

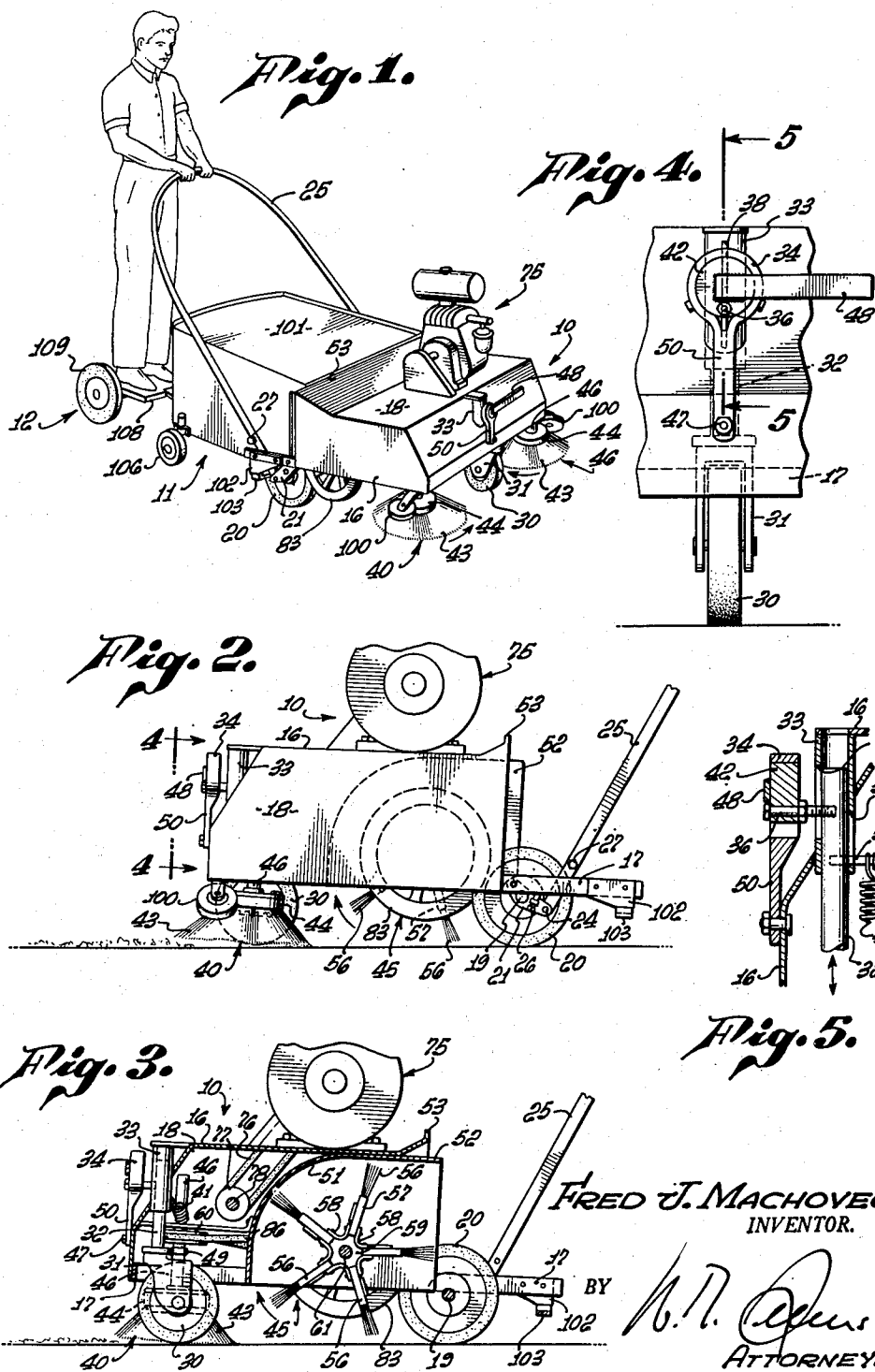
Nov. 3, 1953

F. J. MACHOVEC
POWER PROPELLED SWEEPER

2,657,408

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2 Sheets-Sheet 1



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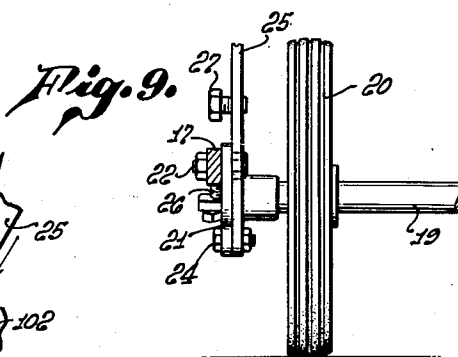
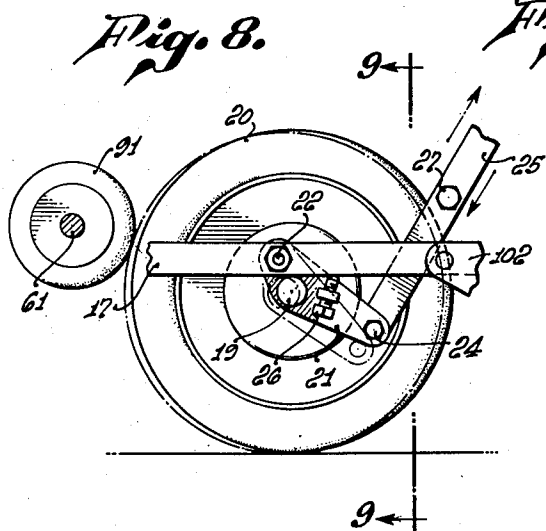
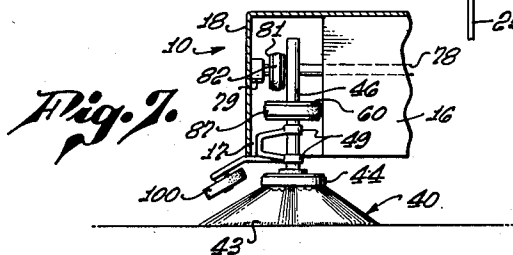
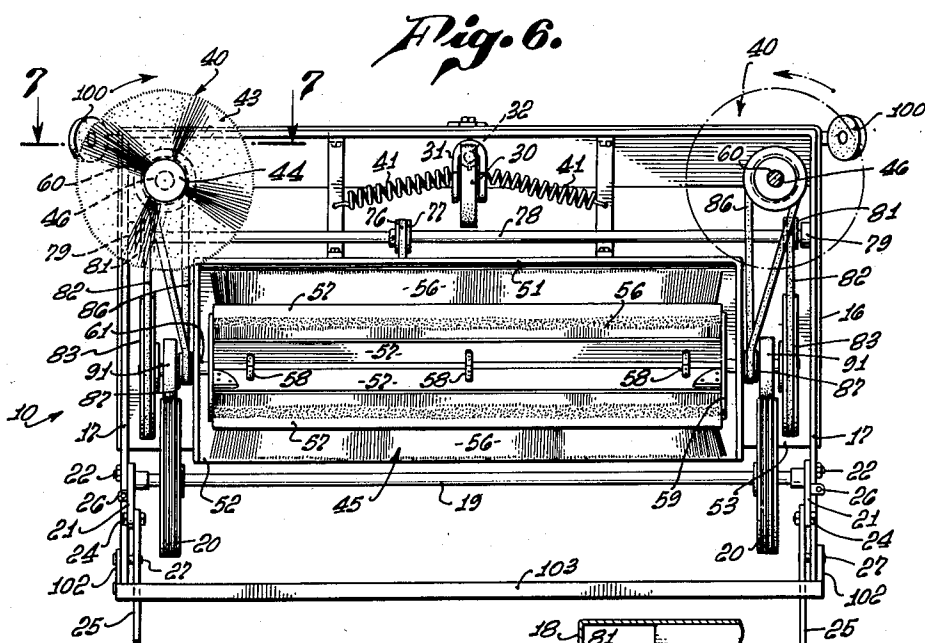
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2 Sheets-Sheet 2



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POWER PROPELLED SWEEPER

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4 Claims. (Cl. 15—83)

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The present invention relates to sweepers in general and particularly to a power sweeper incorporating its own driving and propelling power unit. More specifically the invention comprises a power sweeper suitable for the sweeping of hard surfaces, such as sidewalks, streets and parking lots, and adjustable as to transform it into a lawn sweeper.

The task of sweeping large surface areas is time-consuming and is best accomplished by a power-driven sweeper capable simultaneously of sweeping the surface and gathering the debris. Large lawns and large hard surfaces, such as streets, parking lots and sidewalks, are frequently so extended that the power-driven unit preferably incorporates its own prime mover independent of outside power sources. It is also desirable that the sweeper should be suitable for the sweeping of hard flat surfaces and also of lawns which are relatively soft and delicate and have depth. The conversion from a unit primarily adapted for one type of operation to the other should be simple and easy.

It is also desirable that the sweeper should be so constructed and designed that the power unit functions not only to drive the sweeping elements but also to propel the apparatus, thereby removing that burden from the operator. It is important that control of the movement of the unit should be flexible and at all times in the operator. He may wish to proceed in a straight line for a considerable distance, at other times he may wish to approach the face of a wall and to stop abruptly, and thereafter to turn the unit as to proceed parallel to the wall, during the turning operation the driving power being disconnected from the driving wheels.

With an appreciation of the problems which are characteristic of the field to which the invention relates it is a primary purpose of the present invention to provide a new and improved sweeper which is power-driven and capable both of sweeping hard flat surfaces and of cleaning lawns.

It is another object of the invention to provide a power-driven sweeper which is self-propelled and in which the control of the sweeper movement is at all times in the operator.

A still further object of the invention is to provide a simplified power-driven sweeper in which the sweeping means and the propelling means are driven by the unit's self-contained power unit, and with which the operator can ride, if desired.

A still further object of the invention is to provide a power sweeper in which debris is swept inwardly and up into the path of a brush rotating about a horizontal axis by which it is carried into a receiving receptacle.

A still further object of the invention is to pro-

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vide a power sweeper incorporating simplified means by which the driving connection between the power source and the traction wheels is at all times within the control of the operator.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated:

Figure 1 is a view in perspective of a sweeper constructed in accordance with the present invention showing the operator riding upon the dolly;

Figure 2 is a side elevation of the sweeper constructed in accordance with the present invention with the receptacle unit removed;

Figure 3 is a longitudinal section through the sweeper;

Figure 4 is a partial front view of the unit looking in the direction of the arrows upon the line 4—4 of Figure 2 and illustrates the vertical height-adjusting means for the front end of the unit;

Figure 5 is a section through the height-adjusting means upon the line 5—5 of Figure 4;

Figure 6 is a bottom view of the sweeper constructed in accordance with the present invention;

Figure 7 is a view looking in the direction of the arrows upon the line 7—7 of Figure 6 and shows the position and mounting of one of the pairs of rotary brushes;

Figure 8 is an enlarged showing of the pivotal mounting of one of the traction wheels and the operating handle; and

Figure 9 is a view looking in the direction of the arrows upon the line 9—9 of Figure 8.

Referring again to the drawings, the complete assembly of the power sweeper constructed in accordance with the present invention is illustrated in Figure 1. It may be divided broadly into the sweeper unit proper, indicated generally by the reference character 10, the receptacle unit or container, generally indicated at 11, and a dolly unit detachably connected to the rear of receptacle unit 11 and indicated generally by the reference character 12. Dolly 12 comprises a desirable addition and provides means by which the operator can ride but it may be omitted without affecting the operation of the other two units.

Directing our attention first to the sweeper unit 10, it is seen that that most important part of the sweeper comprises a body or casing 16 the size and shape of which is not of the essence of the invention but which is formed of suitable frame members to impart rigidity, including frame member 17, and a casing 18 which may be of sheet metal, or other suitable material, and which is supported by the rigid frame, being

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open at its bottom and at its rear side. It is to be understood that the exact structural details of the body may be varied so long as the unit remains capable of functioning and operating as hereinafter set forth.

Sweeper unit 10 is supported by means of a pair of traction wheels 20 mounted rotatably upon a cross-shaft 19, the extremities of which are carried by cantilever arms 21 pivoted at their upper ends at 22 to the frame member 17 in each instance. Each arm 21 carries an adjustable stop 26 positioned as to abut the underside of frame member 17 to limit the upward pivotal movement of the lever, and so the connected wheel 20, relative to the body 16.

At its lower rearward end each arm 21 pivotally seats at 24 the lower end of a U-shaped handle 25 which extends upwardly, as shown in Figure 1, during operation. Each side of the handle carries a laterally extending abutment or stop 27 above its pivot 24 and positioned as to rest upon the upper side of the adjacent frame member 17 when the handle is lowered into a substantially horizontal position during periods of inactivity.

The front of the sweeper unit 10 is supported by a swiveled castor wheel 30 rotatable in its frame 31 which is eccentrically mounted for swivel movement at the lower end of a vertical post 32 which extends upwardly in a seat 33 fixed rigidly in the unit body 16. To make possible the adjustment of the post 32 vertically with respect to its seat 33, and so adjust the height of the body 16 above the castor wheel 30, pins 36 and 37 extend forwardly and rearwardly, respectively, from the post 32 through slots 38 and 39 formed in the seat 33. Coil springs 41 connect to the pin 37, their opposite ends connecting to the body 16, and at all times pull the post downwardly. The forwardly extending pin 36 seats rotatably in a circular eccentric cam 42. The latter seats rotatably in a circular seat formed by a ring 34 integral with a vertically extending arm 50 the lower end of which is pivoted to the unit body 16 at 47. A rigid handle or arm 48 extends laterally from the cam 42 and provides means by which its angular position in its seat 34 can be adjusted to raise or lower post 32 and so castor wheel 30.

The surface-contacting sweeping means of the sweeping unit 10 comprises a pair of rotary brushes rotatable about vertical axes at the forward corners of the body 16, and generally indicated by the reference character 40, and an elongated rotatable litter-lifting or brush unit, generally indicated by the reference character 45, rotatable about a horizontal axis. Turning first to the brushes 40, they are seen to comprise conically arranged bristles 43 carried by a disc-shaped body 44 at the lower end of a vertical shaft 46. The shaft 46 of each brush unit 40 positioned at a forward corner of body 16 is rotatable in and vertically displaceable within an approximate range of $1\frac{1}{2}$ inches, in spaced bushings 49, and between its ends carries a belt pulley 60.

The elongated horizontal brush unit 45 is positioned rearwardly of brushes 40 in body 16 within a downwardly and rearwardly opening chamber 51. The top wall of chamber 51 is adjacent the top wall of body 16 and extends rearwardly thereof at 52 to form a discharge duct, the casing 18 of body 16 adjacent the duct being flanged outwardly at 53 in spaced relationship therearound.

Brush unit 45 comprises a plurality of cir-

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cumferentially spaced radially extending brushes 56 each comprising bristles and an elongated axially extending back 57 removably secure, as by brackets 58, to the central body 59 of the brush unit carried by the unit shaft 61. Shaft 61 is itself rotatable in the end walls of chamber 51, as is illustrated in Figures 3 and 6, and is extended therebeyond within the body 16 to carry a plurality of driving pulleys and friction wheels, as will be described.

The source of power of the sweeper unit comprises, in the preferred embodiment illustrated, a small gasoline motor, indicated generally by the reference character 75, suitably mounted upon the top wall of casing 18 of body 16. The power unit may be conventional, it being requisite only that it provide adequate power to actuate the sweeping and the propelling elements. A power-transmitting belt 76 driven by motor 75 extends downwardly through the top wall of casing 18 to engage a pulley 77 carried by a transverse shaft 78 the ends of which are mounted in bearings 79 on the side walls of body 16. Adjacent its opposite ends and near the bearings 79 shaft 78 carries pulleys 81 each of which seats a belt 82. Belt 82 also engages large diameter pulleys 83 carried by and rotatable with the shaft 61 of brush unit 45. The ratio of the pulleys connecting the driving motor 75 to the brush shaft 61 is such that the latter rotates at a speed greatly less than the speed of rotation of motor 75.

The forward vertical brushes 40 are connected to the driven shaft 61 by belts 86 which extend rearwardly from pulleys 60, carried by vertical shafts 46, to seat upon pulleys 87 on shaft 61. Through the belt and pulley connections described brushes 40 and 45 are rotated about their respective axes at all times during the operation of driving motor 75.

To transmit the necessary propelling force from the driving motor 75 to the traction wheels 20 the driven shaft 61 carries adjacent its opposite ends and between the pulleys 83 and 87, in each instance, friction clutch wheels 91. Wheels 91 are positioned in the same planes as traction wheels 20 and are spaced therefrom at a distance such that with wheels 20 forced downwardly with respect to the body 16 by force transmitted through the handle 25, which force displaces the wheel-carrying levers 21 downwardly from the full line to the dotted line position illustrated in Figure 8, wheels 20 contact wheels 91. Normally the weight of the sweeper unit 10 retains the wheels 20 in their upper positions, an illustrated in Figures 2 and 3, in which they are spaced rearwardly from the driving friction wheels 91 and no propelling power is transmitted. With the wheels 20 forced downwardly relative to the frame by handle 25, however, frictional contact is established, slippage being present with a slight downward force to provide a slow forward speed, while a direct drive and relatively high speed is effected with an increased downward force upon the handle.

To protect the sweeping unit 10 from, and particularly from approaching too closely to a wall or curb parallel to the direction of travel, rotatable bumpers 100 are provided which extend to the side, as illustrated most clearly in Figure 6. The bristles 43 extend beyond the sides of the body 16 and the bumpers serve to protect them from being too greatly flexed.

Referring now specifically to the container receptacle unit 11, that very important part of the construction is seen to comprise a rigid box-

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like body 101, the shape of which may be varied as desired. The body and frame of the receptacle unit may be similar to the body and frame of sweeper unit 10 so far as mechanical strength and design are concerned. Body 101 is open at its forward face and is sized to enclose the rearwardly extending duct 52 of chamber 51. When so positioned downwardly extending brackets 102 at the forward bottom corners of body 101 engage receiving seats 103 at the rearward extremities of frame member 17 of body 16, the engagement being such that the forward end of receptacle unit 11 is supported and at the same time permitted limited relative movement with respect to the unit 10. The rear of receptacle unit 11 is supported by rear wheels 106, of which one is shown in Figure 1, suitably affixed to its side.

If desired the sweeper construction of the present invention is adapted to have connected to it a dolly, indicated at 12 in Figure 1, adapted to carry the operator. Dolly 12 comprises a flat frame or plate 108 pivotally connected at its forward end to the rear of receptacle unit 11 and supported rearwardly by a pair of wheels, one of which is indicated by the reference character 109. Dolly 12 is so positioned that the operator may stand thereon, as illustrated in Figure 1, and while so located can grasp the operating handle 25 in a position to exert the downward force necessary to move the propelling wheels 20 into engagement with frictional drive wheels 91, as described. With dolly unit 12 removed the operator must walk in the rear of the sweeping and receptacle units.

The operation of the sweeper constructed in accordance with the present invention is as follows: The entire sweeper assembled as illustrated in Figure 1 is positioned on the surface or lawn to be cleaned. The motor 75 is started, either by cranking or by use of the conventional starting cord, as the case may be. If the surface to be cleaned is a hard surface, such as a street, sidewalk, or surfaced parking lot, the height-adjusting handle 48 is pivoted counterclockwise through 180 degrees from its position illustrated in Figure 4 so that the forward end of the body 16 and rotary brushes 40 and 45 are lowered close to the surface to be cleaned.

The brush unit 45 rotates in a clockwise direction, as illustrated in Figures 2 and 3, while the vertical axis brush units 40 rotate in each instance so that debris contacting the forward side of the brush is carried inwardly and into the path of the brush unit 45. The receptacle unit 11 is connected to the sweeping unit 10, as illustrated in Figure 1, and the operator takes his position in the rear, standing on the dolly 12. The handle 25, normally in a horizontal position with its stop 27 resting upon the rear end of the frame member 17, is held by the operator in the operating position illustrated in Figure 1. When ready for the machine to travel across the surface to be cleaned the operator exerts a downward force upon the handle 25 causing the wheel-carrying cantilevers 21 to pivot downwardly from their positions illustrated in Figures 2 and 3 to that illustrated in Figure 8. This downward travel of levers 21 effects the forward movement of the wheels 20 and brings them into contact with the friction wheels 91 on the rotating shaft 61. Immediately power is transmitted from the friction wheels 91 to the traction wheels 20 and the entire unit moves forwardly. The speed of travel, within its range of speed, can be controlled by the downward force which the operator exerts

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through the handle 25. With the wheels 20 forced hard against the friction wheels 91 a direct driving connection without appreciable slippage is provided and the unit travels at maximum speed. With a lesser force slippage will be present and the unit will travel at a lesser rate of speed.

In the travel of the apparatus across the surface to be cleaned the vertical axis brushes 40 rotate at high speed and debris and litter are thrown inwardly and upwardly into the path of the forwardly and upwardly rotating horizontal axis brush unit 45. The debris is caught by the individual brushes 56 and by the current of air which is set up and is carried upwardly and over the brush body 59 and rearwardly in the chamber 51 to be exhausted through the conduit 52 into the receptacle unit 11.

The sweeper unit is prevented from approaching too closely to a wall or vertical surface by the roller bumpers 100. The presence of these bumpers prevents injury to the sweeper body and also damage to the bristles 43 of the brush units 40. The ability of the shaft 46 of the latter to move vertically in its bushings 49 enables it to compensate for unevenness in the surface.

Upon reaching the end of its travel in one direction the operator of the apparatus releases the downward force he has been exerting through the handle 25, whereupon the propelling force previously exerted upon the traction wheels 20 is removed and the unit slows to a stop. Either before or after the unit has ended its forward movement the operator can start to turn, the presence of the swiveled castor 30 aiding in the operation, as does the limited angular adjustment permitted between the units 10 and 11 by virtue of the connections 102, 103. With the unit turned for travel in the opposite direction the operator again exerts the downward force upon the handle 25, propelling force is again transmitted to the traction wheels 20, and the unit moves forwardly over the surface to be cleaned.

Where a lawn is to be cleaned rather than a hard surface the operation is as described with the exception that the height-adjusting handle 48 is positioned as illustrated in Figures 1 and 4 in which the body 16 is raised to its upper adjustment with respect to the supporting castor 30 so that the brush elements 40 and 45 contact more lightly the surface being swept.

While the particular apparatus herein shown and described in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A power operated sweeper of the character described comprising a body member, rotatable surface contacting brush means and a driving motor both carried by the body member, power transmission means connecting the driving motor to said brush means, a friction wheel on said body actuated by said motor, supporting wheels for said body member including a front wheel and a rear traction wheel, and a handle for the sweeper, said traction wheel having mounting means comprising an arm pivotally connected to the body member to the rear of said friction wheel but in front of the axis of rotation of said traction wheel, said arm being actuated by the weight of

the body to normally hold the traction wheel out of contact with the friction wheel, and means connecting said handle to said arm in rear of the traction wheel shaft to permit moving said mounting means in opposition to the effect of the weight of the body member to cause the traction wheel to be brought into engagement with said friction wheel.

2. A power operated sweeper of the character described, comprising a body member having a rearwardly extending rigid frame portion, a rotatable surface contacting brush unit, a driving motor carried by the body member, power transmission means connecting the driving member to said brush unit, a friction wheel mounted near the rear of the body member and actuated by said driving motor, supporting wheels for said body member including a wheel mounted at the front of the body member and a traction wheel mounted at the rear thereof adjacent and in substantial alignment with the friction wheel, and a handle for the sweeper; the improvement wherein means are provided for so mounting the rear traction wheel that the weight of the body and the parts carried thereby normally tend to move the traction wheel away from contact with said friction wheel, said traction wheel mounting means comprising an arm hinged to said rearwardly extending frame portion, said traction wheel having a shaft mounted for rotation in said arm at a point to the rear of the hinge point of said arm, and said handle being attached to said pivoted arm at a point to the rear of the traction wheel shaft, whereby the pivoted arm carrying the traction wheel may be swung by operation of the handle member in a direction in opposition to that caused by the weight of the body to cause the traction wheel to be brought into operative engagement with said friction wheel.

3. In a power sweeper, a sweeping unit comprising a body having a pair of rigid frame members extending rearwardly of said body, a rotatable brush unit carried by said body for contact with a surface to be cleaned, an engine carried by the top of said body, power transmitting means connecting said engine with said brush unit, supporting wheels movably supporting said body for movement upon a surface to be cleaned and including a front swiveled castor and spaced trac-

tion wheels at the rear of said body, a pair of lever arms rotatably carrying said traction wheels and hingedly connected to said rearwardly extending frame members, and friction wheels driven by said power transmission means from said engine positioned in front of and in substantial alignment with said traction wheels so as to be contacted by said traction wheels in certain of their positions relative to said body, the weight of said body on said traction wheels tending to pivot said lever arms to move said traction wheels from said friction wheels, and a shiftable guiding handle for the sweeping unit having side arms connected to said lever arms and adapted to receive force from the unit operator to pivot said lever arms to move said traction wheels into and from contact with said friction wheels upon itself being displaced, said traction wheels having shafts mounted for rotation in said hinged arms at points to the rear of the points of attachment of said arms to the rearwardly extending frame members, but in front of the points of attachment of said handle side arms.

4. A power operated sweeper as set forth in claim 1, wherein the brush means includes a brush rotating about a horizontal axis, and means comprising a pair of other brushes rotating about vertical axes for sweeping debris into the path of the brush rotating about the horizontal axis.

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