly and more specifically the invention comprises a rotary agitator in which the surface-agitating elements include pivoted helically extending agitating elements.

It is an object of the present invention to provide a new and improved suction cleaner. It is another object of the invention to provide a new and improved rotary agitator for suction cleaners. Another object of the invention is to provide a suction cleaner rotary agitator embodying pivoted helically extending agitating elements. A still further object of the invention is to provide a rotary agitator for suction cleaners which provides pivoted helically extending brush elements. A further object of the invention is to provide, in a rotary agitator for suction cleaners, a pivoted brush element which is radially adjustable by manual means. These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated and in which the same reference character refers to the same part throughout:

Figure 1 is a side elevation of a modern suction cleaner embodying an agitator constructed in accordance with the present invention, certain parts of the casing being broken away;

Figure 2 is a partial side view of an agitator constructed in accordance with the first embodiment of the invention;

Figure 3 is a longitudinal section upon the line 3—3 of Figure 2;

Figure 4 is a section upon the line 4—4 of Figure 3 and illustrates cooperating seats upon the brush back and brush seat which permit of radial adjustment;

Figure 5 is a transverse section upon the line 5—5 of Figure 3 and discloses the pivoted brush in the mid-position and out of contact with a surface undergoing cleaning;

Figure 6 is a transverse section upon the line 6—6 of Figure 3 at substantially the longitudinal mid-point of the brush;

Figure 7 is a view similar to Figure 5 and illustrates the angular position of the brush upon making contact with a surface undergoing cleaning.

Suction cleaner effectiveness depends upon the dislodgment of the foreign material embedded in a surface covering by the cleaner agitating means and the removal of that material by air flow. In a cleaner constructed in accordance with the present invention the means which create the air flow and by which it is effectively directed may be of any common and well known type. Modern rotary agitators of the best design incorporate rigid positive beating elements and flexible brushing elements. These latter elements are normally made of animal hairs and are subjected to wear and after being used for a time require adjustment or replacement. In the agitator constructed in accordance with the present invention the brushing elements are helically extending, and are pivotally mounted upon longitudinal axes parallel to the axis of agitator rotation. This arrangement permits of a greater bristle length and therefore greater life for bristle length has a direct bearing upon bristle life. The agitator constructed in accordance with the present invention is a more efficient, more quiet and more lasting construction than those formerly used and embodied in suction cleaners.

Referring again to the drawings, and to Figure 1 in particular, the modern suction cleaner is illustrated which includes a nozzle 1 having surface-contacting lips 2 and 3, and a suction-creating unit including a fan chamber 4 and a fan 5. The fan is rotatably mounted upon a driving shaft 6 the lower end of which is formed as a pulley 7. In operation the fan draws air from the nozzle 1, along the air passageway 8 which connects the nozzle to the fan chamber, and exhausts the air from the latter through an exhaust outlet 9. A removable dust bag 10 is connected to the outlet and filters from the air which it receives the suspended foreign material. An unshown driving motor is housed within a motor casing 11 above the fan chamber 4. A pivoted handle 12 provides means by which the operator can propel the cleaner over a surface undergoing cleaning upon the front and rear supporting wheels 13 and 14, respectively. The rotary agitator constructed in accordance with the present invention is positioned within the nozzle 1 being indicated generally by the reference character 15 and is driven by a power-transmitting belt 16 from the pulley 7. In operation it is adapted to contact the surface undergoing cleaning between the nozzle lips 2 and 3.

Referring now to Figures 2 to 7, inclusive, a preferred embodiment of the agitator constructed in accordance with the present invention is illustrated. The agitator is seen to comprise an elongated hollow cylindrical casing 18 closed at

its ends by end plates 19 each of which seats a ball bearing 20 seated upon a supporting shaft 21 which extends through the agitator body and from the ends thereof. Thread guard members 22 are screw threaded upon the shaft ends and serve to protect the adjacent bearing. Substantially midway of its length agitator body 18 is formed as a pulley 24 which seats the power-transmitting belt 16 to receive the rotating force therefrom.

The agitating elements of the agitator 15 comprise helically extended rigid beater elements 25 which are fixedly secured to the surface of the body 18 and extend radially therebeyond, and flexible brush elements, indicated by the reference character 26, which are mounted within the normal contour of the body 18 in seats indicated by the reference character 27.

Each brush element comprises a rigid straight mounting element 29 upon which is pivoted a helically extending element 30 from which extends brush tufts 31. The mounting element 29 of the brush back is adapted to be received in an axially-extending-rectangular-section-lower portion of the brush seat 27, as illustrated in Figure 6, and when so positioned, the pivoting element 30 of the brush, as well as the extremities of the brush tufts 31, describe helices which lie upon circles having the axis of rotation as their centers, the brush being in a mid-position as illustrated in Figure 6.

The pivoted element 30 of the brush back is positioned above the rigid mounting element 29 and also above that portion of the brush seat which receives the supporting element. As the brush is intended to pivot upon its support the brush seat is formed above its central portion with diverging side walls so arranged that the entire length of the brush is permitted an angular movement of equal extent upon both sides of a true radial position. In Figures 5 and 6 the brush is shown in its seat in mid-position, and at each point along its length extends radially, while in Figure 7 the brush is shown tilted to its maximum trailing position under the frictional impact of a surface undergoing cleaning. It is seen that the brush is deflected by the surface impact from its mid-point and away from the direction of agitator rotation, as indicated by the arrow in Figure 7.

The brush 26 is removably positioned within its seat 27 with its ends underlying the end walls of the brush seat and spring-pressed upwardly thereagainst by the seat-carried leaf spring 33. To enable the brush to be re-positioned with the supporting element 29 at a greater radial distance from the axis of rotation to compensate for a decrease in the length of the bristles following extended use the supporting element 29 and the ends of the brush seat 27 are formed to cooperate to give to the brush differing radial positions when reversed end for end. The construction used is that disclosed and claimed in United States Letters Patent 1,991,975 granted to V. E. Carlson.

Briefly described the construction which permits the brush to be radially adjusted upon reversal end for end in its brush seat comprise shoulders 36 and 37 at the opposite ends of the positioning element 29 which cooperate with shoulders or seats at the opposite ends of the brush seat. Shoulder 36 extends the entire width of the element 29 while shoulder 37 at the opposite end is centrally positioned and extends only part way thereacross. The brush seat 27 is open at its ends and its end walls are formed with downwardly or inwardly facing shoulders which the brush back shoulders are intended to underlie and against which they are held by the seat-carried spring 33. At one end of the brush seat the shoulder is indicated at 38 and extends entirely across the seat and for the full width of the positioning element 29. At the opposite end of the brush seat, however, two low shoulders 39 are spaced apart and between them at a greater height in the brush seat is a central narrow shoulder 40. Shoulder or seat 40 is adapted to receive and seat element shoulder 37. Narrow shoulder 37 on the brush positioning element is higher thereon than wide shoulder 36, the height separating them being equal to one-half the distance separating shoulders 39 and 40. Also the wide shoulder 38 at the opposite end of the brush seat is at a height in the seat which places it midway between the shoulders 39 and 40 at the opposite end thereof.

The relationship is such that when the brush is new the narrow shoulder 37 of the brush-positioning element underlies the wide shoulder 38 at the inner end of the seat and the wide shoulder 36 of the brush positioning element underlies and contacts the lower shoulders 39, 39 at the outer end of the seat. The brush is then in its new position, which is proper, for the bristle elements have their greatest length.

When the bristles become worn and their length decreased the brush element or unit is removed and reversed end for end. The narrow shoulder 37 then extends between the lower shoulders 39, 39 at the outer ends of the brush seat and underlies and contacts narrow and high shoulder 40 therein while wide shoulder 36 on the element has been shifted from shoulders 39, 39 of minimum height to shoulder 38. As shoulder 40 is higher in the seat than the shoulder 38 at the opposite end thereof it is clear that the end of the brush element at which the narrow shoulder 37 is positioned has moved radially outward in the agitator. The wide end 36 of the positioning element now underlies the broad shoulder 38 at the inner end of the brush seat and as that shoulder is higher than the lower shoulders 39, 39 at the outer end it is apparent that that end also has moved radially outward. The distance, of course, which the ends of the brush element has moved radially outward is the same.

The brush is removed from its seat by depressing one of its ends, the inner end, against the force exerted by the leaf spring 33 to cause it to move under the overlying seat shoulder 38. The opposite end of the brush unit can then be tilted outwardly from the brush seat and the entire unit removed.

I claim:

1. A rotary agitator for a suction cleaner comprising a body rotatable about an axis, an elongated helically extending brush on said body the radial extremities of which are equidistant from said axis throughout the length thereof, and means mounting said brush for pivotal movement about an axis parallel to the axis of rotation of said body and under a force received from a surface undergoing cleaning.

2. In a rotary agitator for a suction cleaner, a rotatable elongated body formed with a helically extending recessed brush seat, a helically extending brush in said seat the radial extremities of which are equidistant from the axis of agitator rotation throughout the length thereof,

and means in said body mounting said brush for pivotal movement about an axis parallel to the axis of agitator rotation and under a force received from a surface undergoing cleaning.

3. In a suction cleaner rotary agitator, a rotatable body, a reversible removable helically extending brush pivotally supported in said body for movement upon an axis parallel to the axis of rotation, and means to vary the radial extension of said brush in its reversed positions in said body.

4. A brush for a suction cleaner or the like comprising a rigid support element having unlike supporting surfaces at its opposite ends and adapted to be reversibly positioned in a cleaner agitator body, said supporting surfaces being so constructed and arranged as to support said element at different heights in the reversed positions, a back pivotally mounted on said element, and brush bristles on said back.

5. A brush for a suction cleaner or the like comprising a rigid support element having unlike supporting surfaces at its opposite ends and adapted to be reversibly positioned in a cleaner agitator body, said supporting surfaces being so constructed and arranged as to support said element at different heights in the reversed positions, a back pivotally mounted on said element, and brush bristles arranged on said back at an angle with respect to the pivotal axis.

6. A rotary agitator for a suction cleaner or the like comprising a cylindrical body, means to support said body for rotation about a major axis, a brush seat in said body, a brush element including helically arranged surface-contacting elements reversibly seated in said seat, means to support said brush element at differing radial positions in the reversed positions, characterized in that the central portion only of said brush is moved in a direct radial direction upon the reversal of said brush in said seat, the remaining portions moving in directions at an angle to their true radii whereby the central portion of said brush receives the maximum radial adjustment.

DONALD G. SMELLIE.