Feb. 14, 1956 J. E. VANCE 2,734,211

BRUSH MOUNTING FOR SUCTION CLEANERS

Filed April 7, 1950 2 Sheets-Sheet 1

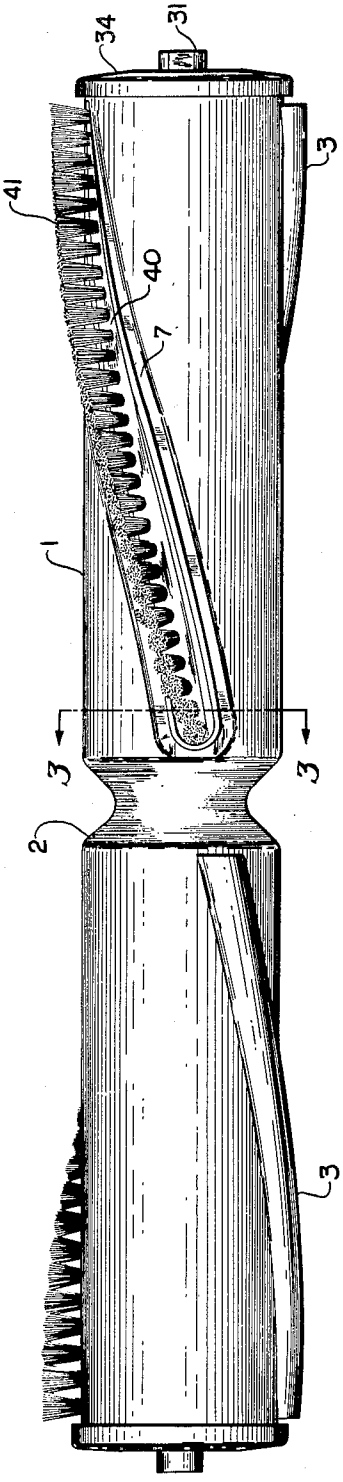

Fig. 1

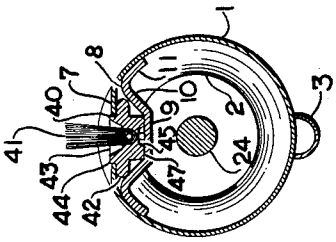

Fig. 3

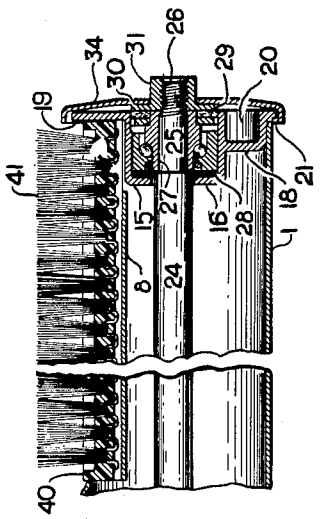

Fig. 2

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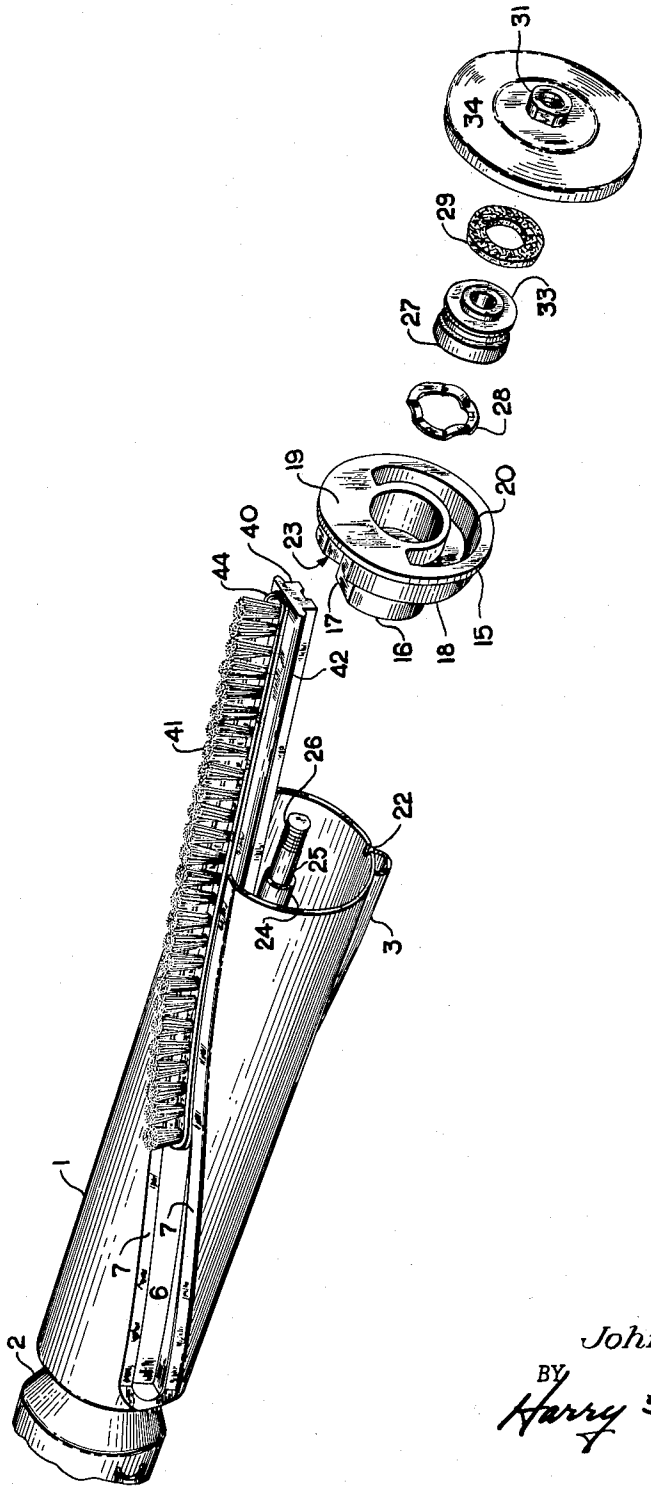

Fig. 4

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BRUSH MOUNTING FOR SUCTION CLEANERS

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Application April 7, 1950, Serial No. 154,627

2 Claims. (Cl. 15—183)

The present invention relates to suction cleaning devices and in particular to a combined agitator and brushing structure of the type which is rotatably mounted in the suction cleaning nozzle of suction cleaning apparatuses.

It is a particular object of my invention to provide a rotary agitator construction in which the brush is inserted into a brush retaining channel in a cylindrical metal brush and agitator roll from the end of said roll and is retained in position by the bearing retaining and dust shielding structure.

It is a further object of my present invention to provide a brush and agitator roll for suction cleaning devices which is particularly characterized by the provision of a structure for retaining a plastic back brush strip in a readily removable manner and in such fashion that the brush strip is positioned so that the bristles are not subjected to flexure against a metal edge.

Other objects and advantages of the invention will become apparent as the description proceeds when taken in connection with the accompanying drawing in which:

Figure 1 is a plan view of a suction cleaner agitator brush roll embodying the present invention;

Figure 2 is a partial longitudinal sectional view of the structure of Figure 1;

Figure 3 is a cross section of the apparatus of Figure 1 taken on the line 3—3 thereof and looking in the direction of the arrows; and

Figure 4 is an exploded perspective view showing the partial disassembly of the apparatus of Figure 1.

Referring now to the drawing in detail, my brush and agitator roll consists of a hollow thin walled steel cylindrical shell 1 having a reduced pulley forming section 2 rolled thereinto to provide a guide pulley for a drive belt. In the form shown, the pulley section 2 is substantially at the center of the shell 1, but it may be displaced from the center without departing from the invention. Suitable hardened and polished steel beater bars 3 are secured upon the outer surface of the cylindrical shell 1. These bars as shown are segments of a long pitch helix, but they may have a different pitch or be coplanar with the longitudinal axis of the brush roll.

The opposite halves of the brush roll, taken with the pulley section 2 as the center are identical, hence only one will be described in detail, it being understood that the description applies equally well to the other end of the structure.

The shell 1 is circular in cross section except for the brush mounting structure to be described hereinafter. An elongated helical slot 6 is formed in the agitator shell 1 extending from the point closely adjacent the belt pulley 2 and through the outer end of the shell. The portion of the shell 1 forming the margins of the slot 6 are bent to form oppositely facing coplanar lands 7 on opposite sides of the slot. The slot 6 and lands 7 are preferably segments of a long pitch helix, however, at any point along the length thereof the oppositely facing corresponding portions of the land 7 are coplanar and lie in a plane normal to a plane including the longitudinal axis of the shell 1

and the center of the slot at the point in question. A channel forming and re-enforcing member indicated generally at 8 is mounted within the shell 1 underlying and across the margins of the slot 6. The channel member 8 comprises a base 9 positioined inwardly of the edges of the slot 6 and lying in planes parallel with the lands 7. The member 9 is provided with outwardly flaring wings 10 which merge into anchoring flanges 11 shaped to lie against the inner wall of the shell 1 in conforming engagement therewith. The anchoring flanges 11 are secured to the cylindrical shell 1 in any suitable manner as by welding or brazing. The channel member 8 is constructed of metal considerably heavier than the wall of the roll 1 to re-enforce the shell and prevent spreading of the edges of the slot 6. The heavy metallic bridging and re-enforcing member 8 has its anchoring flanges 11 secured to the shell 1 beyond the flat shoulder 7 so that the flanges 11 engage the circular portion of the channel. As a result of this construction the heavy metallic member 8 forms a rigid re-enforcing bridge spanning the shoulder 7 and slot 6 to prevent the shell 1 from deforming or expanding under operating stresses.

The open end of the agitator shell 1 is closed by a bearing mounting and closure structure 15 provided with an inwardly projecting bearing receiving cup 16 having a flat portion 17 adapted to line up with the flat bottom portion 9 of the channel member 8 and to form an extension thereof. The closure 15 for the agitator shell also includes a cylindrical portion 18 which is shaped complementally to the inner surface of the end of the shell 1 so as to fit therein and support the same against inward collapse. The section 18 is cut away as at 23 in line with the flat portion 17 to form a brush seating extension of the channel member 8 and merges into a disc like end portion 19 adapted to abut the end edge of the shell 1 and protect the same. As is shown most clearly in Figure 2 the channel 8 is cut backwardly from the end of the agitator roll a short distance so that the same is clear of the bearing retainer cup 16 and its upper surface is in alignment with the surface of the flat portion 17 of the bearing cup. The closure member 15 is cored as indicated at 20 inside the section 18 to eliminate unnecessary weight. A small projection 21, see Figure 2, on the inner face of the disc 19 is adapted to engage with a small notch 22 in the end of the shell 1 in order to position the member 15 in the shell 1.

The agitator and brush roll structure is provided with a central shaft 24 having a reduced extension 25 which is threaded adjacent its end as at 26. A ball bearing structure 27 is mounted on the extension 25 of the shaft 24 with the inner race of the bearing abutting the shoulder at the end of the extension. A spring washer 28 seats in the base of cup 16 around shaft 24 and urges the outer race of the bearing outwardly of the shell 1 to maintain the ball bearings in engagement with both races of the bearing structure. The inner race of the bearing extends along the reduced section of the shaft 25 to the threaded section 26 thereof where it abuts against a disc 30 having a threaded hub 31 engaging with the threaded section 26 of the shaft 24. The inner race of the ball bearing structure also has a disc 33 pressed thereon which forms an abutment for a felt sealing washer 29 engaged between the disc 33 and the inside face of the disc 30. The disc 30 also includes a flanged dust shielding member 34 which overlies the edges of the disc section 19 of the end closure member 15. It is apparent from the foregoing that the threaded hubs 31 at opposite ends of the agitator structure serve to secure the end members to the shell 1 and to secure the bearing structures in place so that these elements form the locking means for the entire assembly. Thus the inner race of the bearing is locked between the shoulder on the shaft and the nut 31; the spring retainer

28 maintains the outer bearing race in position with respect to the inner race of the bearing; and the felt washers 29 are clamped between the discs 33 and 30 so as to retain and seal the lubricant within the bearing structure.

The structure heretofore described is associated with a brush having a moulded plastic back 40 supporting bristle tufts 41. The brush consists of a moulded plastic back 40 having spaced channels 43 and 45 in its outer and inner faces respectively. The brush bristle tufts 41 are secured in holes cored into the common base of the channels 43 and 45 and are secured in any desired manner as by stapling. The particular manner of securing the bristles illustrated herein forms the subject matter of the copending application of R. F. Koch entitled "Brush Structure," filed April 7, 1950, Serial No. 154,708 and assigned to the assignee of the instant application. The brush back is provided with upstanding flanges 44 surrounding the channel 43 and extending slightly beyond the slot 6 in the agitator shell so that the facing edges of the lands 7 engage the flange 44. The inner face of the brush back is provided with projections 47 defining the side walls of the channel 45 and resting upon the base plate 9 of the retaining plate 8. The brush is also provided with laterally projecting side wings 42 which extend between the lands 7 of the shell 1 and the flaring side wings 10 of the retaining channel 8 so as to engage and firmly seat the brush back within the agitator shell structure.

Stated somewhat differently the brush back 40 is an elongated plastic moulding roughly in the shape of a squat H in cross section having bristles secured in the web of the H and projecting outwardly from one side thereof between and in spaced relation to the side arms of the H. Additionally, securing flanges 42 project laterally outwardly of each of the side arms of the H adjacent the face thereof from which the bristles project but slightly inwardly of that face to provide the land engaging flange 44. The channel 43 in the outer face of the brush back provides for maximum free length of the bristles 41 beyond their anchorage in the back to give maximum flexibility to the brush bristles. The flaring sides of the channel 43, normally spaced from the bristles 41 provide soft long contact surfaces against which the bristles can bear and flex in use without cutting into the bristles or introducing small radius bends thereinto. The base channel 45 provides a protected casing for the bristle securing means to guard the same against catching and breaking on the base of the channel 8 when the brush is inserted. Preferably the brush is made to have a snug fit in the channel 8 under the lands 7 so that it does not chatter in operation and the back is firmly restrained.

The brush back may be moulded in the form of a helix conforming to the helical slot or alternately it may be moulded straight and flexed to conform to the pitch of the slot as it is slid thereinto from the end in the manner shown in Figure 4.

It will be apparent from Figures 2 and 3 that removal of the securing nut 31 permits removal of the entire bearing and end member assembly after which the brush back 40 may be pulled from the helical slot 6 by gripping the same with the fingers or a suitable tool. The cut back portion of the retaining structure 8 facilitates grasping of the brush back after removal of the end member 15. In this way worn or distorted brushes are readily removed from the agitator shell structure and replaced by sliding a new brush into the slot between the lands 7 after which the bearing and bearing end member are assembled which secures the brush in the slot and prevents displacement therefrom. The channel member 8, flat 17 and cutout 23 provide a substantially continuous base support for the brush and means for securing the flanges 42 in seating engagement with the lands 7.

The present construction not only permits rapid and easy disassembly of the structure for purpose of removing

or replacing an agitator brush but it also provides a means by which the bristles anchored in a plastic backing member are prevented from contacting any metal edges as they flex in operation. The projecting flanges 44 of the brush back effectively shield the same from engagement with the agitator and provide a comparatively soft surface against which the brush bristles may bend in response to dragging action of a carpet or the like undergoing cleaning. The present construction permits the brushes to extend to the extreme end of the agitator structure. Only the end plates 19, dust shields 34 and nuts 31, which form the means by which the agitator is secured in the nozzle of a suction cleaner, extend axially outwardly of the brush structure.

The present construction is particularly desirable in that it permits the brush to extend to the very end of the agitator without requiring the use of securing bolts and the like through the brush assembly to apply and remove the same.

While I have illustrated and described the invention in considerable detail, it is to be understood that various changes may be made in the arrangement, proportion and construction of parts without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A rotary brush structure comprising a cylindrical shell having a slot therein extending through one end thereof, a brush seating and re-enforcing structure within said shell comprising a channel member having its side legs secured to said shell on opposite sides of said slot and in spaced relation to the margins thereof and a base portion underlying said slot, said channel member terminating short of said one end of said shell, a bearing mounting and re-enforcing structure comprising a cylindrical member telescoped into said one end of said shell, a bearing retaining cup carried by said mounting and re-enforcing structure within said shell, said cylindrical member and bearing cup having portions shaped to conform to the base portion of said channel and forming an extension thereof to the end of said shell, a flange on said bearing mounting structure closing said one end of said slot, a brush mounted on said shell having a back extending the full length of said slot, said back resting on the base of said channel and the extensions thereof and having laterally projecting side wings engaging under those portions of said shell defining the margins of said slot and within the legs of said channel member.

2. A rotary brush structure comprising a cylindrical shell having an elongated slot therein extending through one end of said shell, a channel shaped member positioned within said shell under said slot and terminating short of said one end of said shell, means for attaching said channel shaped member to said shell in spaced relation to the edges of said slot whereby the portions of said shell defining the boundaries of said slot form anchoring flanges extending toward each other inwardly of the sides of said channel shaped member, a bearing retainer telescopically engaged in said one end of said shell having a part within said shell forming a continuation of said channel shaped member, and a radial projection on said bearing retainer positioned to close the channel formed by said channel shaped member and the end of said slot extending through said one end of said shell.

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