Jan. 19, 1954 F. S. HOWARD 2,666,570

FIBER CUTTER FOR SUCTION CLEANERS

Filed June 6, 1949 2 Sheets-Sheet 1

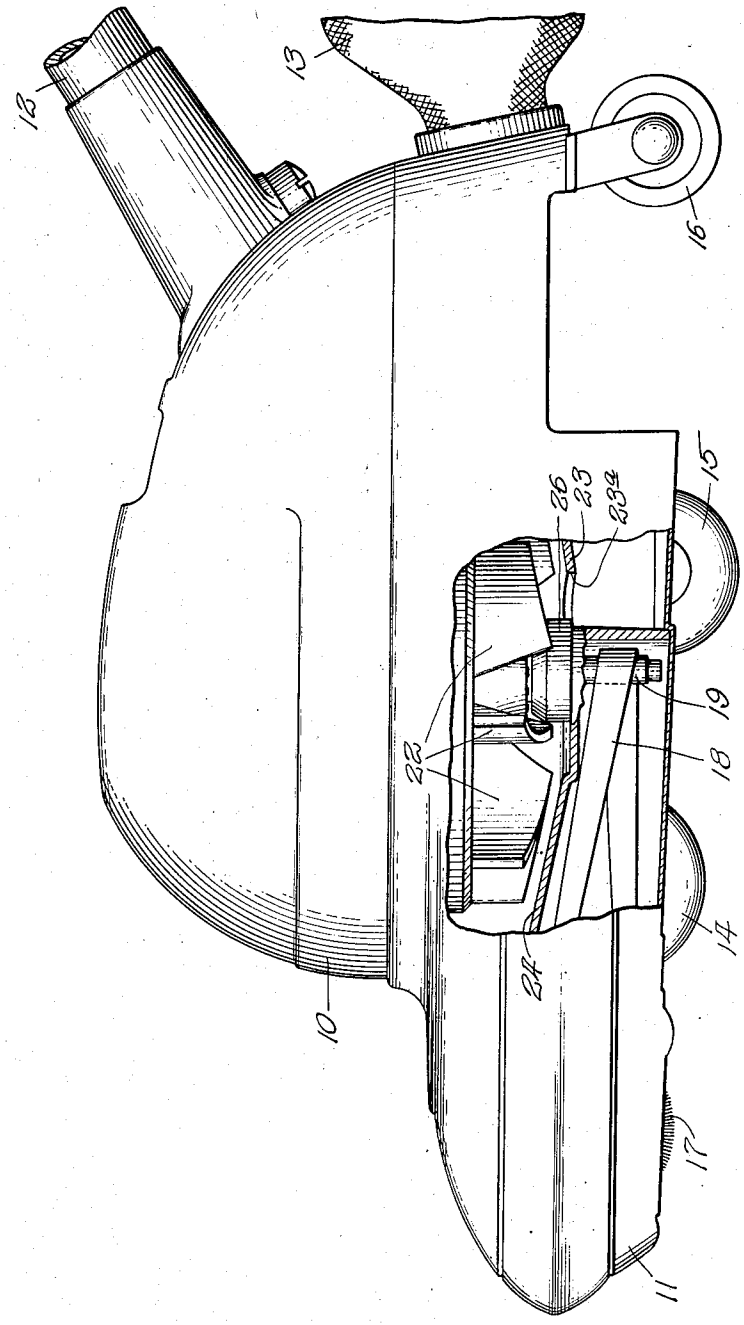


Fig. 1.

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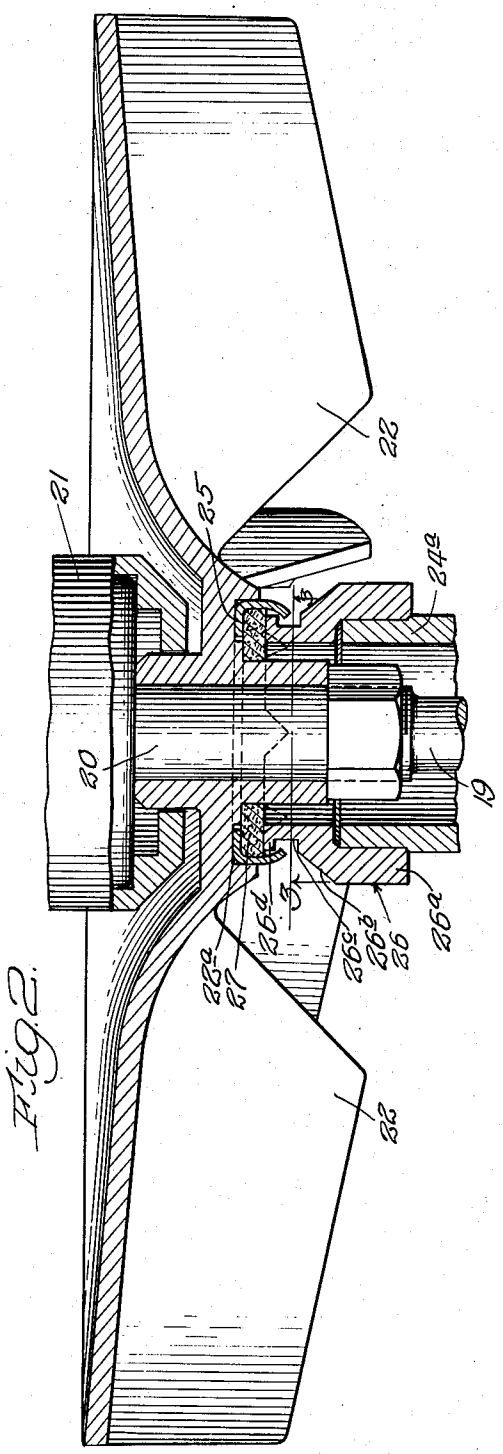


Fig. 2.

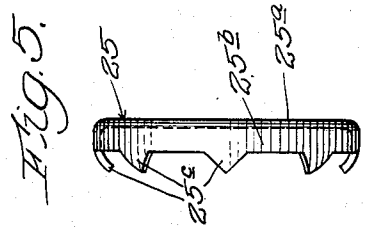


Fig. 5.

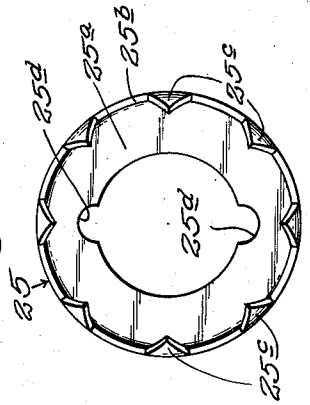


Fig. 4.

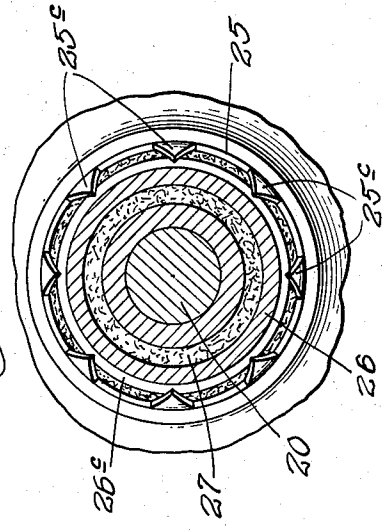


Fig. 3.

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FIBER CUTTER FOR SUCTION CLEANERS

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5 Claims. (Cl. 230—132)

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This invention relates to a suction cleaner having a rotatable suction fan, and relates particularly to a fiber cutter for such a cleaner for cutting long fibers such as threads, hairs and the like that become deposited in regions adjacent the fan.

In suction cleaners employing a rotatable suction fan for drawing a dirt-laden air stream from the surface being cleaned and ejecting it into a bag or other dust trap, difficulties are frequently encountered when relatively long fibers such as hair, thread and the like, are drawn into the cleaner by the air stream. These relatively long fibers often become wound around the fan shaft or other portions of the cleaner adjacent the fan. The rotation of the fan and the air flow cooperate to cause this winding as the first turn of the fiber holds it in place, while the fan and air flow complete the winding. An accumulation of fibers is soon built up and interferes with the air flow. In those cleaners where a belt is provided for driving a rotatable brush, the fibers sometimes get between the belt and the driving spindle where they rapidly damage the belt and cause it to break.

I have invented a fiber cutter which operates to cut the fibers into small pieces so that the air stream can pick up these pieces and blow them into the dust collecting bag. Thus an accumulation of the fibers on the operating parts of the cleaner is avoided.

This fiber cutter is particularly applicable to a suction cleaner which includes a rotatable member such as a fan or fan shaft and a non-rotatable member such as protective collar or guard adjacent the rotatable member. The fiber cutter is provided with at least one cutter blade and is mounted on one of the non-rotatable or rotatable members and adjacent the other member to cut fibers deposited from the fiber-laden air stream on this other member. As the fiber cutter operates continuously, the fibers are cut into small pieces before an accumulation has built up within the cleaner.

The invention will be described as related to the embodiment shown in the accompanying drawings. Of the drawings: Fig. 1 is a side elevation partially broken away and partially in section of a suction cleaner provided with a fiber cutter of this invention; Fig. 2 is an enlarged partial vertical section through the suction fan, fiber cutter and adjacent parts of the cleaner; Fig. 3 is a horizontal section taken substantially along line 3—3 of Fig. 2; Fig. 4 is a bottom elevation of the fiber cutter itself; and Fig. 5 is a side elevation of the fiber cutter of Fig. 4.

In the embodiment shown in the drawings, the suction cleaner includes a housing 10, a nozzle 11, handle 12, dust collecting bag 13 and supporting wheels 14, 15 and 16. In the nozzle 11 there

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is provided a rotatably mounted brush having bristles 17 thereon. This brush is driven by a belt 18 of rubber or the like extending rearwardly to a spindle 19. This spindle is preferably formed as the lower end of the vertically arranged motor shaft 20 driven by a motor 21. Mounted on the motor shaft 20 is a suction fan 22 arranged to draw a fiber and dust laden air stream from the nozzle 11 and eject it into the dust collecting bag 13. There is provided a fan housing 23 around the fan 22 with this housing having an inlet eye 23a preferably opening downwardly as shown in Fig. 1. In order to protect the belt 18 from damage by dust and other particles in the air stream, there is preferably provided a belt guard housing 24 surrounding the belt and the spindle 19. The portion of the housing 24 adjacent the spindle 9 is provided with an annular upwardly extending portion 24a that is substantially concentric with the axis of rotation of the spindle 19 and the motor shaft 20.

When the suction cleaner is in operation it often picks up long threads, hairs and other fibers and these are drawn by the air stream through the fan housing inlet eye 23a into the housing. The force of the air stream and the rotation of the fan 22 frequently causes these fibers to be wound around the shaft or adjacent portion of the belt guard housing 24. In a relatively short time these fibers can accumulate to such a mass that the inlet eye 23a will became at least partially obstructed. In those cleaners which do not employ a belt guard housing or a shaft guard, the fibers become wound around the fan shaft and gradually work downwardly on the spindle 19 until they get between the spindle 19 and the belt so that the belt rapidly becomes damaged and frequently breaks. In any type cleaner employing a rotatable fan, the accumulated wound fibers soon become objectionable and decrease the efficiency of the cleaner.

In order to prevent these relatively long fibers from causing damage to the cleaner and reducing its efficiency, I have invented a fiber cutter which cuts the fiber into small pieces so that the air stream drawn by the fan can eject the pieces into the dust bag 13. In the embodiment shown in the drawings the fiber cutter 25 comprises an annular planar body portion 25a provided with a rim portion 25b provided with spaced cutter blades 25c thereon. As shown in Figs. 2 to 5, inclusive, each cutter blade 25c is of substantially triangular shape and is curved inwardly toward the center of the cutter 25. As shown in Fig. 2, the fiber cutter 25 is held in position in a recess 22a on the bottom of the fan 22 so that the cutter blades 25c extend downwardly and inwardly. The central axes of the recess 22a and the fiber cutter 25 substantially coincide with the axis of rotation

of the motor shaft 20 on which the fan 22 is mounted.

Immediately beneath the fiber cutter 25 there is provided an annular guard member 26. This guard member has a portion 26a closely embracing and fixedly mounted on the top of the belt guard housing portion 24a. The outer surface of the guard member 26 adjacent the embracing portion 26a thereof is provided with a portion 26b sloping inwardly toward the fan 22 and in the direction of flow of the air stream. This portion 26b has the shape of a frustum of a cone. Immediately adjacent the inner end of the sloped portion 26b there is provided an annular groove 26c on the guard member 26 and into which the ends of the cutter blades 25c extend. This groove 26c has its top surface bounded by an outwardly projecting shoulder 26d which is located betwen the innermost ends of the cutter blades 25c and the body portion 25a of the fiber cutter. In order to seal the area between the shoulder 26d and the body portion 25a there is provided an annular washer 27 of felt or other compressible material.

In the structure described above, the guard member 26 is fixed to the portion 24a of the belt guard housing and thus is non-rotatable. The fan 22 is rotated by the motor 21 and the fiber cutter 25 is locked to the fan so that the fiber cutter rotates therewith. Any structure desired may be employed for causing this locking and in the embodiment shown the locking arrangement is provided by having a pair of cut-out sections 25d provided on the inner surface of the fiber cutter 25 to engage similarly shaped sections on the fan 22.

When the suction cleaner is in operation, the dust and fiber laden air stream is drawn by the fan from the nozzle 11 through the fan housing inlet eye 23a and forced into the dust bag 13 where the dust and relatively short fibers are separated from the air stream. When relatively long fibers of hair, thread and the like are in the air stream these will often become wound around the guard member 26. The force of the air stream and the rotation of the fan causes these fibers to be drawn upwardly along the outer surface of the guard member. Due to the sloped portion 26b of the guard member, these wound fibers will be gradually drawn into the annular groove 26c. As the groove is relatively narrow, the fibers soon build up to the point where they can be engaged by the blades 25c of the rotating fiber cutter 25. These blades cut the fibers within the groove into short pieces which are easily drawn by the air stream and ejected into the bag 13 with the dust and small fibers. As will be noted in the drawings, there is an appreciable distance between the innermost edges of the blades 25c and the bottom of the groove 26c. The reason for this space is that manufacturing tolerances do not warrant having the cutter blades extend the full depth of the groove. Even with this construction there will never be a large accumulation of fibers within the groove for as soon as they come in contact with the cutter blades they are immediately cut into small pieces.

Although in the embodiment shown the cutter 25 is disclosed as being mounted for rotation with a rotatable member and operating in conjunction with a non-rotatable member, it is believed obvious that an alternate construction could be provided wherein the fiber cutter is mounted on a non-rotatable member and operating in conjunction with a rotatable member.

As will be noted, the bottom of the guard member 26 extends to a point within the fan housing inlet eye 23a. This is provided so that practically all the fibers that are deposited on the large diameter of the portion 26a will be easily drawn over this portion and inwardly along the sloped portion 26b into the groove 26c where they are in position to be cut by the rotating fiber cutter 25.

Having described my invention as related to the embodiment shown in the accompanying drawings, it is my intention that the invention be not limited by any of the details of description but rather be construed broadly within its spirit and scope as set out in the accompanying claims.

I claim:

1. In a suction cleaner including a rotatable fan shaft, a fan chamber having an opening through which said shaft extends and a fan within said chamber mounted on said shaft for drawing a fiber-laden air stream through said opening, a non-rotatable guard member surrounding said shaft adjacent said fan and said opening, and a fiber cutter mounted for rotation with said fan shaft and having at least one cutter blade adjacent said guard member to cut fibers deposited thereon.

2. The suction cleaner of claim 1 wherein said guard member is provided with an annular groove substantially concentric with the axis of rotation of said cutter and into which said cutter blade extends.

3. The suction cleaner of claim 1 wherein said guard member is provided with a portion sloping inwardly in the direction of flow of said air stream from an area spaced from said cutter to an area adjacent said cutter blade.

4. The suction cleaner of claim 1 wherein said fiber cutter is provided with a plurality of spaced cutter blades.

5. In a suction cleaner including a rotatable fan shaft, a fan chamber having an opening through which said shaft extends and a fan within said chamber mounted on said shaft for drawing a fiber-laden air stream through said opening, a non-rotatable guard member surrounding said shaft adjacent said fan and said opening, said guard member being provided with an annular groove substantially concentric with the axis of rotation of said fan shaft and being provided with a sloped portion on its outer surface sloping inwardly in the direction of flow of said air stream from an area spaced from said groove to said groove, and a fiber cutter mounted for rotation with said fan shaft and having a plurality of spaced cutter blades extending into said groove to cut fibers deposited therein.

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