May 26, 1959 H. I. HANSON 2,887,714

SUCTION ROAD CLEANING MACHINE

Filed Oct. 18, 1952 4 Sheets-Sheet 1

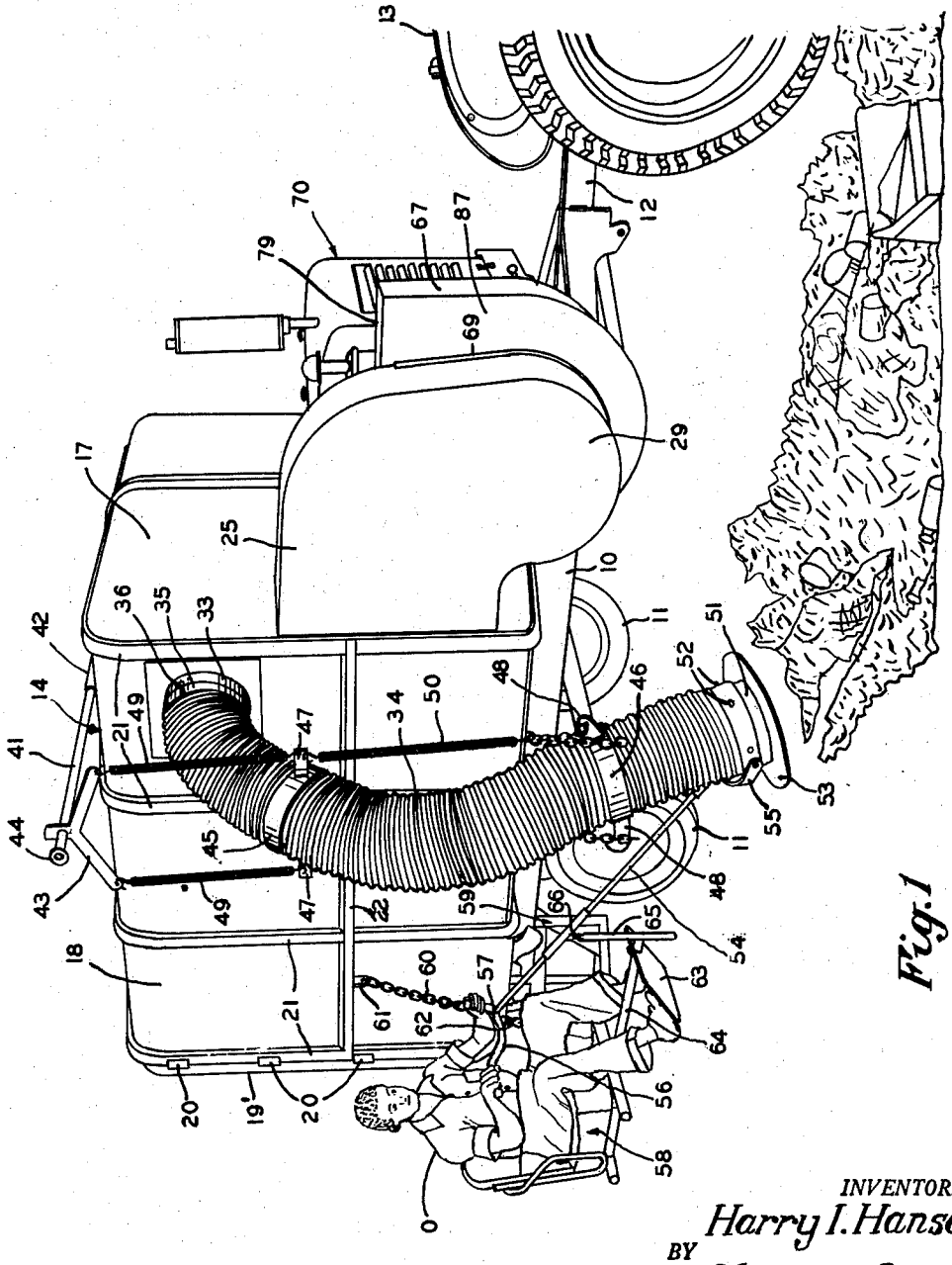

Fig. 1

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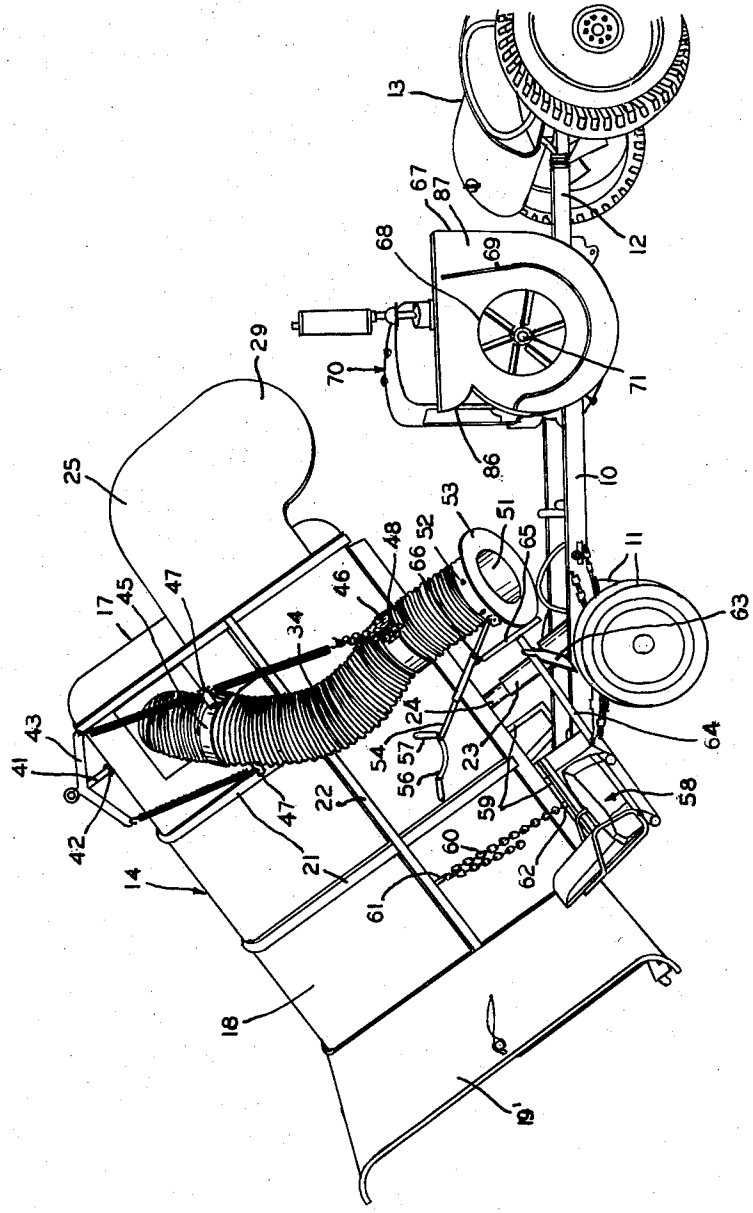

Fig. 2

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SUCTION ROAD CLEANING MACHINE

Filed Oct. 18, 1952 4 Sheets-Sheet 3

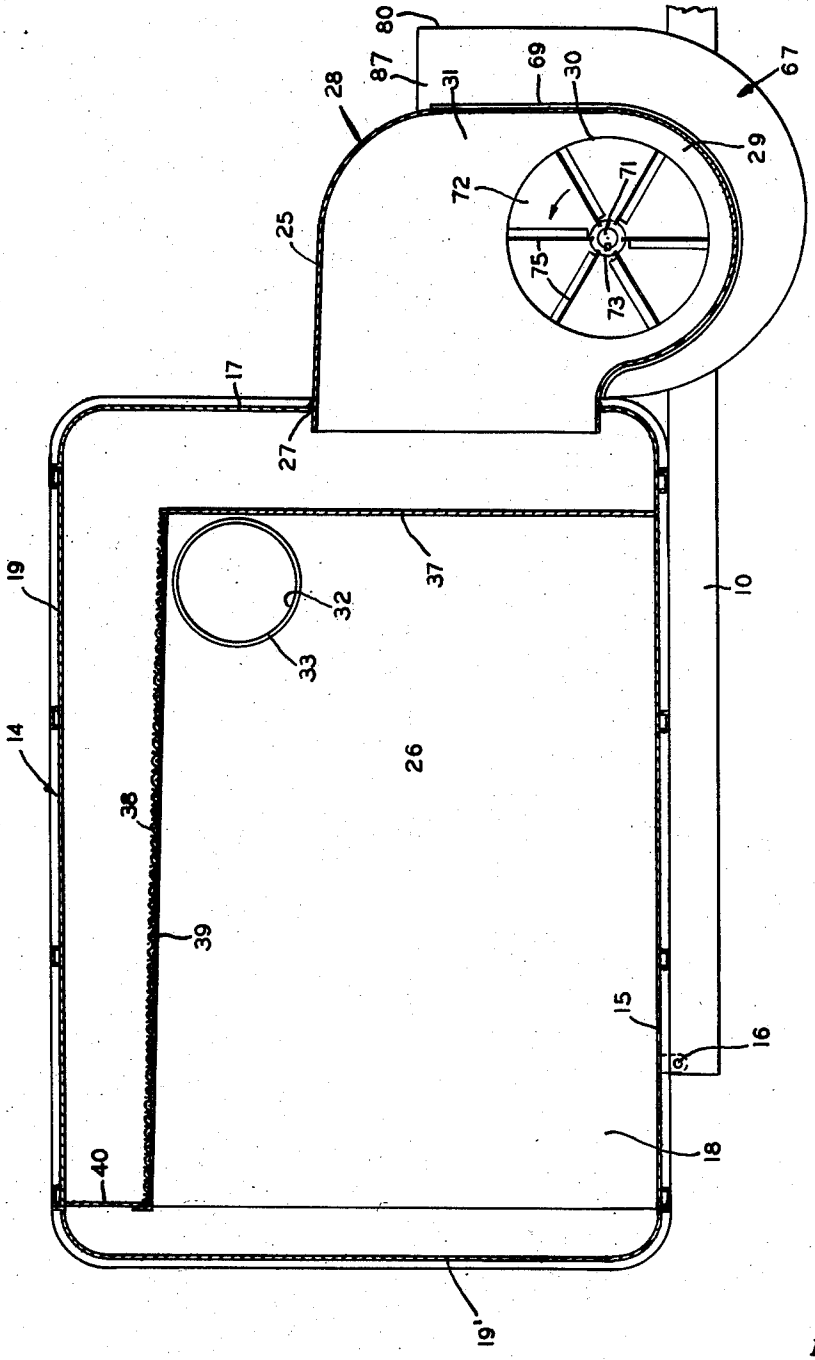

Fig. 3

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SUCTION ROAD CLEANING MACHINE

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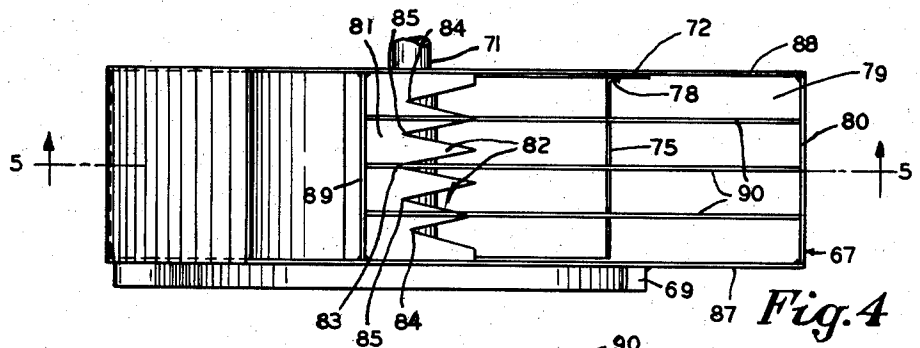

Fig. 4

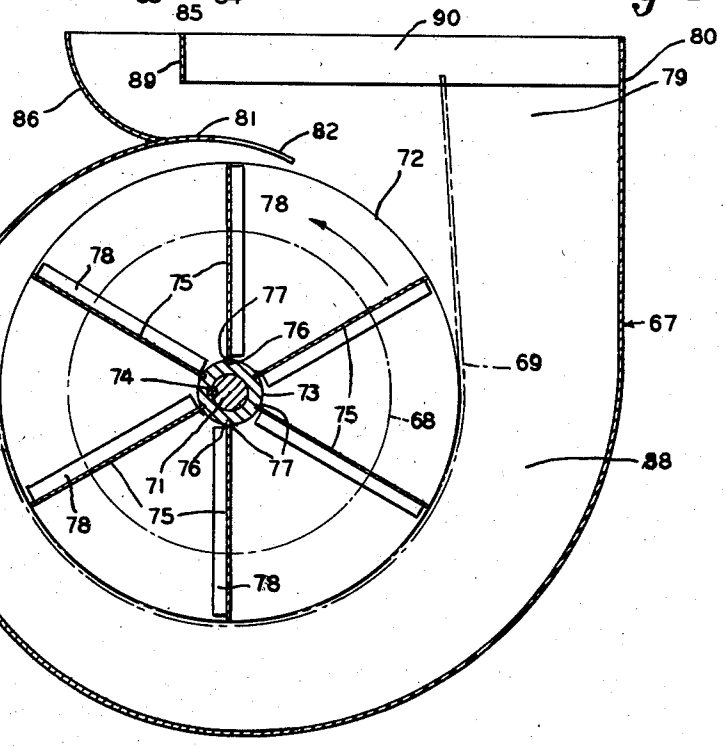

Fig. 5

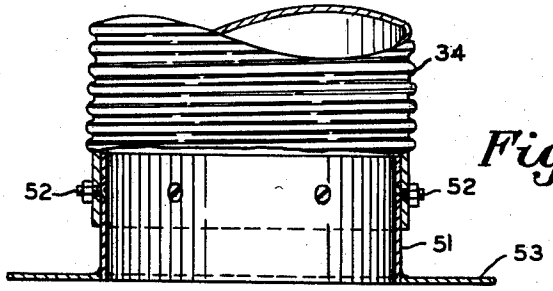

Fig. 6

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SUCTION ROAD CLEANING MACHINE

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Application October 18, 1952, Serial No. 315,509

1 Claim. (Cl. 15—340)

The invention relates to road cleaning machinery, and more particularly to a portable, suction operated machine adapted to be driven along highways or streets for picking up all types of rubbish and debris, including not only leaves, twigs, paper cartons and the like, but also bottles, cans and other heavier articles.

An object of the invention is to provide such an apparatus including a collector chamber, a motor driven fan chamber communicating therewith and a flexible hose adapted to be connected to either side of the collector chamber and provided with a nozzle at its free end, with means for manually manipulating the same over a roadway or other surface to pick up all manner of rubbish and litter thereon.

Another object is to provide such an apparatus mounted upon wheels and adapted to be propelled along a street or road by a tractor or other self-propelled vehicle.

A still further object is to provide an apparatus of the character referred to in which the collector chamber is provided with a baffle wall near its front end, between the flexible hose inlet and suction chamber outlet, and with a screen extending from the upper end of the baffle wall to the rear end of the collector chamber and spaced from the top thereof.

It is also an object of the invention to provide such an apparatus in which the fan chamber and motive means therefor are rigidly mounted upon the chassis of the apparatus, and the collector chamber is pivotally mounted upon the chassis so that it may be tilted to dump the contents therefrom, a suction chamber being carried by the tilting collector chamber and adapted to be positioned in communication with the fan chamber when the collector chamber is in the lowered or normal position.

The above and other objects apparent from the drawings and following description, may be attained, and the above described advantages and results obtained by the apparatus, construction, arrangement and combinations, sub-combinations and parts, which comprise the present invention, a preferred embodiment of which, illustrative of the best mode in which applicant has contemplated applying the principle, being set forth in detail in the following description and illustrated in the accompanying drawings, in which:

Fig. 1 is a perspective view of the improved suction road cleaning machine showing the same in operation;

Fig. 2 a perspective view of the machine showing the collector chamber tilted to dumping position;

Fig. 3 a vertical, longitudinal, sectional view through the collector chamber and suction chamber attached thereto;

Fig. 4 a top plan view of the fan chamber;

Fig. 5 a vertical, sectional view through the fan chamber, taken as on the line 5—5, Fig. 4; and,

Fig. 6 an enlarged, detached, sectional elevation of the lower end of the flexible hose and the suction nozzle connected thereto.

Referring now more particularly to the embodiment of the invention illustrated in the accompanying drawings, in

which similar numerals refer to similar parts throughout. the improved suction road cleaning machine to which the invention pertains is in the form of a vehicle having a chassis 10 mounted upon rubber tired wheels 11, and having a trailer hitch 12 at its forward end for connection to a tractor or other self-propelled vehicle, as indicated at 13, by means of which the apparatus may be propelled along highways, boulevards, streets or other surfaces to be cleaned.

The collector chamber is a normally closed receptacle in the form of a panel truck body, as indicated generally at 14, having a bottom wall 15, pivotally connected to the rear end of the chassis 10, as indicated at 16, a front wall 17, side walls 18 and top wall 19.

The rear end of the collector chamber is normally closed by the doors 19' hingedly connected to the rear edge portions of the side walls, as indicated at 20. The bottom, top and side walls of the body may be reinforced as by the channel frame members 21, extending vertically around the side walls and horizontally around the top and bottom walls, and the members 22 extending horizontally along the side walls 18.

The body 14 is adapted to be moved from the normal or operating position shown in Fig. 1, to the tilted or dumping position shown in Fig. 2, by any suitable means such as the fluid operated cylinder 23, mounted between the side frames of the chassis 10 and having a piston rod 24 connected to the bottom wall of the body 14.

The suction housing 25 communicates with the collector chamber 26 within the body 14, through an opening 27 in the lower portion of the front wall 17 at the right hand side thereof. This suction housing has the rounded upper corner 28 and the depending, half-round portion 29 with a circular inlet opening 30 in the inner wall 31 thereof, as shown in Fig. 3, for communication with the fan chamber as will be later described.

An opening 32 is provided in each side wall 18 of the body 14, at a point near the upper front corner thereof and provided with a ring flange 33 for attachment of a flexible hose 34 of relatively large diameter, in actual practice a 12 inch flexible hose being ordinarily used.

For this purpose, the upper end of the hose is provided with a metal ring 35, and any suitable clamping means as indicated at 36 is provided upon the flanged ring 33 for detachably connecting the flexible hose thereto.

The flexible hose 34 may thus be detachably connected to either side of the body 14, so that the roadway upon either side of the apparatus may be cleaned. When the hose 34 is attached to the ring flange 33 in either side wall 18 of the body, the opening 32 in the opposite side wall is closed by a suitable cap or closure (not shown) in order to maintain the desired suction within the collector chamber.

A vertical baffle wall 37, as shown in Fig. 3, is spaced from the front wall 17 of the body 14 and extends from the bottom wall 15 thereof to a point spaced from the top wall 19, intermediate the openings 32 in the side walls and the outlet opening 27 in the front wall 17.

A wire screen 38, preferably reinforced by a metal frame 39, extends from the top of the baffle wall 37 to the lower end of the back wall 40 of the body 14, so as to entirely enclose the collector chamber 18 and prevent the passage of anything except air from the collector chamber 18 to the suction housing 25.

Thus, when the machine is in operation, all manner of rubbish and debris sucked up through the hose 34 will be deposited in the collector chamber 18 while the air may pass freely through the screen 38 to the suction housing 25.

For the purpose of supporting the weight of the flexible hose 34, and at the same time providing for flexibility of movement thereof, means is provided, as shown in Figs. 1

and 2, including a transversely disposed bar 41 mounted upon the top wall of the body 14 as by a bracket 42 and extending outwardly beyond each adjacent side wall.

A forked bracket 43 is swiveled upon the bar 41 and is prevented from becoming disengaged from the bar by means of the head or shoulder 44 upon the end thereof. Rings 45 and 46 are located around the flexible hose 34 at points spaced from the upper and lower ends thereof respectively, said rings being provided on diametrically opposite sides with ears 47 and 48 respectively.

Coil springs 49 are suspended from opposite ends of the swiveled, forked bracket 43 and connected to the ears 47 of the ring 45 and similar coil springs 50 are connected to the ears 47 of the ring 45 and to the ears 48 of the ring 46, whereby the flexible hose is flexibly and resiliently supported from the transverse bar 41.

At the lower end of the flexible hose 34 a suction nozzle is provided. This nozzle is shown in detail in Fig. 6 and preferably comprises a ring 51, inserted into the lower end of the hose 34 and attached thereto as by the bolts 52.

A flat, annular flange 53 is integrally formed upon, or attached to, the lower end of the ring 51, for operation at or near the roadway or other objective surface to be cleaned.

For the purpose of manually manipulating the suction nozzle of the flexible hose, a rod 54 is pivotally attached to the ring 51 of the nozzle, as by the forked bracket 55, and provided at its outer or rear end with a handle bar 56 and a hand grip 57 adapted to be grasped by the two hands of an operator, indicated at O in Fig. 1, seated upon the adjustable, upholstered operator's seat indicated generally at 58.

This operator's seat may be detachably connected to a supporting bracket, indicated generally at 59, depending from each side of the body 14, so that the operator may sit upon either side of the apparatus depending upon which side thereof the flexible hose 34 is attached.

In order to further support the weight of the operator, a chain 60 or similar elements may be attached to the frame member 22, as indicated at 61, and to the operator's seat 58, as indicated at 62.

A foot rest 63 is adjustably supported upon the operator's seat 58 as by the rod 64, and an upright rod 65 is connected to the rod 64 and may have a swivel connection to the bar 54, as indicated at 66.

With this construction the operator, seated upon the seat 58, may grasp the handle bar 56 and hand grip 57 in this hands and move the suction nozzle 53 upward or downward or to either side as may be required to pick up various objects or litter along the roadway.

A fan housing 67 is rigidly mounted upon the chassis 10, in front of the body 14, and in such position as to be in juxta-position to the suction housing 25 when the body 14 is in the lowered or operative position, as shown in Fig. 1. In this position the opening 30 in the suction housing will register with the inlet opening or eye 68 of the fan housing.

For the purpose of positioning the suction housing 25 relative to the fan housing 67, and forming a tight fit therebetween, an angular flange 69, corresponding to the contour of the suction housing 25, is provided upon the side wall 87 of the fan housing 67 adjacent to the suction housing 25, so that when the body 14 is in lowered or operative position, as shown in Figs. 1 and 3, the forward and lower edge portions of the suction housing 25 will fit tightly against the flange 69.

Any suitable prime mover, such as a heavy duty, industrial internal combustion engine, indicated generally at 70, is mounted upon the chassis 10 adjacent to the fan housing 67, and an extension 71 is provided upon the crankshaft of the engine and located within the fan housing 67, forming the shaft for the fan as best shown in Fig. 5, this fan comprising a disc 72 having a central hub 73 fixed thereto and mounted upon the shaft 71 as by a key 74.

A plurality of radial blades 75 are fixed upon the hub, preferably by inserting the inner edges of the blades into notches 76 in the hub and welded thereto, as indicated at 77. Angular flanges 78 are formed at the inner edges of the blades 75 and welded or otherwise fixed to the disc 72, the fan thus being a rigid unit fixedly mounted upon the shaft 71 and adapted ot rotate within the fan housing 67 in the direction of the arrow shown in Fig. 5.

The fan housing 67 is of usual snail type, the outlet 79 thereof being at the upper side of the fan housing and formed between the terminal of the straight front wall 80 and the terminal of the curved upper wall 81 thereof.

For the purpose of materially reducing the noise of the fan to a minimum, the terminal edge of the upper wall 81 of the fan housing, toward the leading edges of the blades 75 of the fan, is serrated or saw-toothed as indicated at 82 in Figs. 4 and 5.

These saw teeth are preferably of different depths, as best shown in Fig. 4 in order to produce the best results, the central serrations as indicated at 83 being of greatest depth, while the outer row of serrations indicated at 84 are of normal depth, the intermediate serrations 85 having a depth between those at 83 and 84.

The outlet of the fan housing may be slightly enlarged, by means of the rearwardly and upwardly curved rear wall 86 connected to the top wall 81 near the terminal edge thereof and terminating upwardly in the same horizontal plane as the upper edges of the straight front wall 80 and the side walls 87 and 88 of the fan housing.

A grill-work or grating is preferably provided in the outlet opening of the fan housing to protect the fan and at the same time provide a free flow of air therethrough. This grating may comprise the cross bar 89, welded at opposite ends to the side walls 87 and 88 of the fan housing, and the spaced, longitudinal bars 90, welded at opposite ends to the cross bar 89 and the upper end portion of the front wall 80.

With the machine in the position shown in Fig. 1, with the body 14 in lowered or operative position, locating the suction housing 25 in juxtaposition to the fan housing 67, and with the flexible hose 34 attached to the ring flange 33 of one inlet opening 32 of the collector chamber, and the other inlet opening 32 thereof closed by a suitable cap or closure, when the motor 70 is operated the fan will be rotated at high speed, in the direction of the arrow shown in Figs. 3 and 5, producing a terrific suction through the nozzle 51 and flexible hose 34, picking up all kinds of rubbish, including bottles, cans and other heavy objects and depositing them within the collector chamber 18, immediately to the rear of the baffle wall 37, while the air flows upward through the filter screen 38, the filtered air passing through the suction chamber 25 to the fan housing 67, from which it is discharged through the exhaust opening 79.

The flat flange 53 upon the suction nozzle will produce an exceedingly strong suction across the ground on an sides of the suction nozzle, when the fan is positioned near the surface of the ground. By manipulating the suction nozzle by means of the manually controlled rod 54, everything upon the roadway, within a six or seven foot span upon each side of the machine, may be gathered up by the suction nozzle and deposited in the collector chamber.

As the air is exhausted from the fan housing, the serrations or saw teeth 82 in the exhaust opening at the top of the fan housing, reduce the noise of the fan to a minimum so that the operation of the machine will not cause any annoyance to passing motorists or those living in the vicinity.

When the collector chamber 18 has been substantially filled with rubbish and litter, the apparatus may be moved to a dump or other location where the same may be deposited. The engine 70 is of course stopped for this

operation. After opening the doors the cylinder **23** is actuated to tilt the body **14**, as shown in Fig. 2, dumping the contents of the collector chamber. The doors **19** are again closed and the body **14** moved back to the normal position shown in Fig. 1, and the apparatus is again ready for operation.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention or discovery, I claim:

In a road cleaning vehicle, a vehicle chassis, a main housing on the chassis, hinged thereto be raised and lowered about a horizontal hinge axis at its rear end; the main housing comprising upright front, rear and side walls and top and bottom walls; partition walls within the main housing providing a refuse receiving chamber therein comprising a screening wall proximately spaced from the top wall and a chamber wall inwardly of the front wall, providing a space under the top wall and behind the front wall; a flexible vacuum hose outside the main housing attached to a side wall and communicating through an opening therein with the refuse receiving chamber at a point adjacent to the under side of the screening wall, and depending from the side wall and having a refuse pick-up nozzle on its lower end; a walled air conduit secured to the main housing front wall extending forwardly therefrom and in communication with said space and closed at its forward end and having a substantially vertical side wall provided with an opening therethrough;

a power driven vacuum pump on the chassis surrounded by a walled pump housing, a wall of which is substantially vertical and has an opening therethrough forming the inlet for said pump; the two openings being of substantially the same diameter; stop means on the pump housing engaged by a forward portion of the walled air conduit to determine a stopped position thereof when the main housing and air conduit are hingingly lowered, to thereby dispose the said two vertical walls in mutual contact on a common vertical plane with the two openings thereof substantially axially aligned, and jointly effecting therethrough, communication between the pump housing and the walled conduit; the downward stopped position of the air conduit being variable due to inaccuracies of manufacture and varying the accuracy of alignment of the two openings, but without unduly affecting said communication.

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