Nov. 22, 1932. H. B. WHITE 1,888,339

SUCTION CLEANER

Filed Jan. 14, 1931

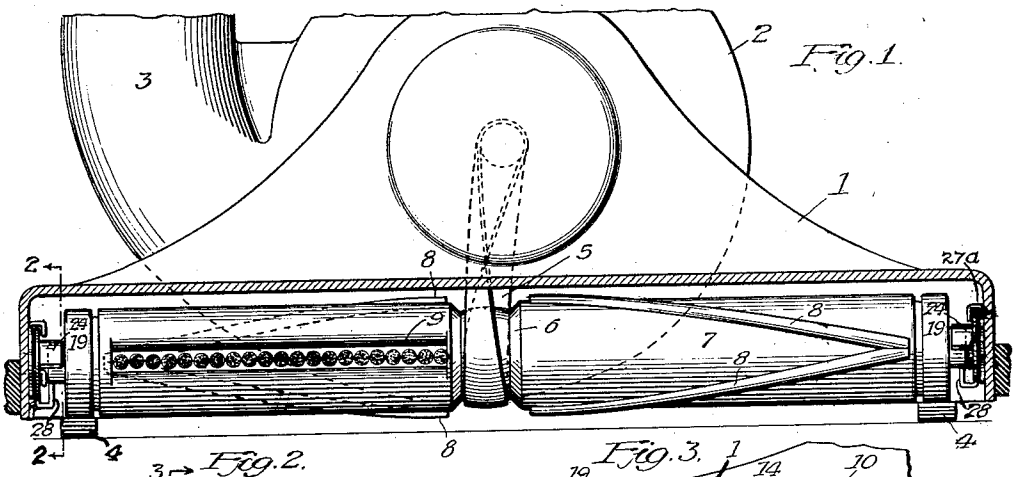



Fig. 1.

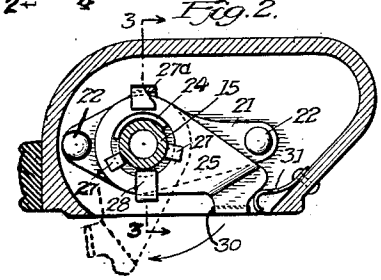



Fig. 2.

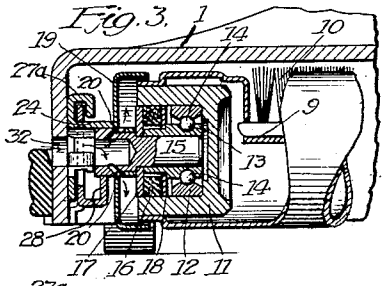



Fig. 3.

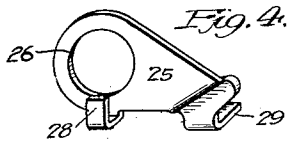



Fig. 4.

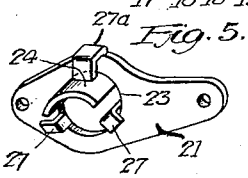



Fig. 5.

Inventor
Harry B. White
By Harry S. Dumasse
Atty.

Witness
R. B. Davison.

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# UNITED STATES PATENT OFFICE

HARRY B. WHITE, OF CANTON, OHIO, ASSIGNOR TO THE HOOVER COMPANY, OF NORTH CANTON, OHIO, A CORPORATION OF OHIO

## SUCTION CLEANER

Application filed January 14, 1931. Serial No. 508,563.

The present invention relates to suction cleaners in general and in particular to new and novel means for rotatably supporting the rotary agitator within the suction cleaner nozzle. More specifically the present invention comprises the provision of a new and improved small diameter rotary agitator and the means by which it is removably secured within the suction cleaner nozzle.

It is an object of the present invention to provide new and novel means for rotatably supporting a suction cleaner agitator within the suction cleaner nozzle. Another object is the provision of new and novel supporting means for a small diameter rotary agitator. Still another object is the provision of a small diameter rotary agitator which is rotatably supported by means of stub-shafts which are rotatably seated within the agitator ends and which are alined by new and novel means by which the agitator is removably secured within the nozzle. These and other more specific objects will appear upon reading the following specification and claims and considering in connection therewith the annexed drawing.

Referring now to the drawing in which a preferred embodiment of the present invention is disclosed:

Fig. 1 is a partial front view of a suction cleaner with the front wall of the nozzle broken away and showing an agitator and supporting means constructed in accordance with the present invention embodied therein;

Fig. 2 is a section upon the line 2—2 of Fig. 1;

Fig. 3 is a partial section thru a nozzle looking in the direction of the arrows on the line 3—3 of Fig. 2;

Fig. 4 is a view of a detail comprising one of the rotatable locking arms;

Fig. 5 is a view of the detail comprising one of the seat plates which are secured within the nozzle to the nozzle end walls and which positively aline the contacting agitator stub-shafts.

In the suction cleaner agitator of the rotary type which includes both positive beating elements and sweeping brushes, in the preferred embodiment, the agitator is supported rotatably upon a shaft which extends longitudinally therethru and beyond the ends thereof to be itself supported at the ends of the nozzle. The tendency in present day suction cleaners is toward small diameter agitators, the minimum diameter of which has heretofore been definitely limited by the position of the radially extending sweeping brush, which is necessarily carried within the agitator body and of sufficient bristle length to provide resilience and flexibility. With a minimum bristle length required and with the height of the bristles beyond the surface of the agitator body determined by the height of the rigid beating elements it is clear that in the thru shaft agitator the diameter cannot be decreased beyond that point at which the inner extremity of the brush, or its seat, contacts the shaft. The desirability of long bristles is understood when it is explained that brush life is materially shortened when the bristle length is decreased beyond a certain point and further the sweeping action is less efficient when sufficient bristle flexibility is not present. Also the thru supporting shaft has been heretofore considered a requisite as it provides a means whereby the bearings at the opposite ends of the agitator may be accurately alined so as to insure long bearing life.

In a suction cleaner agitator, constructed in accordance with the present invention, the usual thru supporting shaft has been eliminated and in its place have been provided sub-shafts at the opposite ends of the agitator which do not extend the length of the agitator thereby making it possible for the brushes to extend inwardly to or past the longitudinal center line. New and novel means are also provided by which the shafts are secured firmly in seats which are themselves accurately alined and which function to aline the stub-shafts which they seat.

Referring again to the drawing, the present invention is disclosed embodied in a suction cleaner which comprises the usual parts found in a modern suction cleaner of which the nozzle 1, the fan chamber 2 with its exhaust outlet 3, and the front supporting wheels 4, 4 are shown. The agitator con-

structed in accordance with the present invention is positioned within the nozzle and extends longitudinally therein as in the usual suction cleaner being rotated by the driving belt 5 which connects the centrally positioned pulley surface 6 upon the cylindrical agitator body 7 with the rotating shaft of the driving motor for the suction-creating fan within the fan chamber 2. The agitator body 7 is provided with helically-extending rigid protrusions or beaters 8, 8 which extend a fixed distance above the cylindrical surface of the body being adapted to contact the surface covering between the lips of the nozzle 1 and to impart thereto the violent vibration or agitation characteristic of the positive agitation type agitator. Carried within the cylindrical body 7, in suitable brush seats 9, 9 upon each side of the centrally located pulley 6, are brushes 10, 10 which extend to a height above the cylindrical body substantially equal to that of the beating elements 8, 8 and which cooperate with those elements to dislodge the foreign matter carried by the surface covering undergoing cleaning, and in particular function to remove the light dust from the top of the pile. The brushes 10, 10 are of the usual removable type comprising a rigid back with bristles carried thereby and are adapted to be removably secured in any suitable fashion within the seats 9, 9 in a manner which forms no part of the present invention.

At each end of the agitator body 7, and interiorly thereof, is an end member or cup 11 which is rigidly carried by the agitator body in fixed relationship. Within the interior of each cup is a bearing comprising an outer race ring 12, which is non-rotatably seated in the cup, and an inner race 13 which is rotatably carried by the outer race by means of balls 14, 14 etc. Within the inner race 13 is positioned a stationary stub-shaft 15 which extends beyond the end of the body where it is provided with an enlarged counterbored end. Suitable packing 16 is positioned at the side of the outer race between the extended inner race 13 and the surrounding wall of the cup 11 for the purpose of preventing the entrance of dirt into the bearing and for preventing the escape of the lubricant therefrom. Suitable rings 17 and 18, carried by the stub-shaft 15 and the inner race 13 respectively, serve to fixedly position the seal. Carried by the extended and enlarged end of the stub-shaft 15 is a stationary end member 19 having a diameter substantially equal to or in fact slightly greater than that of the body of the agitator and having an outer cylindrical flange which overlies that body being spaced slightly therefrom. This member forms what is commonly known as the thread guard and serves to prevent the accumulation of thread, hair and other foreign matter around the ends of the agitator and particularly around the shaft 15 itself. Thread guard 19 is spaced slightly from the end of the agitator and the space therebetween is interiorly connected, by bores 20, 20, to the counterbore within the end of each sub-shaft for a purpose which will be hereinafter explained.

Positioned within the nozzle 1 and carried by each end wall thereof is a plate 21 suitably secured as by rivets 22, 22. Plate 21 is provided with a circular opening 23, which is alined with a similar opening 32 in the nozzle end wall, and from the plate immediately adjacent the upper part of this opening 23 projects an arcuate arm or seat 24 which extends inwardly in the nozzle. The seat 24 has an inner contour which lies on a circle having a diameter equal to that of the enlarged end of the stub-shaft 15 of the agitator. A rotatable locking arm 25 is mounted upon the projecting arm 24 of plate 21, it being provided with an enlarged circular opening 26 which exactly conforms to the contour of the outer surface of that arm. Arm 25 is securely, yet slidingly held adjacent the plate 21 by projecting lugs 27, 27 which are provided on the plate 21 and extend at right angles thereto thru the opening 26 in arm 25 in a manner similar to that of the seat 24, being folded at their extremities to extend closely adjacent the opposite side of arm 25. Similarly an overlying lug 27*a* is provided at the top of plate 21 which extends outwardly and down beside the arm 25 immediately over the seat 24. The arm 25 is itself provided with an inwardly and upwardly projecting seat member 28 directly below the opening 26 which projects upwardly until its upper end contacts the imaginary cylinder on which the inner surface of the seat 24 lies. Arm 25 is provided at its rear end and at a distance from its center of rotation with a transversely extending end 29 which extends under the end wall of the nozzle in the agitator-seating position, being received in a suitable recess 30 thereby serving to prevent the angular movement of arm 25 in one direction. A locking spring 31 carried at the rear wall of the nozzle contacts an overlying portion of the rear end of the locking arm to urge it angularly so as to secure the end 29 in the recess 30.

In the operation of the cleaner, the agitator is positioned within the nozzle 1 with the enlarged cylindrical ends of the stub-shafts 15, 15 firmly held up against the overhanging conforming seats 24, 24 of the plates 21, 21, by the seat members 28, 28 which contact them at a diametrically opposite point. Thru the seats 24, 24 being accurately alined and further thru their contacting surfaces exactly fitting and enclosing a considerable length of the ends of the stub-shafts those shafts are made to extend parallel to the seats and so in accurate alinement with each other.

With the stub-shafts 15, 15 so alined the bearings in the cups 11, 11 of the agitator are subjected to no uneven stress or strain and the result is the equivalent of having a supporting shaft extending longitudinally thru the agitator. With the agitator so positioned each end bearing is protected from the foreign matter which is always present within the nozzle, protected not only by the seal 16, but also by a stream of clean air which enters the nozzle thru the opening 32 in the nozzle end wall and passes thru the counterbored end of the stub-shaft 15, thru an opening 20 and so into the space between the stationary end member or thread guard 19 from which it escapes around the periphery of the agitator body. The passage of this clean air thru the space between each thread guard and the end of the agitator body is of course due to the pressure difference existing between the exterior and the interior of the nozzle and serves to prevent the deposition by the dirt-laden air of foreign matter at that point. If it is desired to remove the agitator it is only necessary for the operator to depress the transversely extending ends 29, 29 of each locking arm 25, against the resilient force exerted by the locking springs 31, 31, and the arms 25, 25 will be rotated relative to the plates 21, 21 until the seat-members 28, 28 extend at one side of the stub-shafts 15, 15 in which position they no longer exert a force to retain the shafts against the seats 24, 24 and the agitator may be removed downwardly thru the nozzle mouth, the driving belt 5 having first been disconnected.

I claim:

1. A rotary agitator for a suction cleaner comprising a hollow body, a brush carried by said body, a bearing-receiving member positioned within each end of the body, stationary stub-shafts extended within said bearing-receiving members, bearings within said bearing-receiving members rotatably supporting said members, said body and said brush for rotation about said stub-shafts, and a stationary thread guard carried by each of said stub-shafts spaced from the end of the body, characterized by the fact that said stub-shafts are bored at their outer ends and the space between said thread guard and the end of said agitator body is connected to said bores.

2. In a suction cleaner having a nozzle, an agitator positioned in said nozzle comprising a rotary body provided with agitating means, a shaft rotatably supporting said body extended adjacent a wall of said nozzle, means supporting said shaft on said wall, said wall being provided with an opening adjacent the end of said shaft, a stationary plate member carried by said shaft and extending radially therefrom adjacent the end of said body and spaced therefrom, and means connecting the space between said member and said body with the atmosphere comprising a conduit thru said shaft to the opening in said nozzle wall.

3. In a suction cleaner having a nozzle with a side aperture, an agitator positioned in said nozzle comprising a body provided with agitating means, a shaft, a bearing rotatably supporting said body on said shaft, a plate member carried by said shaft at the end of said body spaced therefrom and extending radially beyond said bearing, said shaft being bored from its end to a point between said member and said body and there being a radial opening at such point, and means to support said shaft with its end adjacent the aperture in said nozzle.

Signed at North Canton in the county of Stark, and State of Ohio, this 5th day of January, A. D. 1931.

HARRY B. WHITE.