Gitschel et al.

[45] July 17, 1973

[54]	APPARATUS FOR CLEANING THE TEXTILE ARTICLES							
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[51]	Int. Cl	A471 9/06						
[58]	Field of So	earch						
		15/10/ K						
[56]		References Cited						
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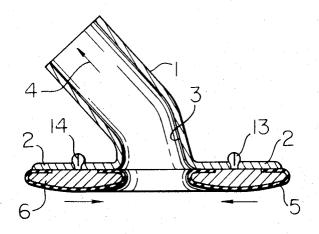
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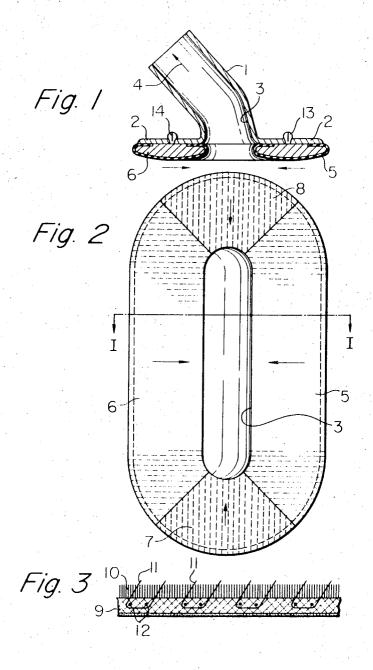
[57] ABSTRACT

The brush apparatus is used for cleaning textile articles, particularly carpets and other similar kinds of floor coverings as well as padded furnitures. The apparatus, which is movable to and fro along the surface to be cleaned, is used in a combination with a mechanical or pneumatic take-up device for the removal of dust, fluffs and the like. A plurality of bristle cushions surround the take-up openings of the devices and include a pad of even-length and soft material bristles and additional bristles intermingled within the even-length bristles. The additional bristles are of a greater length and of a harder material than the even-length bristles and give the pad a striped appearance.

4 Claims, 8 Drawing Figures



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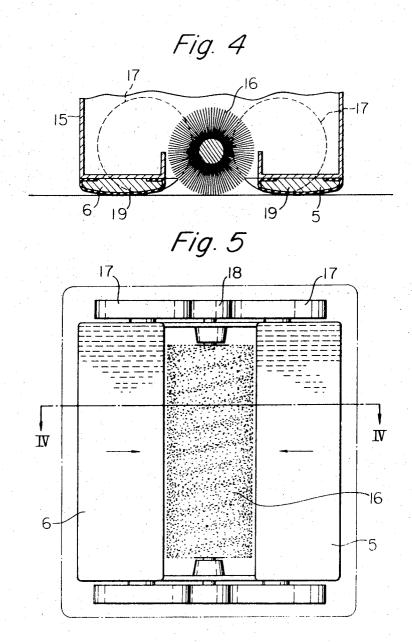


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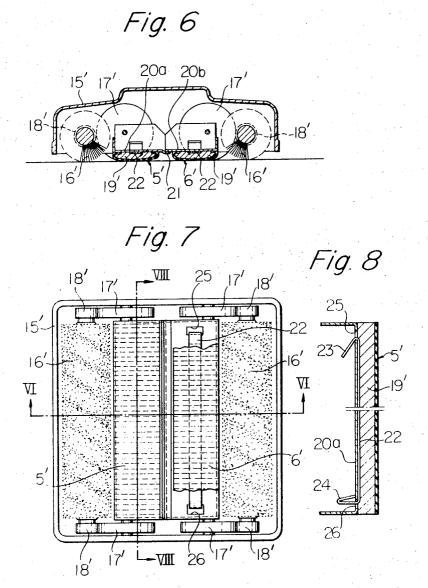
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APPARATUS FOR CLEANING THE TEXTILE ARTICLES

The present invention relates to an apparatus for cleaning textile articles, and more particularly relates 5 to brush apparatus for cleaning carpets and other similar kinds of floor coverings as well as padded furnitures. The apparatus is used in combination with a mechanical or pneumatic take-up device for removal of dust, fluffs and the like and is movable to and fro along the 10 can be employed in clothes cleaning brushes. If the surface to be cleaned.

An apparatus for cleaning textile articles, such as carpets well known. For example, a pneumatically operating vacuum cleaner or a mechanically acting carpet sweeper.

A vacuum cleaner of the instant type has a suction nozzle which has an elongated body or mouthpiece. The lip portion or the periphery portion of said elongated suction nozzle moves along the surface of the textile article in the operation of the vacuum cleaner.

The reduced pressure that is generated in the inner portion of the nozzle of the mouthpiece sucks air through the textile material together with the dust and other impurities that adhere to the textile material. In case of removing the fluffs, difficulties arise from the 25 fact that the fluffs hold persistently to the textile material due to the particular fiber structure of the textile fabric. Therefore, in such a situation the sucking air stream can not tear the fluffs from the textile article to be cleaned. In such cases, the user moves the mouth- 30 piece nozzle of the vacuum cleaner numerous times to and fro in order to bring out a loosening of the fluffs, whereby these fluffs can be easily sucked into the cleaner.

well known as a carpet sweeper and usable for cleaning which is especially suitable for cleaning the carpet, the rollers are provided with brushes which are disposed substantially in the middle portion of the bottom of the sweeper in the horizontal plane and which can be rotated horizontally. Under these conditions, the above mentioned brush rollers contact the upper layer of the textile material in their operation. For example, the brushes contact the crests of the carpet or the crests of the floor coverings. Accordingly, these crests are "combed so thoroughly" that the fluffs adhere to the crests and thus the fluffs can be removed. In addition to the above, the brush apparatus can be moved to and fro in order to remove the more difficult fluffs or other impurities from the textile article. As a general rule, the brushes have relatively hard bristles in order that the fluffs may be removed from the carpet. Consequently the life of a carpet is shortened in an accelerated man-

For a complete cleaning of the carpet or of a like floor covering, a cleaning apparatus in the form of a beating cleaner has been manufactured wherein certain combination working can be expected. However, it is almost impossible to remove completely the penetrated fluffs on a textile article, such as a carpet or a like floor covering by the utilization of aforementioned conventional devices.

The object of the present invention is to provide a brush cleaning apparatus in which deeply penetrated fluffs that are on a textile article such as, a carpet or a like floor covering, can be completely loosened and removed.

The present invention utilizes well-known properties of slanted-bristle materials wherein the bristle-like elements are intermingled with the conventional brush structure and are positioned at an incline to the horizontal surface of the material. The free ends of the bristles are directed towards the center of the apparatus. The free tip portions are projected slightly beyond the brush surface.

It is well known that such slanted-bristle materials movement of the brushes is performed in the same direction as the direction of the inclination of the bristles or "against the line of the bristles" the slanted arrangement of the bristles gives a substantially complete combing action and cleaning of the material to be cleaned. Under the above conditions, the free ends or tips of the bristles penetrate into the crest of the textile article to be cleaned, that is, the upper fiber layer. If the movement is made in the opposite direction bristles in a slanted position merely slip over the material without performing any penetration into the material. Thus, cleaning is performed.

An apparatus for cleaning textile articles in accordance with the present invention, and more particularly to an apparatus for cleaning carpets and other similar kinds of floor surfaces as well as padded furnitures, in which such apparatus is a mechanical or pneumatic device for removing dust, fluffs and the like is characterized substantially by the brush cushions which consist of bristles made of a soft material being intermingled with inclined hard bristles. hang

When such a brush apparatus as defined according to the present invention is moved to and fro along a textile In a mechanically operated device as a conventional 35 article to be cleaned, the brush strip of the slantedtion of the apparatus and behind the take-up device, readily removes fluffs and other similar adhering impurities from the surface of the textile article, because the tip portions of the slanted positioned bristles catch deep in the textile article to be cleaned and "comb completely" said textile article. In this condition, the impurities hang suspended in the bristles. If the brush apparatus is moved in the opposite direction, the opposite strip cushion of slanted-bristle material completes the combing of the textile material by merely sliding said other strip cushion smoothly over the textile article by the first motion, while the strip cushion having impurities therewith transfers these impurities to the surface of the textile article by the motion of the strip cushion against the inclination of the bristles, and the impurities slide off from the ends of the bristles. Thus, the impurities which were loosened and released from the bonding with the textile fibers of the material to be cleaned, can be readily removed from the nozzle of the vacuum cleaner or from the brush of a carpet sweeper.

Fundamentally, a cushion formed of slanted bristles is sufficient for obtaining the intended cleaning operation. However, preferably a pair of oppositely aligned cushions are utilized in performing the cleaning operation in a rapid and efficient manner.

With respect to brush apparatus in a vacuum cleaner having a flat mouthpiece-flange or a sucking nozzle structure capable of being attached to said flat flange, it is preferable to secure the cushion made of the slanted-bristle material to a flange that has a substantially wider width than the usual flange of the nozzle.

With respect to a carpet sweeper that is provided with a rotating brush, the pair of oppositely aligned cushions are arranged in a parallel relationship with the brush axis, and the bristle surfaces are disposed with the same height as the lower circumferential curvature of the rotating brushes which are horizontally located between the cushions. By the utilization of a slanted bristle type cushion, the textile article to be cleaned is completely combed. This is in contrast to rotating brush structures that consist of substantially stronger 10 and stiffer bristles than the described slanted-bristle material. When the rotating brush of the carpet sweeper of the present invention touches the uppermost layer of the textile article, the article is sufficiently cleaned. On the other hand — as heretofore described 15 - fluffs and other impurities are "fetched out" from the crests of the textile article by virtue of the slanted bristle cushion by moving the apparatus to and fro.

For the purpose of sweeping corners of the padded furniture, a flange-pipe-joint portion type nozzle is generally connected with the nozzle of the vacuum cleaner. The joint nozzles constructed for the application in the present invention are substantially characterized in that the periphery of the nozzle and its adjoining flange pipe portion is covered with the slanted-bristle material and its bristles are directed towards the opening of the nozzle.

The invention will be described more in detail hereinafter with particular reference to the preferred embodiments which are illustrated in the drawings. By the descriptions of the preferred embodiments, further features and advantages of the apparatus in accordance with the present invention will be made more clear.

In the drawings:

FIG. 1 is an elevational section diagram of the vacuum cleaner nozzle taken along the line I—I of FIG. 2.

FIG. 2 is an enlarged schematically illustrated bottom elevation diagram of a "slanted-bristle-material" and also shows how the slanted-bristle-material can be used for the apparatus in accordance with the present invention.

FIG. 3 is a sectional view of a portion of a cushion. FIG. 4 shows a vertical sectional diagram of the take-up portion of a carpet cleaning machine taken along the line IV—IV of FIG. 5.

FIG. 5 shows an elevation of the bottom surface of the take-up device of the carpet cleaning machine in accordance with FIG. 4.

FIG. 6 shows a vertical sectional diagram of the takeup portion of a carpet cleaning machine taken along the line VI—VI of FIG. 7.

FIG. 7 shows an elevation of the bottom surface of the take-up device of the carpet cleaning machine in accordance with FIG. 6.

FIG. 8 shows a band plate spring in engagement with a gathering case.

According to the present invention, the vacuum cleaner nozzle 1 illustrated in FIGS. 1, 2 and 3 has an extremely enlarged mouthpiece-flange 2 which may have, for example, a width of from 3 to 4 cm. Air is sucked in the direction shown by the arrow mark 4 through an opening 3 provided in the vacuum cleaner nozzle.

Two strip-type cushions 5 and 6 which are made of a well known teasel material or of a slanted-bristle-material, are provided on the bottom surface of the mouthpiece flange 2 of the vacuum cleaner nozzle 1.

The free ends of the bristles of both these cushions are inclined to the horizontal plane and are directed to the middle portion of the take-up device. In other words, the bristles of the cushions are directed to the opening 3 in the middle portion of the mouthpiece flange. This direction of the free ends of the bristles is clearly shown by the arrows marked in FIG. 2.

In order to show clearly the performance of the cushions, velvet-like characteristics of the slanted-bristle-materials are schematically illustrated in FIG. 3.

In the basis textile fabric 9, in which the velvet-like brush 10 of the fabric is bound, the slanted bristles 11 are fixed either by special weft 12 or also by soaking of the basis textile fabric in an elastomer. Each slantedbristle 11 is illustrated in the form of a slanted pressurized U and each tip portion of the bristle projects slightly beyond the surface of the brush 10. In many cases, it may not be necessary that the tip portions of the bristles project beyond the surface of the soft brush bristles. If the brush is very soft, and accordingly, if the brush will loosen the impurities sufficiently, the tips of the slanted bristles 11 may be made to terminate, within the brush 10. The slanted-bristles 11 are preferably mono-filament synthetic fibers and the diametrical size and bending strength thereof can correspond with the value of conventional bristles used for clothes brushes. Of course, the diametrical size and the bending strength of these bristles are matters of choice. For example, in case of a special apparatus utilized for the cleaning of the rough textile fabrics, relatively strong and thick bristles may be selected On the other hand, in case of cleaning a carpet having fine strands, relatively fine bristles may be utilized.

It is readily understood that if the nozzle 1 of the vacuum cleaner having the cushions of the slanted-bristle stripes 5 and 6, is moved to and fro, the cushions which are directed to the surface to be cleaned behind the nozzle, seize and carry along the fluff and coarse impurities by the bristles thereof. On the other hand, when the nozzle is moved to the rearward direction, these seized impurities will fall off the end of the bristles which are moved in another direction. The fallen impurities remain freely on the surface of the textile material to be cleaned and then, these impurities can be caught and carried off by the sucking stream of air.

As shown in the embodiment in accordance with FIG. 2, the cushions 7 and 8 of the slanted-bristle materials are arranged in a parallel manner to the opening 3 of the mouthpiece so that similar favorable removal actions of the nozzle of the vacuum cleaner can be performed in the lateral directional movement thereof. These actions are also illustrated by corresponding arrows shown in the drawing.

In case the vacuum cleaner nozzle is moved to and fro along the lengthwise direction of the nozzle-mouthpiece or the mouthpiece-opening, all the coarse impurities are removed from these bristles and then liberated to the inner chamber of the nozzle.

In the carpet sweeper apparatus shown in FIGS. 4 and 5, a brush 16 is positioned horizontally in a box-like frame 15. The brush 16 is attached to a wheel 18 covered by gum and the wheel 18 is driven and rotated by wheels 17 coated similarly with gum. The cushions 5 and 6 that are also made of the slanted-bristle material, are arranged to the front and the rear of the rotating brush 16. The bristles of brushes 5,6 are directed towards the center portion of the take up device. This

direction of the slanted-bristle is clearly shown in FIG. 5 by two arrows. The cushions 5 and 6 are provided with inner cores generally made from wood, synthetic resin or from other relatively rigid materials. Each cushion, however, can be also provided with an elastic 5 core which, maybe adapted to fit by its outer contour of the cushion with the unevenness of the surface to be cleaned.

In FIG. 4, the lower circumferential curvature of the rotating brush 16 is of the same floor height with the 10 lower side of the cushions 5 and 6 of the slanted-bristle material. It is readily understood that an undesired penetration of the stiff and hard bristles of brush 16 into the fluff of a carpet or of a floor covering can be prevented. Contrary to the conventional setting of a carpet 15 cleaning machine having a rotating brush, it is quite unnecessary that the bristles of the rotating brushes penetrate deep into the carpet surface. In other words, the cushions 5 and 6 — as heretofore described in detail catch the impurities already on the surface of the mate- 20 rial to be cleaned and let them remain in front of the brushes, so that the brushes can remove the impurities without penetrating so deeply into the carpet surface then the impurities can be let down into the collecting tank and disposed in side portions of the frame.

However, the cushions of the slanted-bristle materials arranged on both sides of the vacuum cleaner and carpet sweeper of the present invention, perform not only their principal functions of eliminating the fluff and coarse impurities from the carpet surface and of 30 feeding into the taking-up devices but also act as brushes which adjust the fibers of the carpet. Further, the cushions are combed gently and thoroughly and also rearrange the fibers simultaneously in accordance with the manner of a conventional tease. Thus the 35 cleaned surface is combed by the apparatus in accordance with the present invention in a "step-back manner" in advancing positively towards one direction. If a single apparatus should be utilized by the user for cleaning textile articles which are quite different in their fiber construction, it is advantageous to use various exchangeable type strips of the slanted-bristle material or cushions of the slanted-bristle material. The exchangeability of the cushion can be obtained by many variable means.

As an example, FIG. 1 shows a means of securing the cushion to the flange 2 by push-buttons 13 and 14. Each push-button has a slitted globular head which is pressed into the flange 2 of the nozzle 1 of the vacuum cleaner through the holes in the flange. Many other types of snap securing means can be utilized. A securing means by screws can be also provided. Also the principle of the turn-buckle could be used.

It may be advantageous that the cushions adher rigidly to the flange of a suction nozzle or be bolted thereto and have the exchangeable feature apply to the flange connection to the nozzle or with the mouthpiece.

It is to be understood that the slanted-bristle material may be different from the arrangement shown in FIG. 3. In other words, the slanted-bristle material need not have velvet-like characteristics. It is also possible to secure the slanted bristles to crepe textile fabric or to the textile fabric-like materials and such strip of simplified 65 construction also performs an excellent cleaning operation when handled in the above stated manner. For example, it is readily adhered to a textile fabric made of

monofilament synthetic fibers, from which some fibers are inclined and bent aside and cut away, so that the ends of the fibers are projected as bristles from a sup-

plementary surface layer of the textile material. It is also possible to secure the slanted bristles to a ground material other than a textile surface layer somewhat in the similar manner as is performed in a card fitting ar-

rangement with card wires.

The carpet cleaner as shown in FIGS. 6, 7 and 8 has two brushes 16' which are located at both sides of and enveloped by a frame 15', and are driven by travel wheels 17' and friction wheels 18'. The cushions 5' and 6' having elastic cores 19' are located between said two brushes 16' and are fixed to the bottom of gathering cases 20 a, 20 b which are open at the boundary. The cushions are preferably exchangeably fitted. The free ends of each of the slanted bristles are directed towards the adjacent brushes.

When it is desired to fit the cushions to the carpet cleaner permanently, a suitable adhesive material may be employed. However, if it is desired to have the exchangeable feature snap connection or screw connection can be used.

For the purpose of securing the cushions to the cleaner, spring band plates 22 which are fixed to the back of cushion cores 19 as shown in FIG. 8 can be also employed. This band plate is provided with a stop-edge 24 and a hooked edge 23. At first the stop edge 24 is inserted to opening 26 on the bottom plate of the gathering case and, thereafter the hooked edge 24 is inserted to opening 25. When it is necessary to exchange the cushions, they are disconnected by pushing down the stop edge 24 with ease.

It should be also noticed that a nozzle of a vacuum cleaner having cushions of the slanted-bristle materials arranged on the both sides thereof in accordance with the present invention, can be also assembled in other ways than that shown in FIG. 1. In order to make it possible to connect a standardized nozzle to the vacuum cleaner having the connecting ends of different various diameters, it is possible either to enlarge the connecting end in a conical form or to construct in step-like form, so that a standardized nozzle can be fitted to the different vacuum cleaners.

The arrangement of the strip cushions is not only utilizable advantageously for the nozzle of a vacuum cleaner or for the cleaning machine of the carpet 50 sweeper but it can be also applicable to other types of vacuum cleaning apparatus. For example, the takingup device may utilize static electricity for the attractive force.

We claim:

1. A take-up device comprising in combination:

a hollow body provided with a bottom face having an elongated opening therein and provided interiorly with a collecting chamber,

said bottom face including an enlarged flange surrounding said opening and having at least a pair of oppositely aligned bristle cushions secured to said flange and operatively arranged adjacent opposite sides of said opening, each respective bristle cushion including a pad of a plurality of even-length, soft flexible material bristles,

additional bristles intermingled within said pad bris-

tles,

said additional bristles being of greater length and of harder and stiffer material than said even length bristle

said additional bristles arranged in an inclined manner toward said opening, said additional bristles 5 rendering a striped apperance to said cushions.

2. A take-up device according to claim 1, wherein said flange is of a width from 3 to 4 centimeters.

3. A take-up device according to claim 1, wherein said collecting chamber is a suction chamber.

4. A take-up device according to claim 1 and including an additional pair of oppositely aligned bristle cushions secured to said flange and arranged to cooperate with said at least a pair of oppositely aligned bristle cushions to surround said opening.

UNITED STATES PATENT OFFICE CERTIFICATE OF CORRECTION

Patent No.	3,745,605	Dated	Dated July 17, 1		
Inventor(s)	Hilde Schwab	nee Gitschel	et al.		

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [19] "Gitschel et al." should read -- Schwab et al. --.

Signed and sealed this 29th day of January 1974.

(SEAL)
Attest:

EDWARD M.FLETCHER, JR. Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents