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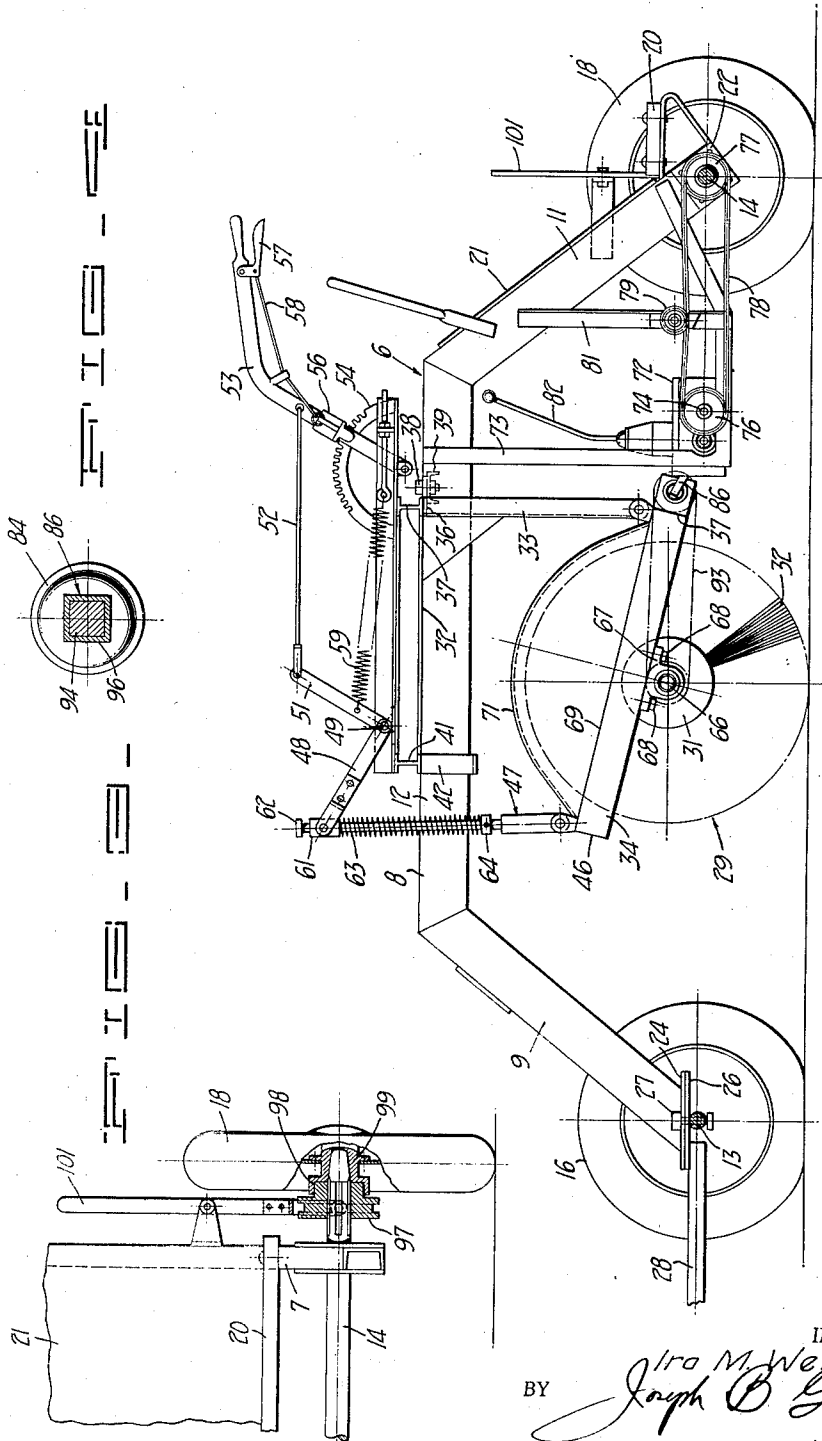
I. M. WELLS

2,238,716

BROOM

Filed Nov. 8, 1937

3 Sheets-Sheet 1



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April 15, 1941.

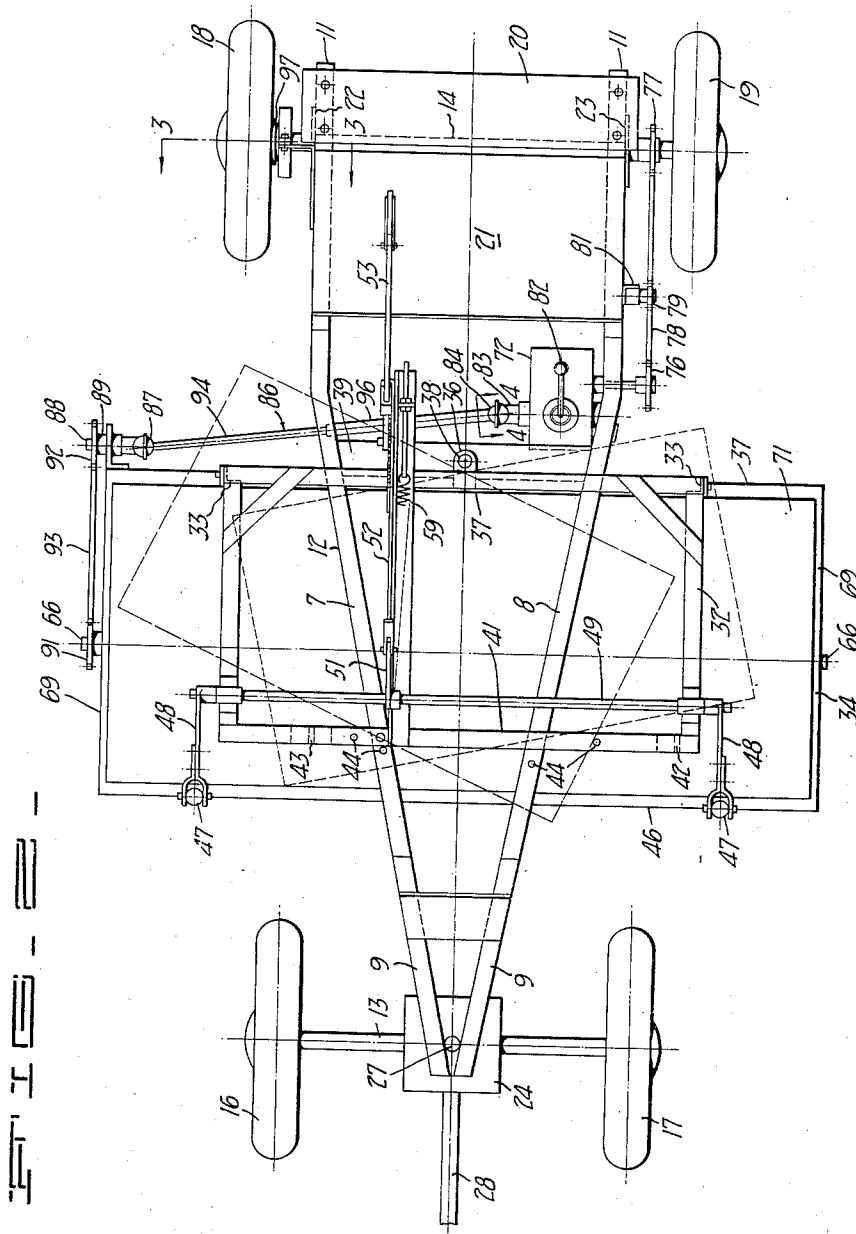
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3 Sheets-Sheet 2



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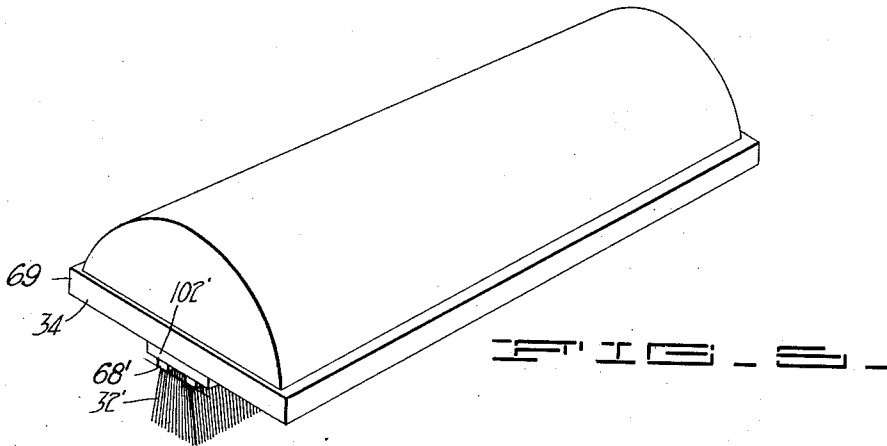
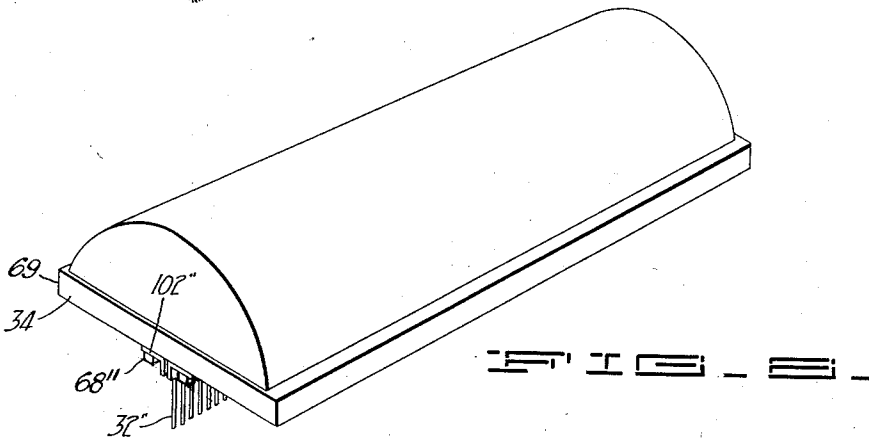
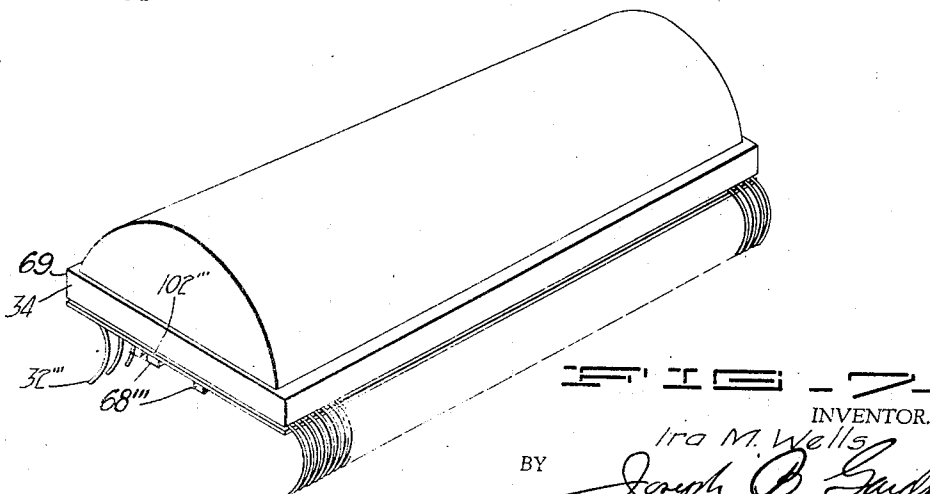
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3 Sheets-Sheet 3



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BROOM

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Application November 8, 1937, Serial No. 173,338

2 Claims. (Cl. 15—82)

The invention relates to power driven brooms of the type used for street sweeping and in sweeping and spreading light materials in road construction.

Brooms of the character described have had a relatively wide application in road construction for clearing and sweeping the road bed and in preparation of the subgrade and the completed road surfaces and also in assisting in the application of light materials, such as screenings and the like, to the road. For example, it is common to apply fine earth and screenings to oil treated road surfaces and brooms of the character described may be used for spreading such materials uniformly across the road bed. It is frequently desirable to traverse the road with such a broom several times and to continually move or work the material towards one side of the road. Means are, therefore, frequently provided on such brooms for changing the inclination of the broom so that on movement of the broom along the road in one direction the material may be uniformly spread to, say, the right side of the equipment and the road, and on return of the broom over the road in an opposite direction the inclination of the broom may be adjusted so as to displace the material to, say, the left side of the equipment and to the same side of the road as before. With such an arrangement it is possible to sweep the road in both directions of movement without taking the broom out of operation on the return movement to the original starting position.

A broom capable of such variations in its inclination relative to the direction of movement of the broom vehicle is generally termed a reversing type broom and the broom proper is generally supported on a secondary pivoted frame from the main body or vehicle frame. Where the broom is of a power driven rotary type the provision for both changing the inclination of the broom axis and for driving the broom in its various inclined positions, has given rise to considerable difficulty. Heretofore, such a combination has been attained only by mounting a motor or engine directly on the pivoted frame support for the broom so that the engine and drive connections for the broom would always be spaced by a constant distance permitting of a drive connection between the engine and the broom. The principal disadvantage in this type of construction is that the engine is subjected to a considerable amount of dust and dirt and is frequently completely enveloped within clouds of dust which are drawn into the engine cylinders and deposited at various movable working parts of the engine to produce and greatly

accelerate wear and deterioration of the engine.

In accordance with the present invention and as a principal object thereof, I provide for the driving of a rotary power driven broom of the reversing type from one or more ground engaging traction wheels provided on the vehicle by the use of an extensible universally connected drive member which enables the positioning of the broom at a plurality and variety of positions from the drive wheel and thereby eliminate the necessity of using an independent motor or engine on the pivoted broom frame for driving the broom.

In traction driven brooms heretofore proposed, only a single broom speed was available for a given traveling speed of the broom vehicle. In many types of work it is necessary or at least desirable to use a high broom speed and a slow vehicle speed and on the other hand, it is many times convenient to use a slower broom speed with a relatively high vehicle speed. Such a control of the broom speed relative to the vehicle speed of the equipment has only been heretofore attained by the use of an independent motor means for the broom as above described. However, in accordance with the present invention and as another object thereof, I provide a reversible traction driven broom of the character described having means for providing a multiple speed drive of the broom from the traction means so that a plurality of broom speeds may be obtained for each traveling speed of the broom vehicle.

A further object of the invention is to provide for a detachable broom connection enabling the ready removal of the broom proper from the vehicle so as to allow for rapid transportation of the equipment between points of use.

Still another object of the invention is to provide a broom of the character described having means for interchangeably supporting a plurality of different type brooms so as to enable the use of a single body vehicle with various types of brooms required to be used on a single construction job.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawings accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawings and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawings:

Figure 1 is a side elevation of a broom con-

structed in accordance with the present invention.

Figure 2 is a plan view of the broom illustrated in Figure 1.

Figure 3 is a cross-sectional view of part of the traction drive and is taken substantially on the plane of line 3—3 of Figure 2.

Figure 4 is a cross-sectional view of the extensible drive member and is taken substantially on the plane of line 4—4 of Figure 2.

Figures 5, 6 and 7 are perspective views of various type brooms connected to the present broom support.

The broom of the present invention consists briefly in a wheel supported truck or vehicle body from which is suspended a support for a rotary or other type broom and wherein the support for the broom is so arranged as to enable movement of the axis of the broom to various inclined positions relative to the movement of the vehicle, and wherein the broom is driven from one or more of the supporting wheels of the vehicle. To accomplish this latter drive a special mechanism is used for connecting the broom to the source when the broom is at a variety of positions with respect to the source, and further means is used for providing a selective speed ratio between the drive wheel or wheels and the broom. Also, means is provided for raising and lowering the broom relative to the vehicle frame so as to regulate the pressure of the broom against the road and means is also provided for enabling a quick removal of the broom from its supporting structure and for interchanging various types of broom.

More specifically, the apparatus consists of a body or vehicle frame 6 comprising a pair of transversely spaced longitudinal beams 7 and 8, which as will be seen from Figure 1, are extended downwardly at their forward and rearward ends 9 and 11 from a horizontal intermediate portion 12 and are supported at their forward and rearward ends by wheel supports including front and rear axles 13 and 14, and a set of forward and rear wheels 16, 17, 18 and 19. The rear end portions 11 of the beams are braced by means of a transverse plate 21 and the axle 14 is preferably journaled in dust-proof bearings 22 and 23 provided by the end portions 11 of the beams. Preferably a horizontal platform 20 for the operator is supported by the rear ends of the beams to the rear of the plate 21, the latter acting as a shield to dust stirred up by the broom. The beams 7 and 8 taper forwardly over the intermediate portion 12 and forward portion 9 as shown in Figure 2, and are connected at their forward ends to a plate 24 which is rested on and pivoted to a plate 26 secured to the front axle 13, the pivotal connection being effected by means of a pin 27 extended through aligned openings in the plates 24 and 26 and the axles 13 at substantially the center of the axle. A tow bar 28 is secured to the under side of plate 26 for drawing the device and preferably is of sufficient length to enable the positioning of a towing device such as a truck or tractor or the like sufficiently forward of the broom to remove the towing device from the dust stirred up by the broom.

In the showing of the device in Figures 1 and 2, a rotary type broom 29 is illustrated which consists of a solid or rigid core 31 to which is mounted a plurality of sweeping elements 32 which may consist of fibre or metal bristles or the like and which are extended radially from the core 31 so as to define a cylindrical rotary brush. Means for supporting the brush from the

vehicle frame here consists of a secondary frame 32 which is rested on the intermediate horizontal portion 12 of the vehicle frame and is provided at its rearward ends with depending members 33 which are pivoted to the rear side of a broom frame 34. As will be seen from Figure 2, the secondary frame 32 is of substantially rectangular form and is somewhat wider than the vehicle frame and lies directly over the broom frame 34, which is here shown also of rectangular shape and of somewhat larger size than the secondary frame. The lateral extension of the secondary frame 32 from the sides 7 and 8 of the body frame allows the depending members 33 to straddle the body frame in spaced sidewise relation thereto, whereby a considerable movement of the secondary frame is permitted relative to the vehicle frame for changing the position of the brush. In accordance with the present arrangement the movement of the secondary frame and the brush frame relative to the vehicle frame is confined to a pivotal movement so as to permit of a change of angularity of the axis of the brush relative to the longitudinal direction of movement of the vehicle frame. A pivotal connection between the secondary frame and the body frame is effected by a lug 36 at the rearward side 37 of the secondary frame and which is pivoted, as by means of a bolt 38, to a cross-piece 39 connecting the longitudinal beams 7 and 8 at a rearward portion of the intermediate part 12 of the frame. Preferably the front side 41 of the secondary frame is provided adjacent its transverse ends with depending stop members 42 and 43 which, on rotation of the secondary frame about the pivot 38, engage the sides of the beams 7 and 8 to limit the rotational displacement of the secondary frame. Also a plurality of openings 44 are provided in the forward side 41 of the secondary frame and the longitudinal members 7 and 8 for receiving a bolt or the like for holding the secondary frame in a straightforward and intermediate inclined position of the broom.

The forward side 46 of the broom frame 34 is supported from the secondary frame 32 by means providing for the raising and lowering of the forward part of the broom frame so as to advance the broom into contact with the roadway or to retract the broom therefrom and for regulating the amount of pressure of the broom against the roadway. Such means here consists of a pair of members 47 which are pivoted at their lower ends to the forward side 46 of the broom frame and extend upwardly at the outer sides of the vehicle frame and are pivoted at their upper ends to levers 48 fixed to a transverse shaft 49 carried by the secondary frame. Means for rotating the shaft to raise and lower the members 47 here consists of an arm 51 fixed to the shaft and connected by means of a link 52 to an operating lever 53 pivoted at its lower end to the secondary frame. The lever may be set in adjusted position by means of an adjustable locking mechanism including a segment ratchet 54 carried by the secondary frame and a detent 56 and operating lever 57 and connection 58 therefor carried by the lever 53. A tension spring 59 is preferably connected between the arm 51 and the secondary frame for assisting the operator in lifting the broom frame. Preferably the compression of the broom against the road surface is effected through a resilient means so as to act as a shock release on the broom support upon the broom traversing some irregularity in the roadway. As here shown, such a resilient sup-

port is provided by mounting the levers 48 on slides 61 carried by the forward upright members 47 and limiting the movement of the slides between an upward position against a compression spring 63 confined between the base of the slide and a spring seat 64 of the members 47.

As will be seen from Figure 1, the mounting of the broom to the broom frame 34 is here effected by journaling shaft ends 66 of the broom core 31 in bearings 67 detachably secured as by bolts 68 to the under side of the transverse ends 69 of the broom frame. Preferably a hood 71 is carried by the broom frame over the top of the broom for shielding dust.

As hereinabove indicated, the broom is driven from one or a plurality of the traction wheels of the vehicle and in the present embodiment the rear wheels 18 and 19 and rear axle 14 are used for this purpose. Also, as indicated in the foregoing, the present device provides for a plurality of broom speeds at a given speed of the vehicle notwithstanding the use of a traction drive for the broom. This is effected by the positioning of a variable speed transmission mechanism 72 between the source of power at the rear axle and the broom for increasing or decreasing the speed transmitted from the axle to the broom. As will be understood, the provision for moving the broom into a plurality of inclined and vertical positions relative to the body frame has heretofore prevented the driving of a broom from a fixed point on the vehicle frame, as by a traction wheel. In the present construction, however, this difficulty is surmounted by using an extensible type driving connection which is universally secured at its ends so as to enable a variety of movements of the broom while maintaining the drive connection.

Preferably, the transmission mechanism 72 is fixedly secured to the vehicle frame as by means of depending members 73 directly forward of one of the rear wheels 19 and is provided with a drive shaft 74 which is driven from the rear axle 14 by means of sprockets 76 and 77 mounted on the shaft 74 and the rear axle and chain 78. A vertically adjustable sprocket 79 carried by a depending member 81 from the vehicle frame is preferably engaged with the upper side of the chain to maintain a substantially constant tension and to minimize back-lash and slack in the chain. A gear shift lever 82 extends upwardly from the transmission mechanism between the side beams 7 and 8 and at the forward side of the cross plate 21 for engagement by an operator to effect a change of gears. The transmission mechanism is provided with a driven shaft 33 which is connected by a universal joint 84 to one end of a torque drive member 86, which is connected at its opposite end by a universal joint 87 to a shaft 88 journaled in a bearing 89 supported by the rear side 37 of the broom frame. A chain drive is also preferably provided between the shaft and one of the end shafts 66 of the broom and here consists of sprockets 91 and 92 mounted on these shafts and a drive chain 93 connected therewith. The torque member 86 here consists of a pair of rectangular or polygonal telescopic sections 94 and 96 (see Figure 4), although the same may be otherwise keyed or splined together for rotation as a unit, and which are extensible and contractible longitudinally to permit movement of the broom frame relative to the transmission mechanism. In accordance with the present arrangement, the driving connection between the rear axle and the

broom is such as to cause the broom to rotate in a reverse direction from that of the traction wheels. This is preferably effected by using a reversing gear in the transmission mechanism and a direct drive as here shown between the wheels and broom. It will be understood that the transmission mechanism is of common design such as used in automotive vehicles and includes a plurality of drive and driven gears which are selectively enmeshed by means of the operating lever 82 to produce a variable gear ratio between the drive and driven shafts of the transmission mechanism.

While I prefer to utilize both of the rear wheels 18 and 19 for driving the broom, it is desirable in some instances to disconnect one of these wheels from the rear axle, as when the device is being used on turns or when being towed from place to place at a relatively high speed. Disassociation of the wheels is especially important where the vehicle is turned around on freshly treated road surfaces, as otherwise the sliding and skidding of the wheels greatly disturbs and tears up the soft road surface. While a differential mechanism may be used between the wheels, the same does not provide near the tractional driving force of a solid axle. As here shown in Figures 2 and 3, means is provided for selectively connecting and disconnecting the wheel 18 to the rear axle 14 and such means comprises in the present embodiment a slide block 97 mounted on and keyed to the axle 14 and which is slidable into and out of an opening 98 in the wheel support 99 of the wheel 18 for locking the wheel to and releasing the same from the rear axle 14. A shifting lever 101 is connected to the block 97 and is pivoted to the vehicle frame and extended thereabove for engagement by the operator for selectively locking or releasing the shaft 14 and wheel 18. It will be understood that a separate motor or the like could be mounted on the frame for providing a power input to the transmission mechanism, it being noted that in such case in common with the traction drive that the source of driving power for the broom is positioned at a fixed location on the vehicle frame, while the broom and drive therefor are movable with respect to the frame.

One of the important features of the present construction is in the arrangement for quickly and easily detaching the broom from the broom frame. This is desirable in some instances where the device is to be towed at relatively high speeds from place to place, and also and particularly for permitting the interchanging of various type brooms. For example, I have shown in Figures 5, 6 and 7, three different type brooms which are commonly used in this type of equipment which are especially arranged for ready attachment to the broom frame. In Figure 5 an ordinary type street broom is illustrated in attached position to the end sides of the broom frame. In Figure 6 a heavy stiff wire broom is shown similarly attached, while in Figure 7 a curved stiff wire broom is attached. The broom form illustrated in Figure 6 is frequently used for leveling out heavier screenings or material, while the form illustrated in Figure 7 may be used for raking out oversize pieces of gravel or the like. In each of these different type brooms, the broom elements 32', 32'', and 32''' are secured to rigid backing members 102', 102'', and 103''', which are secured by bolts 68', 68'', and 68''' to the under surface of the ends 69 of the broom frame 34 through identical bolt holes used

in connecting the bearings 67 of the rotary broom.

I claim:

1. In a sweeper having a wheel supported frame and a horizontally arranged cylindrical broom adjustably mounted thereon for movement about both vertical and horizontal axes, drive means connected to one of said wheels and to said broom and including as part thereof an extensible torque member providing a drive for said broom in the several adjusted positions thereof.

2. In a sweeper having a wheel supported

frame and a horizontally arranged cylindrical broom adjustably mounted thereon for movement about both vertical and horizontal axes, a manually controlled variable speed transmission mechanism carried by said vehicle frame in a fixed position thereon, drive means connecting said transmission mechanism with one of said wheels, and a drive mechanism including an extensible torque member connecting said transmission mechanism with one end of said broom in the several adjusted positions thereof.

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