Oct. 12, 1937. W. F. HUDSON ET AL 2,095,472

SUCTION CLEANER

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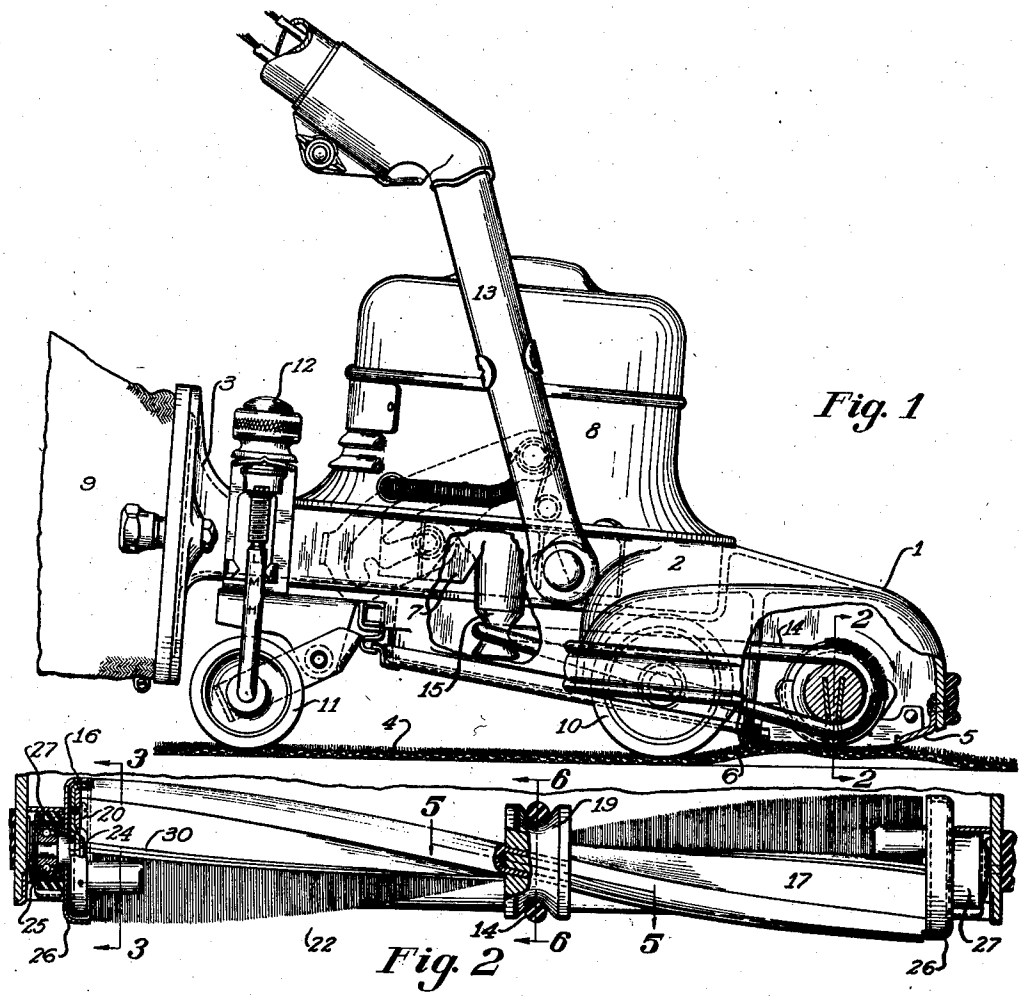


Fig. 1

Fig. 2

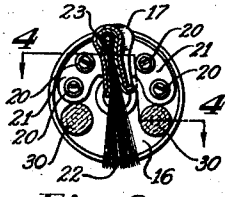


Fig. 3

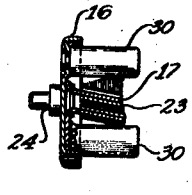


Fig. 4

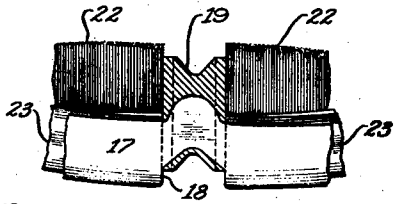


Fig. 5

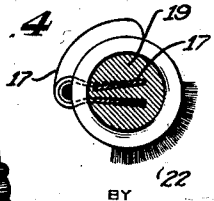


Fig. 6

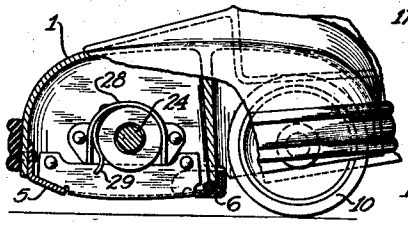


Fig. 7

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SUCTION CLEANER

Filed July 17, 1933 2 Sheets-Sheet 2

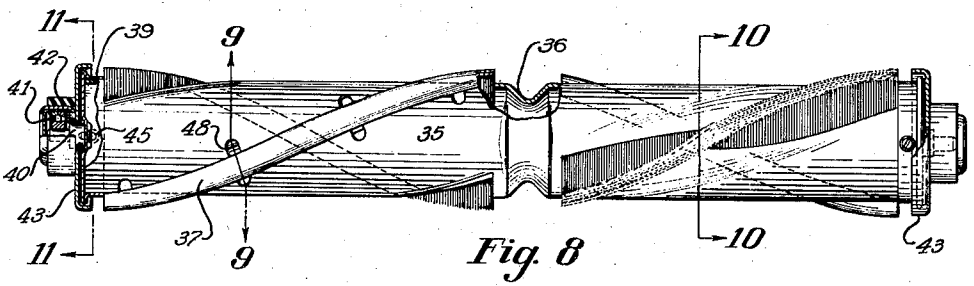


Fig. 8

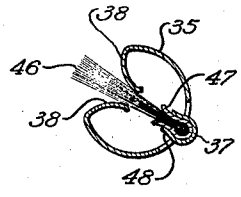


Fig. 9

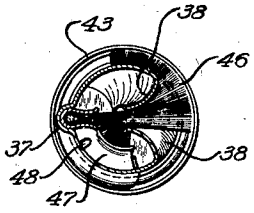


Fig. 10

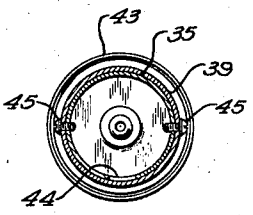


Fig. 11

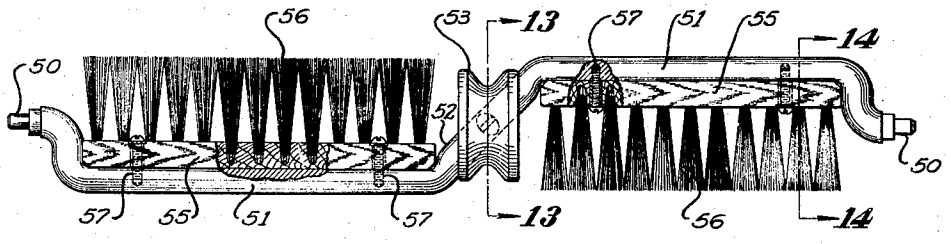


Fig. 12

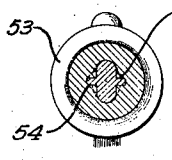


Fig. 13

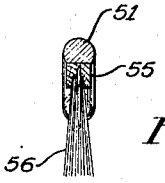


Fig. 14

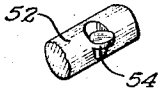


Fig. 15

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UNITED STATES PATENT OFFICE

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SUCTION CLEANER

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Application July 17, 1933, Serial No. 680,706

9 Claims. (Cl. 15—6)

The present invention relates to suction cleaners in general and particularly to a new and improved agitator therefor. More specifically the invention comprises the provision of a simplified rotary agitator for a suction cleaner which includes both positive beating and brushing means.

It is the object of the present invention to provide a new and improved suction cleaner agitator. It is another object to provide, in a suction cleaner, an inexpensive simple rotary agitator construction in which the brush element is mounted directly on, and is carried by, the beater element, the latter being of sufficient strength to maintain the rigidity of the construction which is unprovided with a longitudinally supporting shaft. It is still another object to provide, in a rotary agitator for a suction cleaner a simple construction in which the brush element is carried by the beater element and extends to a surface-contacting position at a point spaced circumferentially therefrom. A still further object is to provide a simplified rotary agitator construction in which the brush element is carried by the beater element and extends therefrom to a point diametrically opposite thereto. Still another object is the provision of an agitator of the rotary type in which the brush element is mounted on the beater element and extends radially therefrom across the axis of the agitator, the beater element being extended to partially enclose the brush element. 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 preferred embodiments of the present invention are disclosed:

Figure 1 is a side view, partially in cross section, of a modern suction cleaner with the present invention embodied therein;

Figure 2 is a longitudinal view of the agitator being taken upon the line 2—2 of Figure 1;

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

Figure 4 is a section upon the line 4—4 of Figure 3;

Figure 5 is a longitudinal section through the agitator pulley being taken upon the line 5—5 of Figure 2;

Figure 6 is a transverse section upon the line 6—6 of Figure 2;

Figure 7 is a transverse view showing the nozzle and wall with the agitator supporting means;

Figure 8 is a second preferred embodiment of the present invention;

Figure 9 is a section upon the line 9—9 of Figure 8;

Figure 10 is a section upon the line 10—10 of Figure 8;

Figure 11 is a section upon the line 11—11 of Figure 8;

Figure 12 is a side view of a third preferred embodiment of the present invention;

Figure 13 is a transverse section through the pulley of the agitator of Figure 12, being taken upon the line 13—13;

Figure 14 is a section upon the line 14—14 of Figure 12;

Figure 15 is a view in perspective of that portion of the beater bar which is positioned within the pulley of the agitator shown in Figure 12.

In the drawings, and in Figure 1 in particular, is illustrated a modern suction cleaner of a type in which an agitator constructed in accordance with the present invention is adapted to be embodied. The cleaner includes a nozzle 1, fan chamber 2 and an exhaust outlet 3. In the operation of the cleaner the surface covering 4 undergoing cleaning is lifted between the front and rear nozzle lips 5 and 6, respectively, by the suction created within the nozzle 1 by the fan 7 within the fan chamber 2. The fan is itself rotated by an unshown motor positioned within the motor casing 8 immediately above the fan chamber 2. The dirt-laden air drawn by fan 7 passes through the fan chamber 2 and is exhausted through the exhaust outlet 3 into the removably secured dust bag 9. The cleaner is movably supported by front and rear wheels 10 and 11 respectively, there being means, indicated generally by the reference character 12, by which the rear wheels 11 may be adjusted relative to the body of the cleaner for the purpose of varying the distance or height of the lips 5 and 6 above the covering undergoing cleaning. The cleaner is also provided with a pivoted handle 13 by which the operator may exert a propelling force.

Within the nozzle 1 of the cleaner a rotary agitator is provided. The agitator is driven by means of a belt 14 which extends from the end of the motor shaft 15, below the fan 7, forwardly to the nozzle 1, where it encircles the agitator. The present invention lies in the specific construction of the agitator within the nozzle.

Referring now to the first embodiment of the invention, illustrated in Figures 2 to 6, inclusive, the agitator is seen to be extremely simple in construction. Between two peripherally flanged end

plates 16, 16 extends a helical metallic channel member 17 which presents a smooth rounded curved surface along its length at points equal distance from the longitudinal axis determined by the plate centers. Substantially in its longitudinal center the element 17 is recessed, as indicated at 18 in Figure 5, and about this recessed portion is positioned a member 19 having an exterior groove or channel and which functions as a pulley. Member 19 may be molded about the central portion of element 17 or may be secured thereto in any suitable manner. As is clearly seen in Figure 2 the sides of the channel element 17 extend completely through the pulley 19 and provide a construction which is rigid and durable. The element 17 is removably secured to each of the end plates 16, 16 by screws 20, 20 etc., which extend through clips or flaps 21, 21 formed integrally on the ends of the element 17.

As is clearly seen in Figure 3 the element 17 is formed as a U-shaped channel which is greater in width at its inner end than at any other point. It is also noted that at any point along the longitudinal axis of the agitator that the channel opens radially. Element 17 is formed in this manner in order that it may serve as a retaining seat for the brush elements, 22, 22, the metallic backs 23, 23 of which are shaped to conform to the interior dimensions of the element 17 and, being similarly shaped into a helical form, are adapted to be slid into the member 17 from the ends thereof after the end plates 16, 16 have been removed. With the metallic back 23 seated within the element 17 at each side of the pulley 19, the bristles of the brushes 22, 22 extend radially from the element 17 to a point diametrically opposite thereto and to a substantially equal radial distance from the longitudinal axis.

Each end plate 16 is provided with an attached stub-shaft 24 which seats within the inner race of a ball-bearing 25. The outer race of each bearing seats within an end construction including an encircling resilient ring 27 and a flanged plate member 26 which extends closely adjacent and overlies the end of end members 16, 16 to perform the function of a thread guard. Each ring or seat 27 is adapted to be received and seated within stationary seat 28 provided at each end of the nozzle 1, each stationary seat being provided with a retaining spring 29 which resistingly locks the agitator in place once it has been inserted into the seat against the spring pressure. This construction is clearly shown in Figure 7.

In the operation of the machine the driving belt 14 cooperates with the pulley 19 to rotate the agitator about its supporting shafts 24, 24 in the longitudinal axis. As the outer curved surface of element 17 and the outer ends of brushes 22, 22 extend to substantially equal distances radially from this axis of rotation these portions will contact the lifted surface-covering between the nozzle lips 5 and 6 at a speed determined by the speed of rotation of the driving pulley 15. At high speed rotation the mass of the beater element 17 more than offsets the centrifugal force of the brushes 22, 22 which are radially opposed thereto, and in order to maintain dynamic balance in the agitator counterweights 30, 30 are provided.

Referring now to Figures 8 to 11, inclusive, a second preferred embodiment of the invention is disclosed. In this embodiment the agitator is formed of a cylinder 35 channeled at substantially its longitudinal center to form a pulley 36, and formed with a helically extending protrusion 37 which functions as a beater element. Diametrically opposite each beater element 37 along its length the surface of cylinder 35 re-enters within the normal radius of the cylinder to form brush protector walls 38, 38. Each end of cylinder 35 is enclosed by an end member 39 which overlies and enforces the cylinder's end and is itself provided with a stub-shaft 40 in the longitudinal axis of the cylinder. As in the first embodiment stub-shaft 40 is rotatably seated within a bearing 41 which is provided on its circumferential exterior with a rubber enclosing ring 42, and which also carries a thread guard member 43 which closely encloses the end member 39. At each end of the cylinder adjacent the end of the beater element 37 the cylinder is slotted as shown at 44 and with the end member 39 removed from the cylinder, accomplished by unscrewing two screws 45, 45, it is possible to insert the brush 46 into the agitator with its metallic back 47 seated within the inner concave surface of the beater element 37. The brush may be inserted manually for its full length into the cylinder 35 until its inner end contacts the end of the element 37. To cooperate with the element 37 in retaining the brush in position lugs 48, 48 have been pressed from the cylinder at spaced points along the length of the beater element. The bristles of brush 46 extend outwardly from the interior of cylinder 35 through the opening between the walls 38, 38 to a point radially beyond the normal circumference of cylinder 35 which is substantially equal to the height of beater element 37 thereabove.

In the two embodiments described the replacement of the brush, upon the bristle length having been decreased through wear in the cleaning operation, is extremely simple requiring as it does only the removal of the agitator end plates and the insertion of a new brush after the worn element has been removed.

Referring now to Figures 12 to 15 inclusive, the third preferred embodiment of the present invention is disclosed. In this construction the agitator body comprises an elongated metallic element provided with ends 50, 50 in the longitudinal axis which are adapted to be seated in supporting bearings. Between these ends the element includes two elongated axially-extending rounded portions 51, 51 at maximum distance from the longitudinal axis which function as beater elements and which are spaced 180 degrees circumferentially upon the opposite sides of the longitudinal center. These two sections are connected by a transversely extending portion 52. Upon this last portion a pulley 53 is positioned which may be mounted in any suitable fashion, but which is shown in the illustration as being molded thereon, the portion 52 being provided with offset ears 54, 54 to insure the permanent positioning of the molded member. The side of each beater portion 51 facing the axis of rotation is flattened, as is clearly shown in Figure 14, to provide a surface to which may be secured the rigid back 55 of a removable brush 56, screws 57, 57 extending between the two to hold them in fixed relative positions. The length of bristles of the brush 56 is such that the brush extends to a point diametrically opposite the beater portion 51 which is at substantially the same radius from the axis of rotation as the outermost portion of that element.

In the operation of this last described embodiment the agitator is rotatably mounted by suitable bearing means within the nozzle of a cleaner with the driving belt encircling the pulley 53.

The agitator rotates at high speed and the curved outer surface of portions 51, 51 contact the surface covering and impart thereto a positive beating action. The outer ends of the brushes also contact the surface covering and perform a brushing action. The construction is extremely simple and economically manufactured and the brush elements may be replaced when worn by simply manually unscrewing the screws, 57, 57 and replacing the wornout brush element by a new brush.

We claim:

1. A rotary agitator for a suction cleaner including an elongated channeled member having a smooth rounded exterior, an end member at the end of said channeled member, means removably securing said members together, means carried by said end member rotatably supporting said members, a brush carried by said channeled member and removable from the end thereof with said end member disconnected therefrom, and a pulley rotatable with said channeled member.

2. A rotary agitator for a suction cleaner comprising an open ended elongated channeled member having a smooth rounded surface, a pulley on said member and rotatable therewith, end plates rigidly and removably secured relative to said member closing the ends thereof, a brush having a rigid back seated in said channeled member and removable from the end thereof, said member being provided with cylindrical walls which extend outwardly from said channel and partially surround said brush and extend channelward and closely adjacent said brush at a point spaced from said channel, and means carried by said end plates supporting the entire construction for rotation about an axis substantially equidistant from the surface-contacting end of said brush and the rounded surface of said member.

3. A rotary agitator for a suction cleaner comprising an elongated shaft having aligned end portions in the axis of rotation and intermediate central portions radially spaced from said axis and circumferentially spaced from each other and connected by a transversely extending portion, a pulley mounted on said last-mentioned portion and centered on the axis of rotation, said central portions being rounded to form beater elements, a brush including a rigid back removably secured to the inner side of each central portion and bristles extended from said back to a point having a radial distance from the axis of rotation equal to that of the exterior surface of said central portions.

4. A rotary agitator for a suction cleaner comprising a rigid elongated longitudinally extending beater element, means to support said element for rotation about a longitudinal axis spaced radially from the surface-contacting portions of said element, a pulley rotatable with said element, and a brush removably secured to said element adjacent its surface-contacting portion on a side thereof facing said longitudinal axis, said brush being extended diametrically from said element to a surface-contacting point equi-distant with said element from the axis of rotation.

5. A rotary agitator for a suction cleaner comprising a rigid elongated surface-contacting beater element one side of which is formed as a brush seat, means rotatably supporting said element for rotation about a longitudinal axis, a pulley rotatable with said element, and a brush including a back with bristles extending from one side thereof, said back lying along said element at said seat and conforming to the shape thereof, said bristles extending from said back to a position spaced circumferentially from said element relative to said axis of rotation which position is spaced from said axis by a distance equal to that of the surface-contacting portion of said beater element.

6. A rotary agitator for a suction cleaner comprising an elongated cylindrical member formed with an inwardly facing concave channel, said member being formed with a brush-receiving opening circumferentially spaced from said channel, end plates secured at the opposite ends of said member, means rotatably supporting said member and plates and carried by the latter, said member being formed with a portion of reduced radius to serve as a pulley, and a surface-contacting brush removably mounted in said channel and extending through said opening and adapted to contact a surface covering upon the rotation of said member.

7. A rotary agitator for a suction cleaner comprising a hollow cylindrical body formed with an opening in its periphery, means to support said body for rotation about its major axis, and a brush mounted on the wall of said body at a point diametrically spaced from said opening and extended across said body and through said opening to a surface-contacting position.

8. The structure defined by claim 7 in which said opening is formed by inwardly converging walls.

9. The structure defined by claim 7 in which said opening extends spirally on said body.

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