

[54] **CARPET SWEEPER**

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[51] Int. Cl. **A47I 11/33**
[58] Field of Search **15/41 R-48**

[56] **References Cited**

UNITED STATES PATENTS

2,770,825 11/1956 Pullen 15/48
3,628,211 12/1971 Fukuba 15/48

Primary Examiner—Edward L. Roberts

Attorney, Agent, or Firm—Woodhams, Blanchard and
Flynn

[57] **ABSTRACT**

A carpet sweeper with provision of: a rotating brush

supported transversely within the lower portion of a housing to sweep up the dust on the floor when said housing moving there along; a pair of cleaning combs attached to said housing in parallel with the axis of said rotating brush, in such a manner that each of them is disposed above but just behind the rotating brush when said rotating brush moves forward along the floor surface, so that the teeth of the cleaning comb can penetrate themselves deeply into the rotating brush to take away therefrom the dust adhered thereto; and a dust receiver positioned just behind said cleaning comb so as to receive the dust cleared off from the rotating brush by the cleaning comb, said cleaning comb being provided between the teeth thereof with an interval several times as wide as the width of a single tooth and on the bottom edge of each interval with a small projection, whereby the tip of said small projection rubs the peripheral surface of the rotating brush and the bottom edge of said interval is barely brought into contact with the same when the tip of each tooth goes deep into the rotating brush.

3 Claims, 10 Drawing Figures

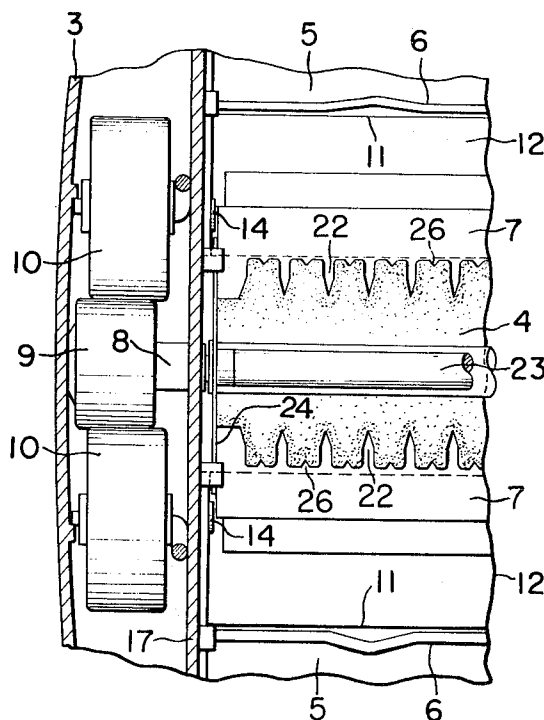


FIG. 1A

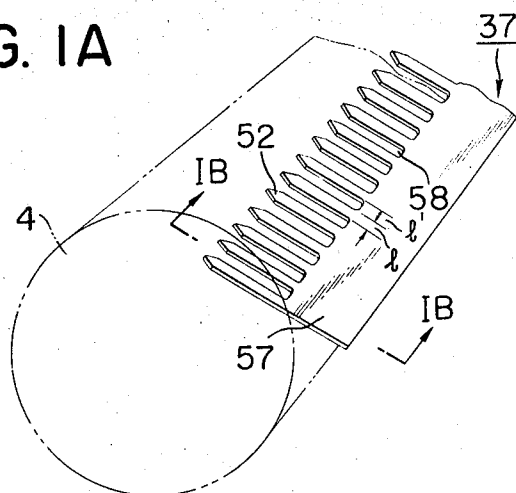


FIG. 2A

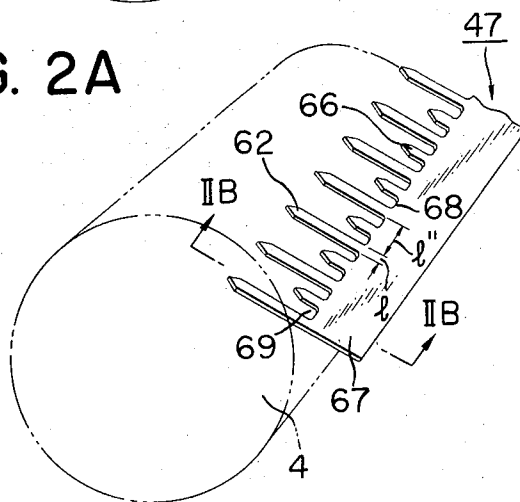


FIG. 1B

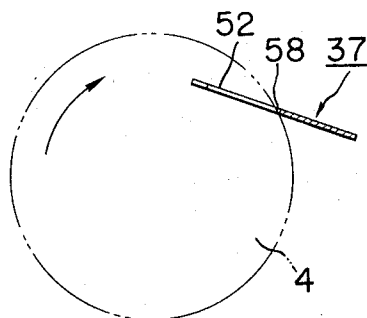


FIG. 2B

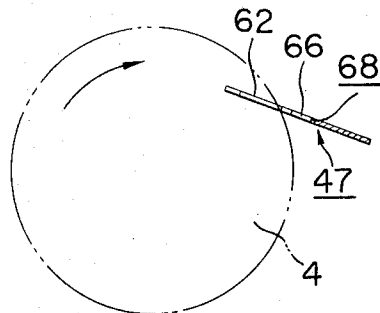


FIG. 3

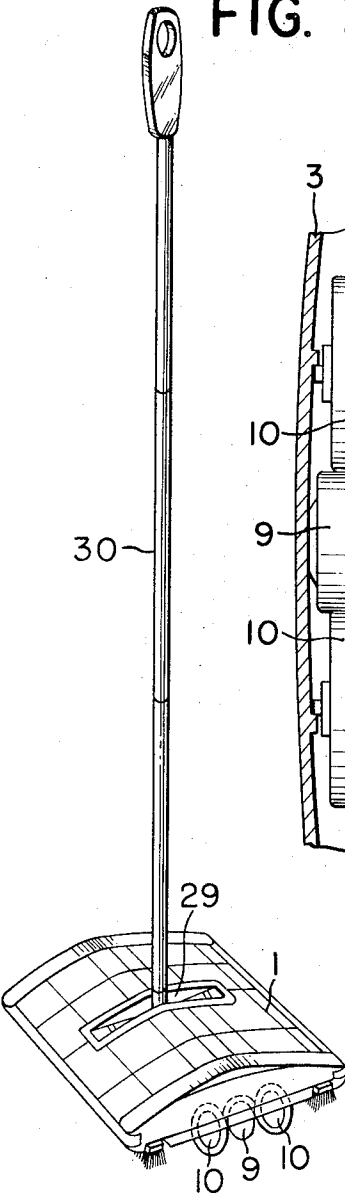


FIG. 4

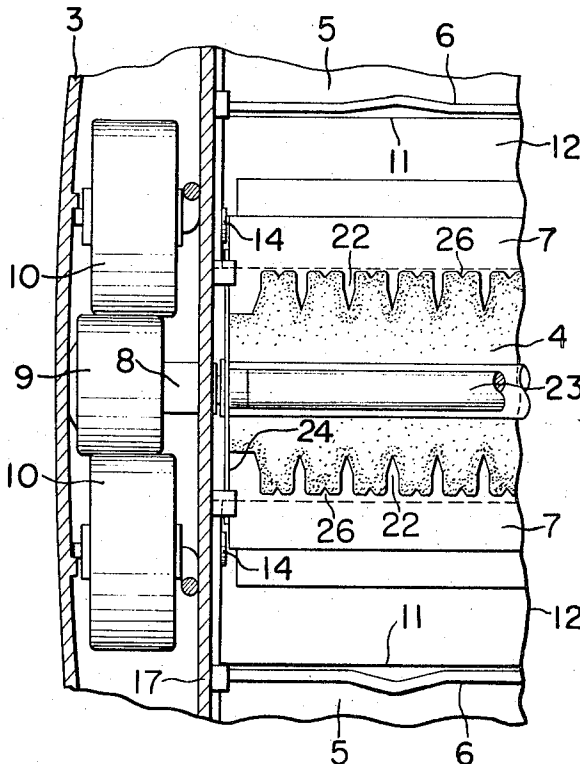


FIG. 7

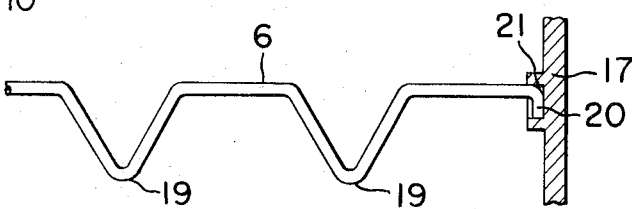


FIG. 5

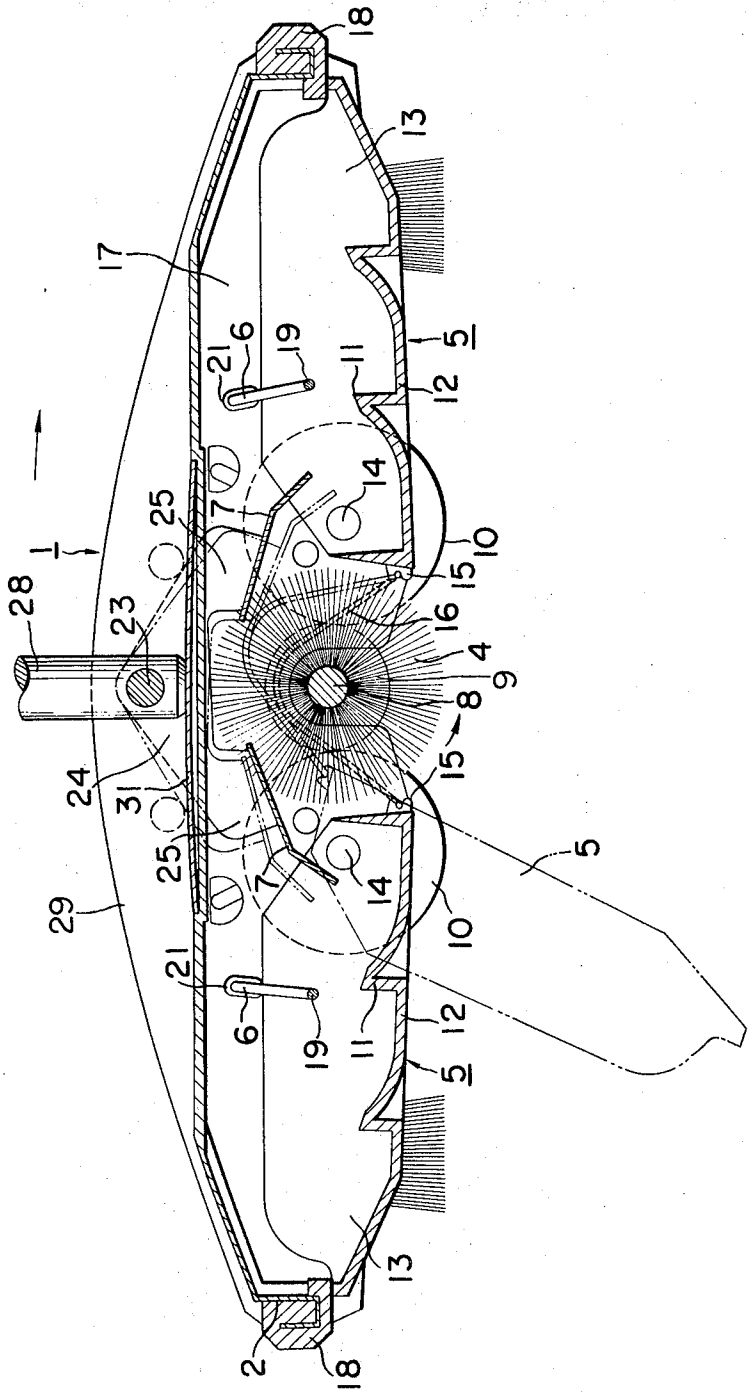


FIG. 6A

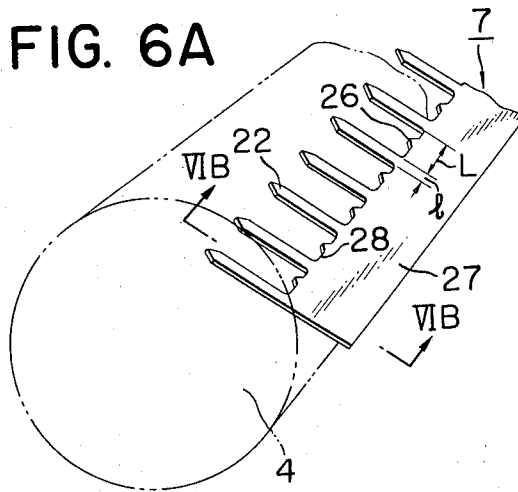
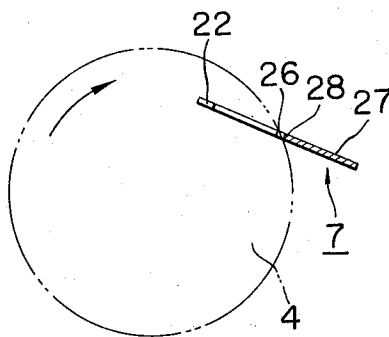


FIG. 6B



CARPET SWEEPER

BACKGROUND OF THE INVENTION

a. Field of the Invention

The present invention relates to a carpet sweeper and more particularly to a carpet sweeper provided with a rotating brush adapted to rotate, in liason with the rotation of the rollers supporting a housing, so as to sweep away the dust on the floor.

b. Description of the Prior Art

The conventional carpet sweeper of this type is disclosed in U.S. Pat. No. 3,628,211.

The carpet sweeper of above-mentioned type is usually provided with a comb having a plurality of teeth which can penetrate their tip ends deeply into the rotating brush to take away therefrom the light and soft dust, for instance, such as fallen hair of the carpet, etc.

In FIGS. 1A and 1B, there is shown a portion of a comb 37 included by a conventional carpet sweeper as above-mentioned. The comb 37 is provided with a plurality of teeth 52 spaced at regular intervals l' which are substantially equal to the width l of a single tooth thereof, and these teeth 52 can be penetrated deeply into the rotating brush 4 as to the full length thereof from the tip to the bottom edge 58. Therefore, these teeth serve, to some extent, to arrest the rotation of the rotating brush by effecting a large resistance thereagainst, since the intervals l' defined between adjacent teeth are comparatively narrow, being almost equal to the width of a single tooth as afore-described. As the result, it becomes impossible for the carpet sweeper to move lightly and easily for operation thereof.

In addition to the above, the practical use thereof has proved that it has a very poor capability in removing the dust from the floor.

To eliminate the above-mentioned disadvantage resulting from the large resistance of the cleaning comb against the rotating brush, the interval l' between the teeth was broadened, whereby the resistance was decreased as expected, but the capability of cleaning was badly decreased even more.

In order to eliminate the foregoing disadvantages, the inventor of the present invention contrived a comb 47 having the teeth as shown in FIGS. 2A and 2B and carried out a series of investigations with regard to effectiveness thereof.

As apparent from the appended drawing, this improved comb 47 was provided on the base plate thereof with a plurality of long teeth spaced at the intervals l'' that are several times as broad as the width of a single tooth and at the center of the bottom edge 68 with a tooth 66 shorter than the aforesaid long tooth 62.

It was found out, however, that, even from such an improved comb, there still resulted the same disadvantage as from the comb illustrated in FIGS. 1A and 1B, when it was set in such a manner that both teeth 62 and 66, long ones and short ones, could penetrate so deeply into the rotating brush. Accordingly, to avoid such a disadvantage, the improved comb was re-set, as seen in FIGS. 2A and 2B, in such a manner that the tip ends of the short teeth 66 were only to touch and rub the peripheral surface of the rotating brush 4.

As the result, the resistance between the comb 47 and the rotating brush 4 was so much decreased that the carpet sweeper could perform very easy movement over the carpet. Nevertheless, such a re-setting of the comb resulted in a vacant space 69 defined between

the peripheral surface of the rotating brush 4 and the bottom edges 68 of the intervals between the teeth 62 and 66, said vacant space 69 having a length almost equal to that of the short tooth and the width just equal to that of the interval.

Therefore, there resulted another disadvantage that the dust was caused to fall off through the vacant spaces 69.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a carpet sweeper which is free from such disadvantages as inherent to the conventional one and having excellent capability of taking away the dust very effectively from the rotating brush and of moving itself very easily and lightly without any resistance in the rotation of the rotating brush.

Another object of the present invention is to provide a carpet sweeper to be operated with easy movement of the housing due to the minimized resistance between the rotating brush and the cleaning comb, resulting from defining each interval between the teeth as several times as broad as the width of each tooth, even when the tip of each tooth goes so deeply into the rotating brush.

A further object of the present invention is to provide a carpet sweeper comprising: a cleaning comb provided with a small projection at the middle of the bottom edge of each interval defined between the teeth, which interval has a width several times as broad as that of a single tooth, so that said small projections can clear away the dust adhering around the peripheral surface of the rotating brush so as to complete cleaning of the entire portion of the brush, while said teeth taking away the dust penetrate into the brush by inserting themselves therein so deeply that said bottom edge just contacts the peripheral surface of the brush; and dust receiver adapted to receive all the dust cleared off from the entire portions of the rotating brush.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a perspective view of an example of the cleaning comb attached to a conventional carpet sweeper.

FIG. 1B is a front view of the cleaning comb shown in FIG. 1A.

FIG. 2A is a perspective view of another example of the cleaning comb attached to another conventional carpet sweeper.

FIG. 2B is a front view of the cleaning comb shown in FIG. 2A.

FIG. 3 is a perspective view of a carpet sweeper according to the present invention.

FIG. 4 is a partially cut-away perspective view of the carpet sweeper shown in FIG. 3 having a portion of the housing cover cut away to illustrate the inner side thereof.

FIG. 5 is an enlarged cross-sectional view of a preferred embodiment of the present invention shown in FIG. 3, taken along a line passing longitudinally through the center portion of the housing thereof.

FIG. 6A is a perspective view of a portion of the cleaning comb attached to the preferred embodiment of the present invention shown in FIGS. 3 to 5.

FIG. 6B is a front view of the cleaning comb shown in FIG. 6A.

FIG. 7 is an enlarged elevational view of the hindering member.

DETAILED DESCRIPTION OF THE INVENTION

In FIGS. 3 to 5, the reference numeral 1 denotes a housing having a gentle rise defined lengthwisely along the central line of the upper portion of the housing so that it has an arc-shaped cross-section.

In the front and rear end portion of the housing 1, there is defined a pendent edge 2 respectively extending downwardly, while, on both side portions thereof, there is provided respectively a side plate 3 also extending downwardly. And a side wall 17 is disposed in parallel therewith and with a predetermined space therebetween.

A rotating brush 4 is located in the central portion of the inner side of the housing 1 in such a manner that the axis 8 of the rotating brush 4 is disposed at a right angle to the direction in which it moves. The axis 8 thereof is rotatably supported transversely between the side plates 3 of the housing and is provided in both end portions thereof with a roller 9, which is fixedly secured thereto, and is properly pressed on both sides by the drive wheels 10 rotatably supported inside of the housing 1.

A dust receiver 5 is provided close to the front and rear side of the rotating brush 4 respectively. The side plates 13 and a bottom plate 12, which is provided with plural detents 11, cooperate to form said dust receiver 5. Said dust receiver is pivotably supported by both side walls 17 at a point on each side plate 13 adjacent to the rotating brush 4, through the intermediate of pins 14.

On the side plate of each dust receiver that faces toward the rotating brush, there is defined a spring receiver 15 in the lower portion of each side end thereof, so that a pair of springs 16 are adapted to engage with each spring receiver respectively with their leg portions.

Thereby, the pushing force of said spring 16 keeps the free end portion of each dust receiver 5 always in contact with the packing 18 attached to the pendent edge 2 of the housing 1.

The reference numeral 6 denotes a hindering member which is provided, as seen in FIG. 7, with plural projections 19 formed with a wire member bent into a series of V-shapes at appropriate intervals and both end portions thereof are further bent so as to make a right angle to themselves for formation of the engaging portions 20.

Said hindering member 6 is disposed over the dust receiver 5 in parallel with the rotating brush in such a fashion that the plural projections 19 are opposed to the dents 11 of the bottom plate 12 of the dust receiver 5 and are slanted in such a manner that the tips of the projections are kept apart from the rotating brush 4. Further, the engaging portions 20 thereof are fitted into a groove 21 defined on each side wall 17 of the housing for fixation of the hindering member thereto.

The reference numeral 7 denotes a flat cleaning comb to be used for cleaning the rotating brush. The central portion of a suspension yoke 24 is oscillatably suspended by a shaft 23 supported transversely over the rotating brush 4 between both side walls 17 of the housing 1. Said cleaning comb 7 is attached to the lower end of each leg 25 of the suspension yoke 24, in order that the tips of the teeth of the cleaning comb op-

pose those of the other comb on the opposite side, besides being kept slanted rather upwardly.

In reference to FIG. 5, when the rotating brush rotates counterclockwise, as shown by an arrow, owing to the rightward movement of the entire carpet sweeper, the comb positioned on the forward side of the rotating brush, namely, on the rightward side of the rotating brush, as seen in FIG. 5, is caused to jump up by the peripheral surface of the rotating brush 4, and in the meantime the suspension yoke 24 oscillates counterclockwise about the shaft 23, whereby the teeth 22 of the comb 7 positioned just behind the rotating brush 4 moving forward penetrate thereinto as shown by a solid line in FIG. 5.

When the carpet sweeper moves in the reverse direction, the teeth of the comb located on the opposite side penetrate into the rotating brush as shown by a broken line.

As seen in FIGS. 6A and 6B, the teeth 22 of said comb 7 are aligned on the base plate 27 with an interval L therebetween, which interval is several times as broad as the width l of a single tooth, and, in the middle of the flat bottom edge 28 of each interval there is provided a small triangular projection 26.

When the teeth 22 penetrate deeply into the rotating brush 4, said small projections 26 rub the peripheral surface of the rotating brush with their tips, while the bottom edge 28 barely comes into contact with the same.

In the drawings, the reference numeral 30 denotes a handle which is turnably connected with the shaft 23 in the lower portion thereof within a groove 29 defined in parallel with the moving direction of the carpet sweeper along the central line on the upper surface of the housing 1. The foremost lower end of the handle is positioned against a plate spring 31 disposed on the bottom of said groove 29.

OPERATION

For practical operation of the above-described carpet sweeper, firstly the handle 30 is pushed so as to move the housing 1 in the direction, along which the groove 29 is defined on the upper surface of the housing 1. Thereby the drive wheels 10 roll over the floor and simultaneously cause the roller 9 to rotate by pressing it therebetween. Then the rotation of the rollers 9 effect simultaneous rotation of the rotating brush 4, which is co-axially connected fixedly with the rollers 9, whereby the rotating brush sweeps up the dust on the floor as it moves along the floor surface.

FIG. 5 illustrate a carpet sweeper moving in the direction indicated by an arrow, that is, moving rightwardly. In this occasion, the teeth of the cleaning comb 7 positioned just behind the moving rotating brush 4 penetrate deeply into the rotating brush.

That is, the teeth 22 of the cleaning comb 7 enter so deeply into the rotating brush that each small projection 26 on the bottom edge 28 of the interval rubs the peripheral surface of the rotating brush, while the bottom edge 28 of each interval comes barely into contact with the same. By this means, each tooth 22 takes away the dust entered so deeply into the rotating brush and each small projection 26 concurrently clears away the dust adhering to the peripheral surface of the rotating brush 4.

The dust cleared away from the rotating brush, as abovementioned, gets gradually rolled up into a ball-

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like shape so as to be dropped into the dust receiver 5. And then, within the dust receiver, the dust is pushed farther and farther backwardly by passing through the hindering member 6. The thus pushed-in dust gets clings together, while the hindering member 6 cooperates with the plural dents 11 to prevent the clung dust from moving in the reverse direction.

When the dust receiver gets filled up with dust, it is swung open around the pins 14 in opposition to the pressing force of the spring 16, so as to discharge the dust therefrom.

Although particular preferred embodiments of the invention have been disclosed hereinabove for purposes of illustration of the present invention, it will be understood that variations or modifications thereof which lie within the scope of the present invention as defined by the appended claims are fully contemplated.

For example, a cleaning comb may be fixedly secured to the housing in the proper position, without being oscillatably attached thereto.

What is claimed is:

1. A carpet sweeper, comprising in combination: a rotating brush supported transversely within the lower portion of a housing to sweep up the dust on the floor during movement of said housing along the floor surface; a cleaning comb attached to said housing in parallel with the axis of said rotating brush in such a manner that it is positioned above and behind the rotating brush relative to the direction of movement along the floor, the comb having elongated teeth and being positioned so that the teeth penetrate deeply into the rotating brush to rake therefrom the dust clinging thereto; and a dust receiver disposed just behind said cleaning comb for reception of the dust raked away from the rotating brush by said cleaning comb; the improvement wherein said cleaning comb has a substantially flat base plate with a plurality of said elongated teeth projecting outwardly from one edge thereof, the adjacent teeth being spaced apart by a space having a width several times greater than the width of a single tooth, a plural-

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ity of small triangular-shaped projections projecting outwardly from said one edge of said base plate, said projections being spaced between said teeth and projecting into said spaces, said projections having a length which is extremely small in comparison to the length of said teeth, and said projection having a width at the base end thereof which is substantially less than the width of said space so that there remains a substantially straight base edge of substantial length extending between the base end of the projection and the base end of an adjacent tooth, said comb being positioned adjacent said brush so that the teeth penetrate deeply into said brush while the tips of the projections slide along the periphery of the brush and the base edge of each space barely comes into contact with the periphery of the brush.

2. A carpet sweeper according to claim 1, wherein a pair of said cleaning combs are disposed on opposite sides of the rotating brush and just above the brush in order that the teeth of the cleaning comb located just behind the rotating brush during forward movement thereof can penetrate deeply into the brush while the other comb located on the opposite side of the brush stays in such a position as to prevent the teeth thereof from deeply penetrating into the brush, and means movably mounting said pair of combs relative to said housing for permitting said pair of combs to be synchronously shifted laterally relative to said brush so that shifting of the combs in one direction causes the teeth of one comb to deeply penetrate the brush while the teeth of the other comb are withdrawn from the brush, said combs when shifted into a second position having the teeth of the other comb deeply penetrating the brush while the teeth of said one comb are withdrawn from said brush.

3. A carpet sweeper according to claim 1, wherein the comb has only a single projection located between each pair of adjacent teeth.

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