April 1, 1941. R. C. EVANS 2,236,815

COLLECTING AND CONVEYING APPARATUS FOR SWEEPERS

Filed May 12, 1938 4 Sheets-Sheet 1

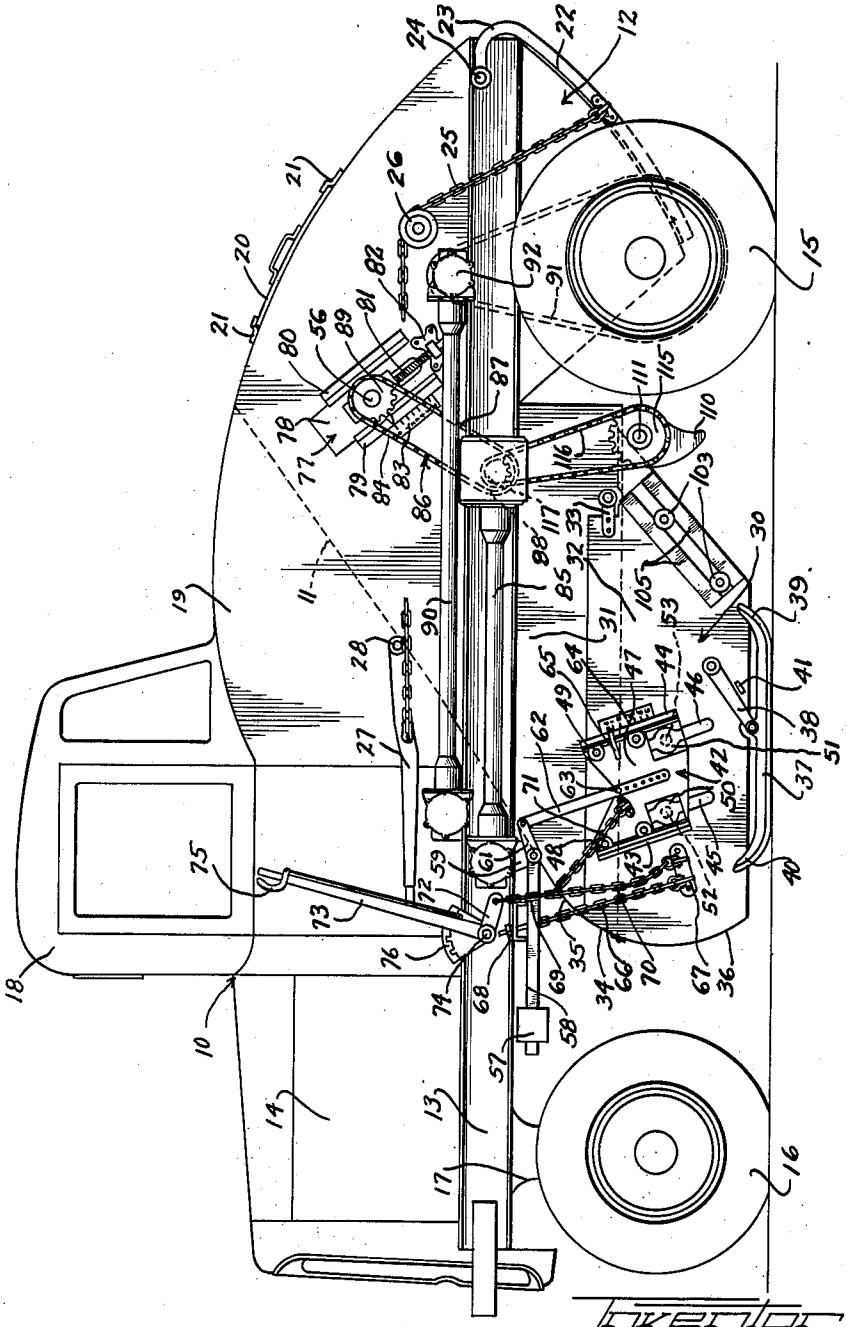


Fig. 1.

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COLLECTING AND CONVEYING APPARATUS FOR SWEEPERS

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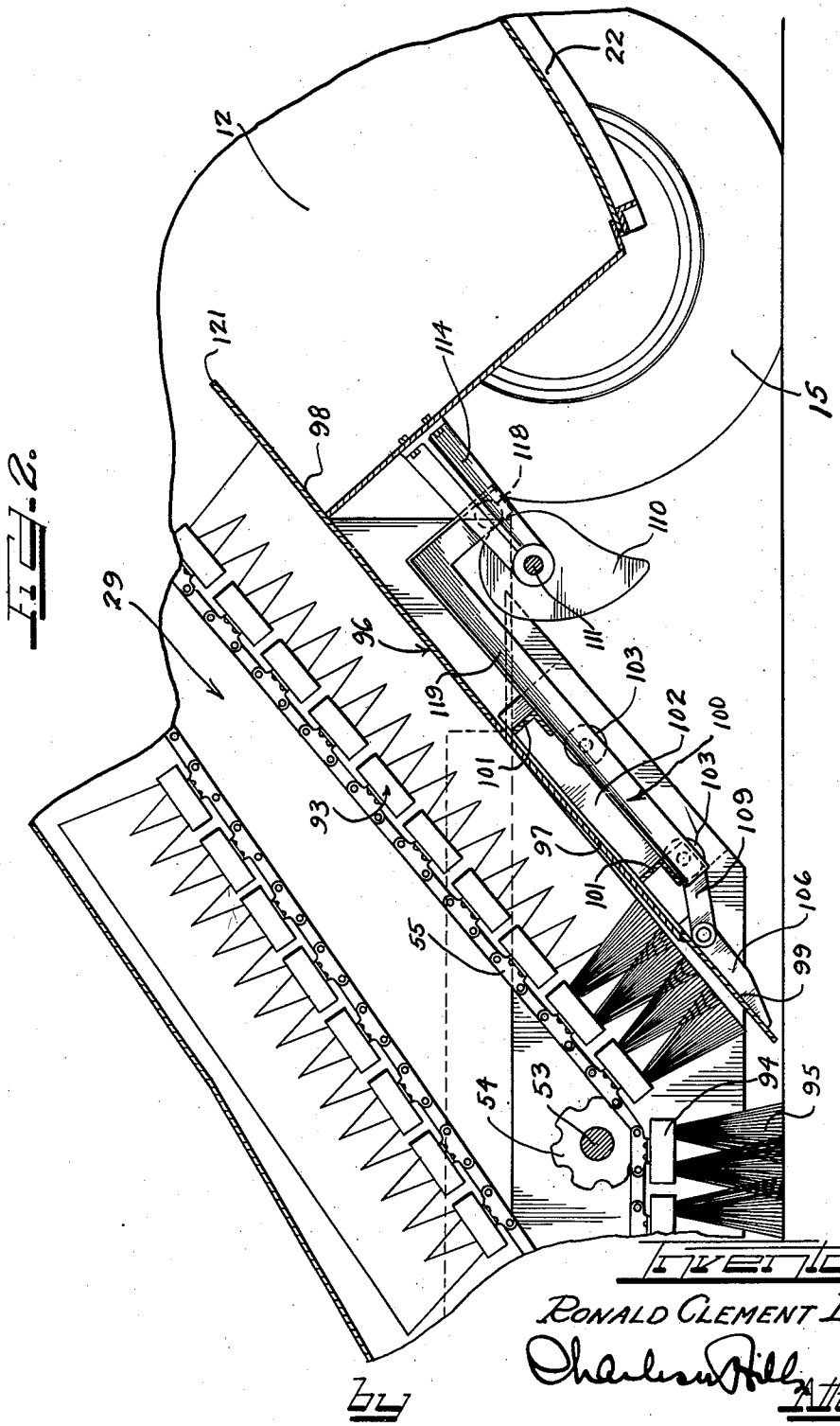


FIG. 2.

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FIG. 4.

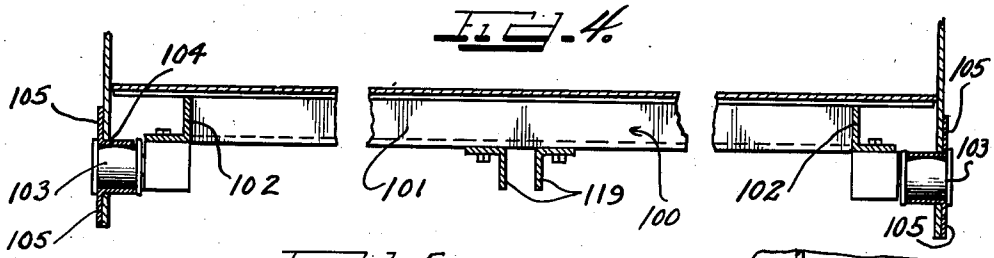
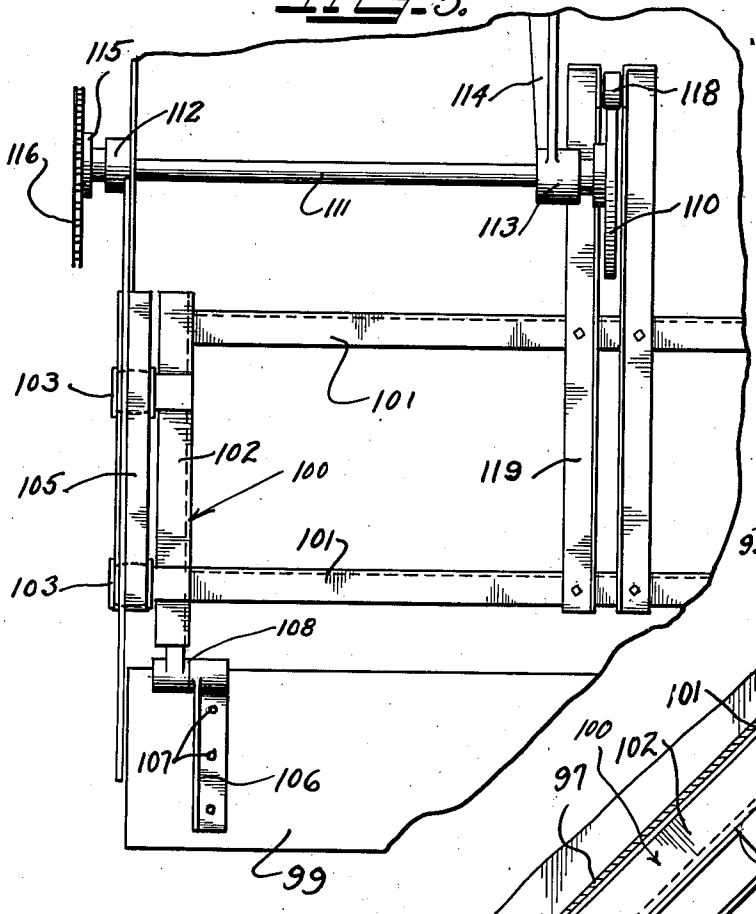


FIG. 5.



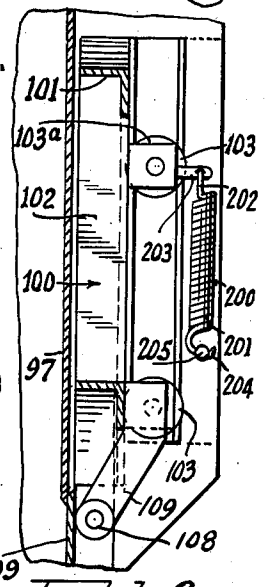


FIG. 8.

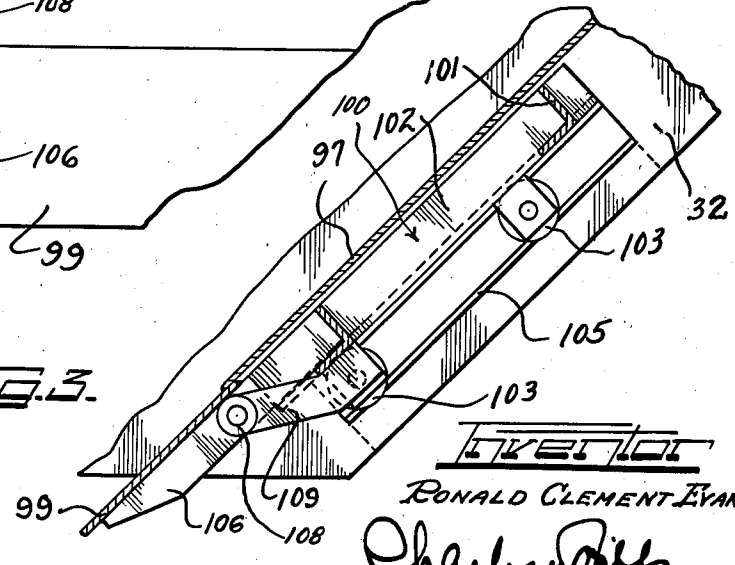


FIG. 3.

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April 1, 1941. R. C. EVANS 2,236,815

COLLECTING AND CONVEYING APPARATUS FOR SWEEPERS

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Fig. 7.

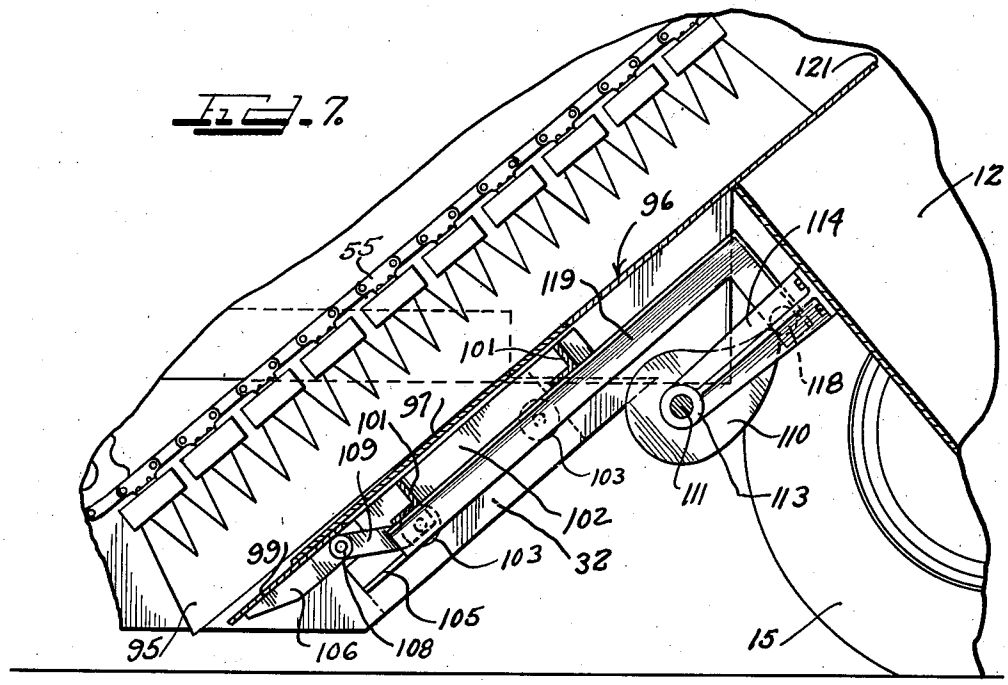
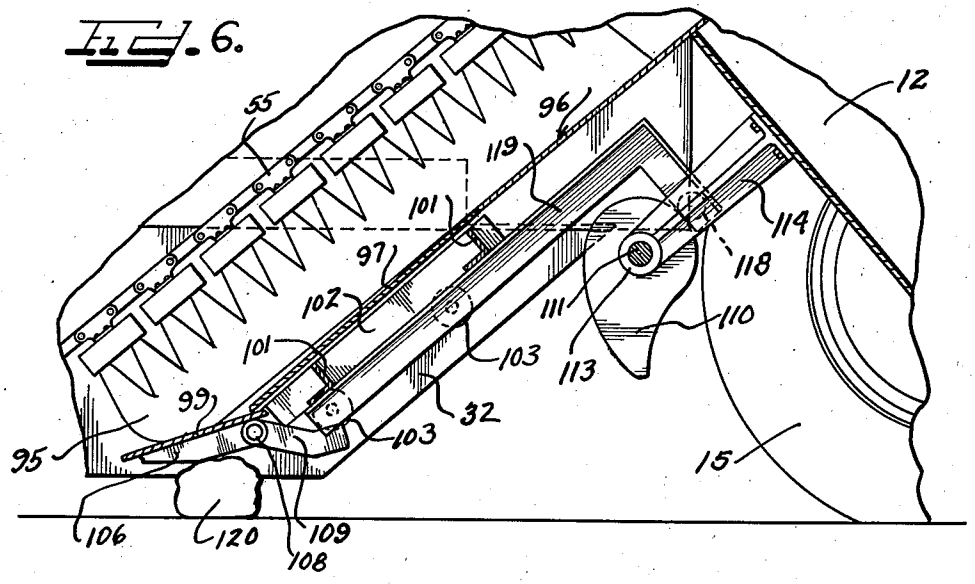


Fig. 6.



Inventor

RONALD CLEMENT EVANS

by Charles Bell Attys.

Patented Apr. 1, 1941 2,236,815

UNITED STATES PATENT OFFICE

2,236,815

COLLECTING AND CONVEYING APPARATUS FOR SWEEPERS

Ronald Clement Evans, Elgin, Ill., assignor to Elgin Sweeper Company, Elgin, Ill., a corporation of Illinois

Application May 12, 1938, Serial No. 207,445

8 Claims. (Cl. 15—80)

This invention relates to a street sweeping apparatus, and more particularly to novel collecting and conveying means for sweepers.

The subject matter hereof is related to that of my copending applications Serial Nos. 207,443, 207,446, and 216,740, the first two of which were filed on May 12, 1938, and the latter of which was filed on June 30, 1938.

Many forms of street sweeping apparatus have been employed in the past for cleaning streets and other surfaces to be swept. The different forms of sweeping apparatus may be roughly classified as caterpillar brush sweepers, rotary brush sweepers, and combined rotary brush and conveyor sweepers. The greatest difficulty in the design of any of these sweepers lies in the fact that a sweeping apparatus which is particularly well suited for sweeping dirt and other finely divided debris has not in the past been particularly efficient in sweeping leaves, twigs, stones, refuse, and other similar forms of debris; while sweeping apparatus which has been designed to sweep leaves and other similar debris efficiently has not been particularly well suited for sweeping dirt and finely divided debris. It is believed that the reason for this lies in the fact that an efficient dirt sweeper requires a pick-up plate or drag plate disposed in front of the brush with its bottom edge very close to the surface being swept, while an efficient sweeping apparatus for picking up leaves and the like requires some means which will permit the leaves to pass to the brush, or in other words, a construction in which the pick-up plate or drag is not disposed very close to the surface being swept. In the first instance referred to above, the leaves are pushed ahead of the sweeping apparatus and for that reason do not come into contact with the sweeping brush. Where the pick-up plate or drag plate is high enough to permit leaves to pass thereunder, the sweeping apparatus throws the dirt underneath the plate and for that reason it is not swept up.

It is an object of the present invention to provide novel means for sweeping streets and the like which is efficient in picking up both types of debris referred to above.

Another object of this invention is to provide novel means for cleaning streets which includes an arrangement which permits dirt and other finely divided debris to pass to the sweeping brush at all times, while leaves and other similar debris are intermittently passed to the sweeping brush of the sweeping apparatus.

A further object of this invention is to provide a novel sweeping apparatus employing novel collecting and conveying means.

A still further object of this invention is to provide novel means for accumulating and picking up debris.

Another and further object of this invention is to provide novel means for segregating debris into two classes and for continually sweeping one of the segregated classes of debris but only intermittently sweeping the other segregated class of debris, the second class of debris being pushed ahead of the sweeping apparatus during the interval when it is not permitted to pass to the sweeping brush.

Another and still further object of this invention is to provide a novel drag plate and drag plate mounting for street sweeping apparatus and the like.

Still another and further object of this invention is to provide a novel actuating mechanism for periodically raising and lowering a drag plate employed in a street sweeping apparatus.

Another and further object of this invention is to provide a novel collecting and conveying apparatus for sweepers which is economical to manufacture, which is rugged and reliable in use, and which is extremely efficient in operation.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its construction and organization, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings in which:

Figure 1 is a side elevational view of a street sweeping apparatus employing a caterpillar brush and a periodically oscillated drag plate;

Figure 2 is an enlarged fragmentary elevational view illustrating the lower end of the caterpillar brush assembly and the drag plate which cooperates therewith;

Figure 3 is a greatly enlarged cross-sectional view of the drag plate and drag plate mounting of the sweeping apparatus;

Figure 4 is an enlarged cross-sectional end view of the drag plate and drag plate mounting of the sweeping apparatus;

Figure 5 is a fragmentary bottom view of one side of the drag plate and drag plate mounting;

Figure 6 is an enlarged fragmentary elevational view showing the drag plate carriage in its lower position and the drag plate being rocked upwardly as it passes over a large boulder;

Figure 7 is a view similar to Figure 6 but shows the drag plate carriage in its upper position; and

Figure 8 is a detail view similar to Figure 3 showing the spring for positively lowering the drag plate to its lower position.

The sweeping apparatus illustrated in Figure 1 of the drawings is a street sweeper of the caterpillar brush type. The sweeping elements of this apparatus together with their associated elements are mounted on a motor driven vehicle 10, the principal component parts of the complete apparatus being a caterpillar brush assembly 11, a dirt and debris storage hopper 12, and a chassis 13 having a rear mounted motor 14 thereon (the motor being diagrammatically indicated by showing the customary hood enclosing the same). The chassis 13 includes a pair of front wheels 15 mounted on a fixed axle (not shown) and a pair of rear wheels 16 which are preferably mounted closely together on a pivotally mounted steering assembly 17. Steering assembly 17 is connected through any suitable connecting mechanism to a steering wheel disposed in the driver's compartment or cab 18.

To enhance the general appearance of the vehicle 10 and to protect the sweeping apparatus from the elements, a body 19 is provided which forms a continuation of cab 18 and which may be given any shape which will further enhance the general appearance of the vehicle. In the upper forward wall of the body 19, a relatively large transverse opening is provided to permit access to the upper portion of the caterpillar brush assembly 11. This transverse opening in the upper forward wall of body 19 is closed by a sliding cover 20 which is held in desired position by a pair of flange members 21 welded or otherwise suitably secured to the top of body 19, the flanges 21 being so arranged as to permit transverse sliding movement of the cover 20.

The dirt and debris collecting hopper 12 is situated at the extreme forward end of the vehicle 10 and communicates directly with the upper portion of the brush assembly 11. Hopper 12 is designed to receive dirt and debris carried upwardly thereto by the sweeping apparatus and to store the same until it is desired to empty the hopper 12. Lower end wall 22 of the dirt and debris collecting hopper 12 is pivotally mounted to the end of chassis 13 by a pair of hook shaped arms 23 which are pivotally secured to the horizontal frame members of the chassis 13 as at 24.

In order to hold the end wall 22 of hopper 12 in its closed position so as to prevent escape of dirt and debris from the hopper, a flexible cable or chain 25 is employed to hold end wall 22 in place. Chain 25 is connected at one end to end wall 22, is then passed over a sheave 26 secured to the side wall of the body 19, and is connected finally at its opposite end to a dump lever 27. The dump lever 27 is pivotally mounted on the body 19 as at 28, its downward angular movement being limited by a suitable stop means (not shown) to the position shown in Figure 1. In this position the lever is in an overcenter position which automatically locks the end wall in its closed position. When dump lever 27 is moved upwardly and forwardly, the forward movement of the flexible cable or chain 25 permits the end wall 22 to open by virtue of its own weight.

The caterpillar brush assembly 11 includes in general a caterpillar brush 29, and a caterpillar brush housing 30 composed of an upper stationary housing portion 31 and a lower movable housing portion 32 arranged with limited angular movement about a transverse axis. More specifically, lower housing portion 32 is hinged to and supported by upper housing portion 31 as at 33. The rear wall 34 of housing portion 32 is preferably given a segmental cylindrical curvature, and the lower end 35 of the top wall of the upper housing portion 31 is similarly curved but arranged to permit the lower housing member 32 to be telescoped thereover. The side walls of lower housing member 32 overlap the side walls of upper housing member 31 even when the former are in their lowermost position. This substantially completes telescopic engagement of the lower housing member 32 with the upper housing member 31, and permits the former to be raised and lowered without any substantial interference from the latter.

In order to permit ready accessibility to the caterpillar brush 29 to repair or replace a portion thereof, the rear wall 34 includes a pivotally mounted panel 36 which preferably extends over a major portion of the rear wall 34.

The caterpillar brush assembly 11 also includes a pair of dirt shoes 37 carried on the lower housing portion 32 by arms 38, the latter being pivotally connected to shoes 37 as well as to the housing portion 32. Dirt shoes 37 are in the form of runners which ride along the street surface, the forward and rear ends 39 and 40 being turned up for that purpose. These shoes prevent dirt and other debris from being thrown out the sides of the sweeping apparatus. A stop block 41 on each side of housing portion 32 engages the arms 38 when the housing portion 32 is raised and this carries the shoes 37 up with it. The general and specific nature of dirt shoes 37 is described in claims in my copending application Serial No. 207,446, filed May 12, 1938, and assigned to the same assignee as the present invention.

In order to provide continuous and efficient sweeping irrespective of ripples and the like in the street surface, a floatnig mount 42 is provided for caterpillar brush 29. This floating mount has the effect of permitting the lower end of the caterpillar brush 29 to float on the surface being swept. The novel features of this floating mount are described and claimed in my aforesaid copending application.

More specifically the caterpillar brush floating mount 42 comprises a pair of tracks 43 and 44 which are mounted in parallel spaced relationship on both sides of the lower housing portion 32. The tracks 43 and 44 may be provided by employing offset flange members which are welded or otherwise suitably secured to the sides of housing portion 32. Portions of the housing wall between the complementary track members 43 and 44 are cut away as at 45 and 46 to permit free movement of the caterpillar brush supporting means which extends therethrough. A caterpillar brush supporting plate 47 having small wheels or rollers 48 and 49 is disposed between each pair of complementary tracks 43 and 44, the wheels or rollers 48 and 49 being arranged to ride in tracks 43 and 44 respectively. It will thus be understood that caterpillar brush supporting plate 47 is mounted for limited movement along a line parallel to the tracks 43 and 44.

Secured to the lower portion of supporting plate 38 are two bearings 50 and 51 which are adapted to receive and have journalled therein sprocket axles 52 and 53. Sprocket axles 52 and 53 each carry a pair of sprocket wheels 54 (see Figure 2), over which two endless articulated caterpillar brush chains 55 ride. At the upper

end of the assembly the two endless chains 55 ride on sprocket wheels (not shown) which are similar to sprocket wheels 54 and which are carried on a sprocket axle 56.

Since the position of the lower end of the caterpillar brush 29 is defined by the position of the axles 52 and 53, it will readily be perceived that the position of the lower end of caterpillar brush 29 depends upon the relative position of the brush supporting plate 47 in the complementary tracks 45 and 46.

Due to the relatively heavy weight of caterpillar brush 29, some means must be provided to partially relieve the weight of the brush, brush mechanism and brush fibres in order to lighten the pressure of the brush structure on the surface to be swept. Such a means may be conveniently provided by counterbalancing the brush supporting plates 47. One means for providing such a counterbalance is shown in Figure 1, wherein counterweights 57 are provided on opposite sides of the vehicle 10 and are pivotally supported from the chassis 13 by means of counterweight arms 58, the counterweight arms being pivotally mounted on the support brackets 59 at an intermediate point in their length as at 60. The counterweight arms 51 each have an overhanging portion 61 which pivotally carries the supporting link arm 62. The lower end of the link arm 62 is bolted or otherwise suitably secured to the supporting plate 47 as at 63. As is clearly shown in Figure 1 of the drawings, the lower end of each link arm 62 is preferably provided with a series of holes so that the relative length of each link arm may be adjusted at the will of the operator of the machine. A position index may be provided by employing an index scale 64 on the lower housing portion 32 and a pointer 65 on the plate 47.

From the above description it will be apparent that the greater part of the weight of the caterpillar brush 29 is released from the brush fibres. The counterweights 57 are preferably adjusted on their arms 58 until the force tending to lift the caterpillar brush 29 off of the street approaches but does not quite equal the weight which the brush fibres of the brush 29 must support.

Previous mention has been made of the fact that lower housing portion 32 is pivotally mounted for limited angular movement on upper housing portion 31. Some means must of course be provided for limiting downward movement of the housing 32 and for raising and lowering the same at the will of the operator. The means for raising housing 32 must include means for raising caterpillar brush 29 at the same time. Accordingly a flexible cable or chain 66 is provided for defining the lowermost position of housing 32 which is connected at one end to the housing 32 as at 67 and at the other end to the chassis 13 as at 68.

Additional means is provided for raising and lowering the entire caterpillar brush assembly 11. More particularly, the caterpillar brush 29 and the caterpillar brush lower housing 32 may be raised or lowered by means of a flexible cable or chain 69 which branches off into two lower chain portions 70 and 71 which are connected to the caterpillar brush housing 32 and the caterpillar brush supporting plate 47 respectively. The upper end of chain 69 is connected to a crank arm 72 of a control lever 73 which is pivotally mounted on the chassis 13 as at 74. Control lever 73 is preferably equipped with the usual spring bias latch (not shown) under the control of the control lever latch release 75, the latch being arranged to engage a cooperating notched latch plate 76 mounted on the side of the vehicle. As shown in Figure 1 of the drawings, when control lever 73 is in its forward position, the caterpillar brush assembly 11 is in its lowermost position, while when control lever 73 is in its rearwardmost position, the caterpillar brush 29 and the caterpillar brush housing 32 have been lifted by the chain 69 to a raised position.

A caterpillar brush tensioning device 77 is provided to take up slack in the endless articulated chains 55 of the caterpillar brush assembly 11 and to provide the desired amount of tension therein. As will readily be appreciated from a cursory examination of Figure 1, the degree of tension in the endless chains 55 can be governed by varying the relative spacing of the upper sprocket axle 56 from the two lower sprocket axles 52 and 53. Thus, if some means is provided for varying the distance between the upper sprocket axle 56 and the two sprocket axles 52 and 53, it is apparent that an adjustable tensioning arrangement will be provided. The specific means for accomplishing this end has been described in detail and claimed in my aforementioned copending application Serial No. 207,446, filed May 12, 1938, and assigned to the same assignee as the present invention.

The tensioning device 77 is provided by journalling the upper sprocket axle 56 in suitable bearings (not shown) carried on support plates 78 which are arranged to slide within complementary flange or track members 79 and 80. These complementary track members 79 and 80 are secured to the side walls of upper housing 31 in parallel spaced relationship to each other, but special note should be taken of the fact that the longitudinal axis of the track members 79 and 80 are not in parallelism with the longitudinal axis of the track members 43 and 44. While the angle of divergence of the longitudinal axis of the two sets of track may vary within wide limits without departing from the spirit and scope of the present invention, the angle is illustrated in Figure 1 of the drawings as being approximately 20°, the lower ends of the track members being further apart from each other than their upper ends. Due to the fact that the longitudinal axis of the track members 79 and 80 is disposed at an angle with respect to the longitudinal axis of track members 43 and 44, it will readily be appreciated that by raising and lowering the support plates 78, the tension in the endless chains 55 may be adjusted. This is by virtue of the fact that as the plate members 78 are lowered in track members 79 and 80, the distance between the upper sprocket axle 56 and the two lower sprocket axles 52 and 53 is increased. The position of the support plates 78 in the tracks 79 and 80 is determined by clamping bolts 81 which are mounted in collars 82 to upper housing 31. A position index is preferably employed by providing an index scale 83 on the sides of the housing opposite each lower track 79 and by providing a pointer 84 on the movable plate 78 of each tensioning device 77.

Power for driving the caterpillar brush 29 is obtained from the motor 14 and is transferred through a pair of drive shafts 85 (the drive shafts being illustrated in the drawings merely by showing the housing thereof) and then through a chain drive 86 to the upper sprocket axle 56, the necessary drive chains 87 and

sprocket wheels 88 and 89 being provided for this purpose.

Power for driving the vehicle itself is obtained from the motor 14 through a second pair of drive shafts 90, one on each side of the vehicle, and a pair of drive chains 91, the usual bevel gear boxes being provided at 92.

As may be seen best in Figure 2 of the drawings, the caterpillar brush 29 is preferably made up of a plurality of individual brush units 93 which are detachably and individually secured to the articulated chains 55. Each brush unit 93 includes in general a brush head 94 and a brush proper or fibre portion 95, which is made up of a multitude of individual fibres composed of any suitable material, such for example as bamboo fibres.

The novel features and specific characteristics of this caterpillar brush and mounting are described in detail and claimed in my copending application, Serial No. 216,740, filed June 30, 1938, and assigned to the same assignee as the present invention.

During the sweeping operation, the caterpillar brush 29 is driven in a counterclockwise direction from the upper sprocket axle 56. The individual brush units 93 as they pass over the surface being swept cause the dirt and debris to be thrown forwardly and upwardly. In order to convey the dirt and debris upwardly to a point where it may be deposited in the hopper 12, an inclined plane 96 must be provided immediately below the ends of the brush fibres 95. This inclined plane 96 forms the bottom wall of the brush housing portions 31 and 32, although it is spaced from the lower edges of the side walls of housing portions 31 and 32.

In order to get the dirt and debris onto this inclined plane 96, it is necessary to cause the lower end 97 of the inclined plane 96 to diverge slightly away from the brush fibres 95 to provide a throat into which the dirt and debris may be thrown by the brush. The upper portion 98 of the inclined plane, however, is preferably in direct contact with the lower end of the brush fibres 95. This novel caterpillar brush and brush assembly is described in detail in my aforementioned copending application No. 207,446.

Extending downwardly from the lower edge of the inclined plane 96 and forming substantially a continuation thereof is a drag plate 99. For a reason which will presently appear, drag plate 99 is mounted for limited longitudinal movement in a plane parallel to the lower end portion 97 of the inclined plane 96.

The particular mounting for the drag plate 99 may be seen best in Figures 3, 4 and 5, and includes a carriage 100 having a pair of cross bars 101 and a pair of end bars 102. Rotatably mounted on each end bar 102 is a pair of flanged wheels 103. Housing 32 is suitably slotted at 104 for the reception of wheels 103, the major axis of the slots 104 being parallel to portion 97 of inclined plane 96. Welded or otherwise suitably secured to the side walls of the housing 32 within slots 104 are a set of tracks 105 in which the wheels 103 are arranged to ride. Two drag plate mounting arms 106 are secured to the underside of the drag plate 99 by rivets 107 or in any other suitable manner and these mounting arms 106 are pivotally mounted to the carriage 100 as at 108. A stop arm 109, which is arranged to engage lower cross bar 101, is provided to prevent angular movement of the drag plate 99 below the plane of the portion 97 of the inclined plane 96. That is to say, when the carriage 100 is in its lowermost position, the drag plate 99 may move angularly upwardly, but cannot move angularly downwardly (see Figures 3 and 6 of the drawings).

Now it has been found that in sweeping with a caterpillar brush, two separate and distinct problems must be overcome in order to have a satisfactory and efficient sweeping apparatus. More particularly, it has been found that in order to sweep dirt and other finely divided debris the drag plate 99 must be disposed relatively close to the surface being swept. When this is not done, there is hardly any effective pickup by the caterpillar brush of the sweeping apparatus, for the reason that the dirt is swept forwardly underneath the drag plate. By way of example it was found that when the drag plate was disposed with its lower edge approximately two inches above the surface being swept, there was little or no pickup ability left in the sweeping apparatus; but when the drag plate was disposed with its lower edge approximately three-quarters of an inch above the surface being swept, the apparatus was very efficient in sweeping dirt.

If a drag plate is fixed in this position, however, it has been found that the sweeping apparatus would not operate effectively to sweep up leaves and other debris of that character for the reason that the leaves would not pass under the lower edge of the drag plate, but would cause them to be pushed forwardly in front of it. Some means was necessary, therefore, to permit the leaves to pass to the caterpillar brush. One of the important features of the present invention is the manner in which this is accomplished. More particularly, and in accordance with the teachings of the present invention, the drag plate 99 is periodically oscillated (that is, raised) to permit the leaves and other similar debris to pass thereunder to the caterpillar brush 29. In order to maintain effective and efficient sweeping of dirt and other finely divided debris, it has been found preferable to provide a mechanism which will maintain the drag plate 99 in its lowermost position for a predetermined distance and to then effect a quick lifting and lowering of the drag plate 99.

The novel means for periodically raising and lowering the drag plate 99 includes a cam 110 of the wiper or involute type (see Figures 2, 6 and 7) which is centrally secured to a cam axle 111 that is journalled in bearings 112 and 113 secured to one side wall of the housing 32 and to a centrally disposed mounting bracket 114 respectively. Secured to the outer end of the cam axle 111 is a sprocket wheel 115 which is driven by an articulated chain 116 from the drive shaft 85, a suitable gear reduction being provided in the gear box 117 so that the rate of rotation of the cam 110 is relatively slow. The speed of rotation of cam 110 may, of course, vary within wide limits without departing from the spirit and scope of the present invention, it being simply necessary to adjust the cam speed so that the accumulation of leaves and other similar debris will not be unduly great.

The cam 110 is positioned to engage a roller bar or cam follower 118 which is carried at the lower end of an L-shaped roller bar support arm 119. Roller bar support arm 119 is centrally secured to the carrier 100, as may be seen best in Figures 2 and 4 of the drawings. From a careful inspection of the drawings it will at once be understood that the cam 110 will cause an

upward movement of the carrier 100 along its tracks 105 during a small fraction of each revolution of the cam axle 111. This upward movement of the carrier 100 causes the drag plate 99 to be periodically raised in a plane parallel to the lower portion 97 of the inclined plane 96.

The drag plate 99 is pivotally mounted on the carrier 100 in order that it may pass over large stones 120 and other heavy objects without damage to the apparatus as is clearly shown in Figure 6.

To operate the sweeping apparatus of the present invention, power is supplied to the upper sprocket axle 56 which causes counterclockwise movement of the endless chains 55 which carry the brush units 93. Due to the fact that the lower end of the caterpillar brush assembly 29 is freely floating on the surface which is being swept, the lower ends of the brush fibres 95 are constantly in engagement with this surface. By properly adjusting the counterbalance weight 57, substantially all of the weight of the caterpillar brush assembly 29 is removed from the fibres 95 themselves. The individual brush units 93 sweep the dirt and other finely divided debris upwardly and forwardly against the drag plate 99 where it is carried by the brush 29 upwardly along the inclined plane 96 until it passes over the open mouth 121 of the hopper 12.

Leaves and other debris of this character is pushed forwardly in front of the drag plate 99 by the drag plate itself until the drag plate is raised by the cam 110 in the manner shown in Figure 7 of the drawings. At this time leaves and other debris of this character pass under the lower edge of the drag plate 99 where they are thereafter swept forwardly and upwardly by the brush units 93 onto the inclined plane 96.

As the rotation of the cam 110 is continued, the drag plate 99 is returned to its lowermost position as shown in Figure 2 where it is again effective to catch and collect the dirt swept forwardly and upwardly by the individual brush units 93. During the interval that the drag plate is being moved upwardly and returned, the dirt and finely divided debris on the surface being swept is merely thrown forwardly ahead of the brushes until such a time as the drag plate is in its lowermost position, where the dirt and other finely divided debris is again caught and collected by the drag plate and caused to pass upwardly along the inclined plane 96 into the hopper 12.

The dirt shoes 37 slide along the surface which is being swept and prevent dirt and other debris from slipping out either side of the sweeping apparatus. These dirt shoes 37 thus prevent any impairment of efficient sweeping action by the apparatus.

After the storage hopper 12 has become filled, the dirt and debris collected therein may be dumped by throwing the dump lever 27 upwardly and forwardly thus causing the lower end wall 22 of the hopper 12 to open about its pivot 24. After the hopper 12 has been dumped, the end wall 22 is returned to its closed position by pulling the dump lever backwardly and downwardly until it has passed its overcenter position.

In traveling to and from the area to be swept, the caterpillar brush assembly 29 and the lower brush housing 32 are elevated by pulling the control lever 73 to its rearward position (that is, to its left hand position as viewed in Figure 1 of the drawings).

From the above description, it will be apparent that I have illustrated means which is extremely effective in sweeping streets and the like. As will readily be apparent to those skilled in the art, dirt and finely divided debris is segregated from other debris such as leaves and the like. The dirt and finely divided debris is continually permitted to pass to the brush of the sweeping apparatus while the other debris, such as leaves, is pushed forwardly, except for intermittent intervals, when it is permitted to pass to the sweeping brush along with the dirt and finely divided debris. It will further be apparent to those skilled in the art that the novel sweeping apparatus which has been illustrated and described herein is of a form which is economical to manufacture and rugged and reliable in use.

While I have designated my sweeper as a street sweeper, it is, of course, to be understood that I do not intend in the accompanying claims to limit the use of my sweeper solely for cleaning streets. It may be used with equal advantage in sweeping paved yards, warehouse floors, stadium floors, and numerous other similar surfaces where extensive sweeping operations are required.

A detail of my invention is shown in Figure 8, which discloses a view of the drag plate carriage held in its lower position by a spring device.

This spring device, which holds the drag plate carriage in its lower position when not rocked upwardly by the cam 110, is designated generally by the reference numeral 200. As Figure 8 is a view similar to Figure 3 with the addition of the spring device 200, all other parts carry the same reference numerals in both figures.

Previous mention has been made of the novel means for raising the drag plate 99, as shown in Figures 6 and 7. The spring device includes a pair of helical springs 201 which effect a positive lowering of the drag plate and supplement the force of gravity. Each of these springs has one end 202 secured to the roller hanger 103a by a lug 203 depending therefrom, and the opposite end 204 is hooked around a pin 205 which is secured to and carried by the side walls of the housing 32. The tension of the springs 201 holds the cam follower 118 (shown in Figure 7) against the cam 110, resulting in a positive upward and downward movement of the drag plate as it is actuated by the cam.

While I have shown a particular embodiment of my invention, it will, of course, be understood that I do not wish to be limited thereto, since many modifications may be made, and I therefore contemplate by the appended claims to cover all such modifications as fall within the true spirit and scope of my invention.

I claim as my invention:

1. In a sweeping apparatus, a brush, a drag plate disposed ahead of said brush in a plane at an oblique angle to the surface being swept, the lower edge of said drag plate being disposed close to but in spaced relation to the surface being swept, whereby dirt and finely divided debris can pass thereunder, but other debris is pushed forwardly by said drag plate, and means for intermittently moving said drag plate to raise it in said oblique plane to permit said other debris to pass thereunder.

2. In a sweeping apparatus, a brush, a drag plate disposed ahead of said brush in a plane at an oblique angle to the surface being swept, the lower edge of said drag plate being disposed close to but in spaced relation to the surface being

swept, whereby dirt and finely divided debris can pass thereunder, but other debris is pushed forwardly by said drag plate, said drag plate being mounted in the sweeping apparatus for only an up and down sliding movement substantially in said plane, and means for raising as well as enabling lowering of said drag plate.

3. In a sweeping apparatus, a brush, a drag plate disposed ahead of said brush in a plane at an oblique angle to the surface being swept, the lower edge of said drag plate being disposed close to but in spaced relation to the surface being swept, whereby dirt and finely divided debris can pass thereunder, but other debris is pushed forwardly by said drag plate, a drag plate supporting carriage, a plurality of tracks carried by said sweeping apparatus upon which said carriage is mounted for movement therealong, the longitudinal axis of said tracks being substantially parallel to said oblique plane, said drag plate being pivotally mounted on said carriage for limited angular movement upwardly away from said oblique plane, and means for enabling the periodical oscillation of said carriage on said tracks.

4. In a sweeping apparatus, a caterpillar brush extending forwardly and upwardly from the surface being swept, a caterpillar brush housing having an inclined surface disposed immediately below and substantially in contact with an inclined lower edge of said brush, the lower portion of said inclined surface diverging away from the surface of said brush to provide a dirt and debris receiving throat, and a drag plate movably mounted relative to said housing and forming a substantially continuous downward extension of said inclined surface, and means for moving said drag plate substantially parallel to said lower portion of said inclined surface.

5. In a sweeping apparatus, a caterpillar brush extending forwardly and upwardly from the surface being swept, a caterpillar brush housing having an inclined surface disposed immediately below and substantially in contact with an inclined lower edge of said brush, the lower portion of said inclined surface diverging away from the surface of said brush to provide a dirt and debris receiving throat, and a drag plate movably mounted relative to said housing and forming a substantially continuous downward extension of said inclined surface, and means for periodically raising said drag plate to permit leaves and other similar debris to pass thereunder into contact with said brush.

6. In a sweeping apparatus, a caterpillar brush extending forwardly and upwardly from the surface being swept, a caterpillar brush housing having an inclined surface disposed immediately below and in substantial contact with the inclined lower edge of said brush, the lower portion of said inclined surface diverging away from the surface of said brush to provide a dirt and debris receiving throat, and a drag plate movably mounted on said housing and forming a substantially continuous downward extension of said inclined surface, said drag plate having an upper and lower position, means for maintaining said drag plate in its lower position for a predetermined distance of travel of said sweeping apparatus, and means for raising and enabling lowering of said drag plate over a second predetermined distance of travel of said sweeping apparatus.

7. In a sweeping apparatus, an apparatus supporting chassis, a brush mounted on said chassis, a drag plate disposed ahead of said brush in an oblique plane, the lower edge of said drag plate being normally disposed close to but in spaced relation to the surface being swept, whereby dirt and finely divided debris can pass thereunder but other debris is pushed forwardly by said drag plate, a drag plate supporting carriage, a plurality of tracks carried by said chassis upon which said carriage is mounted for movement therealong, the longitudinal axis of said tracks being substantially parallel to said oblique plane, and an involute type cam mounted on said chassis is proximity to said carriage and arranged to be rotated during forward movement of said sweeping apparatus, a cam engaging roller bar mounted on said carriage and positioned to be engaged by said cam, whereby said drag plate is raised by said cam at intermittent intervals during the forward movement of said sweeping apparatus.

8. In a street sweeping apparatus including a power driven brush bearing on the surface to be swept, a collecting means in advance of the brush against which leaves, twigs, refuse, and debris is adapted to accumulate as the sweeper is advanced over the surface being swept, said collecting means being spaced slightly from the surface being swept so as to allow dirt to be continuously picked up off of said surface by said brush, and driven means operative to release the collected debris to allow same to be swept up by said brush, said collecting means including a displaceable barrier element in advance of and spaced from the brush, said driven means including mechanism for displacing said barrier element out of the path of the accumulated debris at predetermined intervals in the forward movement of the sweeper over the surface being swept and without increasing the space separating said barrier from said brush.

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