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W. A. SHERBONDY

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HAND CARPET SWEEPER CONSTRUCTION

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2 Sheets-Sheet 1

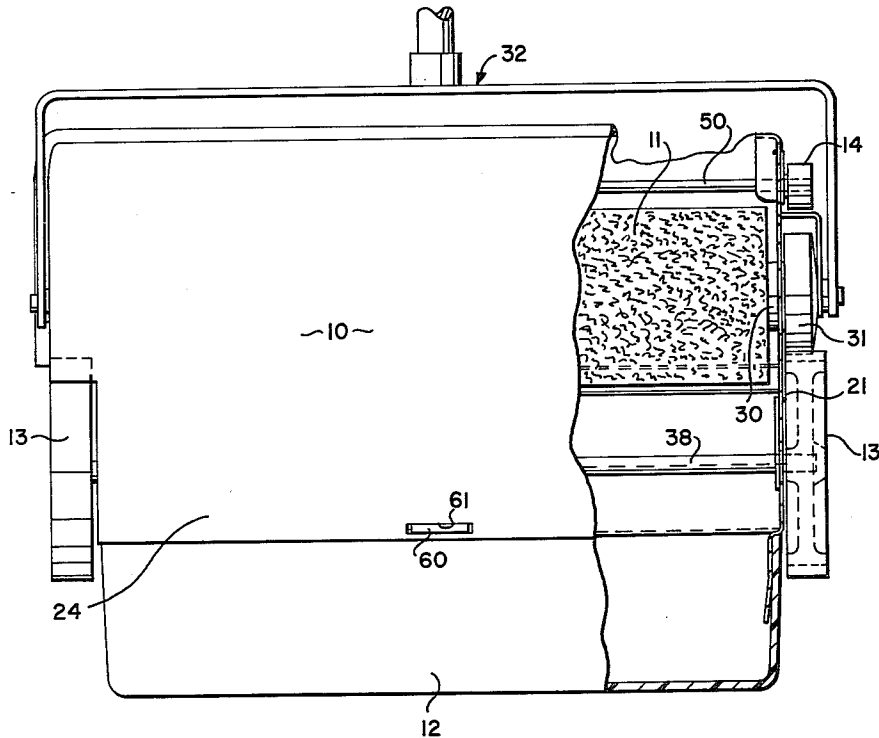


FIG.-1

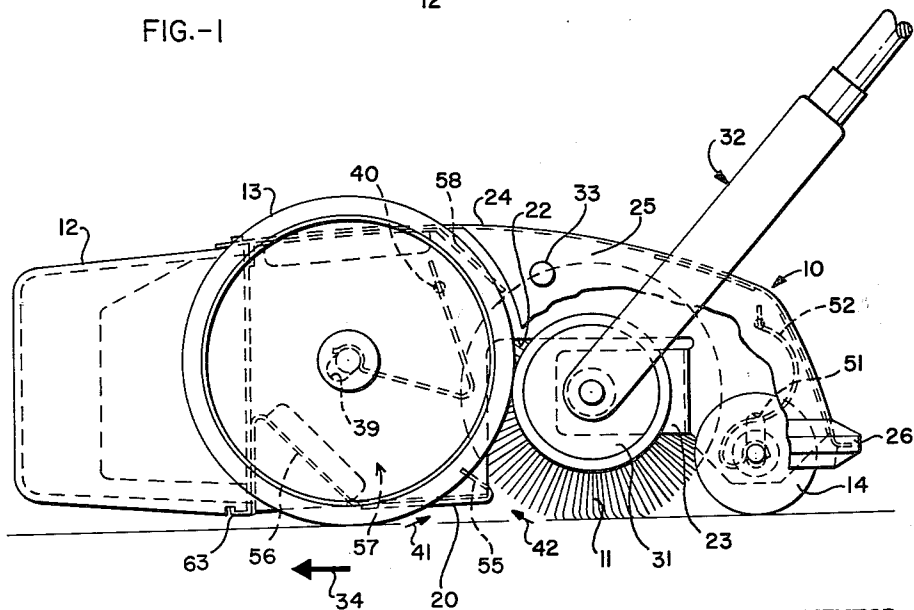


FIG.-2

INVENTOR.
WILLIAM A. SHERBONDY

BY *Watts & Fisher*

ATTORNEY

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W. A. SHERBONDY

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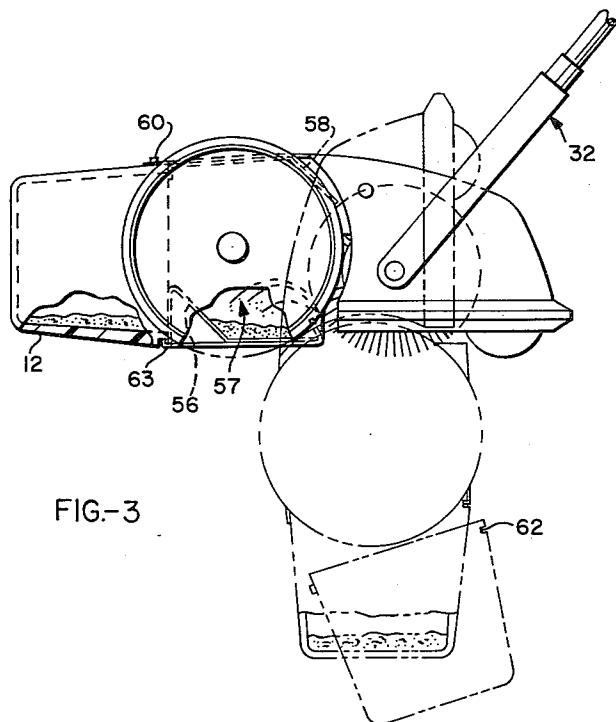


FIG-3

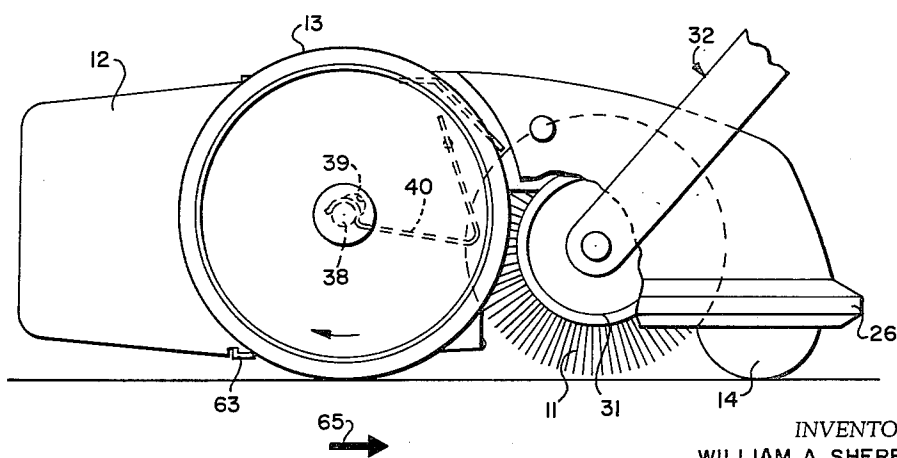


FIG-4

INVENTOR.
WILLIAM A. SHERBONDY

BY *Watts & Fisher*

ATTORNEY

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3,092,862

HAND CARPET SWEEPER CONSTRUCTIONWilliam A. Sherbondy, 2517 Guilford Road,
Cleveland Heights, Ohio

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7 Claims. (Cl. 15—41)

The present invention relates generally to floor cleaning apparatus, and more specifically to improvements in the construction of manually operated carpet sweepers.

This application is a continuation-in-part of my co-pending application Serial No. 2,207, filed January 13, 1960, and now abandoned, entitled "Flip-Pan Sweeper."

The basic construction of hand operated carpet sweepers is very old and generally includes a housing in which is journaled a wheel-driven brush. The brush usually projects through a slot in the sweeper so that, when the sweeper is pushed along the floor, the brush will be rotated to sweep dirt into the housing. Although many different arrangements of this basic structure have been evolved in the past, nearly all of the prior art devices have well known objectionable features.

For example, those who have used conventional hand carpet sweepers recognize that the sweeping action is relatively inefficient. One reason for this is that in some constructions the brush is rotated so that it sweeps across the floor in a direction opposite to that in which the sweeper is being moved. Thus, the speed of the brush relative to the floor is the velocity of the sweeper less the angular velocity of the brush. In use, it is practically impossible to push sweepers of this construction rapidly enough to effect the degree of relative movement between the brush and floor which is necessary for an efficient sweeping action.

The typical sweeper construction of the prior art also includes relatively small dust compartments in the housing at either side of the brush. These small dust compartments must be emptied at frequent intervals, usually each time the sweeper is used. Even then, it is a common experience for the sweepings to sift from the sweeper when it is being operated and/or when it is carried or stored.

In order to prevent the sweepings from sifting out of the sweeper, some prior devices have provided larger dust compartments which are located either at the front of the sweeper or at the rear. Most of these constructions, however, do not effectively trap the dirt in the sweeper. Moreover, they are difficult to empty without spilling and without the dirt getting on the operator's hands.

In those conventional constructions in which the dirt compartment is at the front of the sweeper, the brush is usually rotated so that the dirt is initially swept into the back of the housing and then carried over the brush into the dirt compartment. In addition to the inherently inefficient sweeping action explained above, this rotative action causes the brush to become quickly clogged with dirt and lint so that it must be frequently cleaned.

An object of the present invention is to provide an improved hand carpet sweeper construction which is characterized by an efficient sweeping action.

Another object of the invention is to provide a hand carpet sweeper construction having a large dirt-carrying capacity and which can be stored and carried without the sweepings sifting from the sweeper.

A further object of the invention is to provide a hand carpet sweeper construction which can be easily cleaned without spilling the dirt and without the dirt getting on the operator's hands.

Still another object of the invention is to provide a hand carpet sweeper construction having all of the ad-

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vantages described above and which is relatively inexpensive to manufacture.

In accordance with the present invention, the foregoing objects are attained and the disadvantages of the prior art overcome by the novel construction in which the brush is located at the rear of the sweeper housing and the dirt storage area at the front of the housing. The brush is rotated in the opposite direction of the sweeper wheels so that it sweeps across the floor in the direction of movement of the sweeper. Because of this construction, the velocity of the sweeper is added to the angular velocity of the brush so that it is rapidly moved relative to the floor. As a result, the sweeper construction of the invention is characterized by a very efficient sweeping action which is accomplished without pushing the sweeper at a high speed.

Another advantage afforded by the invention is that, when the sweeper is pushed in forward direction, the dirt is swept directly into the dirt storage area instead of being carried around the brush. This forward sweeping action prevents the brush from being quickly clogged with lint and other sweepings. According to the preferred construction, reverse rotation of the brush is prevented by automatically disengaging the drive between the sweeper wheels and the brush whenever the sweeper is pulled in a rearward direction. Consequently, the brush is unidirectionally rotatable even though the sweeper may be alternately pulled and pushed in opposite directions when sweeping a floor.

The invention further contemplates a construction in which the dirt storage area in the front portion of the sweeper comprises a dirt-receiving chamber immediately adjacent the front side of the brush and a dirt storage compartment which is forwardly disposed of the dirt-receiving chamber. When the sweeper is operated, the dirt which is swept into the housing is initially trapped in the dirt-receiving chamber. The sweeper handle is pivotally connected to the housing rearwardly of the center of gravity of the sweeper so that, when the sweeper is lifted from the floor, the housing will swing to a vertical position allowing the dirt to fall from the dirt-receiving chamber into the dirt storage compartment. In this manner the dirt-receiving chamber is automatically emptied each time the sweeper is lifted from the floor.

The dirt storage compartment comprises a removable cartridge which is clipped to the front end of the sweeper housing and in the embodiment of the invention, is a generally trough-like member. When the sweeper is lifted from the floor and the housing swings to a vertical position, the trough-like cartridge will be lowermost. In this position, the cartridge can be easily unclipped from the housing without spilling the dirt and without the dirt getting on the operator's hands.

Other objects and advantages of the invention will become apparent from the following detailed description and the accompanying drawings.

In the drawings:

FIGURE 1 is a top plan view showing the preferred embodiment of the invention with a portion of the housing being broken away;

FIGURE 2 is a side elevational view showing in dot-dash lines the structure within the housing;

FIGURE 3 is a view similar to FIG. 2 which illustrates in broken lines the position to which the housing swings when the sweeper is lifted from the floor; and,

FIGURE 4 is a side elevational view illustrating the sweeper when being pulled in a reverse direction.

Referring now to the preferred embodiment of the invention illustrated in FIGS. 1 and 2, the sweeper construction is shown to comprise a fabricated housing 10 in the rear portion of which is mounted a transversely extending brush 11. A removable dirt storage cartridge 12 is

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clipped to the front end of the housing 10 for storing the dirt which is swept into the housing by the brush. As will hereinafter be explained in more detail, wheels 13 are connected to the housing between the brush and the dirt storage compartment 12 for supporting the sweeper and for selectively driving the brush when the sweeper is moved in a forward direction. Smaller trailing wheels 14 are connected to the housing rearwardly of the brush.

As shown, the fabricated housing 10 has a bottom wall portion 20 between the brush 11 and the cartridge 12, and opposed side walls 21 which are cut away at corresponding portions 22 to form ears 23. A cover member 24 defines the top and rear wall of the housing and also forms a skirt 25 which extends over the openings 22 in spaced adjacency to the housing sides 21. A strip of rubber or plastic may be secured around the bottom edge of the cover 24 to form a yieldable bumper 26.

The brush shaft 30 is journaled in the ears 23 so that the bristles of the brush project below the bottom wall 20 of the housing. The right hand end of the brush shaft, as viewed in FIG. 1, carries a drive wheel 31 between the skirt 25 and the adjacent side 21 of the housing. This drive wheel 31, as well as the wheels 13, may be formed of molded rubber with a soft tread and a hard core or may simply be molded plastic wheels having separate molded rubber treads.

A handle assembly 32 is pivotally connected to the ends of the brush shaft 30. It is to be noted that the shaft 30 on which the drive wheels 13 are mounted and to which the handle assembly 32 is pivotally connected is disposed a substantial distance rearwardly of the center of gravity of the entire housing assembly. Thus, when the sweeper is lifted from the floor by the handle assembly, the housing will automatically swing to the vertical, broken line position illustrated in FIG. 3. A handle stop 33 is preferably provided on one or both sides of the skirt 25 for preventing the handle from pivoting counterclockwise, as viewed in FIG. 2, beyond a vertical position. The stop 33 thus maintains the handle assembly in the proper position for pushing the sweeper in the direction of arrow 34 in FIG. 2.

The wheels 13 are mounted on a shaft 38 which transversely extends between the side wall of the housing 10. The ends of the wheel shaft 38 are received in cam slots 39 formed in the housing side walls 21. As illustrated in FIG. 2, these cam slots 39 slant upwardly and toward the brush 11. One or more springs 40 secured within the housing bear on the shaft 38 to urge it toward the bottom of the slots 39.

When force is transmitted through the handle assembly 32 to push the sweeper forwardly, the downward pressure causes the wheel shaft 38 to ride upwardly in the slots 39 against the action of the spring 40 so that the shaft and wheels 13 move rearwardly of the housing toward the brush 11. As a result of this rearward movement of the wheel assembly 13, 38, the brush drive wheel 31 is frictionally engaged by the adjacent wheel 13. With the wheels thus engaged, rotation of the wheels 13 in the direction 41 (FIG. 2) will cause the brush to rotate in the opposite direction 42. Thus it will be seen that when the sweeper is moved forwardly, the brush 11 is rotated in such a manner as to sweep across the floor in the same direction as the sweeper is being moved.

Conversely, the downward force on the rear of the housing 10 is removed when the sweeper is pulled rearwardly. As illustrated in FIG. 4, this allows the springs 40 to force the wheel shaft 38 downwardly in the cam slots 39 to move the wheel assemblies away from the brush and out of driving contact with the brush drive wheel 31. It will thus be seen that the brush drive wheel will be automatically disengaged so that the brush 11 cannot rotate when the sweeper is pulled.

The trailing wheels 14 are mounted on a transversely extending shaft 50 at the rear end of the housing 10. This shaft extends through vertical slots 51 formed in the side

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walls 21 of the housing and is normally urged toward the bottom of the slots by a spring 52 secured within the housing. When force is applied through the handle assembly 32 to push the sweeper, the shaft 50 will move upwardly in the slots 51 and allow the bristles of the brush 11 to contact the floor. When the sweeper is pulled rearwardly, the spring 52 will force the shaft 50 toward the bottom of the slots so that the brush is raised away from the floor (FIG. 4).

Referring again to FIG. 2, it will be seen that the bottom wall 20 of the housing 10 includes an upwardly projecting lip 55 which transversely extends across the housing at the front lower side of the brush 11. A partition 56 also extends across the housing and cooperates with the lip 55 to form a dirt-receiving chamber 57. As most clearly illustrated in FIG. 3, the dirt is initially swept into this dirt-receiving chamber 57 when the sweeper is moved in a forward direction. A baffle 58, which extends downwardly and rearwardly from the top of the housing toward the brush 11, is preferably provided for deflecting the dirt into the dirt-receiving chamber and preventing large balls of lint or the like from being carried around the brush and deposited behind the sweeper on the floor.

As generally noted above, the dirt storage cartridge 12 is preferably of trough-like configuration. According to the illustrated construction, one side edge of the trough-shaped cartridge is formed with a securing tab 60 which cooperates with a slot 61 formed in the top front edge of the cover 24 (FIG. 1). The ends of the opposite side of the cartridge are formed with grooves 62 which cooperate with clip formations 63 on the bottom of the housing for detachably clipping the cartridge to the front of the sweeper.

Referring to FIG. 3, it will be seen that, when the sweeper is lifted from the floor to allow the housing to swing to the broken line position illustrated in FIG. 3, the dirt in the compartment 57 will fall into the mouth of the cartridge over the partition 56. This action automatically occurs whenever the sweeper is lifted from the floor, as when storing it or carrying it for use in different locations. After the sweeper has again been positioned for use, the dirt-receiving compartment 57 will be empty and will require no attention on the part of the operator.

Still referring to FIG. 3, it will be seen that the cartridge 12 can easily be unclipped from the housing when it is in the vertical position. This is accomplished by simply depressing the tab 60 so it is disengaged from the slot 61 and by disengaging the clip formations 63 from the grooves 62. Since the trough-shaped cartridge will be lowermost when the sweeper is raised from the floor, the cartridge can be easily removed without spilling the dirt and carried to any convenient receptacle into which the dirt may be dumped. After dumping the cartridge, it can be quickly reclipped to the housing.

The operation of the sweeper construction embodying the present invention will be largely obvious from the foregoing description. When the sweeper is moved in a forward direction by pushing on the handle assembly 32, the housing 10 will be moved toward the floor and the brush drive wheel 31 will be automatically engaged by the adjacent wheel 13. Rotative movement of the wheels 13 will thus serve to drive the brush 11 so that it sweeps across the floor or carpet in the same direction as the sweeper is being moved. As previously discussed, this particular movement of the brush provides an improved sweeping action, since the relative speed of the brush to the floor is greatly increased.

The dirt which is swept into the housing by the movement of the brush is first deposited in the dirt-receiving chamber 57, the baffle 58 serving to prevent the dirt from being carried around the brush and deposited on the floor behind the sweeper. If, during this sweeping action, the movement of the sweeper is reversed, as designated by the arrow 65 in FIG. 4, the wheel 13 will disengage the brush

drive wheel 31 so that the brush remains stationary. This prevents any dirt from being swept into the rear of the housing.

When the sweeper is picked up to be stored or moved to a new location, the housing will swing to the broken line position of FIG. 3, so that the dirt will fall from the dirt-receiving chamber 57 into the cartridge 12. After repeated uses, the sweeper may be disposed in the dot-dash position of FIG. 3 so that the cartridge 12 can easily be removed and emptied.

It will thus be seen that the invention provides for an improved sweeper construction which is characterized by an efficient sweeping action and by a unique dirt collecting and storage construction. It is almost impossible to sift dirt out of the machine when carrying or storing it because of the unique manner in which the dirt is first trapped in the dirt-receiving chamber and is then automatically dumped into the dirt storage cartridge.

The dirt storing capacity of the sweeper is significantly larger than most conventional constructions and need not be emptied as often. Further, the sweeper is much easier to clean than prior art constructions, since the cartridge can be removed with one hand and dumped into any container without spilling the dirt and without the dirt getting on the operator's hands.

The sweeper can be conveniently stored by either setting the sweeper upright on the flat bottom surface of the trough-shaped dirt cartridge 12 with the handle assembly 32 upright, or by setting the sweeper housing horizontally with the handle assembly upright, or by hanging the sweeper by the end of the handle assembly with the housing extending vertically. Since the sweeper assumes a vertical position when it is lifted and carried, the housing provides a minimum obstruction to the legs of furniture and the like.

Obviously, many modifications and variations of the invention will be apparent to those skilled in the art in light of the foregoing detailed disclosure. Therefore, it is to be understood that, within the scope of the appended claims, the invention can be practiced otherwise than as specifically shown and described.

What is claimed is:

1. A carpet sweeper comprising a housing including a forward end, a top wall, a bottom wall having an opening therein, and spaced side walls, a trough-like dirt storage cartridge at said forward end of said housing communicating with said opening, said cartridge having one side removably clipped to the top wall of said housing and its opposite side removably clipped to the bottom wall of said housing, a rotatable sweeping brush journaled between the side walls of said housing and partially extending through said opening, said brush being disposed rearwardly of said cartridge, wheels for rollingly supporting said sweeper, means connecting said wheels to said housing, said connecting means including means for unidirectionally rotating said brush opposite to the direction of rotation of said wheels when said sweeper is moved forwardly, and a handle rotatably connected to said housing about an axis parallel to said brush and rearwardly of the center of gravity of said sweeper for permitting said housing to pivot when lifted by said handle so that dirt will fall from said housing into said cartridge

2. The carpet sweeper as claimed in claim 1 including a dirt-receiving chamber in said housing between said dirt storage cartridge and said brush, said chamber being formed by a partition sloping upwardly and forwardly from the bottom wall of said housing at the open end of said cartridge and by a generally upwardly extending lip at the front edge of said opening adjacent said brush.

3. A carpet sweeper comprising a housing having a top wall, a bottom wall having an opening therein, and spaced side walls; a trough-like dirt storage cartridge at one end of said housing, said cartridge having one side edge removably clipped to the top wall of said housing

and its opposite side edge removably clipped to the bottom wall of said housing, a dirt-receiving compartment in said housing adjacent the mouth of said trough-like cartridge, said compartment being defined by an upwardly extending partition connected to the bottom wall of said housing and terminating below said top wall, said partition extending transversely of said housing between its side walls forwardly of said opening, and a lip adjacent said opening and extending upwardly from said bottom wall; a brush journaled in said housing between its side walls, said brush being disposed adjacent said lip and partially extending through said opening below said bottom wall; wheels rotatably carried by said housing, at least one of said wheels being operatively engageable with said brush to oppositely rotate it when said sweeper is moved in the relative direction of said cartridge, whereby said brush is caused to sweep dirt into said dirt-receiving compartment; and a handle rotatably connected to said housing about an axis parallel to said brush for permitting said housing to be disposed in substantially a vertical plane so that dirt will fall from said dirt-receiving compartment into said cartridge.

4. A carpet sweeper comprising a housing having front and rear ends and a transversely extending bottom opening therein, rotatable sweeper brush means carried in said housing and partially extending through said opening, a dirt-receiving compartment in said housing immediately in front of said brush means, said dirt-receiving compartment being defined by an upwardly extending lip along one edge of said opening at the front lower side of said brush means and by a forwardly spaced, upwardly extending partition, a dirt storage compartment at the front end of said housing, said dirt-receiving chamber and said dirt storage compartment being in open communication above said partition, means removably connecting said chamber to the front end of said housing, said connecting means being operative to hold said chamber in position when said sweeper is in substantially a vertical plane with said chamber lowermost, and wheel means supporting said housing for rolling movement, said wheel means including means for rotating said brush means in the opposite direction to said wheel means when said sweeper is pushed in a forward direction.

5. The sweeper as claimed in claim 4 including handle means rotatably connected to said housing about an axis parallel to said brush means for permitting said housing to be disposed in a vertical plane so that dirt will fall from said dirt-receiving compartment over said partition into said dirt storage compartment.

6. The sweeper as claimed in claim 5 including angled slots formed in the sides of said housing, said slots extending upwardly and rearwardly toward said brush means, and wherein said wheel means comprises axle means disposed in said slots, wheels supported on said axles, and spring means normally urging said axle means downwardly in said slots to a position where said wheels are spaced from said brush means, said axle means being movable upwardly in said slots to operatively engage at least one wheel with said brush means.

7. A carpet sweeper comprising a housing member including a front end, a top wall, side walls, and a bottom wall having an opening therein, a rotatable sweeper brush carried in said housing member and partially extending through said opening, wheels supporting said sweeper, means connecting said wheels to said housing member, said wheel-connecting means including means for rotating said brush, a plastic, trough-like dirt cartridge member for receiving dirt swept into said housing member, and means detachably connecting opposite side edges of said cartridge member to said top and bottom walls of said housing member at its front end and in communication with said opening, said detachable connecting means including clips projecting from an edge of one of said members, means defining grooves on an edge of the other of said

members, said clips being releasably engaged in said grooves, a securing tab extending from an edge of one of said members opposite to said releasably engaged clips, and a slot formed in the other of said members for receiving said tab, said plastic cartridge being deformable so that said tab can be released from said slot.

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