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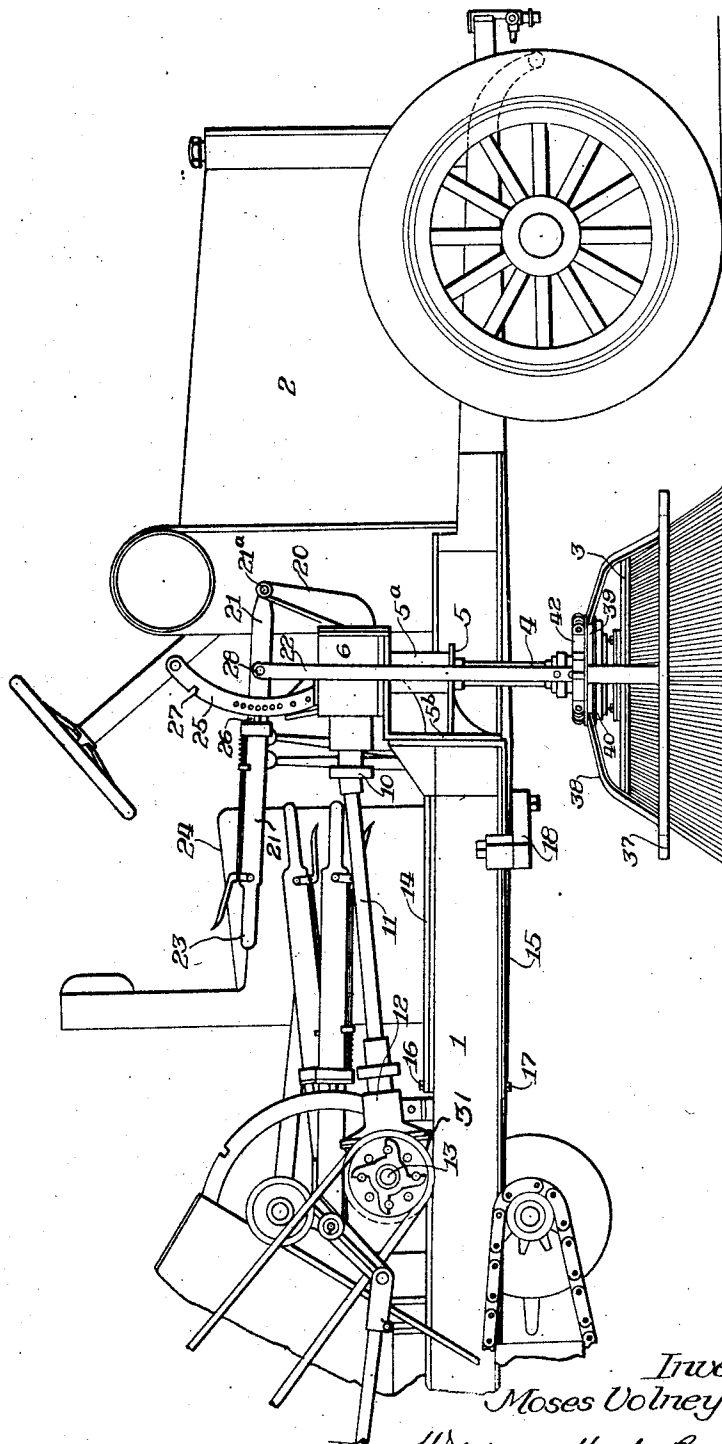
M. V. LIDDELL

GUTTER BROOM ATTACHMENT FOR SWEEPING MACHINES

Filed Nov. 19, 1923

6 Sheets-Sheet 1

Fig. 1.



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Oct. 16, 1928.

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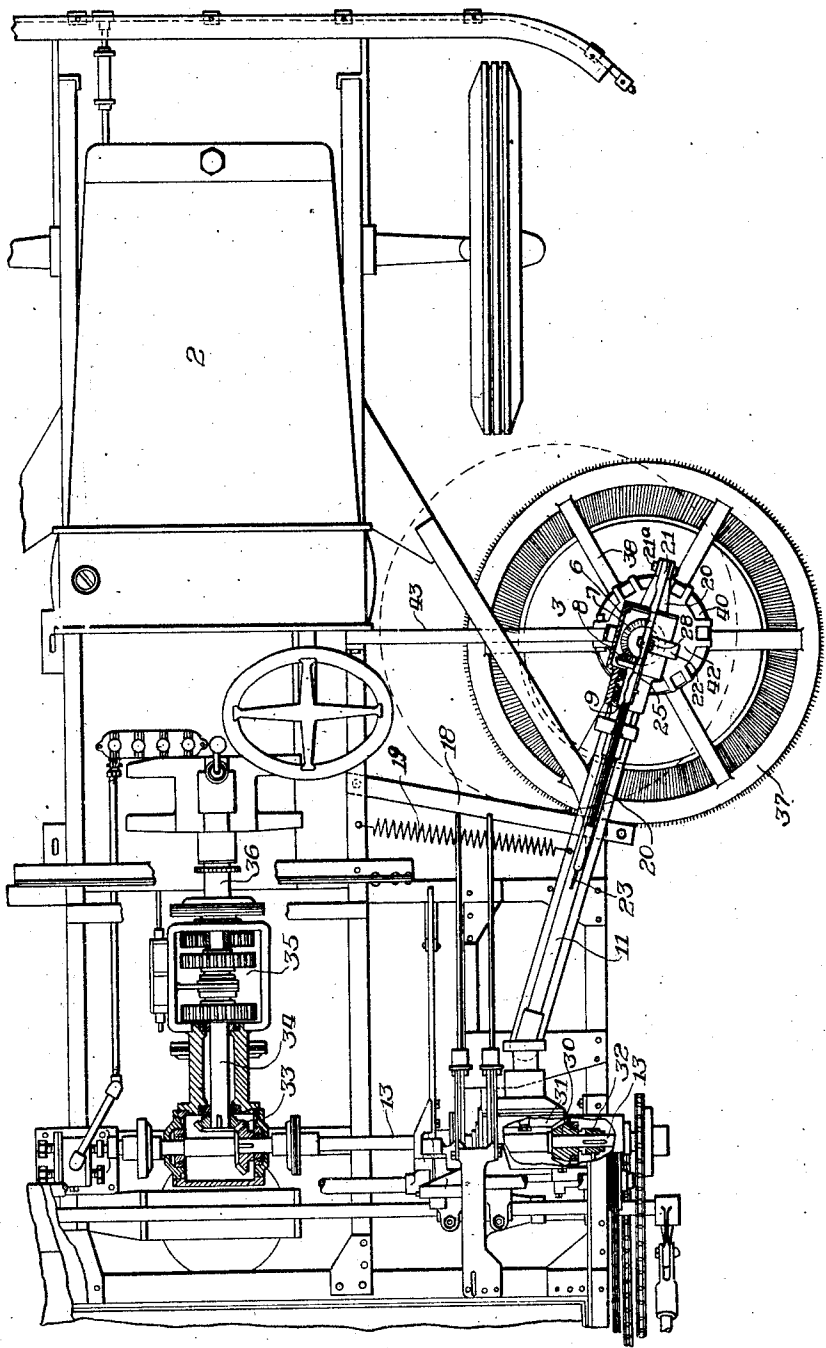
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GUTTER BROOM ATTACHMENT FOR SWEEPING MACHINES

Filed Nov. 19, 1923

6 Sheets-Sheet 2

Fig. 2.



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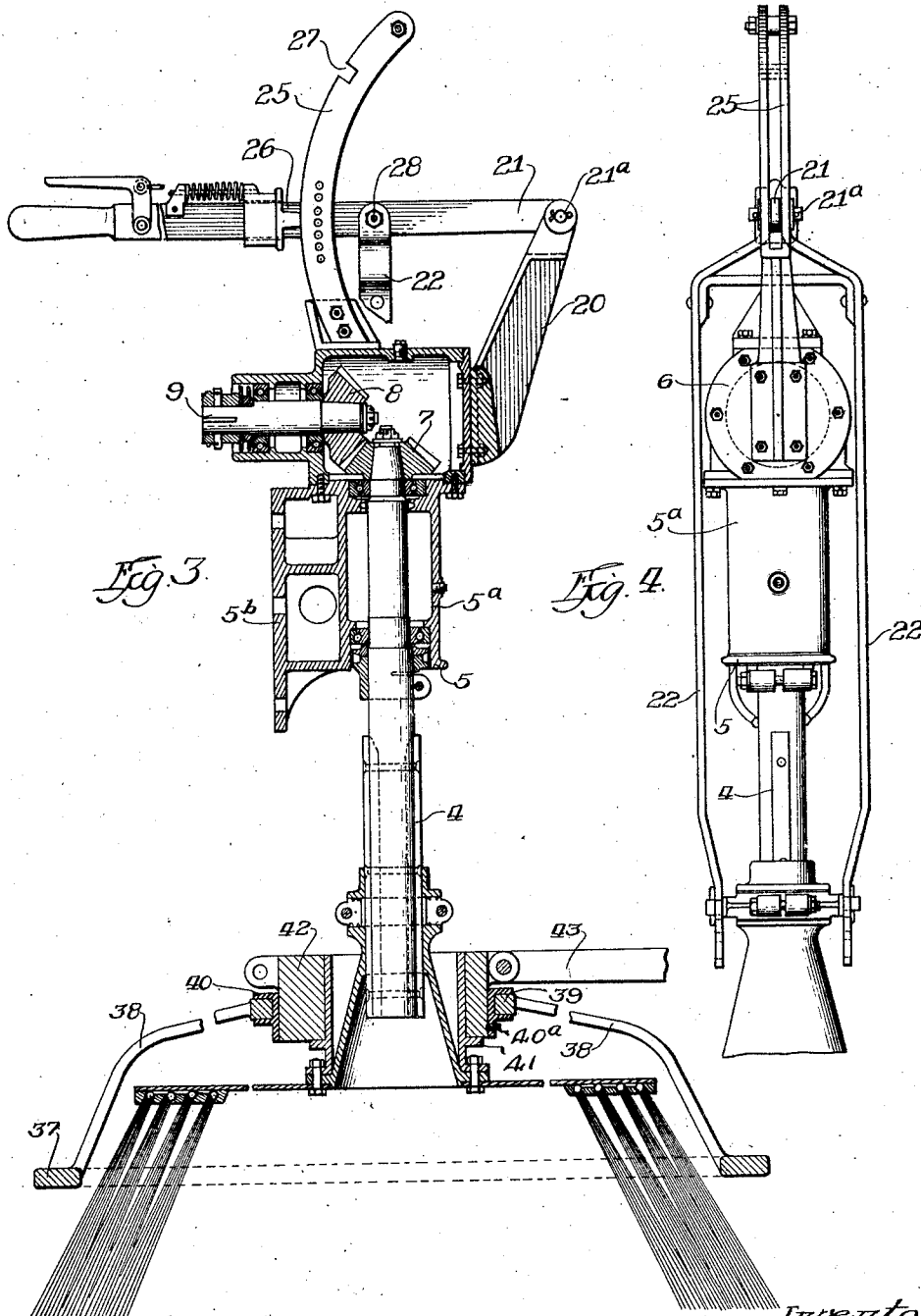
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GUTTER BROOM ATTACHMENT FOR SWEEPING MACHINES

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6 Sheets-Sheet 3



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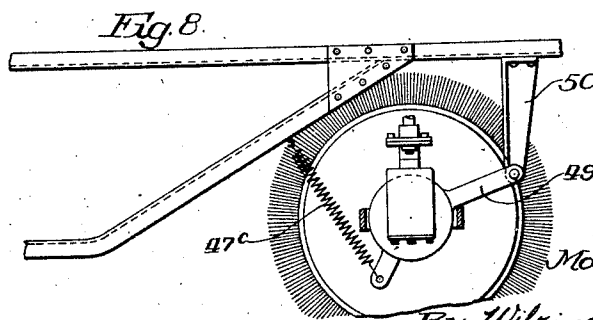
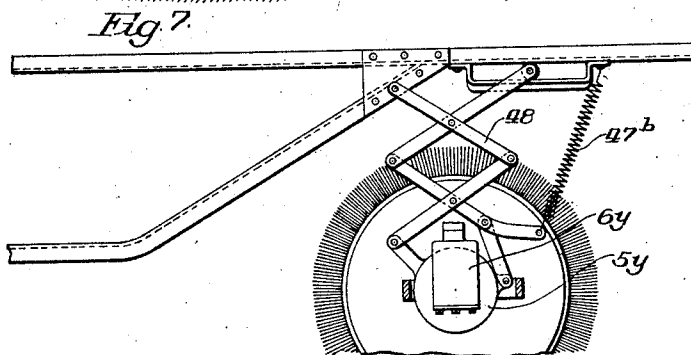
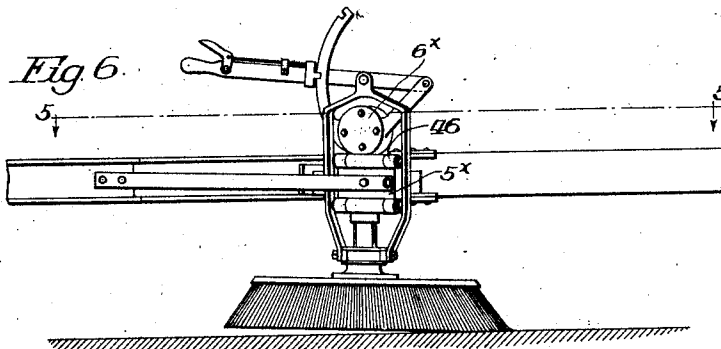
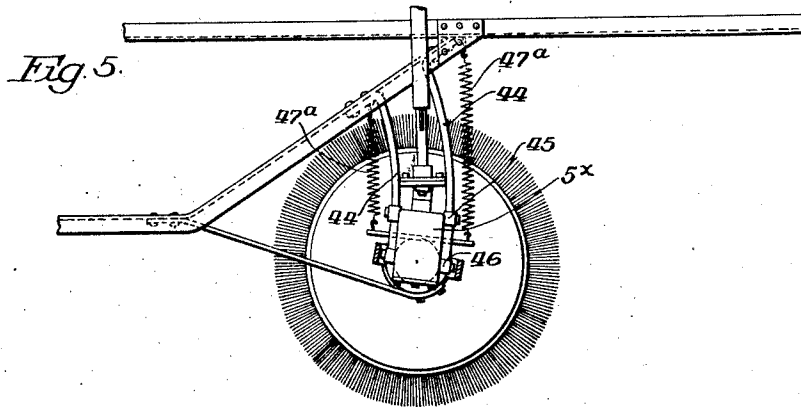
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GUTTER BROOM ATTACHMENT FOR SWEEPING MACHINES

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6 Sheets-Sheet 4



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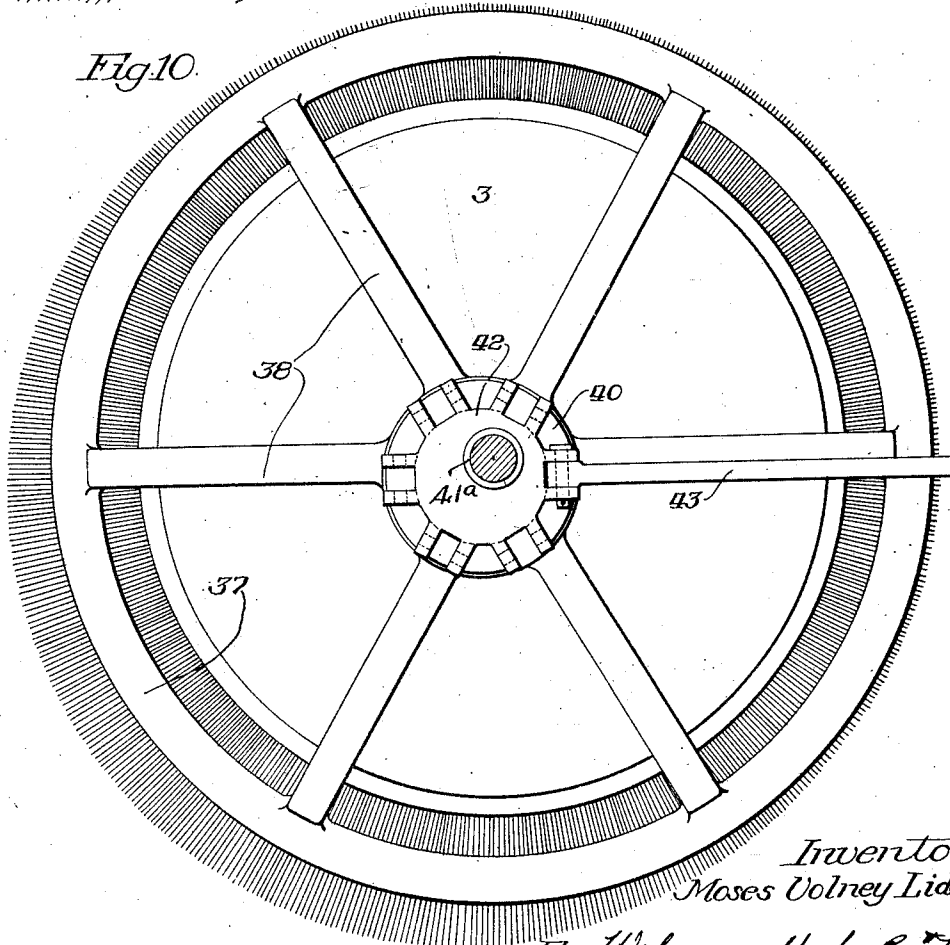
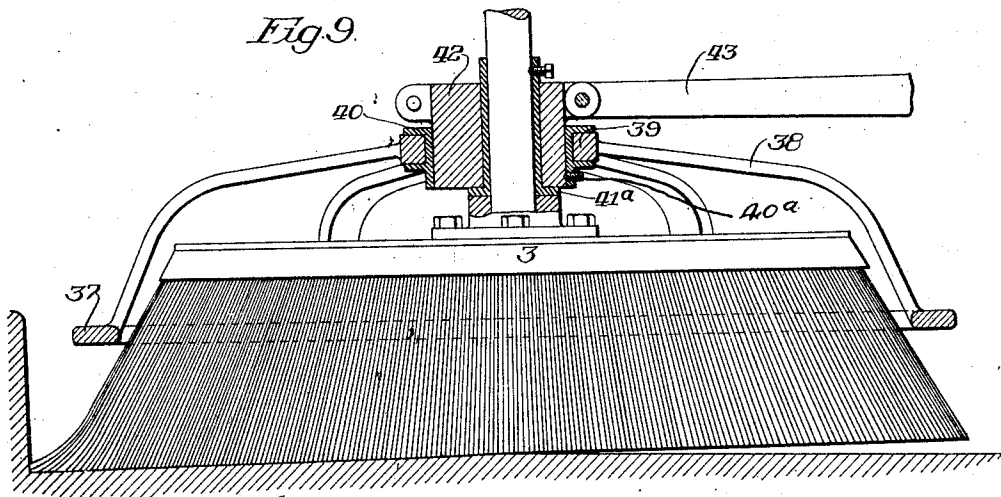
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GUTTER BROOM ATTACHMENT FOR SWEEPING MACHINES

Filed Nov. 19, 1923

6 Sheets-Sheet 5



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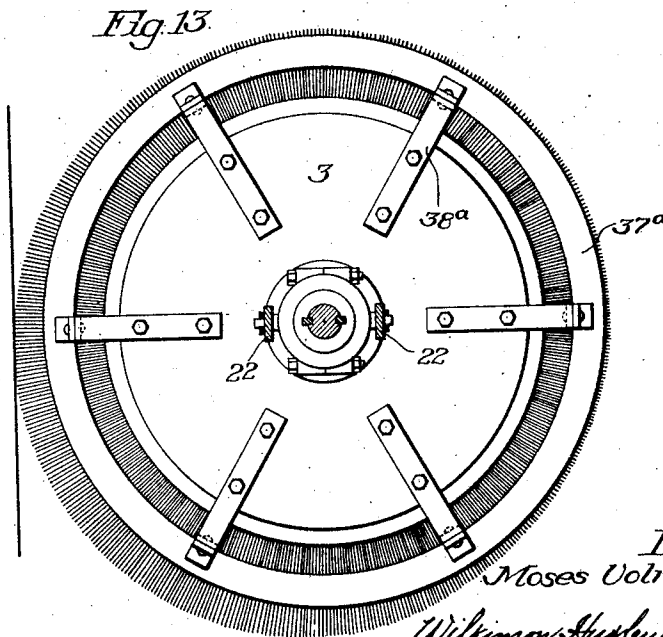
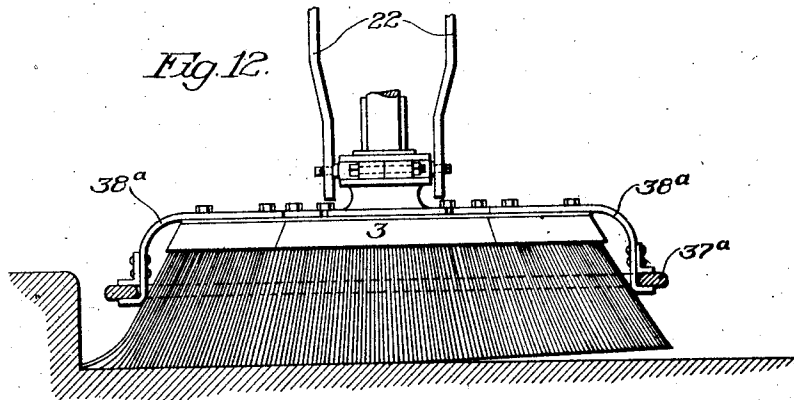
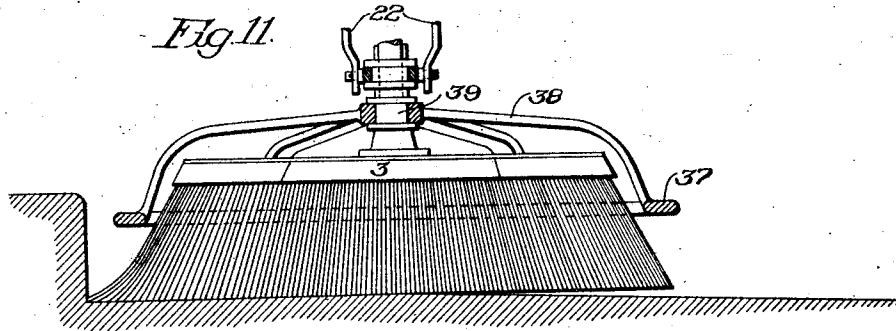
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GUTTER BROOM ATTACHMENT FOR SWEEPING MACHINES

Filed Nov. 19, 1923

6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE.

MOSES VOLNEY LIDDELL, OF MATTITUCK, NEW YORK.

GUTTER-BROOM ATTACHMENT FOR SWEEPING MACHINES.

Application filed November 19, 1923. Serial No. 675,440.

This invention relates to means for mounting upon a sweeping machine, for instance, a power driven pick-up sweeper for street and road cleaning purposes, a broom of the kind usually designated as a gutter broom, comprising a body of splints or bristles mounted to rotate upon a vertical or approximately vertical axis.

One object of the invention is to provide means whereby a gutter broom, while being rotated about its axis, will be permitted to feed bodily outward from the vehicle upon which it is mounted in order to maintain a sweeping path that extends entirely to a curb or other obstruction that renders the surface inaccessible to the main broom of the sweeper; and in realizing this end, according to the preferred embodiment of the invention, the gutter broom of a sweeper is rotatably supported in a head which is connected with the frame of the sweeper through means of vertically spaced radius arms having their remote ends pivoted to the frame in a vertical axis offset from the head in the longitudinal direction of the machine, so that the head, with the gutter broom, will be free to swing laterally of the machine, within limits, the head will be sustained against torsional displacement, and the position of the shaft of the broom will be definitely fixed, preferably at an angle to the vertical, which limits surface contact of the broom to the forward outward segment thereof. A feature of the construction incident to the preferred means for realization of this object consists in means for raising the broom from operative position and thrusting it downward to such position, which means is mounted upon the swinging head so that the load of the elevating means as well as the broom is not only removed from the swinging head when the gutter broom is in action, but even develops upward reaction from the depressing thrust or load of the elevating lever which largely relieves the bearing of the swinging head or its controlling arms upon the vehicle frame.

Another object of the invention is to adapt the gutter broom to automatically feed outwardly toward the curb or other obstruction, and to this end, another feature of the invention consists in combining the features of limited segment of contact and freedom of horizontal swinging. A subordinate feature incident to the preferred means for realizing this object consisting in providing

a resilient return connection for the head, which normally tends to draw the head inward, but with a force less than the outward feeding force developed by rotation of the broom, with its limited segment in contact with the surface, so that whenever the broom is raised out of contact with the surface, it will be held to the inner limit of its horizontal swinging movement, and thereby reduce the overall lateral dimension of the machine during transport or while sweeping areas not involving the gutter or curb.

Still another object is to sustain the load of the broom mounting, through the broom, upon the surface that is being swept, with the dual effect of insuring proper sweeping contact by the load sustained, and relieving the head and radius arms from substantial bearing upon the frame of the vehicle during the swinging movements of the broom; to which end, the means for lowering and raising the broom to and from operative position is mounted upon the head in which the broom is rotatably mounted and with which the broom swings. One subordinate feature incident to the preferred means for realizing this object consists in fixing the rotary broom shaft against vertical movement in the swinging head and having the elevating means connected with the broom in a manner to raise the broom upon the shaft as distinguished from sliding the shaft in the head; and another such subordinate feature consists in developing the broom elevating means in the form of a lever which is fulcrumed upon the head so as to partake of the swinging movements of the latter, and has its manipulating end extending a substantial distance toward the pivots of the radius arms about which the head swings, so that the lever remains within convenient reach of the operator in all positions of the head.

Still another object of the invention is to provide means to relieve the bristles of the broom from excessive lateral thrust against the curb during gutter sweeping, and to this end, another feature of the invention consists in interposing between the body of the broom and the curb, preferably in a horizontal plane intermediate of the disk of the broom and its surface of contact, a curb guard that will impinge against the curb under excessive outward feed of the broom and before the bristles are unduly deflected inwardly or subjected to excessive wearing

pressure; this curb guard being preferably in the form of an annulus supported with freedom of rotation in order to reduce the friction of its own contact with the curb, and also being, in the preferred embodiment of this feature of the invention, supported upon the broom through means of a sleeve that is eccentric to the shaft of the broom and therefore adapted, by rotation of the eccentric to different relative positions, to vary the offset of the curb guard toward the curb and render the limiting action appropriate to different stages in the length of the bristles as they wear away in use.

In the accompanying drawings which show that portion of a sweeping machine with which the present invention is immediately concerned and in which the preferred embodiments of the several features of the invention are included by way of illustration—

Figure 1 is a side elevation of the forward portion of a sweeping machine including its power developing and transmitting elements and certain elements of control.

Figure 2 is a plan view of the same, with certain parts of the vehicle omitted.

Figure 3 is a vertical axial section showing details of the construction, mounting and control of the gutter broom.

Figure 4 is an elevational view of parts shown in Figure 3, as viewed from the right in the latter figure.

Figure 5 is a plan view, and Figure 6 is a side elevation of a modified mounting for the gutter broom whereby it is permitted to feed outward when in contact with the surface and retracted when raised therefrom.

Figure 7 is a plan view showing a third method of mounting a gutter broom with outward feed and automatic retraction.

Figure 8 is a plan view showing a fourth method of realizing the functions of outward feed and automatic retraction of a gutter broom.

Figures 9 and 10 are, respectively, a side elevation partly in axial section, and a plan view of a gutter broom having associated therewith a curb guard and means for changing the offset of said guard in the direction of the curb.

Figure 11 is a view similar to Figure 9 showing the curb guard mounted upon the gutter broom with freedom of rotation but without adjustment.

Figures 12 and 13 are, respectively, a side elevation and a plan view showing still another method of mounting a curb guard upon a gutter broom.

Referring more particularly to Figures 1 and 2, 1 represents the chassis frame and 2 the power plant of a motor propelled sweeping machine, and 3 represents a gutter broom mounted on said machine with its shaft 4 in approximately vertical position. In order that the gutter broom 3 may move outward and inward laterally of the frame 1, shaft 4 is

journaled in a swinging head 5 comprising a cylindrical housing 5^a and a supporting bracket 5^b, and terminates in a gear box 6 in which its bevel gear 7 meshes with a gear 8 on the stub shaft 9 which is connected through universal joint 10, connecting rod 11, and universal joint 12 with a horizontal shaft 13 which is driven from the power plant 2. Swinging head 5 is connected with chassis frame 1 through means of radius arms 14, 15 vertically spaced apart so that they can swing in horizontal planes above and below said frame, and having their ends remote from the head connected with the frame through pintles 16, 17 lying in a vertical axis distant from the head 5 in the longitudinal direction of the machine. Head 5 is thereby adapted to swing horizontally about the pintles 16, 17 as an axis and in a direction approximately transverse to the longitudinal axis of the machine; and said head, while thus free to swing, is rigidly sustained by the radius arms against torsional displacement and is thus adapted to definitely fix the position of the vertical shaft 4. Shaft 4 is mounted in the head 5 at an angle to the vertical that insures surface contact of the broom 3 only at a forward and outer sector of the broom so that when the broom is rotated counterclockwise, as viewed in Figure 2, it tends to "walk" or automatically feed outwardly toward the curb with reference to which the machine is being driven, and thus insures engagement of the bristles with the entire area of the gutter and angle between the gutter surface and the curb.

18 represents a limit stop mounted on the frame 1 and extending across the path of one of the radius arms, for instance, the arm 15, to limit the outward movement of the broom 3 under the action just described. 19 represents a spring which may be employed if desired for normally drawing back the broom when raised out of contact with the surface; or the broom may be drawn inward through means of a lever, now to be described, by which the broom is raised and lowered.

To adapt the broom 3 to be raised and lowered relatively to its mounting and thus presented in or withdrawn from working position, the broom is preferably fitted to slide up and down upon its shaft 4, the latter being fixed against vertical movement in the head 5; and in order that the broom may be loaded by its elevating and depressing mechanism, and the bearing of the head 5 as well as the upper radius arm 14 upon the frame 1 largely relieved when the broom is in operation, the elevating and depressing mechanism is mounted upon the head 5 and involves not only means for sustaining the broom in elevated position but means for regulating the depression of the broom upon its shaft, which latter means is adjustable in order to compensate for reduction of the vertical dimension of the broom as the bristles wear

away. Thus, the raising and lowering mechanism may comprise a fulcruming arm 20 mounted on the gear box 6, and a lever 21 fulcrumed at 21^a on said arm, connected by links 22 with the broom 3, and having its manipulating end 23 extended toward the axis 16, 17 upon which the broom swings, which brings the lever within convenient reach of the operator occupying the seat 24, and is sufficiently near the axis of swinging movement to greatly reduce the arc through which the grip of the lever swings, and therefore avoids moving the lever beyond reach of the operator. Segment rack 25 receives the locking dog 26 of the lever 21 in the notch 27 for holding the broom elevated. The position of the joint 28 between links 22 and lever 21, in relation to the fulcrum 20 of said lever and the mass of the free end of the lever beyond said joint 28 is such that not only does the load of the lever assist in depressing the broom, but reaction from such downward thrust develops a substantial upward moment on the fulcrum arm 20, which, transmitted to the swinging head 5, largely relieves the bearing of the head and the radius arm 14 upon the frame.

Shaft 13 drives the connecting rod 11 through means of bevel gears 30, 31, of which the gear 30 is carried by the shaft 13 but is loose thereon and enters into driving relation thereto through manipulation of the clutch 32. Thus, the shaft 13 can be employed for driving other mechanisms which enter into the organization of the complete sweeping machine, such, for instance, as the main sweeping broom, elevator, etc., not shown, and thus the gutter broom may be completely thrown out of action when the machine is used for sweeping unobstructed surfaces or in situations where the gutter broom is not desired.

Shaft 13 is preferably driven through bevel gears 33 from shaft 34 of an auxiliary transmission 35, which in turn receives its drive from the motor shaft 36, the auxiliary transmission 35 being preferably separate and distinct from the transmission through which the shaft 36 propels the sweeping machine. These features are described and claimed in my application filed of even date herewith, and serially numbered 675,441; and except for certain novel features in the variable speed drive of brooms, including the gutter broom, in relation to the drive of the machine, as well as the condition of driving either or both brooms independently of the propulsion of the machine when desired, they bear no special relation to the construction and operation of the gutter broom per se, which forms the subject-matter of the present application.

In order to avoid undue wear upon the bristles of brush 3 by outward thrust of the brush against the curb, brush 3 is provided

with a curb guard 37 (Figures 9, 10, and 11) or 37^a (Figures 12 and 13) in the form of an annulus surrounding the body of bristles in a plane intermediate between the sweeping surface and the disk of the broom, and this guard is preferably mounted with freedom of rotation, as, for instance, by supporting it through means of a spider 38 (Figures 9, 10 and 11) in a bearing 39 (Figures 9 and 10) or 38^a (Figures 11, 12, and 13) carried by the broom. And in order that the guard 37 may be adjusted relatively to the axis of the broom and thus compensate for changes in the diameter of the body of bristles as the latter wear away, the bearing 39 is provided by a sleeve 40 (Figures 3, 9 and 10) mounted upon the hub 41 (Fig. 3) or 41^a (Fig. 9) of the broom through the medium of an eccentric 42 which is adapted to be adjusted and held in any designed rotary position by means of lever 43. By adjusting the sleeve 40 vertically, as, for instance, by releasing and resetting the set screw 40^a (Figs. 3 and 9) the height of the guard 37 can be changed appropriately to changes in the height of the brush resulting from wearing away of the bristles.

If desired, the curb guard may be mounted directly upon the broom and without radial adjustment, as shown in Figures 12 and 13, wherein the annulus 37^a is rotatably supported on arms 38^a bolted directly to the disk of the broom.

For supporting the broom with freedom of lateral swinging movement relatively to the machine frame upon which it is mounted, means other than that disclosed in Figures 1 and 2 may be employed. For instance, as shown in Figures 5 and 6, the head 5^x and gear box 6^x may be mounted to slide upon the arcuate guides 44 through means of sleeves 45 and rolls 46, springs 47^a being arranged to normally draw the broom inward. Or, as shown in Figure 7, a head 5^x and gear box 6^x may be sustained with lateral movement relative to the machine frame through means of a lazy-tong construction 48, spring 47^b being provided for normally returning the broom. Or, as shown in Figure 8, the gutter broom, and its appurtenant mountings may be sustained by a radius arm 49 pivoted to a bracket arm 50 and provided with a controlling spring 51 for drawing it inward when not in use.

I claim:

1. In a machine for sweeping surfaces adjacent to curbs, a frame, a rotary broom positioned with its axis of rotation approximately vertical but inclined in the vertical plane of travel, to limit its contact with the swept surface to a sector which in the rotation of the broom moves away from the curb, means rotating the broom and developing from said limited sector of contact an inherent feeding force in the broom which is toward the curb,

and a broom-mounting connecting the broom with the frame with freedom of the broom to respond to said feeding force.

2. In a machine for sweeping surfaces adjacent to curbs, a frame, a rotary broom positioned with its axis of rotation approximately vertical but inclined in the vertical plane of travel, to limit its contact with the swept surface to a sector which in the rotation of the broom moves away from the curb, means rotating the broom and developing from said limited sector of contact an inherent feeding force in the broom which is toward the curb, a broom-mounting connecting the broom with the frame with freedom of the broom to respond to said feeding force, means for raising said broom from surface contact, and means for drawing the broom toward the frame when so raised, acting constantly but yieldingly upon the broom, and being of less force than the outward feeding force inherent in the broom when it is in surface contact.

3. In a machine for sweeping surfaces adjacent to curbs, a frame, a rotary broom positioned with its axis of rotation approximately vertical but inclined in a direction to limit sweeping contact to a sector of the broom which, in the rotation of the broom, moves away from the curb, means for rotating the broom means mounting the broom upon said frame comprising a radius arm having pivotal connection with the frame, and extending from said pivotal connection forwardly with respect to the direction of travel of the machine and swinging laterally on said pivotal connection under the resistance of the broom, and means for limiting outward lateral movement of the broom.

4. In a sweeping machine, a frame, a rotating gutter broom, a head in which said broom is mounted with freedom of movement of the broom to and from the swept surface and with its axis of rotation approximately vertical, but inclined in a direction to limit contact of the broom with the pavement, to a sector of the broom which moves away from the curb, during rotation, means connecting said head with the frame said means being movable with the head laterally outward from the frame under the feeding force of the broom, and broom-raising means which presses the broom downward when the broom is lowered; said broom-raising means being sustained by and reacting upwardly upon the head to reduce the load of said head while pressing downwardly upon the broom.

5. In combination in a sweeping machine, a frame, a gutter broom rotating about an approximately vertical axis, means for mounting said broom upon the frame and permitting it to move bodily outward thereon without changing the angular position of the axis of the broom, and a stop limiting said swinging movement: said means comprising a head in which the broom is journaled, and

a pair of horizontally swinging vertically spaced radius arms, each connected at one end with the head and having its other end pivotally connected to the frame; and said limit stop being mounted on the frame and projecting across the path of one of said radius arms.

6. In a sweeping machine a frame, a rotating broom, a broom-mounting positioning the broom with its axis of rotation approximately vertical but inclined in the plane of travel of the machine and with freedom of the broom to move downwardly and upwardly to and from the swept surface, said broom-mounting being movable laterally to and from the machine, a vertical support for said laterally movable broom-mounting, and broom-raising means carried upon and sustained against vertical displacement by said broom-mounting, adapted to press the broom downward, and reacting upwardly upon the broom-mounting and reducing the pressure of the mounting upon said vertical support while the broom is depressed.

7. In a sweeping machine, a frame, a head, a radius arm connecting the head with the frame with freedom of horizontal swinging movement in the head, a gutter broom journaled in said head, and a pressure developing means for depressing said broom upon the surface; said means being mounted on and sustained against vertical displacement by the head while imposing downward pressure upon the broom and thereby reacting upwardly upon the head from the thrust incident to the depression of the broom, and largely relieving the load of the head upon the machine when the broom is in action.

8. In a sweeping machine, a frame, a horizontally swinging radius arm pivotally mounted on said frame and projecting forwardly from its pivot, a gutter broom having an approximately vertical shaft journaled in the forward free end of said arm, and a broom elevating and depressing lever fulcrumed on said arm and having positive lifting and depressing connection with said broom and having an operating end adapted for manipulation extending rearwardly toward the pivot of the arm.

9. In a machine for sweeping surfaces adjacent to curbs, a frame, a rotating broom, a head in which said broom is rotatably mounted with its axis approximately vertical but inclined in the plane of machine travel to cause the broom to contact through a sector which moves away from the curb, and with freedom of the broom to move downwardly and upwardly to and from the surface swept, a radius arm mounting said head upon the frame with freedom of the head to swing laterally, said radius arm being pivoted on the frame at a point in rear of the broom and thereby adapted to thrust the broom forwardly in the travel of the machine, and a broom-

raising lever having lifting connection with the broom and fulcrumed on said head, whereby the lever partakes of the lateral swinging movements of the head and broom; said lever having a free manipulating end extending rearwardly near the radius arm and toward the pivot of the radius arm.

10. In a street sweeping machine, a gutter broom, a head mounted to swing horizontally about a center on said machine in rear of said head, a rotatable broom having a shaft journaled in said head and swinging bodily with the head, a driving member mounted on the machine independently of said head, and a connecting rod universally jointed to said driving member in the line of said center and extending forwardly therefrom and connected with said shaft.

11. In a machine for sweeping surfaces adjacent to curbs, a frame, a rotatable broom, means mounting the broom upon the frame with freedom of the broom to move laterally toward a curb, and a guard mounted upon said broom and limiting the approach of the broom to the curb; said guard comprising an annulus surrounding the axis of rotation of the broom, in a substantially horizontal plane, at a level above the swept surface and mounted for rotation independent of the rotation of the broom.

12. In a machine for sweeping surfaces adjacent to curbs, a frame, a rotating broom,

means mounting said broom upon said frame, with its axis of rotation approximately vertical and with freedom of the broom to move laterally toward a curb, a guard for limiting the approach of the broom to the curb, comprising an annulus surrounding the axis of rotation of the broom in an approximately horizontal plane above the swept surface, and means carried with the broom in mounting the guard with freedom of rotation independent of the rotation of the broom, the last-named means being adjustable relatively to said axis of rotation in a plane that changes the approach of the broom to the curb.

13. In a street sweeping machine, a frame, a rotatable broom mounted on said frame with its axis of rotation in approximately vertical position and movable bodily outward relatively thereto, toward a curb past which the machine moves, a curb guard surrounding said broom in an approximately horizontal plane at a height that adapts it to encounter the curb, an eccentric surrounding the axis of rotation of said broom and upon which said guard is mounted, and means for fixing said eccentric at different angles of rotation to vary the offset of the guard relatively to the said axis.

Signed at Mattituck, New York, this 5th day of November, 1923.

MOSES VOLNEY LIDDELL.