

T. A. KILLMAN.
STREET SWEEPER.
APPLICATION FILED JULY 18, 1911.

1,087,588.

Patented Feb. 17, 1914.

5 SHEETS—SHEET 1.

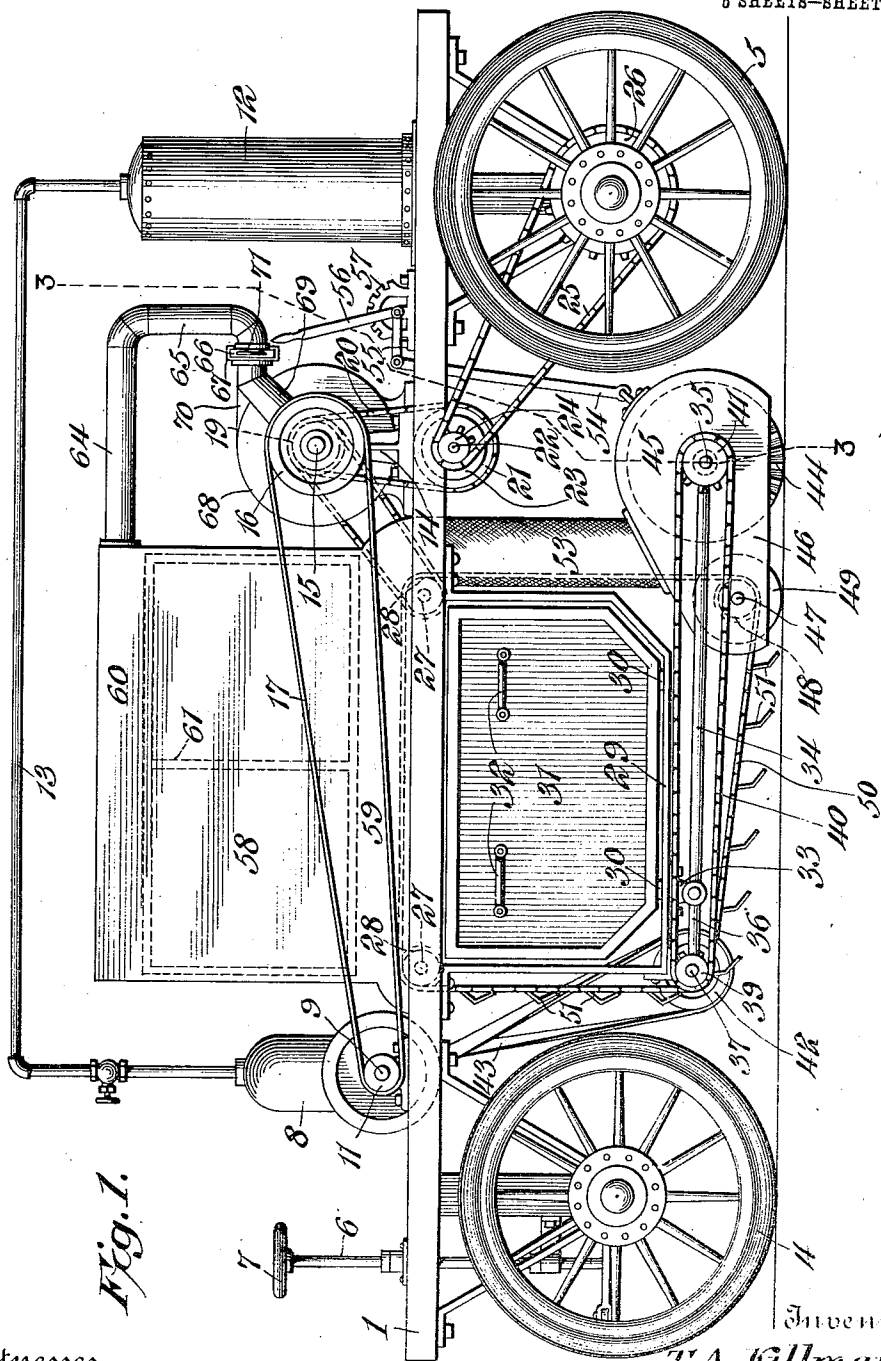


Fig. 1.

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6 SHEETS—SHEET 2.

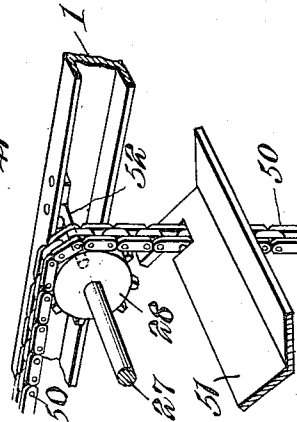
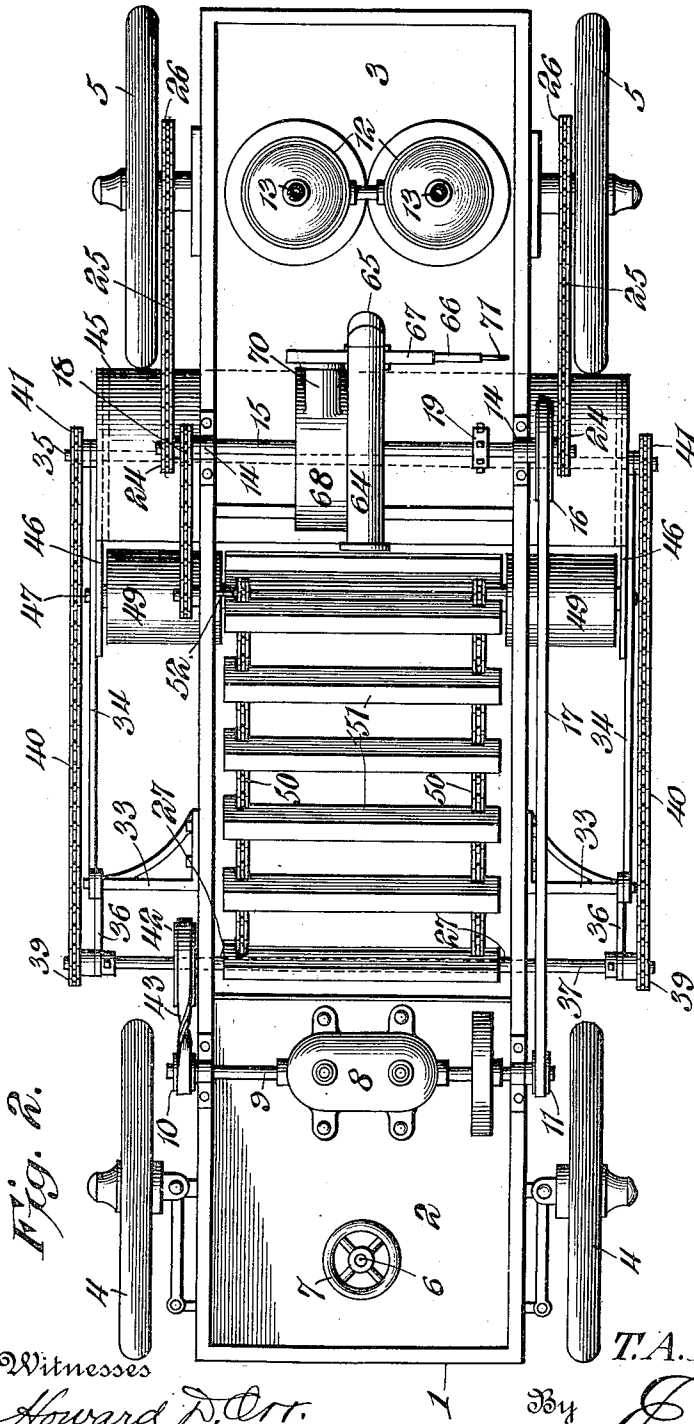


Fig. 10.

Fig. 2.

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5 SHEETS—SHEET 3.

Fig. 9.

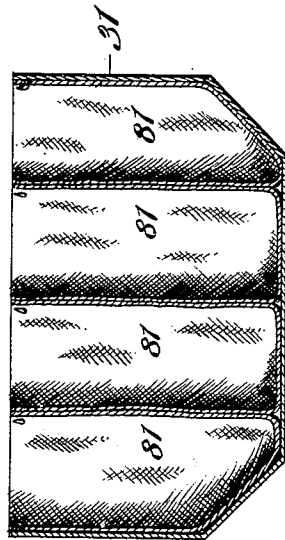
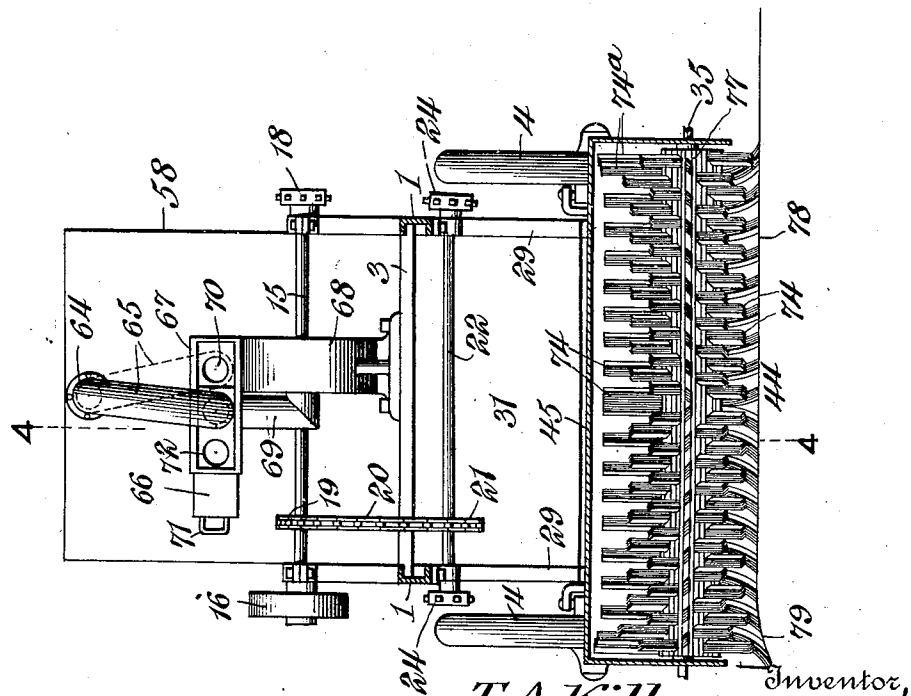


Fig. 3.



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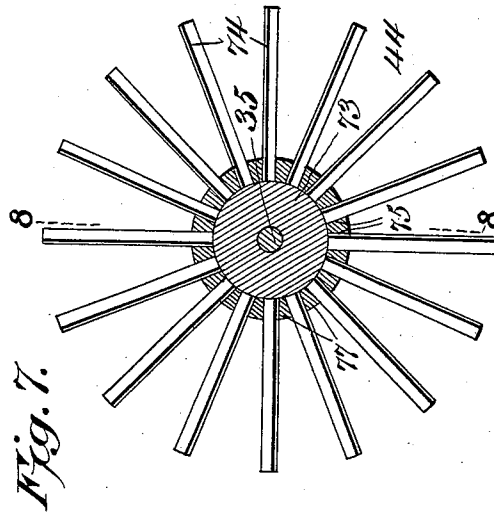
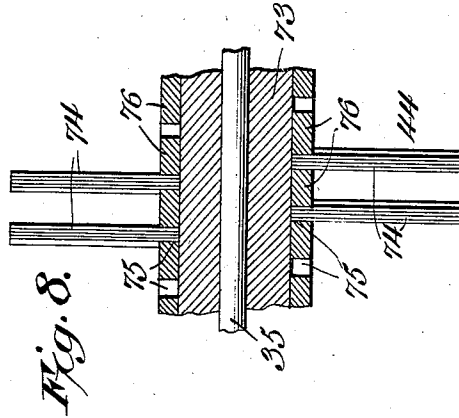
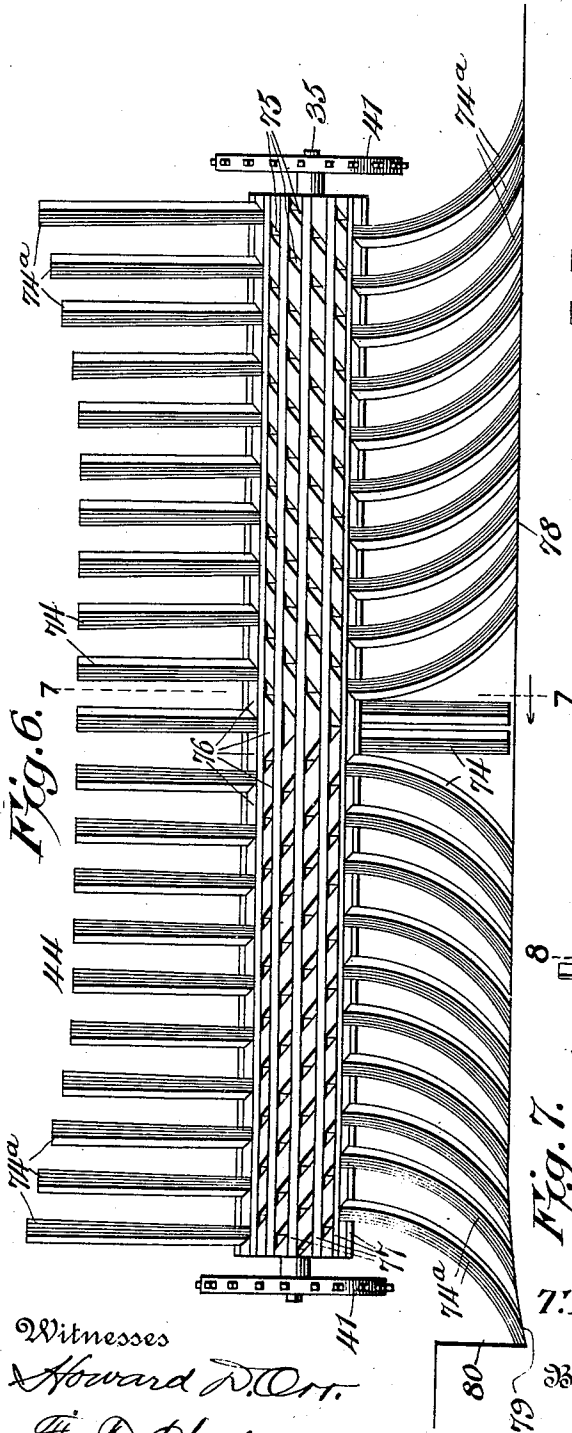
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5 SHEETS—SHEET 5.



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Witnesses

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UNITED STATES PATENT OFFICE.

THOMAS A. KILLMAN, OF NASHVILLE, TENNESSEE.

STREET-SWEEPER.

1,087,588.

Specification of Letters Patent.

Patented Feb. 17, 1914.

Application filed July 18, 1911. Serial No. 639,160.

To all whom it may concern:

Be it known that I, THOMAS A. KILLMAN, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented a new and useful Street-Sweeper, of which the following is a specification.

This invention has reference to improvements in street sweepers, and its object is to provide a sweeper which will remove dirt and dust from the surface of a roadway without the necessity of first dampening the surface with water by sprinkling, and which at the same time will not scatter dust broadcast, but will entrap and retain all the dirt and fine dust which may be taken from the surface of the roadway, the invention further contemplating the employment of a collecting brush of comparatively wide extent, usually wider than the tread of the machine, so that the sweeping may be performed up to the curbs of gutters, but a comparatively narrow conveyer for the reception of the swept dirt may be utilized.

In accordance with the present invention there is provided a vehicle having dirt collecting and receiving means and dust collecting means embodying constructions hereinafter set forth, whereby the cleansing of the surface of a roadway is facilitated. Moreover, in accordance with the present invention the dirt gathering brush is so designed as to not only sweep over a wider path than the width of tread of the vehicle but impel the swept dirt toward the center line of travel of the vehicle, so that such swept dirt will be deposited upon the buckets of a conveyer materially narrower than the width of tread of the vehicle, wherefore the weight and bulk of the vehicle is markedly less than would be the case were the sweeping brush and conveyer of substantially equal extent in a direction transverse to the length of the vehicle.

The invention will be best understood from a consideration of the following detailed description, taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that while there is shown in the drawings a practical embodiment of the invention, the latter is susceptible of other practical embodiments without departure from the salient features of the invention.

In the drawings:—Figure 1 is a side elevation of a street sweeper constructed in ac-

cordance with the present invention. Fig. 2 is a plan view of the street sweeper with the dust separator removed. Fig. 3 is a section on the line 3—3 of Fig. 1 with parts omitted. Fig. 4 is a section on the line 4—4 of Fig. 3, but drawn to a larger scale, and omitting the dust collecting brush, the suction fan and other parts. Fig. 5 is a section on the line 5—5 of Fig. 4. Fig. 6 is an elevation, with some parts omitted, of the dust collecting brush separate from the sweeper. Fig. 7 is a section on the line 7—7 of Fig. 6. Fig. 8 is a section on the line 8—8 of Fig. 7. Fig. 9 is a view of the removable dirt receiving box provided with dirt receiving sacks. Fig. 10 is a detail perspective view of the means for tripping the flights on their passage over the dirt receptacle.

In the drawings there is shown a vehicle provided with a frame 1, preferably of channel steel, having a flooring or platform 2 at one end and a flooring or platform 3 at the other end. The vehicle is supported on wheels 4, 5 all of suitable type. The wheels 4, which are the front wheels, are controlled by a steering stem 6 having a hand wheel 7. Mounted on the platform 2 is an engine 8 which may be an explosion engine and is typical of any power means sufficient to propel the vehicle and actuate the moving parts requiring power to drive them. The engine 8 is provided with a shaft 9 extending beyond the side beams of the frame 1 and at the ends carries pulleys 10, 11, respectively. The platform 3 carries tanks 12 connected to the water jackets of the engine 8 by pipes 13, so that the tanks 12 constitute radiators for cooling the engine.

The parts so far described may be varied as the constructor may desire.

Mounted in journal bearings 14 on the side members of the frame 1, near the rear portion of the frame, is a shaft 15 extending at its ends beyond the side members of the frame and at one end carrying a pulley 16 connected by a belt 17 to the pulley 11 of the engine shaft. The shaft 15 has at one end beyond the side members of the frame 1 a sprocket wheel 18, and adjacent the end carrying the pulley 16 also carries a sprocket wheel 19, the latter being connected by a sprocket chain 20 to a sprocket wheel 21 on a shaft 22, and the sprocket wheel 21 is connected to the shaft 22 through the intermediary of suitable transmission gear,

simply indicated in Fig. 1 by a casing 23, since such transmission gear may be of the type usually present in automobiles, and in practice includes reversing mechanism of common type. The shaft 22 carries at each end a sprocket wheel 24 connected by a sprocket chain 25 to another sprocket wheel 26 fast to a respective rear wheel 5, so that the rear wheels which constitute the drive wheels of the vehicle are separately driven, as is the custom in automobile practice.

Located at about the middle portion of the machine, and in the particular showing of the drawings, on opposite sides of the transverse center line of the machine, are shafts 27 extending from one side member of the frame to the other and suitably journaled in these side members and adjacent the side members of the frame each shaft carries sprocket wheels 28, while motion is transmitted to the rear shaft 27 by a suitable sprocket chain driven by the sprocket wheel 18.

Secured to and depending from the side members of the frame 1 at points about coincident with the shafts 27, is a frame composed of two side members 29 joined at the lower portions by cross members 30, these cross members 30 with the supporting frame 29 constituting a skeleton frame in which may be lodged a box 31 constituting the dust box of the machine, and which may be readily removed from lodgment in the frame 29 when so desired, suitable handles 32 being provided for the purpose. The frame 29 has attached thereto bearing brackets 33 on each side near the forward end, these bearing brackets depending from the bottom of the frame 29, and each bearing bracket, which extends laterally outward for an appropriate distance from the corresponding frame 29 carries one end of a bar 34, the other end of which extends toward the rear of the machine to a point adjacent the corresponding rear wheel 5 where it is formed into a journal bearing for a transverse shaft 35, the said shaft 35 being supported near opposite ends by the respective bars 34 and capable of moving with said bars about the axes of the journal bearings of the brackets 33 as pivots. Fast to the brackets 33 are supports 36 extending in a direction toward the front wheels 4 and terminating in journal bearings for a transverse shaft 37 upon which latter are carried sprocket wheels 38 spaced into conformity with the sprocket wheels 28, and the shaft 37 at the outer ends beyond the supports 36 also carries other sprocket wheels 39, the latter being each connected by a sprocket chain 40 to a respective sprocket wheel 41 on the corresponding outer ends of the shaft 35. The shaft 37 also carries a pulley 42 connected to the pulley 10 on the shaft 9, by a belt 43, so that the engine 8 may drive the shaft 37 and the

latter may drive the shaft 35. The sprocket wheels 38 may be mounted to turn freely on the shaft 37, so as to not participate in the movement thereof, but to be driven by means to be described.

The shaft 35 carries a rotary brush 44 which will be more particularly described hereinafter, and this brush is inclosed except toward the surface to be swept and toward the front of the machine by a casing 45, and the casing is provided with forwardly extended side wings 46 which in turn are provided with journal bearings for the ends of a shaft 47, and this shaft at appropriate points is provided with sprocket wheels 48 corresponding in spacing to the sprocket wheels or pinions 28 and 38 before referred to. The shaft 47 between the wings 46 and the sprocket wheels or pinions 48 carry rollers 49 designed to engage the surface to be swept and uphold the shaft 47, and the corresponding end of the casing 45.

Mounted on the several sprocket wheels or pinions 28, 38 and 48 is an endless conveyer comprising suitably spaced sprocket chains 50 each carrying the corresponding ends of a series of buckets 51, said buckets being preferably of expanded V-shape in cross section and near one edge pivoted to the chains. The pivot connections between the chains and the buckets, which latter are sufficiently elongated to extend from one chain to the other chain, and at the ends beyond the chains, are such that on the up traveling run of the chain the buckets will outstand from the chain in receptive position and will be carried to the corresponding sprockets 28 on the shaft 27 at which point each bucket is caught by a pin 52 which may be supported by the corresponding side member of the frame 1 and the bucket is turned on its pivot supports to dump its contents into the box 31. It then moves toward the front of the machine and then downwardly past the shafts 25 and 37, then rearwardly in a pendent position which is maintained while the buckets are carried along by the lower run of the chain between the sprocket wheels 38 and the sprocket wheels 48, this lower run of the chain being adjacent the ground but sufficiently elevated therefrom to prevent the buckets from scraping on the ground or road surface, while the parts are so proportioned that as the buckets pass about the sprocket wheels 48 to the elevating run of the conveyer they will be in position to receive dirt thrown on to them by the brush 44.

The lifting run of the conveyer passes through a conduit 53 made fast at the lower end to the casing 45, and opening into said casing, while the upper end of the conduit 43 is carried to about the level of the upper run of the conveyer. This conduit 53 is made of material substantially impervious

to air, but still flexible so that the casing 45 may be lifted about the axis of the brackets 33 or lowered until the brush 44 is in operative relation to the surface to be swept. The raising and lowering of the casing 45 with parts carried thereby is brought about by means of a link 54, or more than one link where necessary, and this link 54 is made fast to one arm 55 of a latch lever 56 which may be held in any position by a suitable latch engaging a segmental rack 57 mounted on the platform 3. By this means the brush may be moved into engagement with the surface to be swept when sweeping is to be performed, and may be sufficiently lifted to be out of engagement with the surface of the roadway when sweeping is not desired, but the machine is to be transported from place to place.

Mounted on the frame 1 in covering relation to the upper run of the conveyer and the receptacle 31, is a hood 58 having its lower portion open at one end to the conduit 53, this lower end of the casing forming a chamber 59. The upper end of the hood is formed into another chamber 60 and between the two chambers are screens 61 arranged in parallel spaced relation, so that between a pair of screens there is formed a channel 62 closed at one end, and at the other end open to the chamber 60, while between every two pairs of screens there is formed another channel 63 closed to the chamber 60 and open to the chamber 59, and there are provided as many pairs of screens 61 as may be found necessary and the size of the hood 58 will permit. Leading off from the chamber 60 is a pipe 64 connected at the end remote from the casing 58 to an elbow pipe 65, the connection being such that the elbow 65 may move with relation to the pipe 64 about the longitudinal axis of the latter. The elbow section 65 has its end remote from the pipe 64 connected to a slide 66 mounted in a frame 67, so that the slide may be moved lengthwise of the frame, this movement being substantially parallel with the base of the machine. The frame 67 is mounted on the casing of a blower or fan 68 having an inlet 69 and an outlet 70, although, of course, it will be understood that the terms inlet and outlet will depend upon the direction of rotation of the fan which is mounted upon the shaft 15. By means of the slide 66 which is provided with a handle 71 for manipulation, the elbow section 65 of the pipe section 64 may be brought into communication with the intake 69 of the fan, or the outlet 70, and the slide 66 is provided with a passage 72 which, when the elbow 65 is in communication with the outlet 70, will match the intake 69, so that the latter is then in free communication with the atmosphere. The purpose of this arrangement will presently appear.

In order to make the sweeper effective for road sweeping, the path of the brush should be sufficiently wide to extend beyond the margin of tread of the machine, so that the brush will take into gutters up to the curb, and, furthermore, the structure of the brush should be such that the crown of the roadway and the depression of the gutters will not interfere with the sweeping action of the brush. With brushes as heretofore constructed such lateral extension means either that the conveyer must be as wide, or wider than the brush, or that more than one brush must be used and in the latter case brushes be set at an angle one to the other in order that the dirt may be delivered to a conveyer of less width than the combined sweeping extent of the brushes transverse to the machine. In order to realize these desirable conditions, the brush 44 is provided, and this brush is best shown in Figs. 3, 6 and 7. The brush comprises a body portion 73 which may be of substantially cylindrical form, and this body portion carries tufts 74 made up of bundles of flat bands, that is, the bands are wider than thick and each has its forward face set at an oblique angle to the axis of rotation and to the line of travel of the vehicle, the angle being approximately forty-five degrees, although not confined to any exact angle. The tufts or bundles 74 of sweeping strips are lodged in pockets 75 which may be formed by appropriately located blocks 76 fast on the cylinder or hub 73 between longitudinal ribs or strips 77, which latter are appropriately spaced circumferentially about the hub or body portion 73. From each end of the brush toward the middle thereof the tufts or bundles 74 are so arranged that their flat portions on engaging the surface to be swept will strike the latter at an angle tending to move the engaging or outer end of the bundle toward the corresponding end of the brush, the result being that the brush will spread outwardly toward the ends, and at the ends the engaging portions of the bundles will expand beyond the ends of the body portion 73, whereby the effective path of the brush is considerably extended over the length of the brush where not in engagement with the surface to be swept. However, as the bundles of sweeping strips are carried along and finally away from the surface to be swept, their resiliency, these strips being made of elastic fibrous or other material, will cause the bundles of strips to again assume their normal, substantially radial relation to the axis of rotation of the brush, with the result that any dirt engaged by the sweeping ends of the bundles of strips will be impelled toward the middle of the brush, and as the strips composing the bundles leave the surface with an added speed due to their elasticity on assuming

their normal position, the dirt is thrown with considerable force forward and toward the middle portion of the brush. Moreover, the terminal bundles are made longer than the intermediate bundles, so that they will reach well into a gutter and up to the curb without the necessity of moving the supporting wheels of the vehicle into so close relation to the curb as to touch the same.

10 In Fig. 6 the surface to be swept is indicated by the line 78, a gutter is indicated at 79, and a curb at 80, while the elongated bundles at the ends of the brush are indicated at 74^a.

Let it be assumed that the sweeper is traveling along a roadway which it is desired should be swept and that this roadway has not been sprinkled or wet down, but is simply in a dry, dusty condition, with heavier dirt also scattered over the roadway.

20 The brush 44 rotates on an axis substantially transverse to the line of travel of the vehicle and when the sweeping is to be done the lever 56 is manipulated to lower the casing 45 and the brush 44 with it until the brush is in such relation to the road surface that the bundles of sweeping strips will on engaging the surface bend from the middle portion of the brush outwardly toward the ends thereof in a manner more or less diagrammatically represented in Figs. 3 and 6.

30 The parts are so proportioned that the conveyer buckets 51 move from front to rear with relation to the travel of the vehicle at approximately the speed of progression of the vehicle, so that these buckets are relatively stationary with respect to the surface being swept, when they approach the position to receive dirt propelled forward by the sweeping members of the brush. The rollers 49 not only serve to support the shaft 47, but also receive any dirt thrown by the brush against them to return the same to the brush by rebound closer to the center of the brush than before, so that the dirt from the extreme ends of the brush is not thrown in front of the conveyer, but is returned to the brush to be again thrown forward and into the buckets 51 being continually presented into operative relation with the brush.

50 While the machine is moving forward, the fan 68 is driven and the slide 66 is so positioned that air is drawn from the chamber 60 by way of the pipe 64 and elbow 65 and is discharged into the atmosphere. This creates a current of air through the screens 61 from the chamber 59, and also by way of the conduit 53 which opens into the casing 45 close to the point where the brush 44 directs the sweepings on to the conveyer buckets 51. The result of this is that there is a strong current of air directed through the conduit 53 in the same direction as the travel of the buckets 51, and all light and some heavier particles of dust and dirt are carried by the strong air current into the

chamber 59, while dirt deposited in the buckets 51 is discharged into the receptacle or box 31. The lighter or floating particles of dust or dirt are caught by the streams 61 so that air reaching the chamber 60 is clean air and as such is discharged into the atmosphere. The masses of dust deposited on the screens 61 in time become heavy enough to fall by their own weight into the box 31 immediately beneath these screens. However, portions of the dust become imprisoned in the meshes of the screens and do not so drop, but ultimately clog the screens, whereby the air currents become less effective. Then the slide 66 is momentarily moved to bring the elbow pipe member 65 into communication with the outlet 70 of the fan and the opening 72 into communication with the fan intake, thus reversing the air currents through the machine and a blast of air is directed against those sides of the screens presented toward the channels 62 to blow the dust off the faces of the screens presented to the channels 63, which dust ultimately finds its way into the receptacles 31.

It is quite customary in street sweeping to collect the sweepings in sacks, and when these sacks are full their mouths are tied and they are then placed in carts or other vehicles for transportation to the point of disposal. In Fig. 8 the dirt receiving box 31 is shown provided with dirt receiving sacks 81 into which the dirt carried by the conveyer buckets 51 and dislodged from the screens 61 may gravitate, and when these sacks are full, the box 31 may be removed from the machine, the sacks taken from the box and tied up and empty sacks placed in the box for the reception of further sweepings.

While the engine 8 has been described as the prime mover for both the vehicle and the movable parts mounted upon the vehicle, it will be understood that the vehicle may be otherwise propelled than by the engine 8.

What is claimed is:—

1. In a street sweeper provided with supporting wheels, an elevating conveyer between and of less lateral extent than the breadth of the sweeper as defined by the supporting wheels, and a single sweeping brush of greater length than the width of the sweeper as defined by the supporting wheels and extending transversely of the sweeper substantially perpendicular to the line of travel of said sweeper, said brush having its sweeping elements all normally substantially perpendicular to the longitudinal axis of the brush and at the end portions of the latter of greater length than at the intermediate portions to direct sweepings toward the center line of the vehicle.

2. In a street sweeper, the combination of a vehicle, a transversely disposed dirt re-

ceiving means thereon, and a rotatable sweeping brush having a straight axis of rotation and of greater axial length than the transverse extent of the dirt receiving means, said brush having elastic sweeping elements all normally substantially perpendicular to the axis of rotation and each consisting of a member wider than thick and with the forward face set at an oblique angle to the plane of rotation of the member about the axis of rotation of the brush, said elements being so set that said oblique angle on one side of the center of the brush is the reverse of that on the opposite side.

3. In a street sweeper, a rotatable sweeping brush having a straight axis of rotation in transverse relation to the line of travel of the street sweeper, an elevating conveyer in front of the brush in position to receive dirt therefrom, and means between the respective sides of the conveyer and the corresponding ends of the brush for intercepting sweepings from the brush and directing them back to the brush, said brush having means for impelling sweepings from its ends toward the center line of travel of the sweeper.

4. In a street sweeper, a rotatable sweeping brush in transverse relation to the sweeper with respect to the line of travel, a conveyer, for receiving the sweepings, of less width than the length of the brush, rollers in advance of the brush and on opposite sides of the conveyer, and a casing for the brush, said rollers on opposite sides of the conveyer in front of the brush supporting the corresponding portion of the conveyer and casing and being of a length to stop sweepings thrown forward by the end portions of the brush.

5. In a street sweeper, a rotatable sweeping brush, a dirt receiving and elevating conveyer having the elevating run in front of the brush with reference to the normal direction of travel of the machine, and supporting rollers in advance of the brush and on opposite sides of the conveyer at the beginning point of the elevating run of the conveyer, said rollers being each of a length substantially that of the distance between the respective end of the brush and the corresponding side of the conveyer.

6. In a street sweeper, a rotatable sweeping brush having sweeping members disposed to direct the sweepings toward the center line of travel of the machine, an elevating conveyer of less width than the sweeping brush and having an elevating run in advance of the sweeping brush with relation to the normal direction of travel of the machine, and supporting rollers on opposite sides of the elevating run of the conveyer and extending laterally to the limits of the ends of the brush.

7. In a street sweeper, a rotatable sweeping brush having sweeping members dis-

posed to direct sweepings forwardly with relation to the normal direction of travel of the machine and toward the center line of travel of the machine, a casing overriding the brush and provided with forwardly extended terminal wings, a conveyer of less width than the length of and in advance of the brush with relation to the normal direction of travel of the machine and having an elevating run in position to receive sweepings from the brush, and supporting rollers for the forward ends of the wings of the casing and disposed on opposite sides of the elevating run of the conveyer in advance of the brush and extending laterally to substantially the corresponding ends of the brush.

8. In a street sweeper, a rotatable sweeping brush having sweeping members disposed to direct sweepings forwardly with relation to the normal direction of travel of the machine and toward the center line of travel of the machine, a casing overriding the brush and provided with forwardly extended terminal wings, a conveyer of less width than the length of and in advance of the brush with relation to the normal direction of travel of the machine and having an elevating run in position to receive sweepings from the brush, and supporting rollers for the forward ends of the wings of the casing and disposed on opposite sides of the elevating run of the conveyer in advance of the brush and extending laterally to substantially the corresponding ends of the brush, a conduit leading from the casing and inclosing the elevating run of the conveyer, a dirt receptacle in position to receive the dirt discharged by the conveyer, a dust separator in overriding relation to the dirt receptacle and communicating with the conduit, and means for directing air currents through the dust separator and the conduit.

9. In a street sweeper, a rotatable sweeping brush, elongated journal supports for the brush having in turn pivot supports at the ends remote from those carrying the brush, a casing overriding the brush, dirt receiving and elevating means in position to receive sweepings from the brush, means for elevating and lowering the casing and brush about the pivot supports of the journal bearings of the brush, and a flexible conduit connected at one end to the casing and housing the elevating run of the conveyer.

10. In a street sweeper, a rotatable sweeping brush, a casing in part housing the brush and provided at the ends with wings extended forwardly in the normal direction of travel of the machine, the journals of the brush extending through the casing, a rod at each end of the casing formed at one end with a journal bearing for the corresponding journal of the brush, said rod extend-

ing forwardly in the normal direction of travel of the machine and at the forward end provided with a pivot support, an endless conveyer having an elevating run in position to receive sweepings from the brush and disposed in front of the brush with relation to the normal direction of travel of the machine, rollers on opposite sides of the conveyer having journal supports in the forwardly extended end wings of the casing, a flexible conduit connected at one end to the casing and through which the elevating run of the conveyer travels, a pendent sustaining means for the casing and brush carried thereby, and means for adjusting the pendent supporting means to elevate or lower the casing about the axis of the pivot supports of the rods as a center.

11. In a street sweeper, a rotatable sweeping brush having the active portions mov-

able in the same direction as the normal direction of travel of the machine, and an endless conveyer having an elevating run adjacent to and in advance of the brush in position to receive sweepings therefrom, the conveyer having its return run located close to and approximately parallel with the surface being swept and movable in a direction the opposite of the normal direction of travel of the machine, said conveyer having actuating means timed to cause the speed of movement of the return run to be substantially that of the travel of the machine.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

THOMAS A. KILLMAN.

Witnesses:

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A. E. POTTER.