May 19, 1942. J. B. RICHARDS 2,283,229

MECHANIZED CLEANING DEVICE

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Fig. 1.

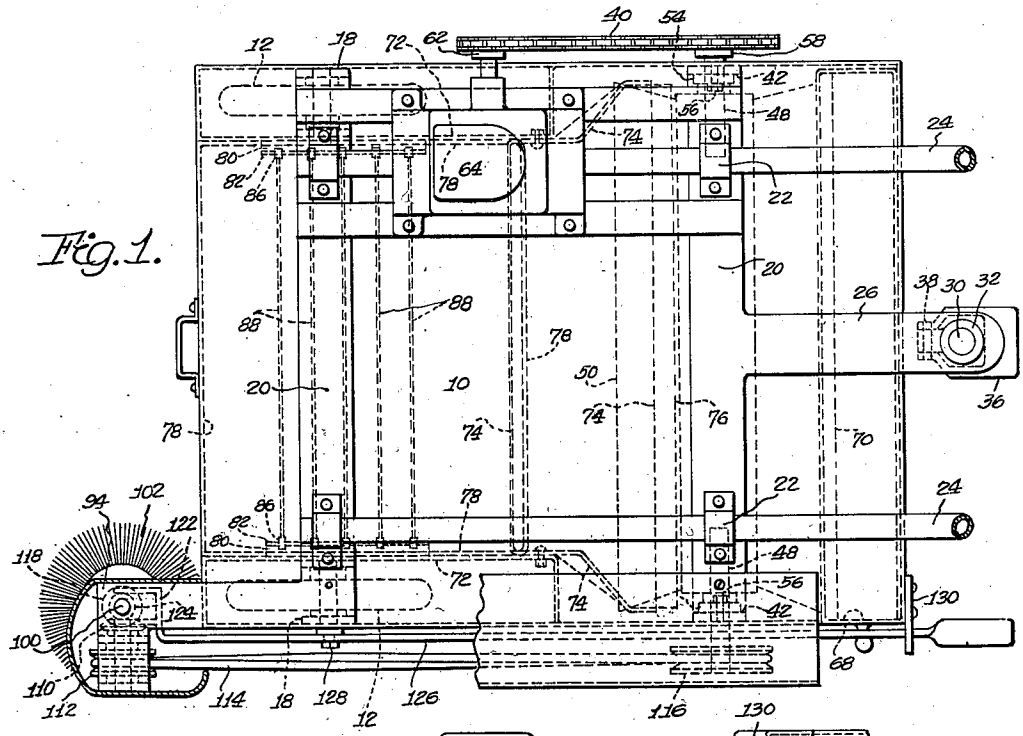


Fig. 7.

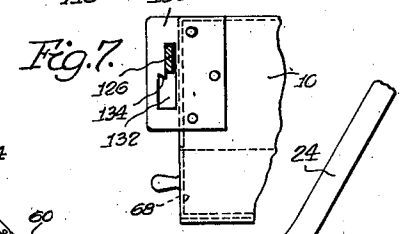
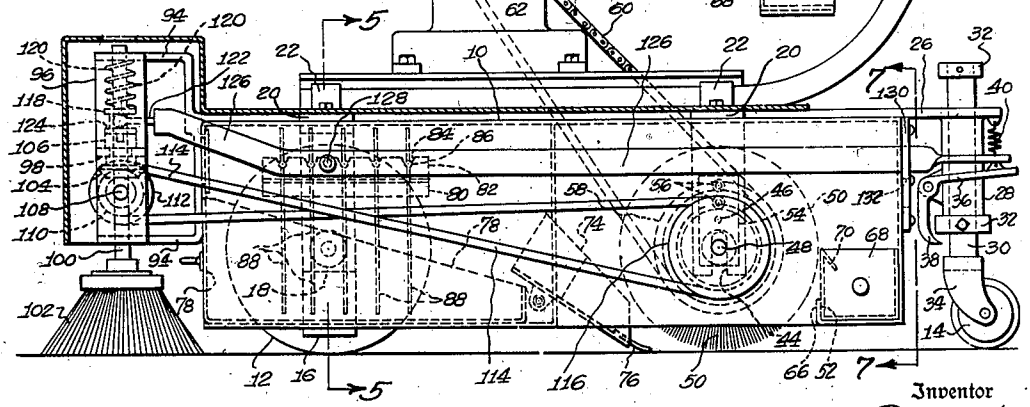


Fig. 2.



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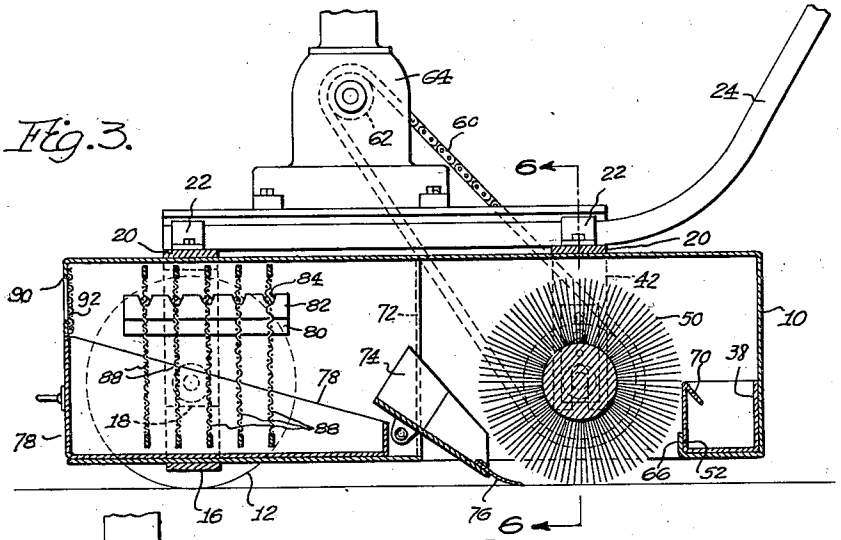
Attorney

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MECHANIZED CLEANING DEVICE

Filed Sept. 8, 1939 2 Sheets-Sheet 2

Fig. 3.



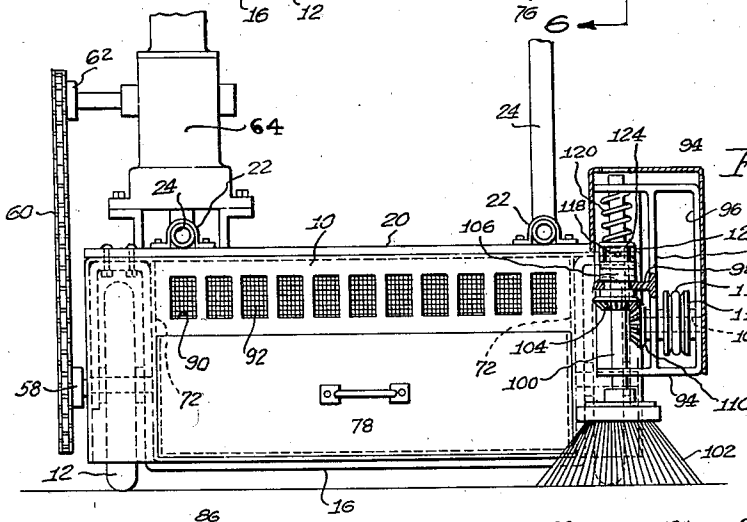


Fig. 4.

Fig. 6.

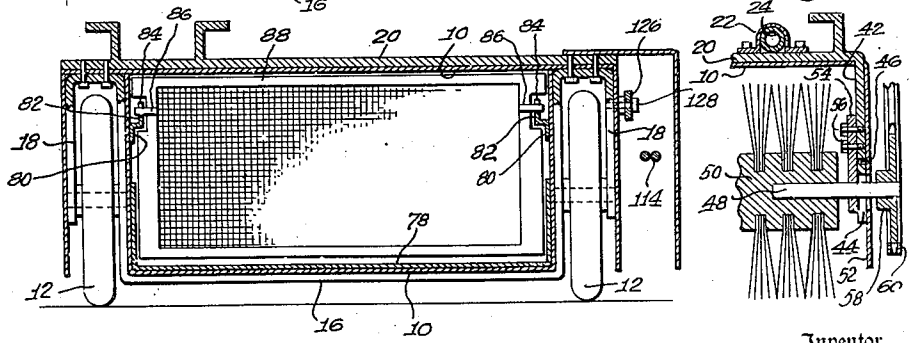


Fig. 5.

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UNITED STATES PATENT OFFICE

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MECHANIZED CLEANING DEVICE

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Application September 8, 1939, Serial No. 293,990

4 Claims. (Cl. 15—49)

This invention relates, in general, to cleaning devices and, in particular, to a new and improved device of the mechanized type.

One of the objects of this invention is to provide a new and improved mobile, mechanized cleaning device which is easily handled and operated and produces highly efficient results.

Another object is to provide a mobile, mechanized cleaning device having a new and improved arrangement of parts the combination of which renders greater utility and operating efficiency than heretofore.

Another object is to provide a new and improved mechanized sweeper of the mobile type wherein the dirt and foreign matter after being removed from the area cleaned is more efficiently and sanitarily handled than heretofore.

Another object is to provide a new and improved cleaning device having at least a pair of cleaning members which cooperate to perform a thorough cleaning job and which are selectively operated together or individually and movable together or individually into or out of contact with the surface cleaned, being cleaned or to be cleaned.

Another object is to provide a new and improved cleaning device wherein the removal of dirt and foreign matter from a surface is performed more thoroughly than heretofore and which removal creates air circulation through an improved filtering system in the device and capable of removing all such dirt and foreign matter before the air returns to the outside atmosphere.

Other objects and advantages of the invention will become readily apparent from a reference to the following specification taken in conjunction with the accompanying drawings of which there are two (2) sheets and wherein:

Figure 1 is a plan view, partly in section, of the sweeper and showing details of the invention incorporated therein;

Fig. 2 is a side elevational view, partly in section, of the showing in Fig. 1;

Fig. 3 is a longitudinal elevation partly in section, through the sweeper;

Fig. 4 is a front elevational view, partly in section, of the showings in Figs. 1 and 2;

Figs. 5 and 7 are sectional views taken along the lines 5—5 and 7—7, respectively, in Fig. 2; and

Fig. 6 is a sectional view taken along the lines 6—6 in Fig. 3.

In the figures, the sweeper is shown as consisting of a main casing 10 which houses many of the elements of said sweeper and which is supported slightly above the level of the area to be cleaned for movement thereover by means of a pair of front wheels 12 and a rear wheel 14. A channel-shaped support 16, integrally formed at each of its two sides with an inverted U-shaped portion 18, is mounted to and externally carried by the lower and two side walls of the casing 10, near the front thereof and transversely thereacross, and in each of said portions 18 one of the wheels 12 is supported for rotation about a fixed axis which is aligned with the axis of rotation of said other wheel 12. The support 18—16—18, therefore, not only serves to support the wheels 12, which movably support the casing 10, but also serves to rigidify said casing and lend support thereto from beneath and at the sides thereof.

Whereas the front wheels 12 are mounted for rotation about a common axis which enables the casing 10 to be movably supported above the level of the area to be cleaned, the rear wheel 14 is mounted to swivel about a vertical axis and also, when desired, to move vertically, the swivelling action serving to aid the steering of the sweeper as it is moved over the area, and the vertical movement enabling selective raising and lowering of the rear end of said casing relatively to said area for reasons which will presently appear. To obtain these ends, the upper wall of the casing 10 externally and fixedly carries a pair of longitudinally spaced, transversely extending plates 20 on each of which is mounted a pair of brackets 22 which cooperate to provide an anchorage for a rearwardly extending handle 24 by means of which the sweeper is maneuvered over the area to be cleaned. The rear plate 20 has integrally formed therewith substantially centrally thereof a rearwardly extending plate 26 to the underside of which, rearwardly of the rear wall of the casing 10, there is integrally mounted a hollow boss 28 which reciprocably and rotatably supports therewithin a vertical shaft 30. Shaft 30 carries a pair of adjustably spaced collars 32 and a wheel support 34 for supporting the wheel 14, said support being carried by the lower end of said shaft, and said collars being carried by said shaft on opposite sides of the boss 28 at a distance therebetween substantially greater than the distance between the top of the plate 26 and the bottom of the boss 28. The boss 28 has a foot lever 36 pivotally connected thereto, and said lever has a hook portion 38 integral therewith and extending on the op-

posite side of the pivotal connection between said lever and said boss, the free end of said portion 38 normally residing slightly below and under the lower collar 32 on the shaft 30 due to a spring 40 which inter-connects said lever and the plate 26 and urges said lever upwardly and said portion downwardly about said pivotal connection. As will be seen, then, in Fig. 2, wherein the casing 10 is in its normal position with respect to the area to be or being cleaned, the lower collar 32 is in contact with the lower end of the boss 28, thereby preventing relative vertical movement between said casing and the wheel 14, and the free end of the hook portion 38 is residing below said lower collar under the force of the spring 40 being exerted upon the lever 36. When it is desired to raise the rear end of the casing 10 relatively to the area to be or being cleaned and to maintain same at said raised position, the sweeper is manually raised by the handle 24 and the lever 36 is manually pressed downwardly, the result being that the shaft 30 automatically falls, carrying therewith the lower collar 32 and the wheel 14, until the upper collar 32 strikes the plate 26, whereupon said lever may be released and the hook portion 38 thereof will return to a position above and over said lower collar to hold said shaft in said lowered position and said casing 10 in said raised position. Without describing the brush at this time, this raising of the rear end of the casing 10 is for the purpose of spacing said brush from the area to be or being cleaned thereby for any reason whatsoever, and the adjustability of the collars 32 with respect to the shaft 30, especially the lower one, is for the purpose of meeting and easily overcoming the objection of brush wear.

Each end of the rear, transversely extending plate or bar 20 is integrally formed with a downwardly extending flange 42 which parallels the adjacent side wall of the casing 10 and is formed at its lower end with a slot 44 and a plurality of vertically spaced, threaded openings 46 directly thereabove. The slot 44 and openings 46 in the one flange 42 are at the same levels as the slot 44 and openings 46 in the other flange 42, each of said slots receiving the outer end of a stub shaft 48 onto the inner end of which shaft is rotatably mounted an end of a brush 50 which extends transversely across the casing 10 and therewithin, there being an opening 52 provided in the lower wall of said casing through which the adjacent bristles on said brush may extend into contact with the floor or area to be or being cleaned thereby. The upper levels of the slots 44 in the flanged ends 42 of the rear plate or bar 20 which receive the shafts 48 are such that the bristles of a new brush 50 may just contact the floor or area to be or being cleaned thereby, and in order to support said brush positively as well as to provide for vertical adjustment thereof to remedy brush wear, each of said shafts freely carries thereon, between the adjacent flange and brush end, a plate 54 in which is mounted a number of set screws 56 less than the number of openings 46 in said flange therefor. The openings 46 receive the screws 56, and, since there are more openings than screws, the level of the brush may be changed by changing the positions of the plates 54 relatively to the flanges 42 and changing said screws from their present openings into the newly aligned openings therefor.

For rotatably driving the brush 50 about the common axis of the shafts 48, the outer end of one of said shafts, which is external of the casing 10, has fixedly mounted thereon a sprocket gear 58 which is in driven connection with a chain 60 driven by a sprocket gear 62 rotatably mounted on the drive shaft of a power plant 64 carried on the upper wall of said casing by and between the plates 20. Due to the desirability of being able to move the sweeper freely about from place to place, the power plant 64 is preferably an engine rather than a motor so as to eliminate any necessity for wires, conduits, etc.

The portion of the lower wall of the casing 10 defining the rear edge of the opening 52 therein is upwardly flanged, as at 66, to provide between said flange and the rear wall of said casing a pocket for supporting therewithin an elongated container 68, said container extending for at least the length of said opening and being removable from said pocket through an opening provided therefor in the side wall of said casing adjacent an end of said container. The container 68 is open at its top, and the upper edge of the front wall of said container is so disposed with respect to the brush 50 as to contact the bristles thereof and thereby cause certain of the dirt or foreign matter being carried thereby to be displaced therefrom into said container through the open top of the latter. If desired, this upper front edge of the container 68 may be flanged, as at 70, to reduce the wearing of the brush 50 due to friction between it and said edge.

Each of the two side walls of the casing 10 internally carries a support 72 to which the underside of a tray 74 is pivotally anchored. The tray 74 extends transversely across the casing 10 directly ahead and for the entire length of the brush 50 and is shaped and adapted for conveying all the dirt and foreign matter swept thereupon by said brush forwardly and away from the locality of said brush. The tray 74 is pivoted to the supports 72 at points near the front of said tray so that the portion of said tray disposed behind said points may tilt downwardly and extend through the opening 52 in the lower wall of the casing 10, there being a flexible sealing member 76 attached to the lower rear edge of said tray for lightly engaging the floor or other area directly ahead of the brush 50 to prevent dirt or other foreign matter from passing forwardly therepast under the action of said brush. The nature of the supports 72 and their cooperation with the side walls of the casing 10, the construction of the tray 74 and the effect of the sealing member 76 all tend to define a well directed path along which the dirt swept by the brush 50 travels and to which said dirt is exclusively confined. For reasons which will presently appear, the front end of the tray 74 is open.

The space within and near the bottom of the casing 10 ahead of the tray 74 is fully occupied by a container 78 which is removable from said casing through an opening provided therefor in the lower portion of the front wall of said casing. The container 78 is open at its top to receive the dirt and foreign matter directed from the brush 50 by means of the sealing member 76, the tray 74 and the walls of the supports 72, and extends a slight distance rearwardly beyond and below the front end of said tray to catch heavy matter leaving the latter.

Above the container 78 and to the inner face

of each of the two side walls of the casing 10 there is secured a horizontal, longitudinally extending bar 80, said bars being at the same level within said casing and said level being slightly below the top of said casing. Each of the bars 80 is laterally flanged so as to provide a portion 82 which is offset along its length from the wall of the casing 10 thereadjacent, and the upper edge of each of said offset portions is formed with a series of longitudinally spaced notches 84, the notches in one of said offset portions being aligned with the notches in the other of said offset portions. The two notches 84 of each aligned pair thereof provide bearing surfaces for pins 86 mounted on opposite sides of a filter assembly 88 which covers substantially the entire internal cross sectional area of the casing 10 in the vicinity of the container 78 ahead of the tray 74. The filter assemblies 88 are, therefore, free to swing and are readily removable for purposes of cleaning or replacement and, though they extend into the container 78, they readily permit the removal or insertion of said container from or into the casing 10 without need for their own removal. The filters in the assemblies 88 may have the same mesh, if desired, or they may increase in fineness through the series thereof from the one rearmost to the one foremost, if desired, but, in any event, they serve to filter and clean in its entirety the air which has been put in motion by the brush 50. As a further precaution against having any air pass out of the casing 10 which is not clean, the portion of the front wall of said casing directly above the front of the container 78 is provided with a series of outlet openings 90, and these openings, which provide the only outlet for the moving air within said casing, are each covered with a filtering material 92.

It may be desirable to provide the sweeper with another brush in addition to the brush 50 for brushing dirt from corners and edges into the path of said brush 50 so that said dirt may be removed by said latter brush in the manner heretofore desired. To accomplish these ends, the casing 10 has rigidly mounted thereon at one of its front corners, preferably the corner at the side of said casing opposite the side from which the sprocket gear 58 projects, a support comprising a pair of vertically spaced, horizontal members 94 made integral by means of a pair of horizontally spaced, vertical members 96, there being another horizontal member 98 integrally connected to one of said vertical members 96 between said horizontal members 94 and extending in a direction opposite to the other of said vertical members 96. Carried by the three horizontal members 94 and 98, for rotary and vertical movements relatively thereto, is a vertical shaft 100 the lower end of which fixedly carries a brush 102 in normal engagement with the floor or other area. The location of the brush 102 is such that, during the movement of the sweeper along paths adjacent walls and other upstanding obstructions, said brush will be capable of displacing the dirt therefrom into the path of the main brush 50 and have said dirt dealt with by said latter brush.

For rotating the brush about the axis of and with the shaft 100 (in a clockwise direction as seen in Figs. 1 and 2), said shaft carries a driven member comprising, at its lower end, a bevel gear 104 and, at its upper end, a clutch section 106. Gear 104 and clutch section 106 are integral with each other and are carried on the shaft 100 freely as far as rotation is concerned but fixed against vertical movement by means of a connection with the horizontal member 98 which permits rotation of said gear and clutch section but prevents their vertical movement relatively thereto, said gear residing below said member and said clutch section residing above said member. Another shaft 108, horizontally carried by the vertical members 96 for rotation relatively thereto and extending beyond the inner of the two members 96, has fixedly carried on said extension thereof a pinion or bevel gear 110 in driving engagement with the gear 104, said shaft also carrying for rotation therewith a pulley 112 mounted between said members 96 and driven by a belt 114 interconnecting said pulley with another pulley 116 fixedly carried on an outer extension of the brush shaft 48 which is opposite the brush shaft 48 carrying the sprocket gear 58. Fixedly carried on the shaft 100 for rotary and vertical movements therewith is a clutch section 118 which is held in normal clutching engagement with the clutch section 106 by means of a spring 120 telescopically carried on said shaft between the upper horizontal member 94 and said clutch section 118. The clutch section 106, driven by the gears 104 and 110 and freely mounted on the shaft 100, normally drives the clutch section 118, which is fixedly mounted on said shaft, the brush 102 thereby being rotated. It is also to be seen that the brush 102 is free to seek its own level so as to accommodate itself to level changes in the area being cleaned during the manipulation of the sweeper the shaft 100 being vertically movable with the clutch section 118 but relatively to the member 104—106.

It may be desired to operate the sweeper with the brush 102 idle and in an elevated position. If so, the fixed clutch section 118 is provided with a bifurcated member 122 the bifurcations of which freely engage an annularly recessed portion 124 formed in said section to move said section (together with the brush 102 and the shaft 100) upwardly relatively to the member 104—106 in accordance with the actuation of said member 122. This movement disengages the clutch 106—118, thereby ending the rotation of the brush 102, and also raises said brush from the floor or other area with which it was previously in contact. The bifurcated member 122 is integral with or rigidly connected to the front end of a lever 126 which extends alongside the casing 10 to a rearward position similar to that of the lever 36 so as to be easily reached by the foot of the operator. The lever 126 is pivoted to the casing 10 intermediate its ends, such as at 128, so that downward movement of the rear end of said lever will raise the bifurcated member 122 in opposition to the spring 120 to raise the brush 102 and cease its rotation. In order to maintain the lever 126 in depressed position, a plate 130 is secured to the rear wall of the casing 10 and is provided with an opening 132 through which said lever extends, said opening having a notch 134 into which said lever may be inserted and held when the latter is depressed.

Although the invention has been described with some detail it is not intended to limit said invention to such detailed description. The right is reserved to make such changes in the details of construction and arrangement of parts as will come within the purview of the attached claims.

What I claim is:

1. In a vehicle movable over a surface to be cleaned and having a body structure, a pair of horizontal, vertically spaced supporting arms rig-

idly supported by the body structure at one side of the leading end thereof, a shaft vertically supported by said arms for movement axially and rotatably relatively thereto, brush means fixed to the lower end of said shaft for movement axially and rotatably therewith into and out of cleaning engagement with the surface, a third supporting arm rigidly arranged intermediate said other arms in substantial parallelism therewith, a pair of integral members mounted on said shaft for rotation therewith and relatively thereto and supported on opposite sides of said third arm against axial movement relatively to the latter, a third member mounted on said shaft for rotation therewith and movable axially with said shaft and brush means into and out of driven engagement with one of said integral members, and means in driving engagement with the other of said integral members.

2. In a vehicle movable over a surface to be cleaned and having a body structure, a pair of horizontal, vertically spaced supporting arms rigidly supported by the body structure at one side of the leading end thereof, a shaft vertically supported by said arms for movement axially and rotatably relatively thereto, brush means fixed to the lower end of said shaft for movement axially and rotatably therewith into and out of cleaning engagement with the surface, a third supporting arm rigidly arranged intermediate said other arms in substantial parallelism therewith, a pair of integral members mounted on said shaft for rotation therewith and relatively thereto and supported on opposite sides of said third arm against axial movement relatively to the latter, a third member mounted on said shaft for movement axially and rotatably therewith, means normally urging said third member axially into driven engagement with one of said integral members, means operable for effecting movement of said third member axially out of said driven engagement in opposition to said second means, and means in driving engagement with the other of said integral members.

3. In a vehicle movable over a surface to be cleaned and having a body structure, a pair of horizontal, vertically spaced supporting arms rigidly supported by the body structure at one side of the leading end thereof, a shaft vertically supported by said arms for movement axially and rotatably relatively thereto, brush means fixed to the lower end of said shaft for movement axially and rotatably therewith into and out of cleaning engagement with the surface, a third supporting arm rigidly arranged intermediate said other arms in substantial parallelism therewith, a pair of integral members mounted on said shaft for rotation therewith and relatively thereto and supported on opposite sides of said third arm against axial movement relatively to the latter, a third member mounted on said shaft for movement axially and rotatably therewith, a spring mounted on said shaft between said third member and one of said arms of said pair for normally urging said third member axially into driven engagement with one of said integral members, shifting means operable for effecting movement of said third member axially out of said driven engagement in opposition to said spring, and means in driving engagement with the other of said integral members.

4. In a vehicle movable over a surface to be cleaned and having a body structure, a pair of horizontal, vertically spaced supporting arms rigidly supported by the body structure at one side of the leading end thereof, a shaft vertically supported by said arms for movement axially and rotatably relatively thereto, brush means fixed to the lower end of said shaft for movement axially and rotatably therewith into and out of cleaning engagement with the surface, a third supporting arm rigidly arranged vertically between said arms of said pair at one side of said shaft, a fourth supporting arm rigidly carried by said third arm intermediate said arms of said pair in substantial parallelism with the latter, a pair of integral members mounted on said shaft for rotation therewith and relatively thereto and supported on opposite sides of said fourth arm against axial movement relatively to the latter, a third member mounted on said shaft for rotation therewith and movable axially with said shaft and brush means into and out of driven engagement with one of said integral members, and means supported by said third arm in driving engagement with the other of said integral members.

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