ABSTRACT

One or more auxiliary brushes are floatingly mounted for sweeping litter from either a carpeted or smooth floor into the path of the main transverse sweeper brush means. The drive for the auxiliary brushes is internal and does not depend upon rotation of the sweeper's main drive mechanism. A caster device drives the auxiliary brushes through a non-circular connection having substantial play therein so that the brushes will readily position themselves to conform to the contour of the surface being swept. Means are provided to limit deformation of the brush bristles against the floor.

14 Claims, 7 Drawing Figures
FLOOR SWEEPER WITH AUXILIARY SURFACE LITTER BRUSH MEANS

BACKGROUND OF THE INVENTION

This invention relates to a floor sweeper having auxiliary surface litter brush means.

Prior known floor sweepers, commonly called carpet sweepers, have utilized one or more auxiliary brushes rotatable horizontally for sweeping into normally inaccessible corners. See, for example, the U.S. Pat. to Tengenberg No. 500,976 and Parker et al. No. 2,782,454. U.S. Pat. No. 2,657,408 to Machovec is also of interest. These prior devices have incorporated relatively complex and expensive external drive means for the auxiliary brush assembly and in most instances the brush height must be manually adjusted, if adjustment is possible at all.

SUMMARY OF THE INVENTION

The present invention is directed to a sweeping concept wherein one or more auxiliary brushes are floatingly mounted for sweeping litter from either a carpeted or smooth floor into the path of the main transverse sweeper brush means. The drive for the auxiliary brushes is internal and does not depend upon rotation of the sweeper's main drive mechanism. A caster device drives the auxiliary brushes through a non-circular connection having substantial play therein so that the brushes will readily position themselves to conform to the contour of the surface being swept. Means are provided to limit deformation of the brush bristles against the floor.

DESCRIPTION OF THE DRAWINGS

The accompanying drawings illustrate the best mode presently contemplated by the inventor for carrying out the invention.

In the drawings:

FIG. 1 is a perspective view of a sweeper constructed in accordance with the invention, with the handle removed;

FIG. 2 is a bottom plan view of the sweeper with parts broken away and in section;

FIG. 3 is a fragmentary enlarged front view of the sweeper showing one of the auxiliary brush assemblies with parts in section, and with the sweeper mounted on an even smooth floor;

FIG. 4 is a generally horizontal section taken on line 4-4 of FIG. 3;

FIG. 5 is a view similar to FIG. 3 showing the brush position with an uneven smooth floor;

FIG. 6 is a view similar to FIG. 3, showing the auxiliary brush position on a relatively even shag rug and

FIG. 7 is a view similar to FIG. 6 with the auxiliary brush on an uneven shag rug and showing the operation of the brush deformation limiting means.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As shown in the drawings, the invention is embodied in a carpet sweeper having a housing or frame which includes side and end walls 1 and 2 respectively, and a top 3. A suitable bail 4 is attached to the frame and has the usual handle, not shown.

A plurality of supporting wheels 5 are suitably mounted to the sweeper frame and drive, through any suitable well-known connection, spaced front and rear elongated main sweeper brushes 6 and 7 which rotate about transverse horizontal axes.

If desired, and as shown herein, the sweeper may be of the type disclosed in Bieneck U.S. Pat. No. 3,457,575 entitled "Sweeper for Carpoted and Smooth Floors" and assigned to a common assignee. In that patent, the drive for the main sweeper brushes provides a unitary brush rotation direction, regardless of the direction of translation of the sweeper over the floor. In accordance with the concept of the invention, there is shown in the present embodiment, a pair of light weight auxiliary brush assemblies 8, 9 which are mounted on the forward end portion of the sweeper frame. For this purpose, an elongated L-shaped bracket 10 is fixedly secured transversely along front end wall 2, as by rivets 11. The horizontal flange of bracket 11 extends forwardly and is formed to provide a pair of transversely spaced downwardly and inwardly inclined support surfaces 12. A 10° - 20° incline would be suitable, with about 15° being preferable.

Each of the brush assemblies 8, 9 is mounted to one of the support surfaces 12. Since the assemblies are virtually identical, only assembly 8 will be described in detail. Referring to FIG. 3, assembly 8 comprises an axle 13 which is fixedly mounted to the lower inclined surface 12 of bracket 10, and which extends angularly downwardly therefrom. Axle 13 acts as a bearing and receives the shaft 14 of a caster 15 thereover, and which is freely rotatable about the axle. Any suitable retaining means may be provided for retaining caster shaft 14 on axle 13. In FIG. 3, a screw 16 is utilized, with its head 17 substantially countersunk into the lower shaft end. If desired, a small retaining screw 18 in head 17 will assure that screw 16 will stay in place during rotation of the caster. Certain other alternative structures may be utilized. For example, detent means, not shown, may be provided between axle 13 and caster shaft 14, instead of the screw connection, to provide a quick release snap-on construction.

The lower end of caster 15 is substantially enlarged in radius to form a wheel 19 having a high friction rim formed by an elastomeric polyurethane tire 20 or the like. The entire caster arrangement is such that wheel 19 and tire 20 will assume an approximately 10° - 20° angular relation to the floor 21. Tire 20 is positioned relative to the sweeper frame so that it engages the floor being swept.

In accordance with the invention, caster 15 carries the final portion of brush assembly 8, namely an inverted-cup shaped backing member 22 having a generally flat top portion 23, a generally cylindrical side wall 24 and a radially outwardly flanged rim or lip 25. A plurality of circumferentially spaced brush tufts are mounted on side wall 24 to form a generally annular outwardly extending brush 26. Brush 26 is inclined downwardly from its base to the outer tuft ends at an angle of approximately 10° - 20° to side wall 24, with the tufts terminating in a plane slightly below lip 25. Brush 26 is therefore slightly frusto-conical.

Backing member 22 and brush 26 form an assembly which floats and is driven by caster 15 as the sweeper is reciprocatingly translated over the floor. For this purpose, at least a portion of the outer periphery of caster shaft 14 is non-circular in section, preferably with at least one flat or straight portion. In the embodiment shown, the outer periphery is triangular. A rectangular or D shape would also be suitable. Top portion
323 of backing member 22 is provided with a centrally disposed opening 27, the edge of which compliments and interengages with the non-circular shaft 14 so that the backing member slidably fits thereon. The clearance between the shaft and opening should be close enough to create a rotary locking action so that rotary motion of caster 15 will positively drive brush 26. However, there should be substantial play between the shaft and opening so that, even though wheel 19 is at 10° – 20° to floor 21, the brush can assume a normal position in a generally horizontal plane on a level floor but will freely tilt and float thereon during sweeping in a manner to conform to any uneven floor contour and ride over large pieces of litter or debris. See FIGS. 3, 5, 6 and 7.

The clearance between shaft 14 and opening 17 should be such that drive wheel 19 is free of backing member 22, no matter what the axial or angular position of the latter.

As the sweeper is moved forwardly over the floor, brush assembly 8 will be driven clockwise to sweep surface litter in a direction toward brush 6 for pickup thereby. At the same time, brush 9 will be driven counterclockwise to sweep surface litter tangentially in front of brush 6. Rearward sweeper movement will reverse the rotation of the auxiliary brushes.

The auxiliary brushes will operate on smooth floors or on nap surfaces of any depth. For this purpose, brush backing 22 can freely shift axially a substantial distance, such as about one-fourth inch, on shaft 14 so that the auxiliary brush will merely rest on top of the surface. Compare FIGS. 3 and 6, which show varying relative generally vertical positions.

On smooth floors, (FIGS. 3 and 5) wheel 19 will directly engage and be driven by movement over the hard surface. On carpeting, wheel 19 will tend to sink into the nap, while backing member 22 will ride on top. See FIG. 6.

In the present embodiment, and as shown in FIG. 2, main sweeper brush 6 is mounted so far forwardly that its ends must be cut away, as at 28, to accommodate the auxiliary brushes. In other embodiments, this may not always be necessary.

It is contemplated that brushes 26 will be of fine flexible material. In the event a brush should tilt substantially, as when riding over uneven shag carpeting, the brush bristles may tend to dig deeply into the carpet and possibly fold over. To prevent this, means are provided to limit the deformation of the brush. This means comprises flanged lip 25 which is disposed closely beneath the brush tuft bases, and which will engage and roll on the carpet, as shown in FIG. 7, and prevent overbending of the brush.

While the embodiment shown utilizes two main sweeper brushes 6 and 7, and two auxiliary brush assemblies 8 and 9, embodiments with only one main brush and/or one auxiliary brush engaging the floor can be constructed without departing from the spirit and concepts of the invention.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention.

I claim:

1. In a floor sweeper having a frame, means supporting said frame for reciprocable translation over the floor, and transversely extending sweeper brush means, the combination comprising:
   a. a caster mounted to said frame,
   b. said caster including a rotatable shaft and a floor engaging wheel fixedly disposed on the lower end of the shaft,
   c. an auxiliary brush member including a generally annular brush,
   d. and cooperative means for mounting said auxiliary brush member to said shaft so that said annular brush floatingly engages the floor and is rotatably driven in a generally horizontal plane by said shaft upon rotation of said caster wheel to sweep surface litter into the path of said sweeper brush means.

2. The combination of claim 1:
   a. wherein said auxiliary brush member includes a brush backing through which said caster shaft passes,
   b. and wherein said cooperative means comprises:
      1. interengaging means between said brush backing and said shaft for causing said brush backing to be rotationally driven by rotation of said shaft,
      2. said interengaging means being formed so that said brush backing can freely tilt relative to said shaft when said annular brush encounters an uneven surface during sweeper movement.

3. The combination of claim 2 wherein said interengaging means comprises:
   a. a non-circular surface formed on said shaft,
   b. and a complimentary opening in said brush backing and disposed at said surface to rotationally lock the said backing and shaft together.

4. The combination of claim 3 in which said shaft surface and said opening have at least one flat or straight portion.

5. The combination of claim 3 in which said shaft, in section, and said opening are triangular.

6. The combination of claim 3 wherein there is substantial play between the said shaft and the edge of said opening to permit the free tilting of said brush backings on said shaft.

7. The combination of claim 2 wherein said brush backing is freely shiftable along said shaft.

8. The combination of claim 6 wherein said brush backing is freely shiftable along said shaft so that the relative generally vertical positions between said auxiliary brush member and said caster wheel can vary according to the type of floor surface.

9. The combination of claim 1 which includes: means to limit deformation of said annular brush as it rotatably and floatingly moves over the floor during sweeper movement.

10. The combination of claim 2 which includes: means to limit deformation of said annular brush upon tilting of the latter as it rotatably floats over the floor during sweeper movement.

11. The combination of claim 10 wherein said brush deformation limiting means comprises: a radially outwardly flanged lip on said brush backing which limitation engages the floor upon substantial tilting of said backing from a generally horizontal position.

12. The combination of claim 6 wherein:
   a. said caster shaft is tilted from the horizontal, and
   b. and said caster wheel is tilted at about 10° – 20° from the normal horizontal floor surface.

13. The sweeper of claim 1:
3,748,679

a. wherein said auxiliary brush member is disposed adjacent the said sweeper brush means,
b. and wherein the sweeper brush means is cut away to accommodate said auxiliary brush member.
14. In a floor sweeper having a frame, means supporting said frame for reciprocable translation over the floor, and at least one transversely extending sweeper brush, the combination comprising:
a. a bracket on said frame and with said bracket having a downwardly inclined support surface,
b. inclined bearing means secured to said bracket and extending downwardly from said support surface,
c. a shaft mounted for free rotation on said bearing means, said shaft being at least partially non-
circular in section with at least one flat portion,
d. a floor engaging wheel disposed at the lower end of said shaft, said wheel being inclined at about 10° - 20° to the horizontal,
e. means for retaining said wheel and shaft on said bearing,
f. an inverted cup-shaped brush backing having an opening which compliments the non-circular section of said shaft and mounted thereover in rotational locking engagement therewith so that rotation of said wheel on the floor will drive said brush backing through said shaft,
g. an annular auxiliary brush mounted on said backing for floating engagement with the floor,
h. there being substantial play between said shaft and the edge of said opening to permit free tilting of said brush backing on said shaft to accommodate uneven floor surfaces,
i. said brush backing being freely shiftable along said shaft,
j. and a radially outwardly flanged lip on said brush backing for engaging the floor upon substantial tilting of the backing from a generally horizontal position to thereby limit deformation of said auxiliary brush.

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