

Jan. 11, 1949.

C. H. TAYLOR

2,459,007

BRUSH ROLL FOR SUCTION CLEANERS

Filed April 9, 1945

2 Sheets-Sheet 1

FIG. 1.

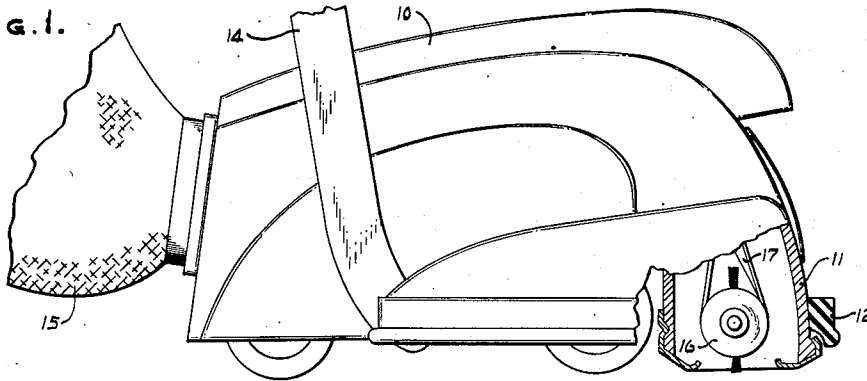
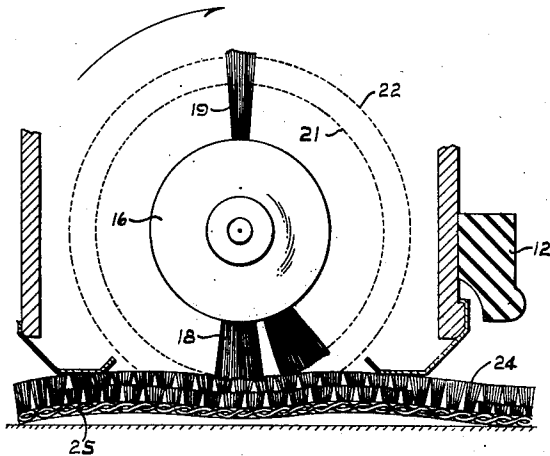
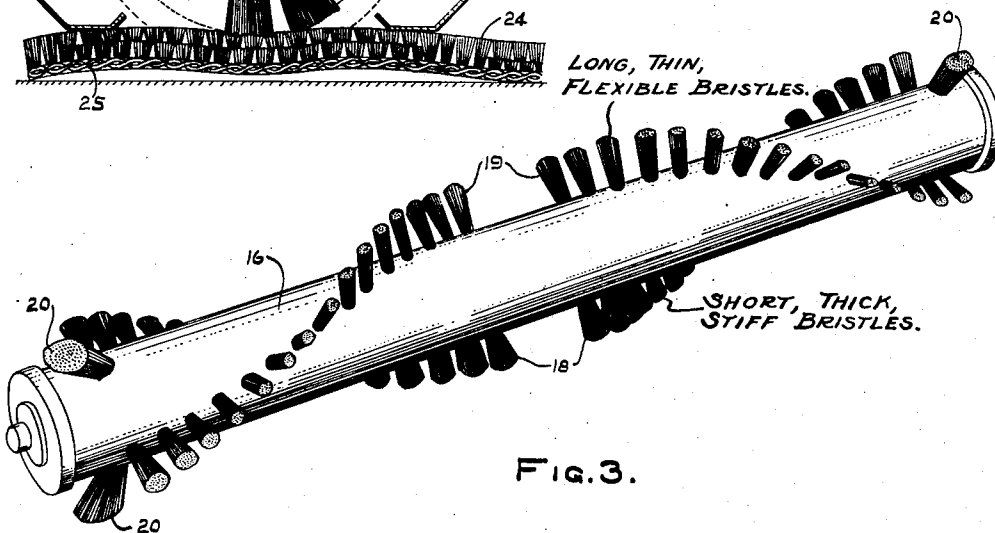


FIG. 2.



LONG, THIN,
FLEXIBLE BRISTLES.



SHORT, THICK,
STIFF BRISTLES.

FIG. 3.

WITNESSES:

C. H. Lutz

M. E. McCloskey

INVENTOR
CHARLES H. TAYLOR

BY R. J. Eisinger
ATTORNEY

Jan. 11, 1949.

C. H. TAYLOR

2,459,007

BRUSH ROLL FOR SUCTION CLEANERS

Filed April 9, 1945

2 Sheets-Sheet 2

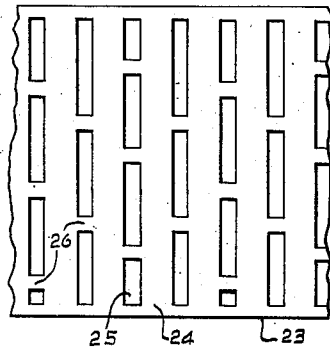


FIG. 4.

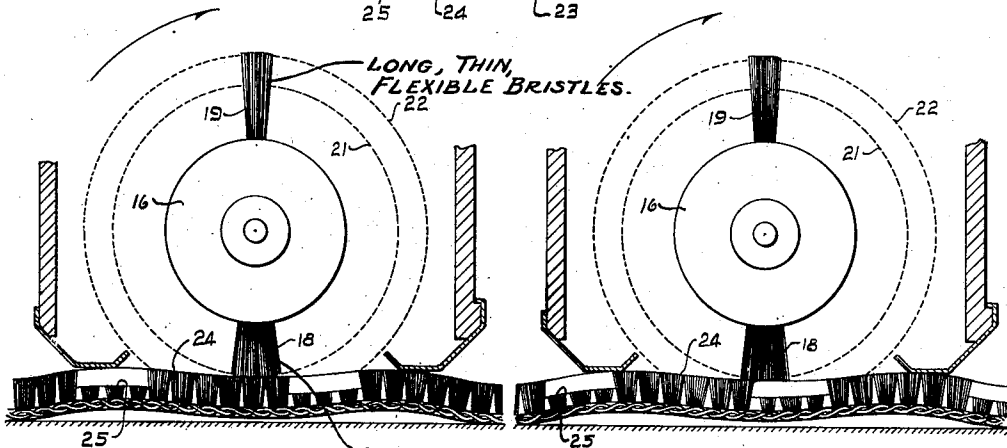


FIG. 5. SHORT, THICK, STIFF BRISTLES.

FIG. 6.

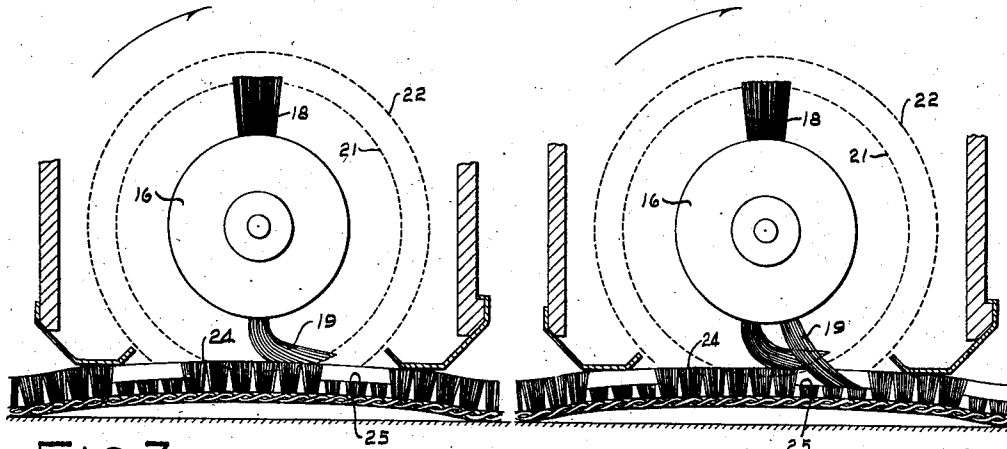
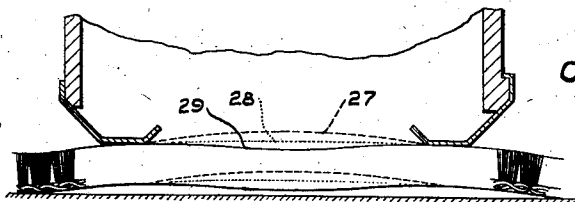


FIG. 7.

FIG. 8.

FIG. 9.



INVENTOR
CHARLES H. TAYLOR

BY *R. J. Eisinger*
ATTORNEY

UNITED STATES PATENT OFFICE

2,459,007

BRUSH ROLL FOR SUCTION CLEANERS

Charles H. Taylor, Springfield, Mass., assignor to
Westinghouse Electric Corporation, East Pitts-
burgh, Pa., a corporation of Pennsylvania

Application April 9, 1945, Serial No. 587,261

3 Claims. (Cl. 15—383)

1

My invention relates to a suction cleaner of the conventional type including a nozzle adapted to be moved over the surface to be cleaned and a rotary brush roll disposed in the nozzle for loosening embedded dirt and for picking up lint, hair, threads and the like, and it has for an object to provide improved apparatus of the character set forth.

Heretofore, such brush rolls have customarily been provided with bristles of uniform length and character. These brush rolls have been satisfactory for most floor coverings, such as carpets and rugs, which usually have a plain nap of uniform height. However, difficulty has been encountered in satisfactorily cleaning carpets or rugs having different kinds of naps or naps of different heights, which are coming into more common use.

It is, therefore, an object of this invention to produce a brush roll which is capable of effectively cleaning floor coverings having different kinds of naps or naps of different heights.

My invention generally resides in providing a suction cleaner with a brush roll having one group of bristles which are sufficiently stiff so that when they strike the carpet, they do not yield materially lengthwise but beat the carpet down the full distance of their length, and in providing the brush roll with a second group of bristles which are much more flexible, so that, when acting on a carpet having a nap of different heights, the bristles which strike the high surface yield and bend, permitting the carpet to remain at a sufficient height for the bristles to reach the low surface, whereby the low nap or surface as well as the high nap is swept. The flexible bristles are preferably made longer than the stiff bristles. The greater flexibility may be provided by bristles of a material which is inherently more flexible, by using thinner bristles, or by bristles which are both more flexible and thinner.

These and other objects are effected by my invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a side elevation of a suction cleaner provided with a brush roll embodying my invention, parts being broken away;

Fig. 2 is a sectional view showing one of the stiff tufts disposed directly over but spaced from the low surface;

Fig. 3 is a perspective view, on an enlarged scale, of the brush roll;

2

Fig. 4 is a plan view of a carpet having a two-height nap, showing one pattern of such type of carpet;

Fig. 5 is a sectional view showing one of the stiff tufts engaging the high surface;

Fig. 6 is a similar view showing a stiff tuft in engagement with the high surface at a point adjacent the low surface and showing the tuft spaced from the low surface;

Fig. 7 is a similar view showing one of the flexible tufts engaging the high surface;

Fig. 8 is a sectional view showing one of the flexible tufts engaging the low surface and another engaging the adjacent high surface; and

Fig. 9 is a diagrammatic view illustrating the height to which the carpet moves between contacts of the bristles and the levels to which the stiff and the flexible tufts depress the carpet.

Referring to the drawings in detail, 10 designates a suction cleaner casing which is of any desired size or contour and which is provided with a conventional nozzle 11, a bumper 12, an operating handle 14, and a dust bag 15. It includes the usual fan and motor (not shown) for creating suction in the nozzle 11. In the nozzle 11 is positioned a brush roll 16 which is driven by a belt 17 from the usual motor.

The brush roll 16 is provided with a row of tufts 18, which row extends from one end of the brush roll along a helical path to the center, and then along a reversely turning helical path toward the other end of the brush roll. The brush roll is provided with a second row of tufts 19, which are disposed diametrically opposite the tufts 18. The outer ends of the brush roll 16 are provided with tufts, such as shown at 20, which are disposed angularly towards the ends of the brush roll to provide maximum effective length of the row of tufts.

The hairs or bristles forming the tufts 18 are similar to the tufts used in conventional brush rolls and comprise relatively short, thick and stiff bristles, such as medium grade horsehair, a stiff grade of pig bristles, or the like, thus resulting in a relatively stiff and thick tuft. Such tufts provide an effective beating action, and they also provide effective sweeping of the upper surface. While these tufts have some resiliency, they are sufficiently stiff and remain substantially straight when striking the carpet to space the carpet substantially the same distance from the core of the brush roll as they would if they were rigid.

The tufts 19 are substantially much more flexible than the tufts 18. The greater flexibility is obtained by providing bristles of a material which

3

is inherently more flexible, by providing bristles which are thinner or of smaller diameter, or by providing bristles which are both of a more flexible material and also thinner. The bristles of the tufts 18 may be, for example, .006 inch nylon strands, goat hair or the like. These bristles are much softer or more flexible per unit length than the bristles of the tufts 18. Each of the tufts 18, as a whole, is preferably thinner than one of the tufts 18, which thinness may be obtained by using thinner bristles. The tufts 18 are sufficiently flexible so that when they strike the carpet, they do not space it from the brush roll the same distance that they would if rigid or if made of the same bristles as used in the tufts 18, but instead they bend substantially and permit the carpet to remain at a higher level. The tufts 18 are also of less mass, which helps to make them yield.

The tufts 18 are also longer than the tufts 18. The orbit or path of travel of the outer ends of the tufts 18 is indicated by the circle 21 and the path or orbit of the outer ends of the tufts 18 is indicated by the circle 22.

In Fig. 4, I show a carpet 23 having nap or pile of two heights. The surface of the higher nap is indicated at 24 and will be referred to herein as the high surface. It covers the greater portion of the area of the rug. The surface of the lower nap is indicated at 25 and will be referred to herein as the low surface. In the pattern shown in Fig. 4 merely as an example for illustration, the areas of the low surface are surrounded by areas of the high surface, and form depressions which are relatively long and narrow. Portions of high surface located between adjacent ends of adjacent depressions and connecting the high surface on opposite sides of the depressions, are indicated, for example, at 26. The depressions may be of any form and may be in any relation to each other.

In Figs. 5 to 8, the brush roll is disposed parallel to the elongated depressions or areas of low surface 25.

In Fig. 5, I show one of the stiff tufts 18 engaging the high surface 24. This represents substantially the action obtained with a conventional brush roll. While the bristles of the tuft 18 have some flexibility and do bend slightly, they are substantially straight and depress the contacted portion of the surface down to the orbit 21, or substantially the same distance as if they were absolutely rigid. The tufts 18 effect both a beating action of the carpet and sweeping of the high surface 24.

In Fig. 6, the cleaner has advanced to a point where only a small portion of the stiff tuft 18 is in engagement with the high surface 24, the remainder of the tuft being disposed directly above and spaced from the low surface 25. In engaging the high surface, the tuft 18 moves the carpet down to the position shown in this figure, so that the low surface 25 is beyond the reach of the stiff tufts. Thus, the surface 25 is not swept by the stiff tufts. If the depression or low surface 25 were of sufficient width and length, the central portion thereof might be drawn upwardly to a sufficient level to engage the low surface with the tufts 18. However, the tufts 18 have a substantial width and as long as they come in contact with an adjacent portion of the high surface, they move the carpet down to the level shown in Fig. 6 in which the low surface is beyond reach of the tufts 18. Even if the areas of low surface were wider, the portions at the ends, that is, adjacent the connecting portions 26, would be moved down

4

beyond the reach of the tufts 18 because of the contact of the tufts 18 with the connecting portions 26.

In Fig. 7, I show one of the long and flexible tufts 18 in engagement with the high surface 24. This tuft is of such flexibility that it bends to a very substantial extent, as shown in this figure, and depresses the rug only to the level shown. While the flexible tufts 18 effect some beating action, they do not move the carpet down as far as do the stiff tufts.

In Fig. 8, I show the cleaner advanced to the point where the brush roll is directly over the low surface 25 with the tuft 18 in the plane of the section disposed at the lowermost part of its revolution. It will be seen that the tuft 18 reaches down into contact with the low surface and, therefore, sweeps such surface. The next flexible tuft, disposed rearwardly from the plane of the section and also angularly displaced toward the rear of the cleaner, in accordance with the helical form of the row, is in contact with the adjacent high surface. Here again, as in Fig. 7, the flexible tuft yields and bends sufficiently to permit the carpet to remain at the level illustrated, thereby permitting the tufts 18 to reach the low surface. If the tufts 18 were as stiff as the tufts 18, they would move the carpet down to a level where the low surface would be beyond the orbit 22 and beyond the reach of the tufts 18.

In Fig. 2, the brush roll is disposed transversely of one of the elongated depressions. The stiff bristles contacting the high surface on opposite sides of the depression move the carpet down to the level shown so that the stiff tuft 18 which is directly over the low surface is spaced therefrom, as shown in Fig. 2.

From observations of one model of my invention in operation, made by means of a stroboscope, it appears that the carpet rises, between the successive contacts with the tufts, to about the same level as indicated at 27 in Fig. 9. The circumferential spacing between the tufts permits the carpet to rise so that the tufts of bristles effect a beating action. It also appears that the flexible tufts 18 move the carpet down only about one-half the distance that the stiff tufts 18 do. In Fig. 9, the line 28 indicates the level to which the flexible tufts 18 depress the contacted surface, and the line 29 indicates the level to which the tufts 18 depress the contacted surface. Also, the stiff tufts are seen passing over the low surface spaced therefrom, and the flexible tufts are seen bending against the high surface and reaching the low surface.

From the above description, it will be seen that I have provided a new brush roll which provides improved and adequate cleaning of a two-height carpet. The stiff bristles provide sweeping action of the high surface as well as beating of the entire carpet, the lower nap being shaken to remove embedded dirt therefrom by the contact of the stiff bristles with the high nap or surface. The lower surface is adequately swept by the flexible and longer bristles, which are able to reach down to the low surface by reason of the fact that they are sufficiently flexible so that those flexible bristles which contact adjacent portions of the high surface bend and yield to permit the carpet to remain at the required height. The flexible bristles also effect a sweeping action on both the high surface and the low surface which, in some respects at least, is different and better than that of the stiff bristles in that, being more flexible and of less mass, they are able to conform more

fully to the shape or irregularities of the surface of the carpet and to remove dirt, etc., from the crevices and irregularities. They are especially advantageous in connection with light clinging types of dirt, such as threads, pieces of cotton and animal hairs. These types of dirt are difficult to agitate in the beating action more generally employed, as they have such a small amount of mass. The form-fitting contact of the flexible tufts in themselves imparts a bunching or rolling action to the light fluffy dirt so that their removal by the flow of air in the nozzles is improved.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

This application is a continuation-in-part of my application, Serial No. 465,952, filed November 18, 1942, which has become abandoned.

What I claim is:

1. In a suction cleaner for cleaning a nonuniform surface and including a nozzle and means for creating suction through said nozzle, a brush roll disposed in and coacting with said nozzle, said brush roll comprising a core, a row of tufts of relatively long, thin and flexible bristles mounted therein and a row of tufts of relatively short, thick and stiff bristles also mounted in said core in circumferentially-spaced relationship to said first-mentioned row, the tufts of the second mentioned row being of greater thickness than the tufts of the first mentioned row.

2. In a suction cleaner, a brush roll adapted to be disposed and operate in the nozzle thereof, said brush roll comprising a rotatable core or supporting member, a group of tufts of bristles which are relatively stiff, and a second group of tufts of the bristles of which are more flexible, per unit of length, than the bristles of the first group

and which extend further from the axis of rotation than the bristles of the first group, the tufts of each group being distributed longitudinally of said core and spaced circumferentially from the tufts of the other group, the tufts of the first-mentioned group being of greater thickness than the tufts of the second group.

3. In a suction cleaner for cleaning a carpet having a nonuniform surface, the combination of a nozzle, means for creating suction through said nozzle, a brush roll disposed in and coacting with said nozzle and means for effecting rotation of said brush roll in a predetermined direction of rotation, said brush roll comprising a core, a row of tufts of relatively long, thin and flexible bristles mounted therein and a row of tufts of relatively short, thick and stiff bristles also mounted in said core, the tufts of short bristles being of greater thickness than the tufts of long bristles and the forward side of the row of short bristles being spaced circumferentially rearwardly, with respect to the direction of rotation, from the rearward side of the row of long bristles, thereby permitting the carpet to rise so that the tufts of the short bristles may effect a beating action of the carpet.

CHARLES H. TAYLOR.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
843,222	Luther	Feb. 5, 1907
1,654,186	Nulsen	Dec. 27, 1927
1,884,013	Losey	Oct. 25, 1932
1,903,867	Lehman	Apr. 18, 1933
2,085,700	Kitto	June 29, 1937