Jan. 17, 1933. C. L. SHANK 1,894,361

SUCTION CLEANER AGITATOR

Filed Nov. 22, 1929

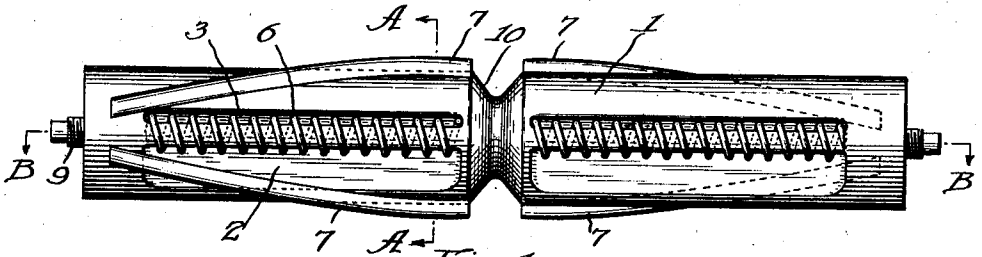


Fig 1.

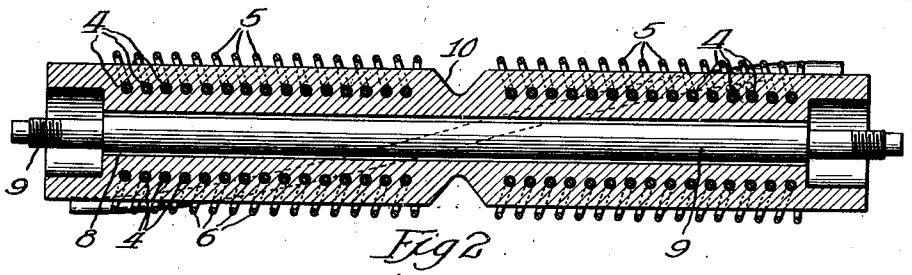


Fig 2.

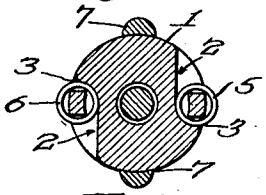


Fig 3.

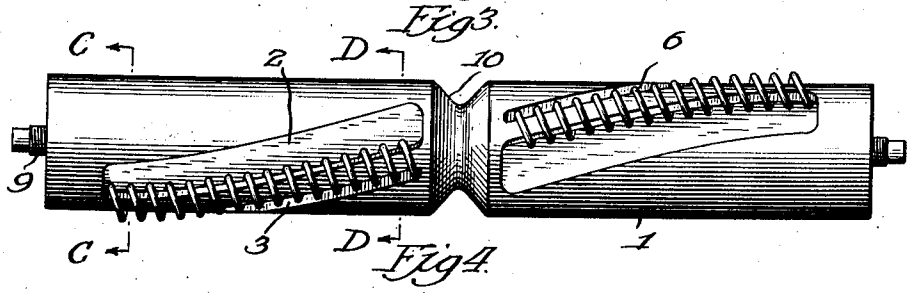


Fig 4.

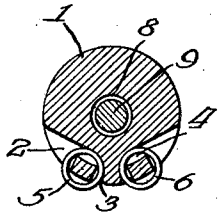


Fig 5

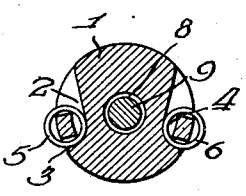


Fig 6

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Patented Jan. 17, 1933 1,894,361

UNITED STATES PATENT OFFICE

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SUCTION CLEANER AGITATOR

Application filed November 22, 1929. Serial No. 408,959.

This invention relates to improvements in suction cleaners and more specifically to rotors or agitators for suction cleaners and has for its object the provision of an agitator for suction cleaners having superior agitating qualities.

A further object is to provide an agitator for suction cleaners containing in its structure means for the positive agitation and deflection of a carpet pile or nap in two or more directions.

A still further object of the invention is to provide an agitator which will permit the cleaning air currents to have unhindered access to the point at which the agitation and pile deflection takes place.

Other objects of my invention will appear in the description following and in the appended claims.

In the operation of a suction cleaner of a well known type the floor covering undergoing cleaning is lifted through the reduced pressure within the nozzle from the floor and contacts against the nozzle lips at the front and rear of the nozzle mouth. The rotor or agitator, as it is called, which is located within the nozzle contacts the lifted surface covering beween the parallel nozzle lips upon a line therebetween, and, through being provided with beater bars upon its cylindrical surface in the form of projecting elements which extend substantially the length of the agitator, imparts to the surface covering an agitation which may be divided into two components namely: a vibration of the entire displaced covering in a vertical plane which tends to separate the foreign matter therefrom; and a deflecting and bending movement of the pile of the surface covering which further tends to dislodge the foreign matter and also opens up the pile, thereby admitting the cleaning air. This agitation of the surface covering is inherent, in the operation of the usual rotary agitator provided with a solid beater bar. This is readily understood when it is considered that the suction within the nozzle lifts the surface covering into contact with the cylindrical body of the agitator and that upon the rotation of that member, the projecting beater bar element displaces said covering downwardly each time it contacts therewith and also, as it moves past the point of contact, deflects the upstanding pile of the covering through its sliding contact with the extremities thereof. The deflection of the pile of the surface covering has been heretofore in one direction only, that being the one in which it was forced by the surface of the beating bars in their rotation, namely, rearwardly or forwardly relative to the cleaner depending upon the direction of rotation of the agitator. With such agitation it is obvious that if the transverse rows of pile were deflected relative to one another that no relative movement would take place between the tufts of pile of an individual row, the agitation thereby failing to dislodge the dirt particles between the individual tufts. In a cleaner making use of an agitator constructed in accordance with the present invention the components of surface covering agitation which are characteristic of the usual agitator are not only present but the cleaning efficiency has been increased through the provision of means effecting the agitation of the pile in more than one direction. More specifically in the operation of new and novel construction the vibration of the rug is present, as in the usual agitator, the rearward or forward displacement of the pile of the surface covering is present, as in the usual agitator, and deflection of the pile of the surface covering in the direction of the sides of the nozzle is also present. The incorporation of this last element of agitation effects the dislodgment of dirt particles lodged between adjacent tufts of pile in the direction of the agitator length and makes possible their removal thru opening a path for the cleaning air thereto.

A still further advantage of a rotor constructed in accordance with my invention lies in the fact that the cleaning flow of air is permitted without hindrance to have contact at the point of agitation, the agitating element being so constructed that air passages are present between the various points of contact of the beater coil with the surface being cleaned.

Referring now to the accompanying draw-

ing wherein like reference characters indicate like parts throughout:

Figure 1 is a side view of an agitator constructed in accordance with my invention.

Figure 2 is a longitudinal cross section on the line B—B of Figure 1.

Figure 3 is a transverse cross section upon the line A—A of Figure 1.

Figure 4 discloses a modification of the present invention in which the agitating coils are helically disposed on the rotor.

Figure 5 is a transverse cross section on the line C—C of Figure 4 showing the relation of the beater coils near the ends of the rotor.

Figure 6 is a transverse cross section on the line D—D of Figure 4, showing the relative positions of the coils near the center of the rotor.

In actual operation in a suction cleaner the agitator constructed in accordance with the present invention revolves in close proximity to the floor covering. The first beating coil comes into contact therewith and the individual coil surfaces extending beyond the agitator body proper comb through the pile of the covering depressing it to the right or left, depending on the direction in which the coil was wound upon the agitator body. With the agitator equipped with beater bars the next contact with the floor covering is made by one of said bars resulting in a depression of the pile in a rearward direction and the vertical downward displacement of the lifted portion of the rug. Upon the second beating coil coming into contact with the covering the pile is deflected in a direction opposite to that caused by the first beating coil as its coils are wound in the opposite direction. Thereafter a beater bar makes contact and the cycle is repeated. The general result of this operation is that the pile is deflected toward each side and toward the front or rear of the cleaner, depending on the direction of rotation of the rotor, and the rug is vertically displaced.

Referring now to Figures 1 to 3 inclusively, the invention is shown embodied in an agitator having a body member denoted by the reference character 1. Extending longitudinally in the body-member 1 are pairs of grooves 2 and 3, each pair of grooves being connected by a series of passageways 4 for a purpose hereinafter described and being interrupted between its ends by the pulley 10. In the embodiment here described the two pairs of grooves are shown extending in parallel relation the length of the rotor, said pairs being spaced one hundred and eighty degrees (180°) circumferentially. Coils 5 and 6 are threaded through the passageways 4 throughout the length of the grooves and extend a fixed height above the rotor surface as shown in Figure 2. The coils 5 and 6 differ only in that they are wound in opposite directions, that is, the coil in each pair of grooves is so wound that the direction of angular advance is opposite to that of the coil in the pair of grooves spaced circumferentially therefrom. The necessity of having opposite directions of angular advance is clear for the coil surfaces which contact the surface undergoing cleaning must have opposing slopes in order that the pile may be deflected first to the right and then to the left, or vice versa. Beater bars 7—7 are formed on the surface of the body 1 and are raised a distance above said surface substantially equal to that which the beater coils project therebeyond. As is clear from the figures these beater bars extend helically about the rotor in oposite directions and have common end points substantially. Within the body 1 is a central longitudinally-extending passageway 8 adapted to receive and house a bearing-support member 9 upon which the rotor is supported in a manner forming no part of the present invention.

Referring now to Figures 4 to 6 inclusive a modification is shown in which the beater coils extend in oppositely directed helices around the body of the rotor. Each coil is formed of two sections which are separated by the pulley 10 and the directions of angular advance of the coils are opposite, that is, starting from either end of the rotor, one coil is wound in a clockwise direction through the passageways 4 between the grooves 2 and 3 whereas the remaining coil is wound in a counter-clockwise direction. In each pair of grooves the relative positions of grooves 2 and 3 are reversed upon opposite sides of the pulley. This is done in order that the ends of the individual coils may approach each other as closely as practical, it being necessary that groove 2 be of greater width than is necessary for groove 3 in order that the passageways 4 may be formed in the body therebetween. In an agitator constructed in accordance with this modification the pile of the surface being cleaned is positively deflected in the directions of the ends of the rotor through the pushing action of the slanting-contacting surfaces of the spiral beaters with reliance being had to the friction between the contacting surfaces and the surface undergoing cleaning for deflection in the third direction.

I claim:

1. An agitator for suction cleaners comprising a body and agitating elements characterized by the fact that the agitating elements comprise spiral coils threaded through the agitator body and projecting therebeyond.

2. An agitator for a suction cleaner comprising a rotor body having parallel longitudinal grooves therein, a dividing wall separating said grooves and having passageways therethrough connecting said grooves, and a

beating element comprising a spiral coil threaded through said passageways.

3. An agitator for suction cleaners comprising a rotor body having parallel grooves therein, a dividing wall separating said grooves and having passageways therethrough connecting said grooves, a beating coil threaded through said passageways and a beating bar mounted on said rotor body.

4. In a rotary agitator for suction cleaners a beater comprising a rigid wire coil, and means supporting said coil at a fixed distance from the axis of rotation.

5. In a rotary agitator for suction cleaners, a beater comprising a rigid helical wire coil, and means supporting said coil at a fixed distance from the axis of rotation.

6. In a rotary agitator for a suction cleaner a series of rigid agitating elements adapted to simultaneously contact the surface covering undergoing cleaning and arranged to deflect the pile of said covering transversely to the direction of travel of said elements, and a second series of rigid agitating elements circumferentially spaced from said first mentioned series adapted to simultaneously contact said covering and arranged to deflect the pile of said covering in the opposite direction.

7. A suction cleaner rotary agitator including a body, rigid surface-contacting-beating means positioned on said body, and surface-contacting pile-flexing means on said body, characterized by the fact that said last-mentioned means is provided with a smooth surface-contacting side whose slope is such that the pile of the surface covering undergoing cleaning is deflected parallel to the axis of rotation of said agitator to a greater extent than it is deflected perpendicular to that axis.

8. A suction cleaner rotary agitator including a body and a plurality of surface-contacting pile-flexing means on said body having a smooth surface adapted to wedge through the pile of a surface covering undergoing cleaning, one of said means being so arranged on said body that the pile of a surface covering undergoing cleaning is deflected to a greater extent parallel to the axis of rotation than it is deflected perpendicular thereto, and another of said means being arranged to similarly deflect the pile but in the opposite direction along the agitator axis.

9. A suction cleaner agitator including a body, means on said body to deflect the pile of a surface covering undergoing cleaning in a direction whose component perpendicular to the axis of rotation of the agitator is greater than its component parallel thereto, means on said body to deflect the pile in a direction having a greater component parallel to said axis than that of the first-mentioned direction, and means on said body to deflect the pile in a direction having a greater component parallel to said axis than said first-mentioned direction and which is opposite to the component of said second-mentioned direction.

10. A suction cleaner rotary agitator as set forth in claim 9 characterized by the fact that said means are circumferentially spaced on said agitator body.

Signed at North Canton, in the county of Stark and State of Ohio, this 29th day of October, A. D. 1929.

CHARLES L. SHANK.