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HOPPER LOCK FOR A STREET SWEEPER

Filed Oct. 11, 1963

2 Sheets-Sheet 1

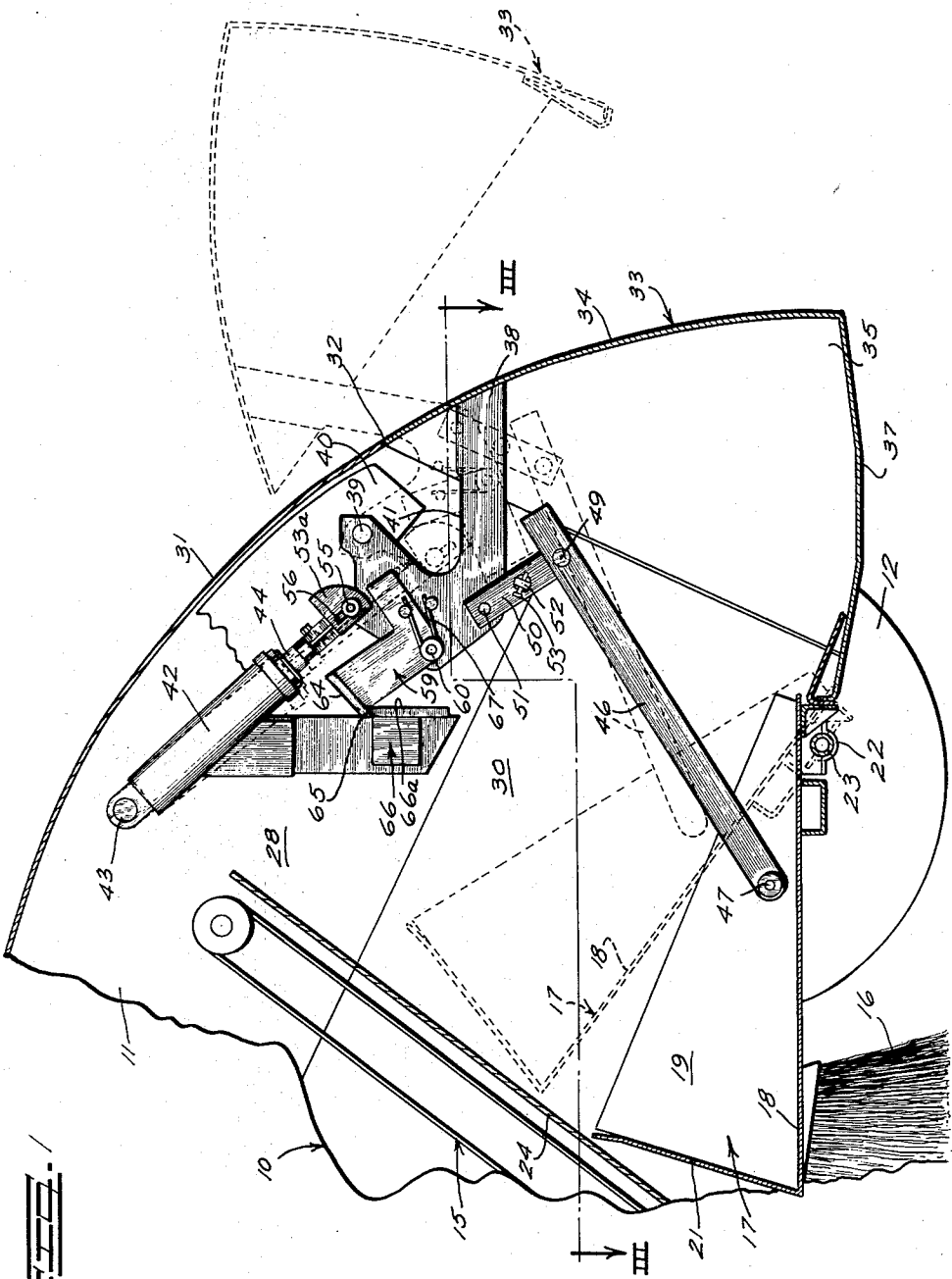


FIG. 1

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FIG. 2

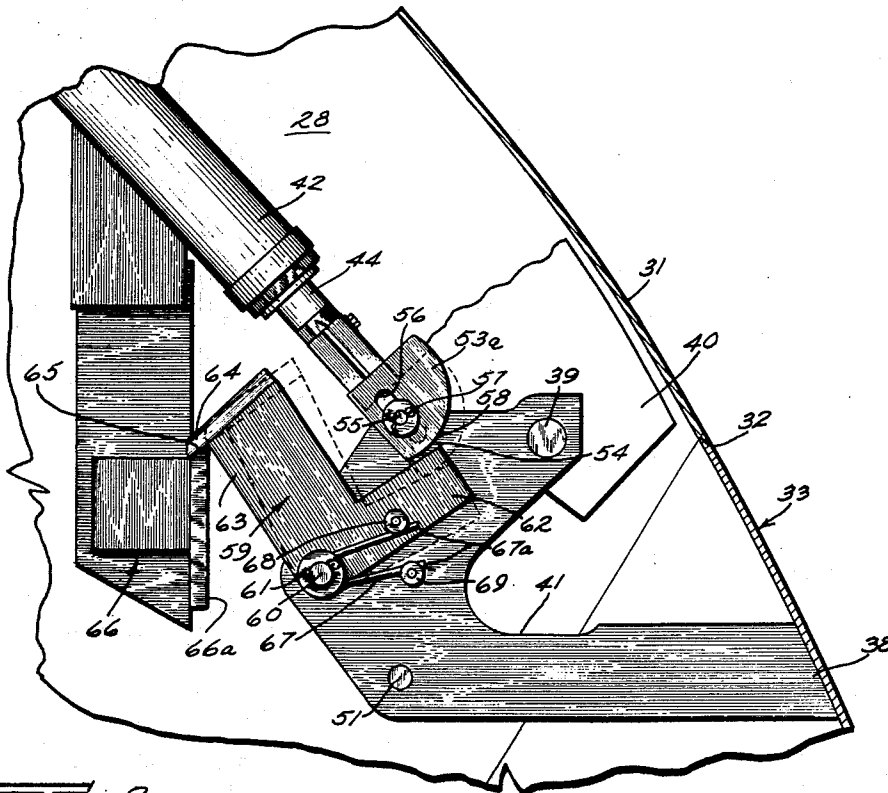
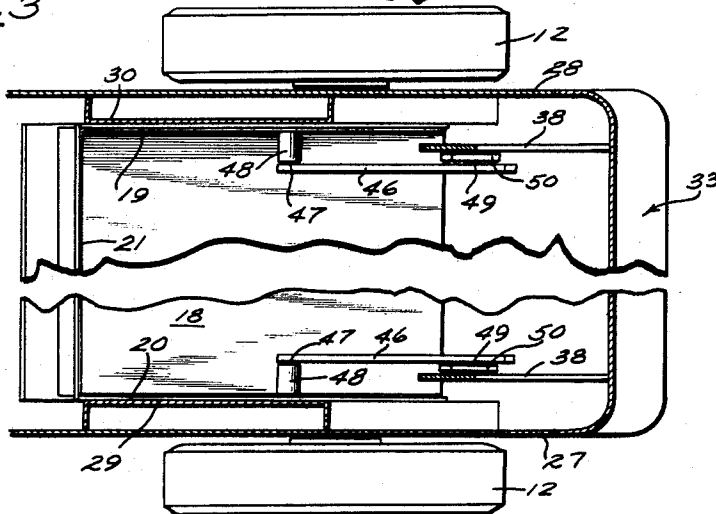


FIG. 3



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HOPPER LOCK FOR A STREET SWEEPER

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6 Claims. (Cl. 214-508)

This invention relates generally to a street sweeper having a new and improved dirt box assembly for preventing accidental spillage of sweepings therefrom. More particularly, the present invention is concerned with a new hopper or dirt box lock for holding the dirt box in a closed position and against relative movement during travel of the street sweeper. The street sweeper illustrated herein is generally of the type shown in U.S. Patent No. 2,828,037.

In the past, it has been found that in the operation of street sweepers there has been a tendency for relative movement to occur between a lower end of the door of the dirt box with respect to the floor of the dirt box whereby sweepings are accidentally released onto the pavement before the sweeper can be unloaded at the place where intended. As an example, the sweeper may strike a bump in the course of its travels in which case there has been a tendency for sweepings to be released because of relative movement between the dirt box door and the dirt box. It has further been found during normal operation of the street sweeper, when the sweeper is heavily loaded with sweepings, that a vibratory or oscillatory movement of the dirt box occurs which movement tends to cause sweepings to be accidentally discharged because of relative movement of the door with respect to the dirt box.

The present invention is primarily concerned with a street sweeper having means for maintaining the door of the dirt box in a closed position at all times to prevent accidental spillage of sweepings.

An important object of this invention is to provide a new and improved dirt box or hopper lock for holding the dirt box door in a fixed position relative to the dirt box.

Still another important object of this invention is to provide a new and improved dirt box or hopper lock which can be released at such time as when a mechanism is actuated for pivoting the door of the dirt box away from the dirt box.

Yet another object of this invention is to provide a new and improved lock for holding the dirt box door in a closed position, which lock can be automatically locked by operation of the mechanism for closing the dirt box door.

Yet another important object of this invention is to prevent relative movement between the door of the dirt box and the dirt box except when it is desired that the dirt box be unloaded.

Other objects and features of this invention will more fully become apparent in view of the following detailed description taken in conjunction with the accompanying drawings illustrating therein a single embodiment and in which—

On the drawings:

FIGURE 1 is an enlarged fragmentary cross sectional view of a street sweeper machine utilizing a dirt box assembly constructed in accordance with the principles of this invention;

FIGURE 2 is an enlarged view similar to FIGURE 1 only illustrating certain details in greater detail; and

FIGURE 3 is a fragmentary longitudinal section further illustrating the hopper lock as taken on the line III—III looking in the direction of the arrows in FIGURE 1.

As shown on the drawings:

Reference numeral 10 generally designates a street

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sweeper incorporating a dirt box assembly constructed according to the principles of this invention which may comprise a housing 11 supported on a pair of front wheels 12 and a single steerable rear wheel (not shown), a main broom (not shown) which is rotated to throw dirt or refuse onto the lower end portion of an upwardly inclined conveyor 15 and a side broom 16 arranged to engage in the street gutter and throw refuse or dirt into the path of the main broom.

The conveyor 15 may be inclined forwardly and the dirt box assembly of this invention may be located at the forward end of the sweeper 10 to receive dirt from the conveyor 15 and accumulate or store dirt until a convenient point for discharge of the dirt is reached, whereupon the dirt box assembly may be actuated to discharge the dirt.

The dirt box assembly may comprise a main dirt box generally designated by reference numeral 17 which may include a floor 18 normally disposed in a generally horizontal position to receive dirt from the upper end of the conveyor 15, a pair of side walls 19 and 20 and a rearward end wall 21 for preventing flow of dirt off of the dirt box floor 18.

It will be noted that the rearward end of the dirt box 17 is disposed in relatively closely spaced relation to the lower end portion of the conveyor and that the dirt box 17 is in underlying relation to the upper end portion of the conveyor 15. With this arrangement, the space within the housing 11 of the street sweeper 10 is utilized to maximum advantage for dirt storage.

The dirt box 17 may be supported for tilting movement between a position as illustrated in full and dotted lines in FIGURE 1 to discharge dirt therefrom, preferably about an axis adjacent the forward end thereof so that the dirt is discharged from such forward end. To provide this tiltable support, an axle 22 may be supported between the side walls of the housing 11 and the dirt box 17 may have a pair of brackets 23 secured to the underside of the floor 18 to pivotally secure the dirt box 17 on the axle 22.

A baffle plate 24 is provided for engaging the rearward end of the dirt box during tilting movement thereof, the baffle plate 24 being disposed in relatively closely spaced relation to the underside of the upper portion of the upwardly inclined conveyor 15. The baffle plate 24 is, of course, rigidly supported between the side walls of the housing 11 of the street sweeper 10.

To provide a seal between the dirt box 17 and the portions of the housing cooperating therewith, a strip of flexible resilient material of the type shown in U.S. Patent No. 2,828,037 may extend around the upper edges of the side walls 19 and 20 and the rearward end wall 21 of the dirt box 17.

It should be noted that the side walls of the housing 11, to which reference numerals 27 and 28 are applied, carry plates 29 and 30 spaced inwardly therefrom on opposite sides of the dirt box 17 adjacent the sides 19 and 20, respectively thereof, to provide space for the journaling of the front wheels 12 of the sweeper 10. The plates 29 and 30 are, of course, engaged by the strip of flexible resilient material to provide the seal between the dirt box 17 and the sides of the housing 11.

The housing 11 has a top wall 31 which is sloped downwardly at the forward end thereof and terminated at an edge 32 spaced upwardly from the plane of the dirt box floor 18 in its normal position. The side walls 27 and 28 of the housing 11 have forward edges extending between the ends of the edge 32 of the top 31 to points generally in alignment with the forward edge of the dirt box floor 18. There is thus provided an opening at the forward end of the housing 11.

This opening is arranged to be closed by means of a door generally designated by reference numeral 33 which comprises a forward wall 34 arranged to extend downwardly and slightly forwardly from the edge 32 of the top wall 31 of the housing 11 to form a continuation of the top wall 31, a pair of generally triangularly shaped side walls 35 arranged to form continuation of the side walls 27 and 28, respectively, of the housing 11, and floor means generally designated by reference numeral 37 arranged for disposition in a generally horizontal plane to form a continuation of the floor 18 of the main dirt box 17. The door 33 thus provides an additional dirt box.

The door 33 is supported for tilting movement away from the dirt box 17 out of closing relation to the opening in the forward end of the housing 11 to discharge dirt from floor means 37 and also to allow discharge of the dirt from the dirt box 17.

For this purpose, a pair of plates 38 are secured to and projected rearwardly from upper end portions of the wall 34 of the door 33 and are pivotally secured by means of pins 39 to a pair of plates 40 secured to and extending rearwardly and downwardly from the top wall 31 of the housing 11 above the edge 32 thereof. The plates 38 may preferably have recessed upper edge portions 41 so that the axis of tilting movement of the door 33 is as high as possible and yet the plates 38 clear the edge 32 of the top 31.

The door 33 may preferably be power-actuated and for this purpose, a pair of hydraulic cylinders 42 may be pivoted by means of pins 43 to the housing 11 with piston rods 44 projecting from the cylinders 42 being pivotally connected to the plates 38 by means of pins 45. By actuation of the cylinders 42, the piston rods 44 may be forced downwardly and forwardly to pivot the door 33 from the full line position of FIGURE 1 through the dotted line position of FIGURE 1. It may be noted that the cylinders 42 are in relatively closely spaced relation under the top 31 of the housing 11 so as to be out of the path of dirt discharged from the conveyor 15 and dirt accumulating in the dirt box assembly. It might also be noted that the plates 38, in addition to providing a pivotal support for the door 33, also serve as a means for connecting the door 33 to the pistons 44 of the hydraulic cylinders 42.

The connection between the door 33 and the dirt box 17 is such that the dirt box 17 is actuated by outward movement of the door 33 but not until the door 33 is opened to a predetermined extent.

To this end, a pair of links 46 are pivotally secured by means of pins 47 to bosses 48 projecting inwardly from the sides 19 and 20 of the dirt box 17. The other ends of the links 46 are pivoted by means of pins 49 to links 50 which are, in turn, pivoted to the plates 38 by means of pins, or bolts 51.

In the normal position of the door 33, as illustrated in full lines in FIGURE 1, the axis of the pins 49 is spaced a substantial distance forwardly from a line through the axes of the pins 47 and 51. With this arrangement, the door 33 may be tilted forwardly and upwardly a substantial distance before actuation of the dirt box 17, for example, to a position as illustrated in dotted lines in FIGURE 1.

However, when this position is reached, means are provided limiting further movement of the pins 49 toward the line between the axes of the pins 47 and 51 and with further outward movement of the door 33, the dirt box 17 will be tilted upwardly about the shaft 22 to a discharge position as illustrated in dotted lines in FIGURE 1.

For limiting relative pivotal movement between the links 46 and the links 50, the links 50 may have inwardly projecting bosses 52 intermediate the pins 49 and 51 engageable with end portions of the links 46 to limit movement of the pins 49 toward a line between the axes

of the pins 47 and 51. The point at which further movement is prevented may be adjusted, of course, by adjustment of bolts of the type shown at 53 in U.S. Patent No. 2,828,037.

It could happen that the dirt box 17 might be left in a position as illustrated in dotted lines in FIGURE 1 and that mud or the like might prevent the dirt box 17 from dropping to its normal position of FIGURE 1 under its own weight. To insure that the dirt box 17 will drop to its normal position of FIGURE 1, a coiled tension spring may be employed as shown at 54 in the aforesaid U.S. patent.

According to important features and principles of the present invention, the piston rod 44 has a yoke or clevis 53 thereon. Yoke legs 53a are spaced apart and the plate 38 has a portion 54 disposed rearwardly of plate pivot 39 between the yoke or clevis legs 53a. The yoke legs 53a and the plate portion 54 are pivotally connected together by means of a bolt or fastener 55 that extends through the legs and the plate portion 54 and is loosely secured in clevis or yoke slots 56 by a cotter pin 57. The slots 56 extend longitudinally of the piston rod 54, in order to permit a time delay to occur before the plate 38 is pivoted so that a lock can be disengaged as will hereafter be described in further detail.

The yoke or clevis legs 53a each has an arcuate cam surface 58 for engagement with a L-shaped latch 59. When the piston rod is actuated, the plate 38 is caused to rock on its pivot 39. The latch 59 is pivotally secured to the plate 38 by a suitable fastener which may comprise a bolt 60 and a cotter pin 61. The latch 59 has a pair of latch legs 62 and 63 disposed at right angles to one another with the legs 62 disposed opposite the cam 58. Upon extension of the piston rod 44, the cam surface 58 is caused to engage the latch legs 62 thereby causing the latch 59 to pivot on the latch pivot 60. The other latch leg 63 of the latch plate 59 has a locking or latching end 64 for latching engagement with an inclined keeper 65 on the latch plate 66. The slots 56 on the yoke legs 53a enable the latching end 64 to be disengaged from the keeper 65 before the plate 38 is rocked to cause the dirt box door to open. When the locking ends 64 are engaged with the keepers 65, the dirt box door is maintained in snug engagement against the floor of the dirt box to prevent any accidental spillage of sweepings contained therein.

The latch plates 66 are suitably secured such as by welds with the side walls 27 and 28 of the housing 11 on opposite sides of the dirt box 17. Spring means in the form of a torsion spring 67 is provided for each of the plates 38. The spring 67 is hooked over the latch pivot 60 with opposite end 67a of the spring disposed between a pair of abutments 68 and 69. One of the abutments 68 is mounted on the latch leg 62 of the latch 59 and the other of the abutments 69 is mounted on the plate 38 above the plate pivot 51. The spring 67 acts to urge the latch 59 to lock on its pivot in a direction toward the latch keeper 65 on the latch plate 66.

The lost motion connection between the yoke legs 53a of the piston rod 44 and the latch plate portion 54 enables the unlocking of the latching mechanism before the door 33 is opened. When the dirt box 33 is to be closed, however, the controls (not shown) for the cylinders 42 are operated to cause the piston 44 to be retracted whereupon the dirt box door is closed against the floor of the dirt box 18 or an extension thereof whereupon after the door is closed, the torsion spring 67 functions to reengage the latching portion 64 with the keeper 65 to lock the door 33 in the closed position.

While the dirt box hopper lock has been illustrated in connection with linkage for pivoting the main dirt box 17, the linkage can be disconnected from the plate pivot 51 or omitted from the street sweeper, as desired. With certain types of street sweepers having a smaller capacity for sweepings, it is not necessary to provide a

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linkage mechanism for tilting the main dirt box 17. The linkage mechanism for tilting the dirt box 17 is generally only required where the main dirt box 17 has a four or five yard capacity.

Although minor modifications might be suggested by those versed in the art, it should be understood that I wish to embody within the scope of the patent warranted hereon, all such modifications as reasonably and properly come within the scope of my contribution to the art.

I claim as my invention:

1. In a street sweeper

a housing,

an upwardly inclined conveyor within said housing,

a dirt box having a floor normally disposed in a horizontal plane below an upper end portion of said conveyor,

a door pivotally mounted on said housing for pivotal movement about a horizontal axis positioned above the floor,

door pivoting means acting between said door and said housing for pivoting said door outwardly,

means for locking and pivoting said door comprising a pair of units disposed inside said housing on opposite sides of said dirt box, each unit including a cylinder attached to a side wall of said housing,

a plate pivotally mounted on said side wall and joined on opposite sides of the pivot between the plate and the side wall with the door and with a piston rod extendible from said cylinder,

a keeper mounted on the inside of said housing on said side wall,

a latch plate pivotally mounted on said plate and having a latching end for locking engagement with said keeper,

the piston rod being engageable with said latch plate for disengaging said latching end from said keeper, and for then rocking said plate on its pivot to pivot said door on its horizontal axis to allow unloading of the sweepings.

2. In a street sweeper

a housing,

an upwardly inclined conveyor within said housing,

a dirt box having a floor normally disposed in a horizontal plane below an upper end portion of said conveyor,

a door pivotally mounted on said housing for pivotal movement about a horizontal axis positioned above the floor,

said door including a generally vertical wall forming an end for the housing and

a bottom wall forming a continuation of said dirt box floor,

means for locking and pivoting said door comprising a pair of units disposed inside said housing on opposite sides of said dirt box,

each unit including a cylinder attached to a side wall of said housing,

a plate pivotally mounted on said side wall and joined on opposite sides of its pivot between the plate and the side wall with the door and with a piston rod extendible from said cylinder,

a keeper mounted on the inside of said housing on said side wall,

a latch plate pivotally mounted on said plate and having a latching end for locking engagement with said keeper,

the piston rod being engageable with said latch plate for disengaging said latching end from said keeper and for then rocking said plate on its pivot to pivot said door outwardly away from said housing on its horizontal axis to allow unloading of sweepings, and spring means for latching said latching end of said plate with said keeper upon the retraction of said piston rod and the closing of said door.

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3. In a street sweeper

a housing,

an upwardly inclined conveyor within said housing,

a dirt box having a floor normally disposed in a horizontal plane below an upper end portion of said conveyor,

a door mounted on said housing and having a door pivot disposed along a horizontal axis positioned above the floor and with said door having a bottom wall forming a continuation of said floor,

means for locking and pivoting said door comprising a pair of units disposed inside said housing on opposite sides of said dirt box, each unit including a cylinder attached to a side wall of said housing,

a plate pivotally mounted on said side wall and joined on opposite sides of the pivot between the plate and the side wall with the door and with a piston rod extendible from said cylinder,

a keeper mounted on the inside of said housing on said side wall,

a latch plate pivotally mounted on said plate and having a latching end for locking engagement with said keeper, and

a lost motion connection between said piston rod and said latch plate for disengaging said latching end from said keeper prior to the rocking of said plate on said door pivot outwardly away from said floor to allow unloading of the sweepings.

4. In a street sweeper

a housing,

an upwardly inclined conveyor within said housing,

a dirt box having a floor normally disposed in a horizontal plane below an upper end portion of said conveyor,

a door mounted on said housing and having a door pivot disposed along a horizontal axis positioned above the floor and with said door having a bottom wall forming a continuation of said floor,

means for locking and pivoting said door comprising a pair of units disposed inside said housing on opposite sides of said dirt box, each unit including a cylinder attached to a side wall of said housing,

a plate pivotally mounted on said side wall and joined on opposite sides of the pivot between the plate and the side wall with the door and with a piston rod extendible from said cylinder,

a keeper mounted on the inside of said housing on said side wall,

a latch plate pivotally mounted on said plate and having a latching end for locking engagement with said keeper,

a lost motion connection between said piston rod and said latch plate for disengaging said latching end from said keeper prior to the rocking of said plate on said door pivot outwardly away from said floor to allow unloading of the sweepings, and

means for moving said latching end into locking engagement with said keeper after said piston rod has pivoted and closed said door.

5. In a street sweeper

a housing,

dirt transporting means,

a dirt box in said housing having a floor normally disposed in a horizontal plane for receipt of sweepings from said dirt transporting means,

a door pivotal on said housing for pivotal movement about a horizontal axis,

means for locking and pivoting said door comprising a pair of units disposed inside said housing generally on opposite sides of said dirt box,

each unit including a cylinder attached to a side wall of said housing and with the cylinder having a reciprocating piston rod,

a plate pivotally mounted on said side wall and joined on opposite sides of its pivot between the plate and

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the side wall with the door and with an end of said piston rod,
 a keeper mounted on the inside of said housing on said side wall, and
 a latch plate pivotally mounted on said plate and having a latching end movable into and out of locking engagement with said keeper,
 the piston rod being engageable with said latch plate for disengaging said latching end from said keeper and for then rocking said plate on its pivot to pivot said door outwardly away from said housing on its horizontal axis to allow unloading of sweepings.
 6. In a street sweeper
 a housing,
 a dirt box having a floor and having a floor area for abutment with a door,
 a door pivotally mounted on said housing for pivotal movement about a horizontal axis positioned above the floor, and with said door having a door area for abutment with said floor area of said floor,
 means for depositing sweepings in said dirt box,
 door pivoting means acting between said door and said housing for pivoting said door outwardly to separate said areas, and
 means for locking and pivoting said door comprising a pair of units disposed inside said housing on opposite sides of said dirt box, each unit comprising:
 a cylinder attached to a side wall of said housing,
 a plate pivotally mounted on said side wall and joined on opposite sides of the pivot between

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the plate and the side wall with the door and with a piston rod extendible from said cylinder,
 a keeper mounted on the inside of said housing on said side wall,
 a latch plate pivotally mounted on said plate and having a latching end for locking engagement with said keeper to prevent accidental separation of said areas and consequent unloading of sweepings from a separable junction defined between said door and floor areas,
 the piston rod being engageable with said latch plate for disengaging said latching end from said keeper, and for then rocking said plate on its pivot to pivot said door on its horizontal axis to separate said areas to allow unloading of the sweepings.

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