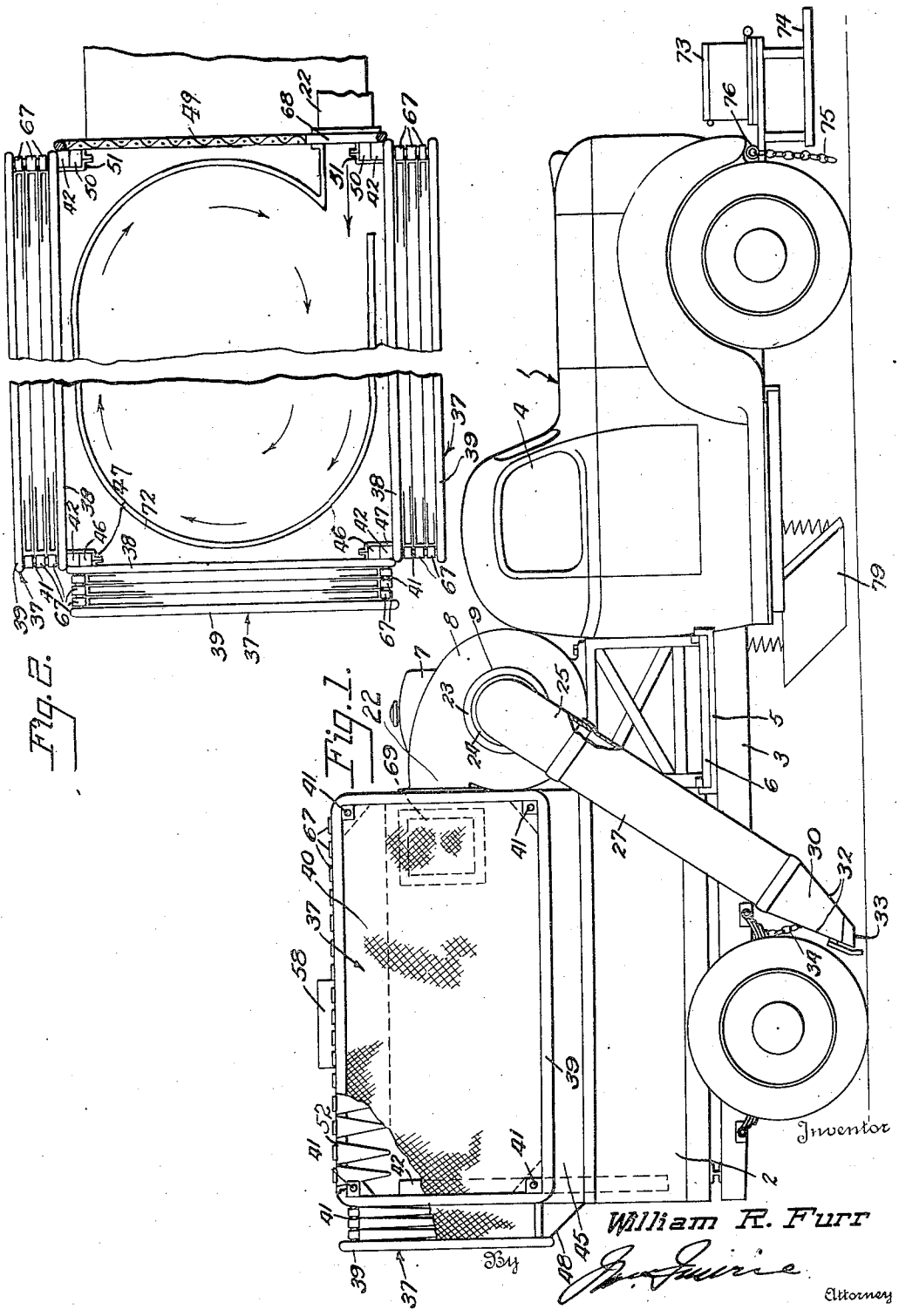
Jan. 4, 1949. W. R. FURR 2,458,258

SUCTION-TYPE STREET SWEEPER

Filed Sept. 15, 1943 3 Sheets-Sheet 1



Jan. 4, 1949. W. R. FURR 2,458,258

SUCTION-TYPE STREET SWEEPER

Filed Sept. 15, 1943 3 Sheets-Sheet 2

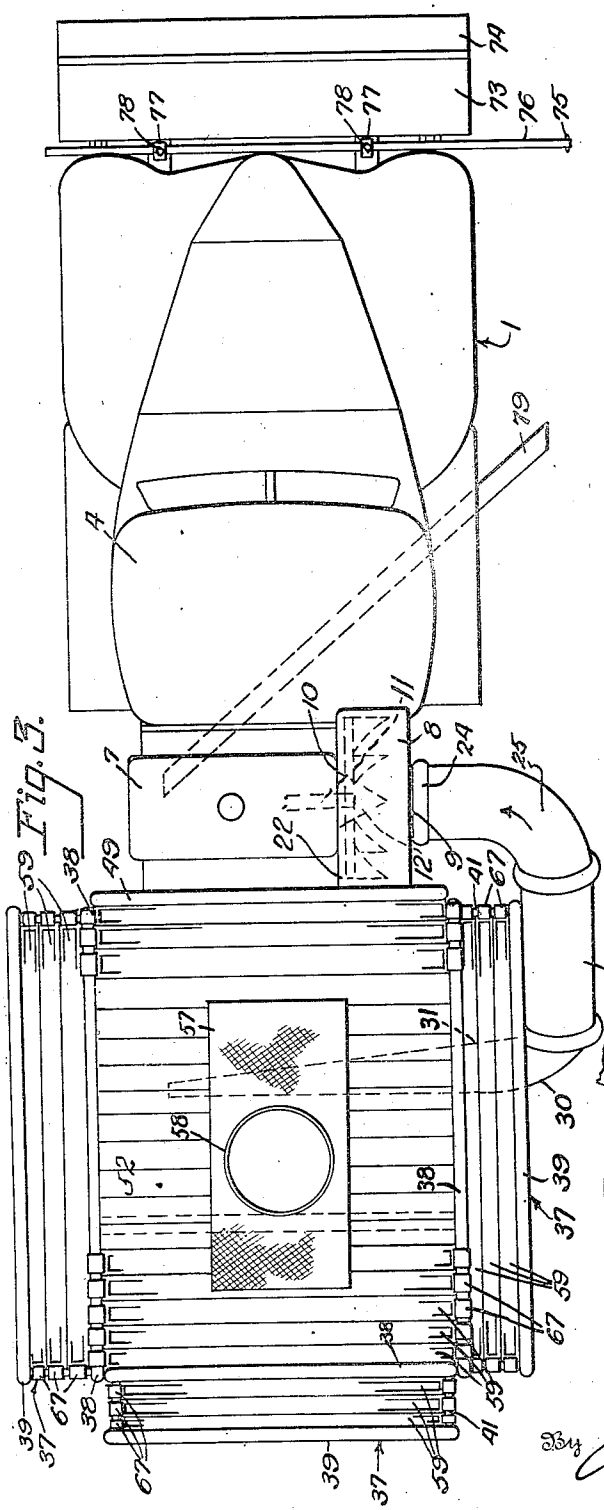


Fig. 5.

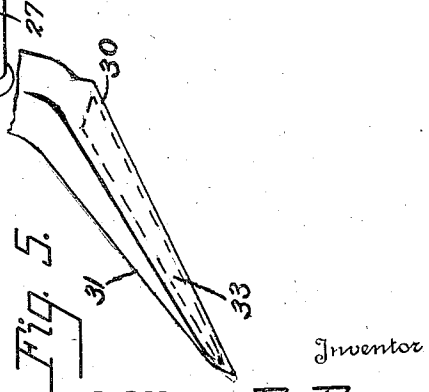


Fig. 5.

Inventor
William R. Furr
By
Attorney

Jan. 4, 1949. W. R. FURR 2,458,258

SUCTION-TYPE STREET SWEEPER

Filed Sept. 15, 1943 3 Sheets-Sheet 3

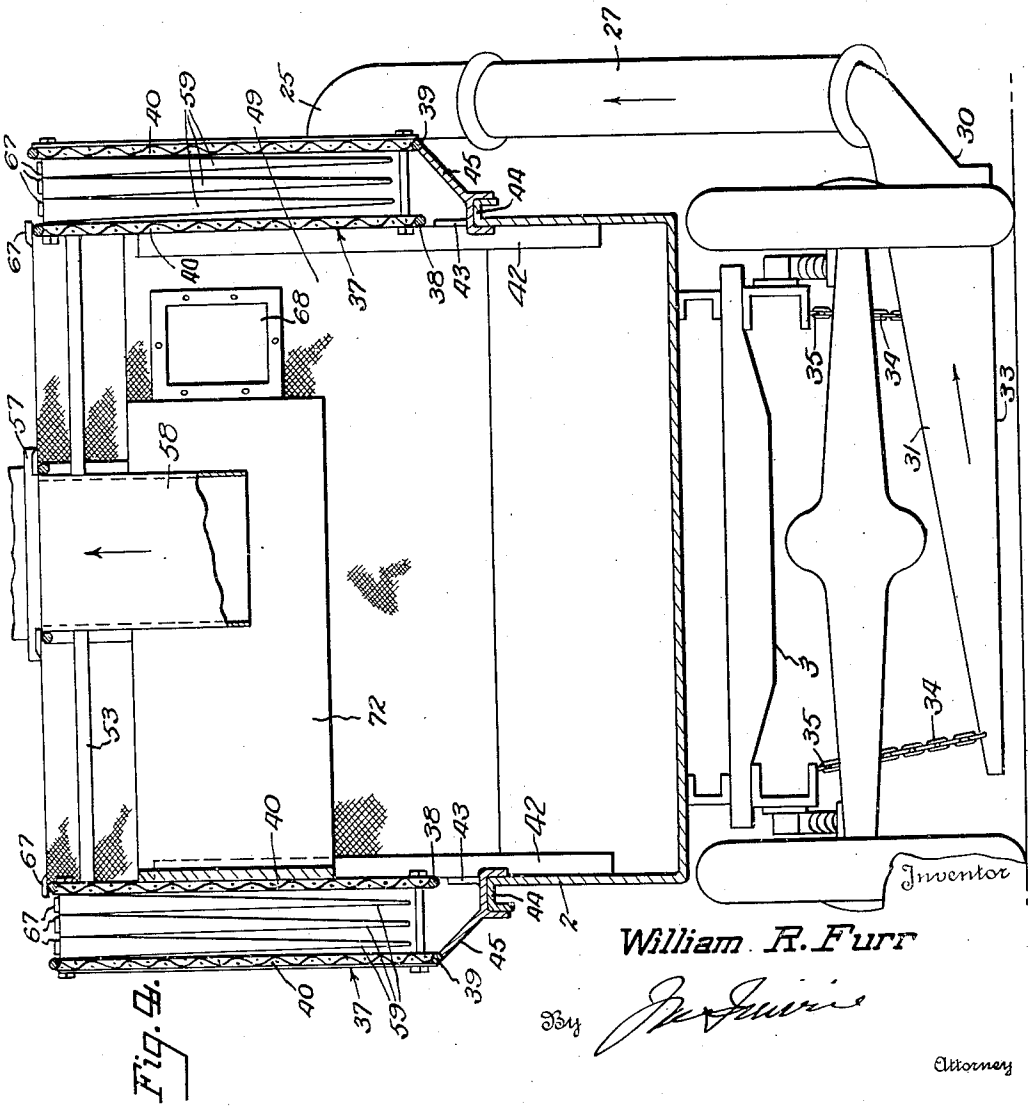


Fig. 4.

Inventor

William R. Furr

By

Attorney

Patented Jan. 4, 1949

2,458,258

UNITED STATES PATENT OFFICE

2,458,258

SUCTION-TYPE STREET SWEEPER

William R. Furr, Washington, D. C.

Application September 15, 1943, Serial No. 502,517

1 Claim. (Cl. 15—340)

1

This invention is directed to an improvement in suction-type street sweepers, and more particularly to increasing the efficiency and operation of this type of sweeper, while at the same time materially simplifying and reducing the number and form of the parts required without interfering with maximum efficiency.

The primary object of the present invention is the provision of a street sweeper including a self-propelled or otherwise independently moved vehicle, having a collector housing or body toward which air laden with refuse is drawn by suction, and which such refuse-laden air is directed by pressure into the body, with such body provided with a maximum area of screened escape for the air while directing the refuse into the body.

A further object of the invention is the provision of a suction trunk, open at one end to a source of suction, and formed at the opposite or inlet end for movement above the surface to be cleaned, with the inlet end of the trunk initially adjustable to provide varying heights above the surface being cleaned as conditions may require, the trunk as a whole being further mounted for bodily swinging movement in any direction in the presence of an obstruction to avoid damage to the trunk or its connections, the trunk automatically returning to initial adjusted position when the obstruction is passed, while permitting continuous suction influence through the trunk in any and all positions thereof.

A further object of the invention is the provision of an independently driven suction fan having a relatively restricted communication with the suction trunk and a relatively large and more or less direct pressure communication with the screened section of the vehicle body, whereby to provide a relative high suction velocity and a materially lower pressure delivery of the refuse-laden air to the body.

A further object of the invention is the provision of a fan motor having direct connection with the suction fan to eliminate belts, gears and the like which are liable to be affected by the refuse in the air, to say nothing of reduced cost, the direct connection protecting the motor shaft, while at the same time serving to insure fan-suction efficiency while preventing damage to the parts.

A further object of the invention is the provision of the vehicle body proper as a dump body so that under a load of refuse collected in the operation of the sweeper, the vehicle may be used

2

to transport the load to a place for dumping, the sweeper trunk being readily movable to a position to arrange its inlet end above the plane of the axles of the vehicle to avoid damage to the trunk during transporting travel of the vehicle.

The invention further comprehends certain important and specific details of construction and arrangement, which will be clear from the appended detail description.

The invention is illustrated in the accompanying drawings, in which:

Figure 1 is a side elevation of the improved sweeper.

Figure 2 is a top plan view with parts omitted of the body section of the sweper.

Figure 3 is a top plan view of the sweeper with the screen sections in place.

Figure 4 is a rear transverse section taken through the body of the sweeper.

Figure 5 is a detail view of the inlet suction section of the main duct.

The vehicle on which the sweeper parts are mounted is preferably an ordinary truck, usually of the dump-body type, and while the term "truck" as used herein is generally intended to identify such a vehicle, it will be understood that the use of any conventional or specially-constructed vehicle for the purpose is contemplated.

As illustrated, the vehicle includes a conventional dump-body truck 1, having a dump body 2, mounted on a wheeled chassis 3, provided with the usual power and control means (not shown) and having the usual driver's compartment 4, in which the usual controls for the speed, direction and steering of the truck are arranged. Aside from certain details to be specifically referred to, the parts of the truck form no part of the present invention and need no specific description or showing.

For the purpose of the present invention, the truck body 2 is moved rearwardly on the chassis from its usual position adjacent the cab 4 to provide an unobstructed space between the driver's compartment and the front end of the body to receive the essential parts of the present invention. A platform base 5 is arranged in this space and removably bolted to the chassis frame bars of the truck. A platform 6, on which the essential operating parts are supported, is removably mounted on the base 5. A structural frame is mounted on the platform 6.

An independent motor, such as an internal combustion engine 7, is supported on the struc-

tural frame above the platform. A fan housing 8 having an inlet opening 9 is arranged at one end of the platform 6, being secured at 10 to the motor 7 and the structural frame on the platform 6. The housing is arranged close to the motor, and the motor shaft 11 extends through the rear wall of and into the housing. A suction-pressure fan 12 is mounted directly on the motor shaft 11.

The inlet opening 9 of the fan housing 8 is centered with respect to the motor shaft 11, and the fan 12.

The fan housing 8 is arranged to provide a somewhat eccentric path surrounding the fan, and terminates in a peripheral outlet 22.

The inlet opening 9 of the fan housing 8 is provided with an outstanding encircling flange 23, to which is connected by a universal joint 24, a short trunk elbow conduit 25, to the terminal of which conduit 25 is connected the trunk proper, indicated at 27. The trunk proper, of metal or any appropriate material, comprises a hollow length terminating at the lower end in a fitting to form one member of the universal joint 24, the other member of which is formed or provided on the meeting end of the trunk conduit 27. The trunk proper 27 extends toward the inlet 9, being circular for a portion of its length beyond the conduit 25, and then formed to present a slightly inclined outer edge portion 30 and a pronounced sharply inwardly and downwardly inclined inner edge portion 31, the sides 32 being slightly convergent toward the inlet 33. This provides a substantially rectangular or tapering inlet opening, the outer end near the edge 30 being normally slightly beyond the plane of travel of the truck wheels, while the opposite end is located inwardly and beneath the vehicle chassis to provide a relatively long open suction mouth 33 for movement over the surface to be cleaned. The lower end of the trunk is provided with chains or other connectors 34 to be adjustably connected to hooks or the like 35 on the chassis of the vehicle to adjust the operative height of the trunk mouth at will relative to the surface being cleaned. The chain connectors 34 readily permit the suction mouth to move freely inwardly or upwardly when meeting obstruction, and also serve to permit adjustment of suction height of the mouth 33 at will.

In street cleaning particularly, the heaviest volume of debris is found closely adjacent the curbstone, and outwardly from the curbstone, the debris is of lighter character. As the improved sweeper is designed to pick up articles of considerable size, the trunk proper is of an unusual diameter—say for example from fifteen to twenty inches, and while this dimension is somewhat reduced at the trunk end of the suction mouth 33, it is apparent that laterally beyond the trunk line, the mouth will not ordinarily encounter such large and heavy debris, and thus there will exist no necessity for a full width mouth throughout its length. Therefore, the mouth is gradually reduced in its dimensions, both as to width of mouth and height, toward its free end. There is another and important reason for such reduction. This is for the purpose of reducing the necessary suction power and air volume of the fan as compared with that necessary if the mouth was the full dimension throughout. Thus the motor may be of less horsepower than would otherwise be the case, the diameter of the fan may be reduced, and a saving in weight and expense provided without sacrificing any efficiency. Primarily, the purpose of this arrangement is to reduce the cubic volume of air necessary for efficient operation and to be disposed of through the filtering cloth.

The fan housing inlet 9 opens transverse the length of the vehicle, the trunk conduit 25 extends slightly outwardly and downwardly, and the trunk proper 27 inclines rearwardly on an angle. The universal joint connections permit substantially any necessary relative swinging and rotative movement between the connected parts to afford maximum efficiency of the suction action. The axial line of the fan housing 8 is transverse the vehicle, and the housing outlet 22 opens toward the rear of the vehicle and above and substantially in line with the front wall of the vehicle body 2.

The body 2 is, for the purposes of the present invention, to be provided with means whereby the refuse-laden air delivered through the fan housing outlet 22 is substantially freed of the dust and refuse and permitted to escape. The contemplated structure comprises a collector housing formed by side walls and end walls 37, fitted to rest on the upper edges of the sides and ends of the body 2 and constructed for screening the air.

Each housing wall has a length commensurate with that part of the truck body 2, with which it cooperates. Each wall comprises an inner and an outer frame, 38 and 39, covered with screen material 40 and held in predetermined spaced relation by transverse end bolts 41, or other means. The inner frame 38 of each side screen wall is maintained in vertical alignment with the sides of the dump body and is provided at each end with posts 42 fitting into the corners of the dump body but terminating short of the bottom of that body. The posts 42 are provided with angle brackets 43 to fit over the upper edges 44 of the sides of the dump body and with the posts 42 hold the screen wall removably in upright position. The outer frame 39 of each side screen wall terminates above the lower end of the inner frame 38 and is provided at its lower end with a bottom section 45, inclining downwardly and inwardly to the side wall of the dump body and is provided at its lower inner edge with channel bars to slidably fit over the upper edges 44 of the dump body.

The rear screen wall is identical to that of the side screen walls, having its inner frame 38 provided with posts 46 to fit within the dump body and abut posts 42 of the side screen walls. Removable clips 47 are used to hold abutting posts together for rigidity. The rear screen wall has the inclined bottom 48 to correspond with the inclined bottoms of the side screen walls, the inclined bottoms being connected at their ends to maintain continuity.

The screen wall at the front of the dump body includes a single frame, as 49, having posts 50 and angle brackets 51 for clamping them to adjacent posts 42.

A top screen section 52 is arranged to cover the space between the inner frames 38 of the side and end screen sections, that is, such top screen section is commensurate with the space between the side and end walls of the dump body. This top screen section 52 has spaced frame bars 53 extending transversely of the dump body and is provided with a plate 57 through which extends a short air-discharge pipe 58.

The screen sections, or more particularly the frames constituting such sections, are designed to receive independently removable screen elements 59, which aside from variation in dimensions are identical.

The screen elements, each completely independent, are supported in the various frames by providing the ends with hook-like extensions 67 to rest on the connecting bolts 41 and on the frame bars 33.

The end screen section next the fan motor 7 is formed in line with the fan housing outlet 22 with an opening 68 framed for strength, through which the refuse-laden air delivered by the fan through the outlet 22 enters the screened collector housing of the truck body 2. In order to utilize the improvement as a sweeping or cleaning unit only and provide other vehicles as transportation factors, one side wall screen section 37 at the end adjacent the opening 68 in the end section is formed with a closable opening 69 framed for strength.

Secured to the screen walls 37 at a point in line with the opening 68 for the incoming refuse-laden air is a deflector strip 72 of sufficient dimension vertically to direct a considerable portion of the air stream to effect a centrifugal whirl to the air stream. The tendency of this travel of the air is to accumulate the dust and refuse toward the outer limit of the whirl and gradually discharge by gravity into the body 2. As the air approaches the center of the whirl, it will lose considerable of its force and be practically free of dust or other refuse. At the approximate center of the whirl, the relatively clear air that does not escape through the porous sides and top of the body is directed upwardly for discharge through the conduit 58, the lower open end of which extends into the center of the centrifugal whirl.

The front end of the truck is provided with a refuse box 73 open at the top and mounted for swinging to a dumping position when desired. A step platform 74 is mounted adjacent the box on which an attendant may stand during sweeping operation of the truck, and from his advance position, note and pick up from the surface being cleaned any object of a size, weight or shape beyond the suction lift of the fan. Such objects may be picked up by hand and placed in box 73 and dumped therefrom by tilting the box at any convenient depository.

A flexible hanger 75 is suspended from a bar carried by the truck; such hanger, such as a length of chain, depends in contact with the surface of the ground and marks the line of operation of the outer edge of the suction trunk. The flexible indicator is at all times within the vision of the driver of the truck so that he may guide the machine accordingly. The chain 75 is mounted on the end of a pipe 76, slidably mounted in guides 77 and fixed at will in any longitudinal adjustment by set screws 78.

A scraper 79 is mounted transverse and beneath the body of the vehicle at a proper angle for leveling debris for convenient pick-up by the suction mouth. This scraper is mounted to yield automatically and to pass over any obstruction which it cannot level, or to raise above the plane of the axles of the vehicle when not in use.

The operation of the sweeper will be fairly plain from the above description. The truck either of special or of conventional form, except for the spacing of its body to receive the motor equipment, is provided with this equipment, removably secured in place, which thus positions the suction trunk and suction mouth, the former being at one side of the truck and the latter extending laterally beneath the body of the truck forward of the rear wheels of the vehicle.

The various screen section frames are applied to the sides and end walls of the truck and the top screen section positioned as described. The air deflectors are applied and the air discharge pipe is applied to the top screen section. The triangular screen elements, each complete in itself, are then placed in position and the machine is ready for use.

In driving adjacent the curb line, where ordinarily in street cleaning the heaviest debris is found, the driver by noting the flexible hanger is constantly aware of the operative position of the larger end of the suction mouth relative to the curb line and can steer the vehicle accordingly.

Material picked up by suction is delivered as described into the truck body, the refuse, even to the fine dust, is screened from the stream delivered by the fan and the clean air permitted ready escape. When the truck body has accumulated a desired load, the suction mouth may be swung up to a position above the plane of the axles of the truck wheels and secured by the connecting chain. The sweeper may thus serve as a truck and carry the accumulated load directly to the dump for discharge. Of course, the sweeper, as such, through the provision of the outlet or side openings, may deliver the refuse directly outside of the sweeper or to another truck.

It is noted that the suction trunk may swing fore and aft, inward, upward and downward, to permit the suction mouth to pass over an obstruction too high to be handled or swing inward if contacting the curbstone, and then instantly resume its proper suction relation, entirely without attention on the part of the operator.

What I claim is:

A street cleaner unit for removable mounting on a dump truck having a chassis frame supporting a cab and a dump body, which unit comprises, in combination, a support for removable mounting on the chassis frame between the cab and dump body, an open bottom collector housing for removable mounting on said dump body, a source of power mounted on said support transversely of the chassis frame, a centrifugal suction fan casing mounted on said support in alignment with said source of power, a fan in said casing connected to the drive shaft of said source of power to be driven thereby, an outlet peripherally of said fan casing and opening into said collector housing, an inlet axially of said fan casing, a universal pipe connection surrounding said inlet and secured to said casing, an elbow pipe secured at one end to said universal connection and with its other end extending downwardly in spaced relation to said casing to be beyond the side of the truck, a straight section of pipe secured at one end to the downward end of said elbow to be positioned downwardly alongside the truck, a nozzle member secured at the lower end of said straight pipe section and extending substantially at right angles thereto for positioning beneath the truck, said nozzle member having a nozzle opening extending longitudinally along the bottom thereof, from a point outside the adjacent truck wheels to a point inside the opposite truck wheels, and chains secured to the top of said nozzle member for adjustable attachment to the underside of the truck chassis.

WILLIAM R. FURR.

(References on following page)

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
485,577	Ethridge	Nov. 1, 1892
678,451	Allington	July 16, 1901
953,201	Harn	Mar. 29, 1910
978,784	Rutherford	Dec. 13, 1910
1,048,009	Vogelzangs	Dec. 24, 1912
1,075,489	Murray et al.	Oct. 14, 1913
1,085,676	Finch	Feb. 3, 1914
1,159,202	Fish	Nov. 2, 1915
1,255,662	Sullivan	Feb. 5, 1918
1,438,933	Bungay	Dec. 12, 1922
1,507,243	Meyer	Sept. 2, 1924
1,633,598	McClatchie	June 28, 1927
1,639,959	Owen	Aug. 23, 1927
1,733,523	Birdsall	Oct. 29, 1929
2,018,791	Kern	Oct. 29, 1935
2,193,784	Smith	Mar. 12, 1940
2,361,909	Bernal	Nov. 7, 1944

FOREIGN PATENTS

Number	Country	Date
486,505	Great Britain	1938