Dec. 5, 1961 R. F. SCHMIDT ET AL 3,011,193

STREET SWEEPING MACHINE

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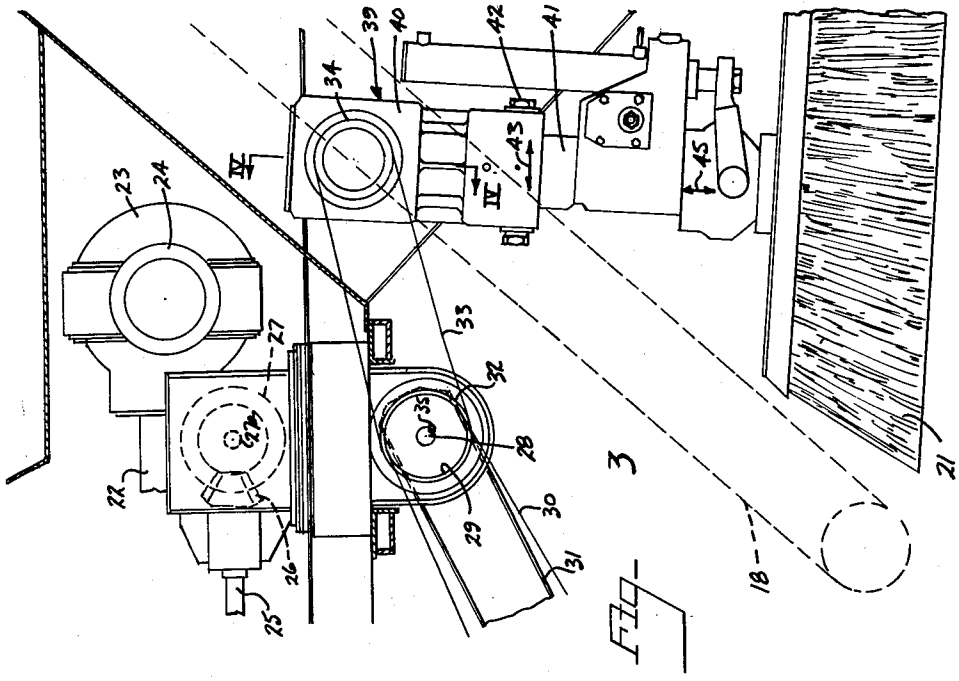


FIG. 3

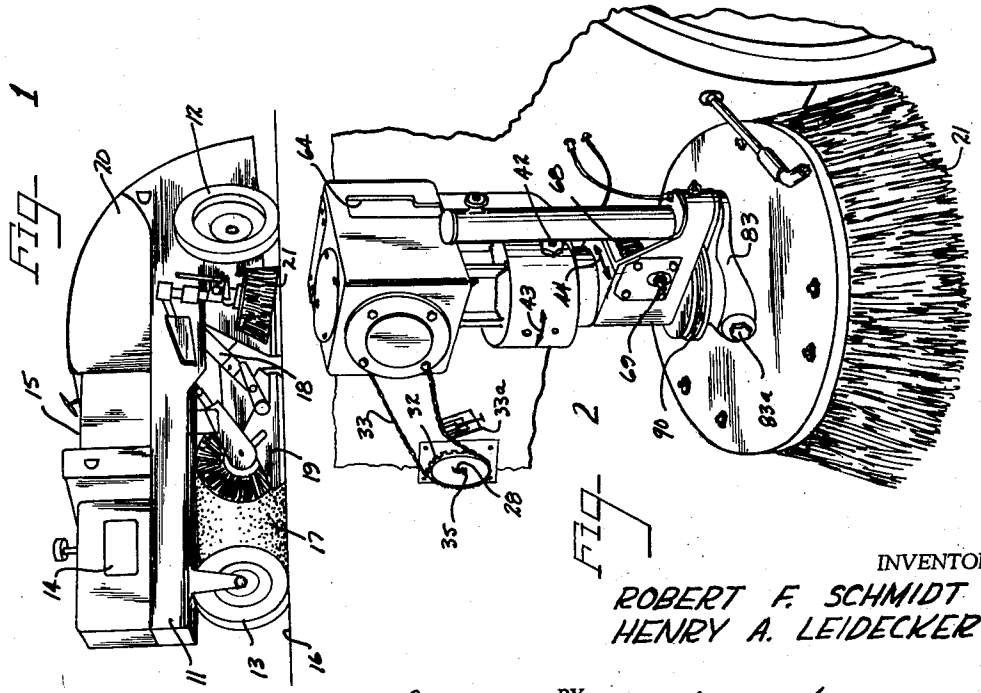


FIG. 1

FIG. 2

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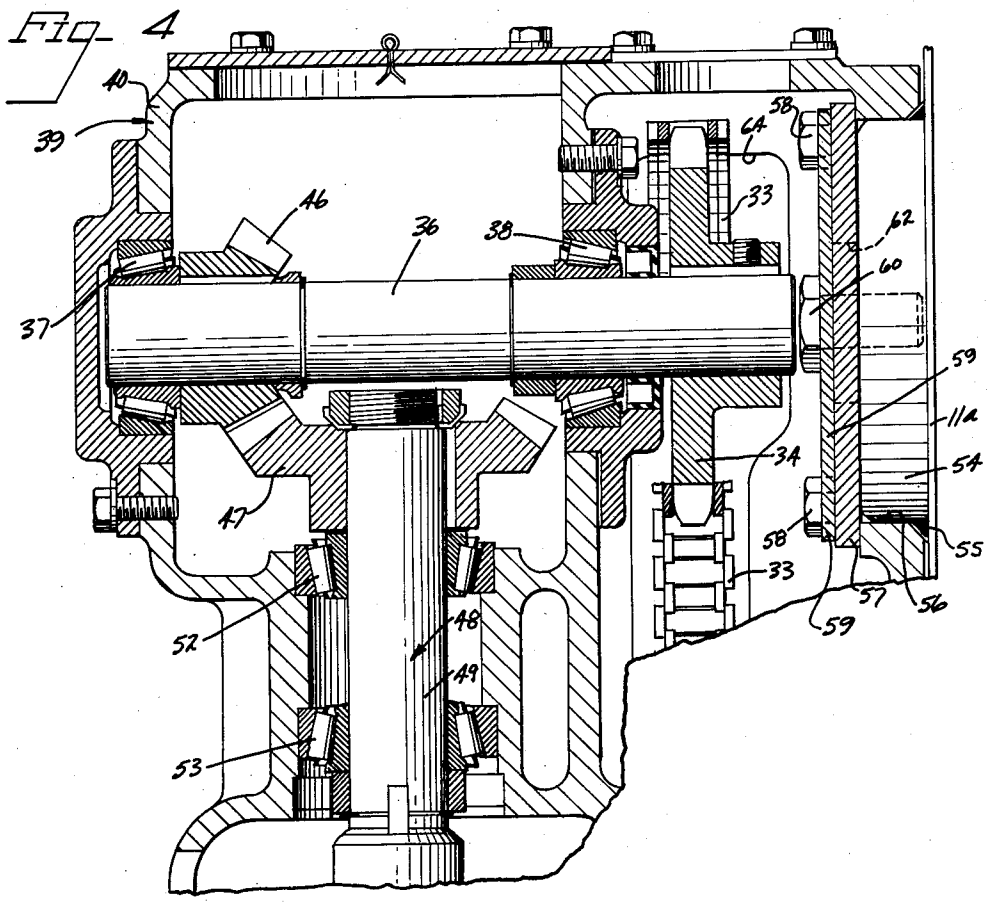
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Fig. 4



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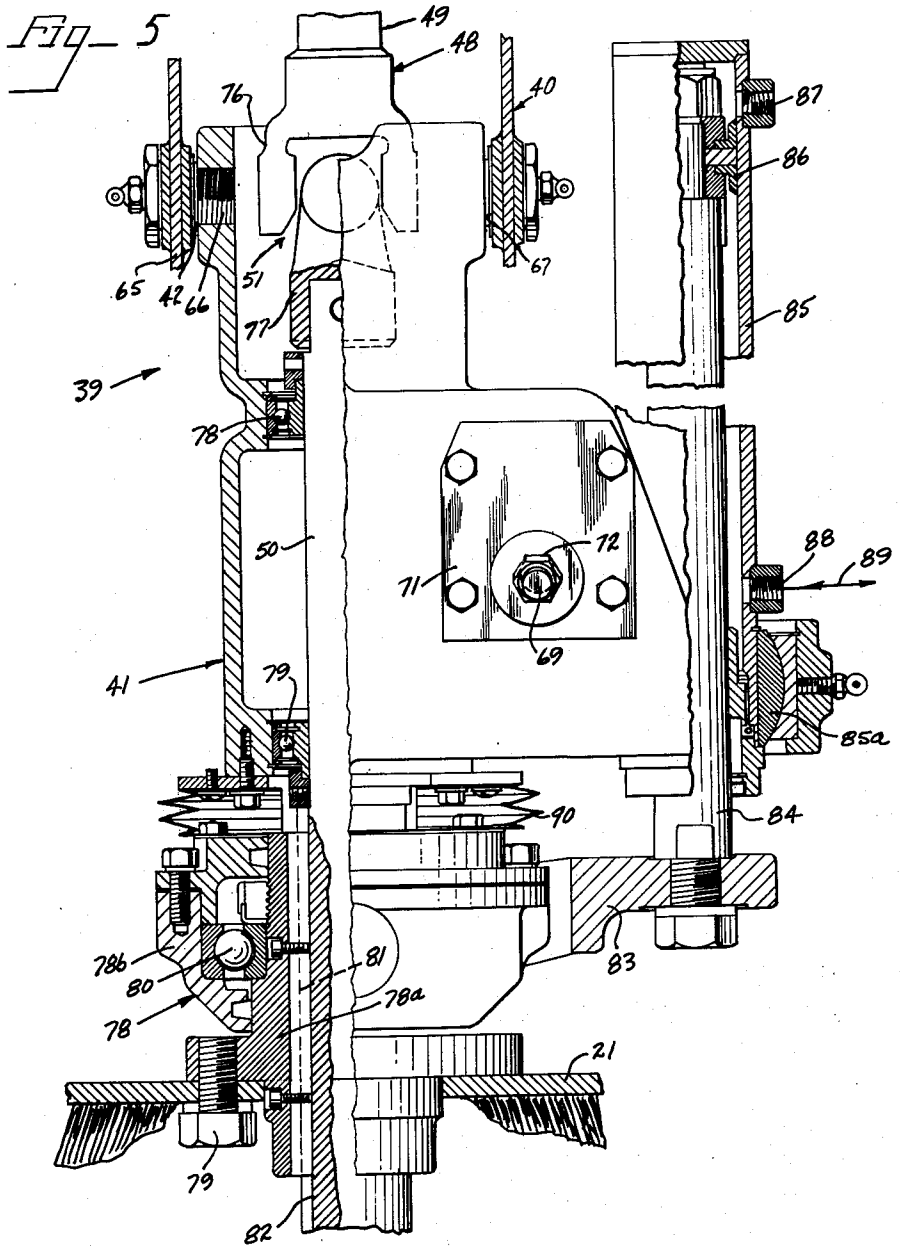
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Fig. 5



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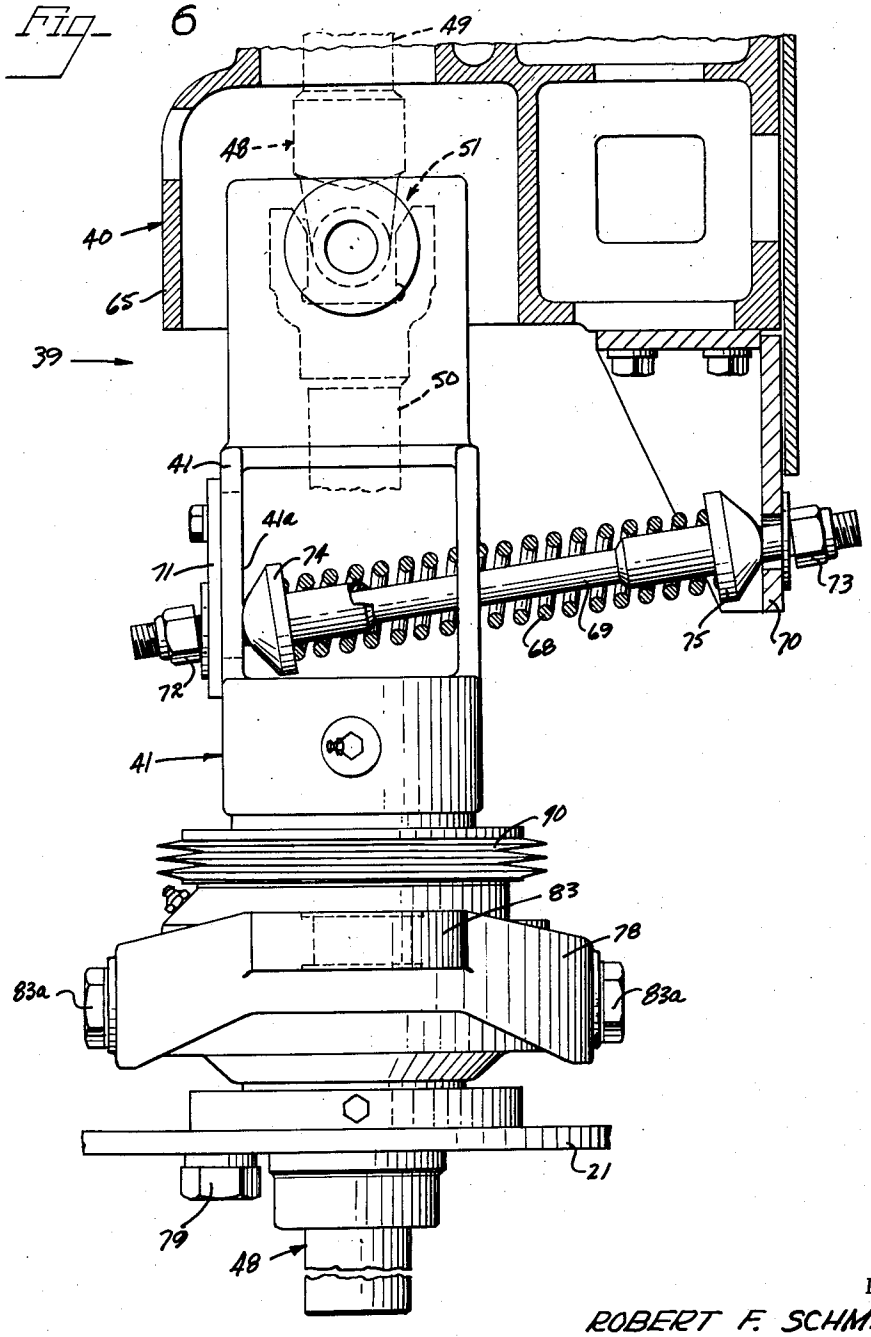
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Fig. 6



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Fig. 7

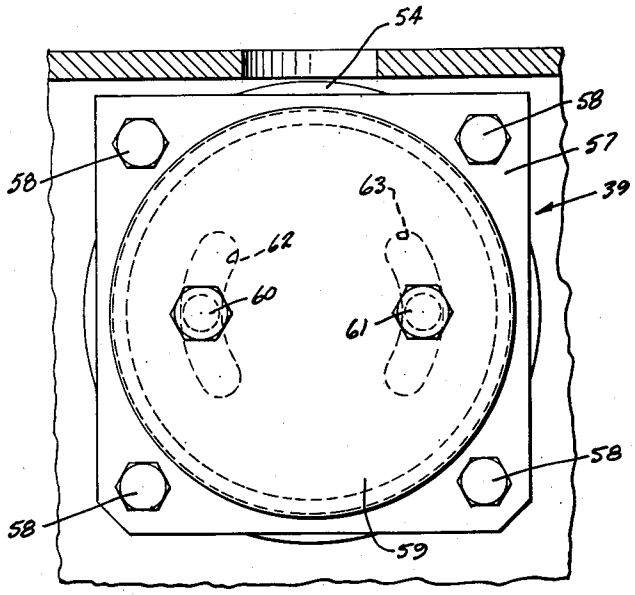
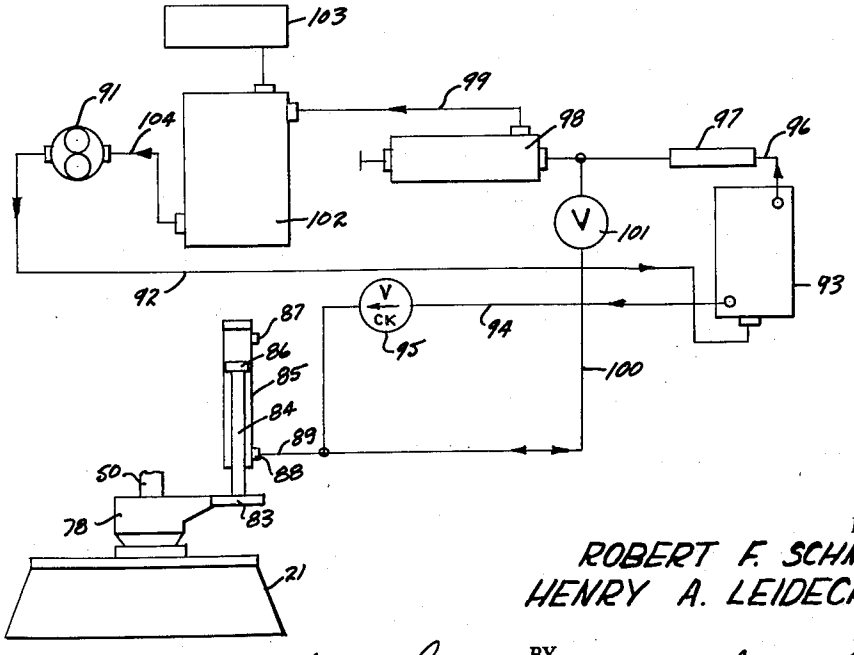


Fig. 8



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United States Patent Office

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Patented Dec. 5, 1961

3,011,193

STREET SWEEPING MACHINE

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Filed Sept. 25, 1959, Ser. No. 842,342
4 Claims. (Cl. 15—87)

The present invention relates to improvements in sweeping machines and particularly to improvements in mechanism for supporting, controlling and driving the side broom of a street sweeping machine.

The instant invention contemplates use in a sweeping machine of the type employing a cylindrically shaped rotary main broom supported for rotation about a horizontal axis and a side broom driven in rotation about a generally vertical axis and provided at one or both sides of the machine. Both the main broom and the side broom are driven in rotation as the machine moves forwardly and the swept dirt is received by a conveyer and collected in a hopper. Numerous factors affect side broom operation including wear of the broom bristles, change in level or contour of surface being swept and the sweeping pressure desired.

It is an object of the present invention to provide an improved mechanism for driving a rotary side broom in a sweeping machine enabling the use of a chain drive operated from the same drive shaft as used for driving the main broom.

Another object of the invention is to provide a street sweeping machine with a side broom having an improved support enabling adjustment in a lateral direction, in a fore and aft direction, and in a vertical direction.

Another object of the invention is to provide an improved support for a side broom in a street sweeping machine which accommodates automatically for broom wear.

A further object of the invention is to provide an improved support for a side broom of a street sweeping machine permitting the broom to pivot in and out against a spring counterbalance in the event an obstruction is encountered and to move up and down.

Other objects and advantages will become more apparent with the teaching of the principles of the invention in connection with the disclosure of the preferred embodiment in the specification, claims and drawings, in which:

FIGURE 1 is a perspective view of a street sweeping machine in accordance with the principles of the present invention;

FIGURE 2 is a perspective view of a side broom assembly of the sweeping machine;

FIGURE 3 is a side elevational view, shown somewhat in schematic form, of the side broom assembly and a drive therefor;

FIGURE 4 is an enlarged vertical sectional view taken substantially along line IV—IV of FIGURE 3;

FIGURE 5 is a fragmentary side elevational view of a lower part of the housing of the side broom assembly, having parts broken away for purposes of illustration;

FIGURE 6 is a front elevational view of the lower end of the side broom assembly having parts removed and parts broken away for clarity;

FIGURE 7 is a fragmentary side elevational view illustrating the mechanism for adjusting the fore and aft pivotal position of the side broom; and

FIGURE 8 is a diagrammatic view of the hydraulic fluid system for the mechanism.

As shown on the drawings:

FIGURE 1 illustrates a street sweeping machine including a main frame and housing shown generally at 11 ambulantly supported on front drive wheels 12 and

a rear steering wheel 13. The vehicle is propelled and the brooms are driven by an engine 14 controlled by an operator seated in the vehicle at 15. The machine sweeps a surface 16 of the street or the like and employs a rotary generally cylindrical main broom 17 which is rotatably supported at its ends and driven in rotation. The dirt and foreign materials swept from the street surface are received by a conveyer 18 and carried upwardly to a hopper 20 which is closed by a control door so as to be able to dump the dirt at the end of the run or when the hopper is filled. Side shoes 19 are provided at the ends of the main broom to retain the dirt in the path of the broom and to prevent streaking. A center dirt deflector is provided, not shown. A rubber runner, not shown, contacts the street preventing the material from being thrown across the path of the machine and out of the other side. A further dirt deflector, not shown, is located under the conveyer structure and this can be removed if necessary during the leaf season. This deflector controls gravel, stones and so forth preventing them from being thrown clear of the sweeping path. A side broom 21 is located ahead of the main broom at the side of the machine and is driven through roller chains and sprockets, as will be described. Further details of the conveyer 18 and the main broom 17 are disclosed in our copending applications U.S. Serial No. 846,165, filed October 13, 1959, and U.S. Serial No. 849,824, filed October 30, 1959.

As illustrated in FIGURES 1 and 3, the vehicle and the brooms are driven from the engine which connects to a transmission controlled by a suitable shift lever, not shown. A drive shaft 22 extends from the transmission to a differential 23 which drives side shafts carrying sprockets 24 provided with suitable chains connected to drive the forward wheels 12.

Also leading from the transmission is a brush driving shaft 25 which connects to a bevel pinion gear 26 that drives a bevel gear 27. The bevel gear 27 is mounted on a shaft 27*a* and a mechanism, not shown, such as chains and sprockets drive a cross shaft 28. Power is derived from this cross shaft to drive the main broom and the side broom. Although the machine is shown and described with a single side broom, side brooms may be mounted on each side of the machine.

The shaft 28 carries a sprocket 29 which drives a chain 30 to drive the main broom, with the main broom being supported at the lower end of pivotal arms 31. The shaft 28 also carires a sprocket 32, FIGURES 2 and 3, and the sprocket is connected to the shaft 28 by a removable shear pin 35 which permits the sprocket to be disconnected in the event the machine is to be used without the side broom. The sprocket 32 drives a chain 33 which is drivingly threaded over a sprocket 34. The sprocket 34 is mounted on a shaft 36, as shown in detail in FIGURE 4. A chain tightener 33*a* engages the chain 33.

The shaft 36 is supported in end bearings 37 and 38 mounted in a support means in the form of a housing 39 for the side broom 21. The housing 39 has an upper housing part 40 and a lower housing part 41, as illustrated in FIGURES 2 and 3.

The housing and its supported side broom are pivotally carried by a first mount on the side of the machine for fore and aft movement about an axis transverse of the machine, in the direction indicated by the arrows 43 in FIGURES 2 and 3. The housing is divided into an upper part 40 and a lower part 41 with the parts being pivotally connected at 42, which provides a second mount for the lower part 41 of the housing to permit pivotal movement of the broom about an axis longitudinally of the machine in the direction indicated by the arrows 44 in FIGURE 2. The broom is also mounted

on the housing 40 for vertical movement by a third mount which is located at the lower part of the housing, as will be described, and the broom has movement in the direction indicated by the arrows 45 in FIGURE 3.

As illustrated in FIGURE 4, the shaft 36 carries a bevel gear 46 which drives a mating bevel gear 47 mounted at the upper end of the broom drive shaft. The broom drive shaft 48 is divided into an upper shaft part 49 and a lower shaft part 50 with the parts being connected by a universal joint 51. The universal joint permits pivotal tilting of the lower part 41 of the housing as will be described.

The upper part 49 of the broom drive shaft 48 is suitably supported in bearings 52 and 53, as illustrated in FIGURE 4.

As illustrated in FIGURES 4 and 7, the side broom housing 39 is pivotally hung on the side of the machine for pivotal movement about a transverse axis in a fore and aft direction. A bearing boss 54 which has a cylindrical shape is secured by a weld 55 to a frame member 11*a* of the machine. The housing 39 is provided with a cylindrical shaped bearing surface 56 which permits it to be supported on the bearing boss 54. A flat plate 57 is connected by bolts 58 to the inside of the housing 39 and is provided with elongated arcuate slots 62 and 63 which are coaxial with the bearing boss 54. Extending through each of these slots 62 and 63 are locking bolts 60 and 61 which are threaded into the bearing boss, and which hold a washer plate 59 against the outer surface of plate 57, clamping plate 57 tightly between the washer plate 59 and the bearing boss 54.

This assembly makes it possible to lock the fore and aft tilted position of the broom. The operator sets the broom to the desired angle, and tightens the bolt 60 and 61 to lock the position of a housing 39. For access to the bolts, slots 64, FIGURES 2 and 4, are provided in the housing 39.

As illustrated in FIGURES 5 and 6, the upper part 40 of the housing has a hood portion 65 covering the upper end of the lower part 41 of the housing. The lower part is pivotally hung on the hood 65 by trunnion pins 66 and 67 threadably secured in the lower part 41 and journalled in the upper part.

The side broom 21 is biased outwardly about an axis extending longitudinally of the machine as supported on the pins 66 and 67. Biasing is accomplished by a coiled compression spring 68 carried on a threaded rod 69. The ends of the rod pass through openings in a bracket 70 on the upper part 40 of the housing and a plate 71 secured to the lower part 41 of the housing. Nuts 72 and 73 are adjustably threaded onto the end of the rod to provide stops to limit the outward pivotal movement of the lower part 41 of the housing end of the broom. The adjustment of the nuts of course will determine the limit of pivotal movement. Slidably mounted on the rod are spring heads 74 and 75 against which the ends of the spring abut and which in turn abut against a surface 41*a* on the housing part 41 and the bracket 70, respectively.

The universal joint 51 of the drive shaft 48 permits outward swinging of the lower part 41 of the housing. The universal joint includes an upper joint fitting 76 having a bifurcated end and attached to the shaft part 49, and a lower joint part 77 having a cross pin and attached to the lower part 50 of the drive shaft.

The lower part 50 of the drive shaft is journalled in bearings 78 and 79 mounted in the lower part 41 of the housing.

The side broom 21 is mounted for rotation on a head 78. The head has a rotatable part 78*a* to which the broom is connected such as by a bolt 79 and a non-rotatable part 78*b*. A bearing 80 is located between the rotatable part 78*a* and the non-rotatable part 78*b*. The rotatable part is driven by the lower part 50 of the drive shaft and carries a key 81 axially slidable in the key way 82 on the shaft. This permits a lifting of the broom 21 and adjustment of its vertical elevation without shifting the vertical position of the drive shaft. For purposes of lifting the broom and controlling its surface pressure, an arm 83 is secured to the broom head 78 by a pivotal connection 83*a* and extends laterally from the non-rotatable part of the broom head and rigidly connects to a piston rod 84 on a piston 86 which is slidable within a cylinder 85. The cylinder has a breather hole 87 at its upper end and a connection 88 at its lower end connecting to a hydraulic pressure line 89. The cylinder is mounted by a flexible ball and socket mount 85*a* on the housing part 41. The shaft part 50 is protected from dust and dirt with change in elevation of the head 78 by a jacket 90 which is attached to the head and which is attached to the housing part 41 and is of an expansible accordion type material.

FIGURE 8 illustrates the hydraulic system for directing hydraulic fluid to the cylinder 85 to control the broom pressure. The mechanism also operates to automatically compensate for wear of the bristles and functions to lift the broom above the sweeping surface. Hydraulic fluid is delivered by a pressure pump 91 suitably driven, and connected to an output line 92 which leads into a control valve 93. For lifting the broom 21, the control valve 93 is set to deliver hydraulic fluid through a line 94 past a return preventing check valve 95 to the line 89 and to thereby force the piston 86 upwardly. For this operation a hand valve 101 is closed.

During normal sweeping operation, hand valve 101 is opened and the valve 93 delivers fluid through a line 96 which has a flow regulator 97 connected therein and the pressure in a line 100 leading to the lower end of the cylinder 85 is controlled by an adjustable relief valve 98 which permits a regulated bleed back of fluid through a line 99 to a reservoir 102.

The reservoir is provided with a breather 103 and the pump 91 draws fluid from the reservoir through a line 104.

For operation of the broom, the operator adjusts the fore and aft pivotal position of the broom by reaching in through slots 64, FIGURES 2 and 4, to loosen and retighten the bolts 60 and 61, FIGURE 7. The lateral transverse position of the broom is controlled by the operator adjusting the position of the nuts 72 or 73, FIGURE 6, on the rod 69. The broom pressure is regulated by adjustment of the relief valve 98, FIGURE 8. The operator drives the machine forwardly, FIGURE 1, with the main broom 17 and the side broom 21 directing dirt and foreign materials into the conveyer 18 to perform the sweeping operation.

Thus it will be seen that we have provided an improved sweeping machine with features for driving and controlling the side broom, which meet the objectives and advantages hereinbefore set forth.

The drawings and specification present a detailed disclosure of the preferred embodiments of the invention, and it is to be understood that the invention is not limited to the specific forms disclosed, but covers all modifications, changes and alternative constructions and methods falling within the scope of the principles taught by the invention.

We claim as our invention:

1. In combination in a sweeping machine, a side broom rotatable about a generally vertical adjustable axis, means for driving the broom in rotation, a support housing having an upper part and a lower part for rotatably mounting the broom at the side of the machine with said broom at the base of said housing, said upper part extending vertically above said lower part, a drive shaft connecting between said drive means and said broom and having an upper portion in said upper part of the housing connected to said drive means and a lower portion in said lower part of the housing connected to said broom, a universal joint between said shaft portions,

means for pivotally mounting the upper support housing on the machine, and a pivotal connection between said upper and said lower part of said housing accommodating pivotal movement of the broom laterally outwardly away from the machine.

2. In a sweeping machine, a side broom rotatable about a generally vertical axis, means for rotatably supporting the broom at the side of the machine, a first mount for said support means pivotal about a first axis extending laterally of the machine, a separate second mount for said support means pivotal about a second axis below the first axis extending longitudinally of the machine and limiting movement of the broom to movement solely laterally of the machine, a third mount for said support means accommodating vertical movement of the broom, means for adjustably locking said first mount against pivotal movement, biasing means urging said second mount pivotally outwardly away from the machine and positioned to apply a lateral force solely at right angles to the axis of said second mount, and stop means limiting the pivotal movement of said second mount.

3. In a sweeping machine, a side broom rotatable about a generally vertical axis, a side housing including an upper housing part and a lower housing part, means pivotally connecting said parts for pivotal movement about an axis longitudinal of a sweeping machine which the housing is mounted and limiting movement of the lower part solely to lateral movement with respect to the axis of the machine, means for mounting the upper housing part at its upper end for pivotal adjustment about an axis extending laterally of the sweeping machine, a broom drive shaft extending through the housing having an upper part and a lower part with the parts connected by a universal joint at the pivotal connection between the housing, a bracket means on the upper housing part, a single rod connected to the bracket means and to the lower housing part and extending parallel to the movement of the lower housing part, a nut adjustably threaded to the rod for limiting the outward movement of said lower housing part, and a coiled compression spring carried on the rod and compressed between the lower housing part and the bracket for urging the lower housing part outwardly.

4. In a sweeping machine, a side broom rotatable about a generally vertical axis, a side housing including an upper housing part and a lower housing part, means pivotally connecting said parts for pivotal movement about an axis longitudinal of a sweeping machine on which the housing is mounted and limiting movement of the lower part solely to lateral movement with respect to the axis of the machine, means for mounting the upper housing part at its upper end for pivotal adjustment about an axis extending laterally of the sweeping machine, a broom drive shaft extending through the housing having an upper part and a lower part with the parts connected by a universal joint at the pivotal connection between the housing, and spring biasing means mounted on the housing and connected to the lower part of the housing below its pivotal connection to the upper part for biasing the lower part laterally outwardly, means limiting the outward pivotal movement of the lower part of the housing.

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