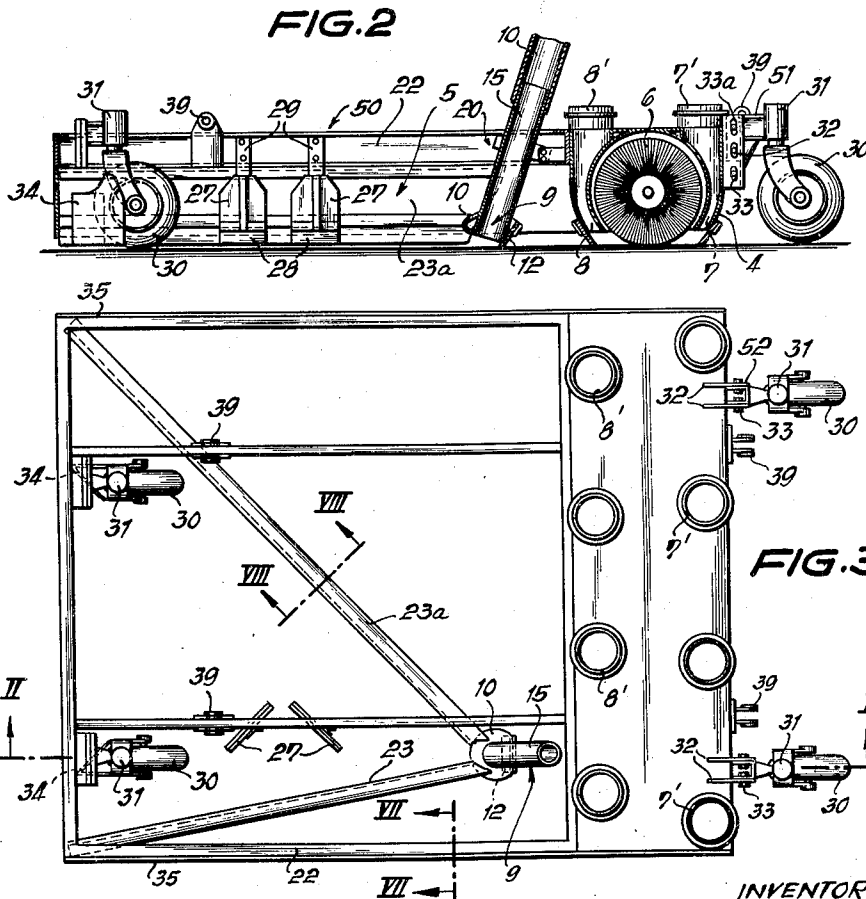
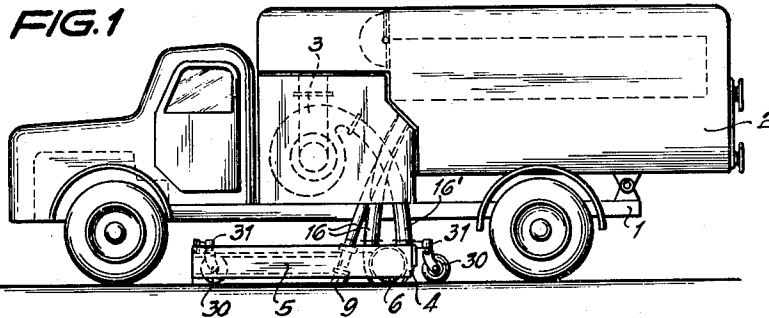


Filed May 27, 1959

**AUTOMATIC SWEEPING MACHINE FOR
RUNWAYS, STREETS, ROADS
AND THE LIKE**

3 Sheets-Sheet 1



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Nov. 7, 1961

H. BRAUN
AUTOMATIC SWEEPING MACHINE FOR
RUNWAYS, STREETS, ROADS
AND THE LIKE

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FIG. 4

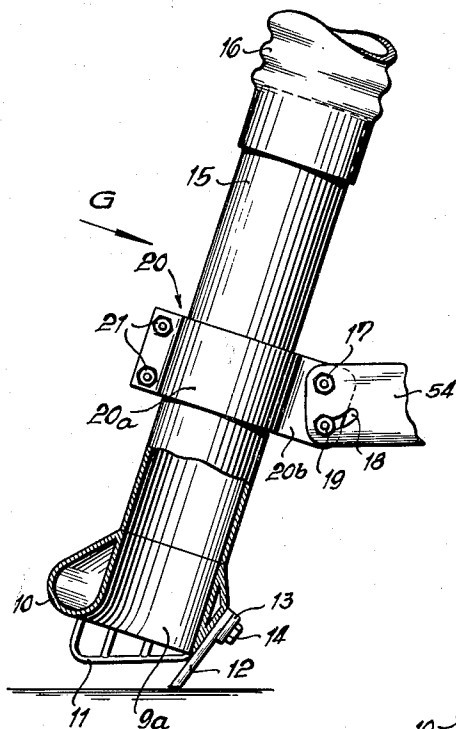


FIG. 5

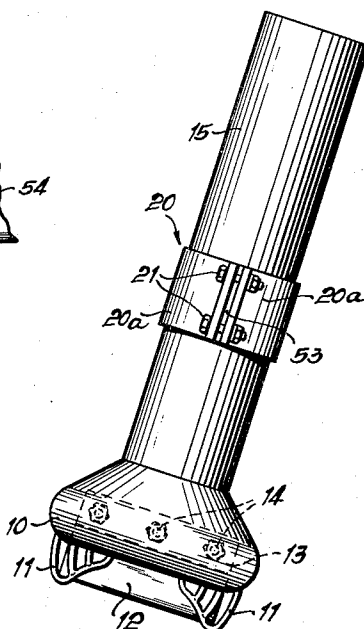
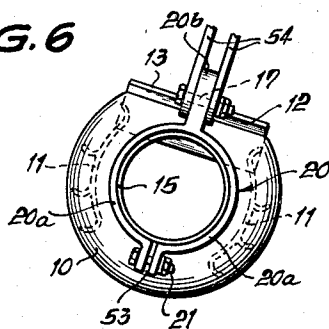


FIG. 6



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FIG. 7

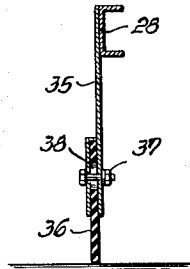


FIG. 8

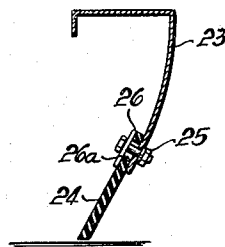
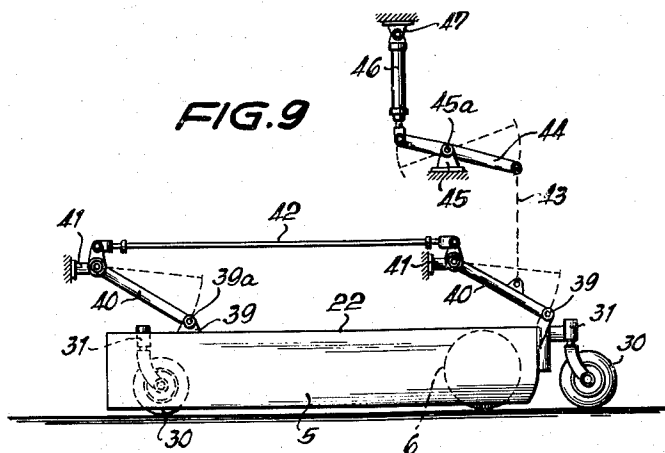


FIG. 9



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3,007,191

AUTOMATIC SWEEPING MACHINE FOR RUNWAYS, STREETS, ROADS AND THE LIKE

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13 Claims. (Cl. 15—340)

The present invention relates to automatic sweeping machines for runways, streets, roads, and the like of the general type known as vacuum road sweepers. Machines of this type comprise a rotary broom having associated therewith a suction hood.

More specifically, the present invention concerns a device for use in connection with vacuum sweepers of the above mentioned type and has as its primary object to provide an automatic pick-up device for picking up coarse particles such as pebbles, stones, and similar refuse particles.

It is also an object of this invention to provide an automatic coarse particle pick-up device of the type set forth in the preceding paragraph, which may selectively be lifted into ineffective position so that it will not handicap the vacuum sweeper if it should be used for certain purposes.

It is a further object of this invention to provide an automatic coarse particle pick-up device of the type set forth in the preceding paragraph which may selectively be adjusted relative to the ground for determining the minimum size of coarse particles to be picked up.

Still another object of this invention consists in the provision of a coarse particle pick-up device as set forth in the preceding paragraphs which includes a suction hood adjustable relative to the ground from which the particles are to be picked up.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 illustrates a side view of a vacuum sweeper with a coarse particle pick-up device according to the present invention.

FIG. 2 is a section taken along the line II—II of the automatic coarse particle pick-up device shown in FIG. 3.

FIG. 3 is a top view of the coarse particle pick-up device of FIGS. 1 and 2.

FIG. 4 illustrates a side view of the suction pipe with mouthpiece shown in FIG. 2, but on a somewhat larger scale than that of FIG. 2.

FIG. 5 illustrates the suction pipe of FIG. 4 as seen in the direction of the arrow G of FIG. 4.

FIG. 6 is a top view of the suction pipe shown in FIG. 5.

FIG. 7 is a section along the line VII—VII of FIG. 3.

FIG. 8 is a section through a guiding bar forming part of the pick-up device of the invention, said section being taken along the line VIII—VIII of FIG. 3.

FIG. 9 diagrammatically illustrates a lifting mechanism for lifting the frame structure for the pick-up device.

General arrangement

The coarse particle pick-up device according to the present invention is arranged below and connected to the chassis of a vacuum sweeper and is characterized primarily by sweeper or collector arms or the like, which are arranged at an angle with regard to each other and have their front ends directed in the driving direction of the vehicle. The front ends of said arms are spaced from each other by a distance preferably equalling the width of the road, runway, or the like to be swept,

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whereas the rear ends of said arms confine a relatively narrow passage located below a coarse particle suction nozzle. The said sweeper and collector arms sweep over the width of the surface to be swept while the vehicle moves forward on said surface and collect all coarse particles from a certain minimum size upwards between said arms. These coarse particles then slide along said arms to said coarse particle suction nozzle where they are picked up and conveyed to a collecting container. The coarse particle pick-up device according to the present invention is preferably arranged ahead of the customary rotary sweeper broom generally forming part of vacuum sweepers of the above mentioned type.

In further development of the present invention, the coarse particle pick-up device is adjustable with regard to the surface to be swept so that the minimum size of the coarse particles to be picked up may be varied.

According to a further feature of the invention, the coarse particle suction nozzle or the suction pipe with the nozzle is adjustable relative to the ground to be swept.

Structural arrangement

Referring now to the drawings in detail, and FIG. 1 thereof in particular, this figure shows a vacuum sweeping machine provided with a coarse particle pick-up device according to the present invention. The said sweeping machine comprises, as is customary, a chassis 1 having mounted thereon a waste and refuse collecting container 2 and an exhaust compartment for creating a vacuum which will bring about a suction effect for conveying the swept-up particles into the collecting container 2. The sweeping machine is, in a manner known per se, provided with a rotary broom mounted underneath a hood which latter surrounds the major portion of said rotary broom 6 and has connected thereto conduit means 7' which communicate through hose 16' with the pressure side of a blower 3 to convey air under pressure from said blower through the mouth portion 7 of said conduit means to the surface to be swept so as to blow the particles to be swept up toward the rotary broom 6. The hood 4 furthermore has connected thereto suction conduit means 8' which communicate with the exhaust compartment and draw particles swept up by broom 6 into the mouth portion 8 of said conduit means and convey the same to said collecting container.

The hood 4 covering to a major extent the rotary broom 6 extends forwardly and also forms a hood for the coarse particle pick-up device according to the present invention generally designated with the reference numeral 50. The pick-up device 50 is more clearly shown in FIGS. 2 and 3 and consists primarily of two sweeping and collecting arms 23, 23a which are fixedly connected to the supporting frame 22 of the pick-up device 50. The said arms 23, 23a form an angle with each other open in the forward driving direction of the vehicle carrying the pick-up device 50 and may consist of bars, boards, angle irons or the like. For reasons of construction, arm 23 is considerably shorter than arm 23a, but it is, of course, to be understood that if desired arm 23a may be shorter than arm 23 or both arms may have the same length. The lower edges of the sweeping and collecting arms 23, 23a are preferably provided with rubber strips 24 or the like (see FIG. 8) which are connected to said arms by clamping rails 26 provided with slots 26a through which extend clamping bolts 25. It will thus be appreciated that by loosening the bolts 25, the rubber strips 24 may be adjusted relative to the ground within the limits of the length of the slots 26a.

The supporting frame 22 and thereby the arms 23, 23a connected thereto may be adjusted relative to the ground by means of the adjustable supporting wheels or casters 30 respectively supported by swivel bearings 31. Each of

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the swivel bearings 31 is, by means of gusset plates or connection plates 51 or the like, connected to a U-profile 52 which is adjustably guided between two supporting plates 32 and may be held in its respective desired position by means of clamping bolts 33 extending through slots 33a in said supporting plates. The two wheels 30 adapted to swivel, which are arranged ahead of the sweeping and collecting arms 23, 23a which may also be called guiding arms, are provided with protective or shielding means 34 in the form of deflecting plates or a deflecting hood for deflecting objects directly in front of the wheels so that the latter will not pass thereover and thereby lift the pick-up device in an undesired manner. The rear ends of the arms 23, 23a are slightly spaced from each other as will be evident from FIG. 3 so as to form a relatively narrow passage. Above this passage and directly at said ends there is arranged a suction nozzle generally designated with the reference numeral 9 for picking up the coarse particles. The width of the said relatively narrow channel corresponds substantially to the width of the suction passage at the mouth of said suction nozzle. The suction nozzle 9 is connected to a hose 16 which in its turn leads to the refuse collecting container 2.

The back side of the suction nozzle mouth 9a (see FIG. 4) is provided with an inclined pan or ramp 12 which may be of rubber or other suitable material for preventing larger or heavier objects or particles from escaping toward the rear. This pan or ramp will also exert a certain agitation. The pan or ramp 12 is connected to the mouthpiece 9a by a clamping rail 13 and a bolt 14. If desired, the pan or ramp may have longitudinal slots therein so as to allow an adjustment of the pan or ramp relative to the mouthpiece 9a toward or away from the ground. In order to prevent larger or heavier objects or particles from escaping sideways, two basket-like or grate-like members 11 are connected to lateral portions of the mouthpiece 9a in any convenient manner.

The suction nozzle or suction pipe 9 is tiltably arranged in such a way that it can be tilted forwardly in driving direction of the vehicle or rearwardly and can be arrested in its respective position. To this end, the suction pipe 9 is held by a clamping ring 20 which is provided with a slot 53 formed by two jaws 20a adapted to be clamped together by clamping bolts 21. The clamping ring 20 furthermore comprises an extension 20b extending between two gusset plates or fish plates 54 hinged or linked to said extension 20b by means of a bolt 17. The said plates 54 are fixedly connected to the supporting frame 22. The plates 54 are furthermore provided with radially arranged aligned slots 18 through which extends a clamping bolt 19. It will thus be obvious that by loosening clamping bolt 19, the suction pipe 9 can be tilted about bolt or pivot 17 over an arc corresponding to the longitudinal extension of the slots 18. After the suction pipe 9 has been adjusted to the desired extent, the clamping bolt 19 is tightened again. The suction pipe 9 may also be turned toward the left or the right whenever desired. To this end, it is merely necessary to loosen the clamping screws 21 and then manually to turn the pipe 9 in the desired direction whereupon the bolts 21 are tightened again.

The mouthpiece 9a of the suction pipe is preferably with the exception of the rear portion where the ramp 12 is arranged designed in conformity with aerodynamic principles, in other words the cross section is drop-shaped as indicated at 10.

As will be evident from the above, when the sweeping machine according to the present invention passes over runways, roads or the like to be swept, the coarse particles or objects having a vertical extension higher than the spacing of the sweeping arms 23, 23a from the ground will be caught by said sweeping arms and will be guided therealong to the relatively small passage between the rear ends of said arms, where the said particles will be drawn in by the suction in the suction mouth 9a and will

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from here be conveyed through suction pipe 9 and hose 16 to the refuse collecting container. Any particles which are directly in front of the front wheels or casters 30 will be deflected by the protective hoods 34 so that the said front wheels or casters will always remain in contact with the ground and thereby maintain the arms 23, 23a in the proper desired distance from the ground.

In order to prevent coarse particles from being deflected by arms 23 and 23a outwardly so that they may leave the pick-up device and roll outwardly to the sides of the pick-up device, there are in further development of the invention provided a plurality of baffle or braking plates 27 which are connected to the frame 22 by connecting means such as bars 29. While FIGS. 2 and 3 show only two of such baffle or braking plates, it is, of course, to be understood that any desired number of such plates may be provided. Also the angle of these plates may be varied in conformity with the respective conditions desired. The lower edges of the baffle plates 27 are preferably provided with rubber strips 28.

In order to be able to vary the spacing of the collecting arms 23, 23a from the ground and thereby to vary the coarseness of the particles to be picked up by the coarse particle pick-up device of the invention, the frame carrying the pick-up device with the various elements described above may selectively be lifted or lowered to the desired height. This lifting mechanism is diagrammatically shown in FIG. 9. The frame 22 is provided with four bearings 39 as will be evident from FIGS. 3 and 9. The chassis of the vehicle is provided with four bearings 41 (two of said bearings only being shown in FIG. 9). Each bearing 39 has hinged thereto one end of a link 40 the adjacent end of which is hinged to the adjacent bearing 41. It will thus be evident that the frame of the pick-up device carrying the various members described above is pivotally suspended on the chassis. In order to assure a precise and uniform lifting and lowering of the pick-up device, each two adjacent links 40 are connected to an equalizing link system 42. Arranged above the rear links 40 on each side of the chassis is an intermediate lever 44 which is pivotally supported by a bearing 45 on said chassis. The intermediate levers 44 and adjacent links 40 are interconnected by a lifting rope, cable or the like 43. One of the intermediate levers 44 is connected to a lifting cylinder 46 which is pivotally suspended on a bearing 47 on the chassis. The two intermediate levers 44 on each side of the chassis are rigidly interconnected in any convenient manner for instance by a shaft 45a so that they will uniformly move in connection with the movement of the lifting cylinder piston system 46. It will thus be evident from the above that when the lifting cylinder piston system 46 carries out an upward or downward movement, all of the links 40 will carry out a uniform tilting movement so as to lower or lift the pick-up device 50 accordingly with regard to the ground. The lifting cylinder 46 may be an ordinary fluid cylinder piston system and may be actuated by oil within the oil circuit of the vehicle.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawings but also comprises any modifications within the scope of the appended claims.

What I claim is:

1. In a road sweeping machine having a chassis and a rotary sweeping broom mounted below said chassis on a transverse axis and also including a suction hood extending partly around said broom from above for creating a suction effect adjacent thereto: elongated guiding members arranged below said chassis in substantially parallel spaced relation with the road and ahead of said broom in the working direction of said sweeping machine, said guiding members forming with each other an angle having its legs spreading apart toward the front of the sweeping machine while the rear ends of said guiding members confine with each other a passage, a collecting container

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adapted for being evacuated supported by said chassis connected with said suction hood for collecting waste and refuse picked up by said sweeping machine, and suction conduit means having one end connected to said container and its other end positioned above and near said passage for receiving coarse particles guided to said passage by said guiding members as the sweeping machine moves forwardly and conveying said coarse particles to said collecting container.

2. In a road sweeping machine having a chassis and a rotary sweeping broom mounted below said chassis on a transverse axis and also including a suction hood extending partly around said broom from above for creating a suction effect adjacent thereto: elongated guiding members arranged below said chassis in substantially parallel spaced relation with the road and ahead of said broom in the working direction of said sweeping machine, said guiding members forming with each other an angle having its legs spreading apart toward the front of the sweeping machine while the rear ends of said guiding members confine with each other a passage, a collecting container adapted for being evacuated supported by said chassis connected with said suction hood for collecting waste and refuse picked up by said sweeping machine, suction conduit means having one end connected to said container and its other end positioned above and near said passage for receiving coarse particles guided to said passage by said guiding members as the sweeping machine moves forwardly and conveying said coarse particles to said collecting container, supporting frame means supporting said guiding members, and means operatively connected to said frame means and supported by said chassis for selectively adjusting the distance between said guiding members and the surface to be swept by said broom while maintaining the guide members parallel with said surface whereby said guiding members may be adjusted for guiding coarse particles of different sizes toward said suction conduit means.

3. In a road sweeping machine having a chassis and a rotary sweeping broom mounted below said chassis on a transverse axis and also including a suction hood extending partly around said broom from above for creating a suction effect adjacent thereto: elongated guiding members arranged below said chassis in substantially parallel spaced relation with the road and ahead of said broom in the working direction of said sweeping machine, said guiding members forming with each other an angle having its legs spreading apart toward the front of the sweeping machine while the rear ends of said guiding members confine with each other a passage, the front ends of said guiding members being spaced from each other by a distance substantially equalling the width of the surface to be swept, a collecting container adapted for being evacuated supported by said chassis connected with said suction hood for collecting waste and refuse picked up by said sweeping machine, and suction conduit means having one end connected to said container and its other end positioned above and near said passage for receiving coarse particles guided to said passage by said guiding members as the sweeping machine moves forwardly and conveying said coarse particles to said collecting container.

4. In a road sweeping machine having a chassis and a rotary sweeping broom mounted below said chassis on a transverse axis and also including a suction hood extending partly around said broom from above for creating a suction effect adjacent thereto: a frame, a parallelogram link system pivotally connecting said frame to said chassis, a pair of elongated guiding members connected to said frame and extending downwardly therefrom to positions near the ground to be swept and parallel thereto, said guiding members forming with each other an angle having its legs spreading apart toward the front of the sweeping machine while the rear ends of said guiding members confine with each other a relatively

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narrow passage, a collecting container adapted for being evacuated supported by said chassis connected with said suction hood for collecting waste and refuse material, a suction pipe having one end connected to said container and having a suction mouth at its other end, said pipe being supported by said frame and having said suction mouth arranged above and near said passage, and fluid operable means operable to actuate said link system for selectively raising or lowering said frame and thereby said guiding members with regard to the ground to be swept.

5. In a road sweeping machine having a chassis and a rotary sweeping broom mounted below said chassis on a transverse axis and also including a suction hood extending partly around said broom from above for creating a suction effect adjacent thereto: elongated guiding members arranged below said chassis in substantially parallel spaced relation with the road and ahead of said broom in the working direction of said sweeping machine, said guiding members forming with each other an angle having its legs spreading apart toward the front of the sweeping machine while the rear ends of said guiding members confine with each other a passage, a collecting container adapted for being evacuated supported by said chassis connected with said suction hood for collecting waste and refuse picked up by said sweeping machine, suction conduit means having one end connected to said container and its other end positioned above and near said passage for receiving coarse particles guided to said passage by said guiding members as the sweeping machine moves forwardly and conveying said coarse particles to said collecting container, said suction conduit means being provided at its said other end with a suction head equipped with downwardly extending confining means extending at the rear and side portions of said suction head to prevent particles conveyed to said passage below said suction head from escaping to the rear and to the sides.

6. An arrangement according to claim 5, in which the confining means at the rear of said suction head is adjustable relative to said suction pipe means.

7. An arrangement according to claim 5, in which the confining means at the rear of said suction head consists of a plate of rubber material inclined in the forward driving direction of said vehicle.

8. An arrangement according to claim 5, in which the confining means arranged laterally of said suction head consists of grate-like members.

9. In a road sweeping machine having a chassis and a rotary sweeping broom mounted below said chassis on a transverse axis and also including a suction hood extending partly around said broom from above for creating a suction effect adjacent thereto: a frame adjustably connected to said chassis and adapted to be moved in parallelism with itself relative to said chassis toward and away from the ground to be swept, a plurality of casters supported by said frame and adjustable relative thereto, a pair of elongated guiding bars fixedly connected to said frame and extending in downward direction therefrom and parallel with the ground, said guiding bars forming an angle with each other having its legs spread apart toward the front of the sweeping machine while the rear ends of said guiding bars confine with each other a passage, an evacuated container on said chassis, suction pipe means supported by said frame and having its lower end arranged above said passage, and means connecting the upper end of said pipe means to said container.

10. An arrangement according to claim 9, in which said pipe means is tiltably adjustably connected to said frame.

11. An arrangement according to claim 9, in which the lower ends of said guiding bars have rubber strips connected thereto.

12. In a road sweeping machine having a chassis and a rotary sweeping broom mounted below said chassis on

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a transverse axis and also including a suction hood extending partly around said broom from above for creating a suction effect adjacent thereto: elongated guiding members arranged below said chassis in substantially parallel spaced relation with the road and ahead of said broom in the working direction of said sweeping machine, said guiding members forming with each other an angle having its legs spreading apart toward the front of the sweeping machine while the rear ends of said guiding members confine with each other a passage, a collecting container adapted for being evacuated supported by said chassis connected with said suction hood for collecting waste and refuse picked up by said sweeping machine, suction conduit means having one end connected to said container and its other end positioned above and near said passage for receiving coarse particles guided to said passage by said guiding members as the sweeping machine moves forwardly and conveying said coarse particles to said collecting container, supporting frame means supporting said guiding members, means operatively connected to said frame means and supported by said chassis for selectively adjusting the distance between said guiding members and the surface to be swept by said broom while maintaining said members parallel to the ground whereby said guiding members may be adjusted for guiding coarse particles of different sizes toward said suction conduit means, and baffle plate means supported by said supporting frame means and extending downwardly into the area between said guiding members for deflecting coarse particles

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ricocheted by said guiding members back to the latter.

13. In combination in a pick-up device for coarse particles for use in connection with a sweeping truck including suction means for roads, runways, streets and similar surfaces to be swept: frame means including means for connection to said truck, a rotary sweeping broom supported by said frame means, guiding members fixedly connected to said frame means and arranged ahead of said broom in working direction of said pick-up device, said guiding members forming with each other an angle having its legs spreading apart toward the front of said pick-up device while the rear ends of said guiding members confine with each other a passage, said members being parallel with and close to the ground being swept, and pipe means having one end connected with said suction means of said sweeping truck, the other end of said pipe means being arranged above and near said passage for receiving coarse particles guided to said passage by said guiding members and conveying said coarse particles to said suction means.

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