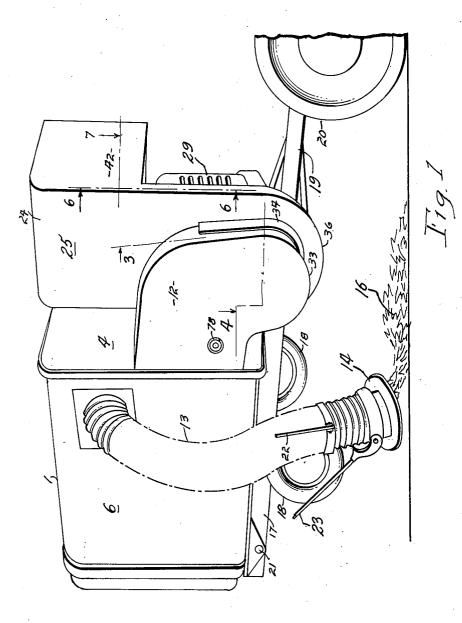
H. I. HANSON ET AL ROAD CLEANING MACHINES

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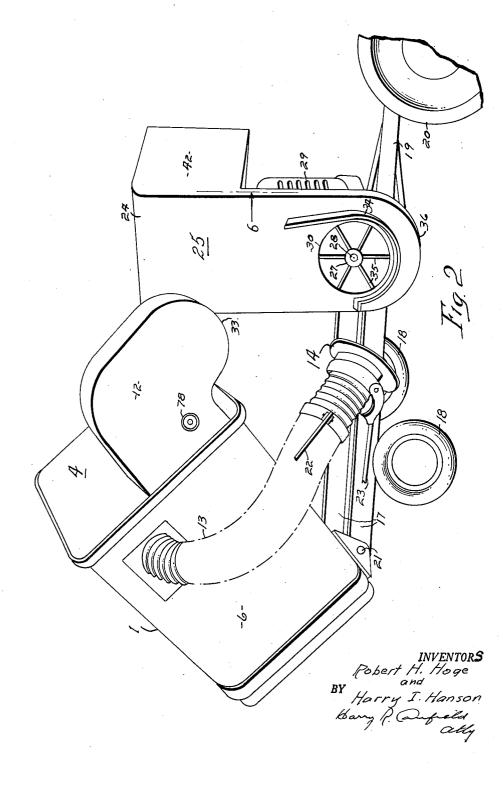


INVENTORS H. Hoge Robert BY Harr I. Hanson Sield alty /6 a

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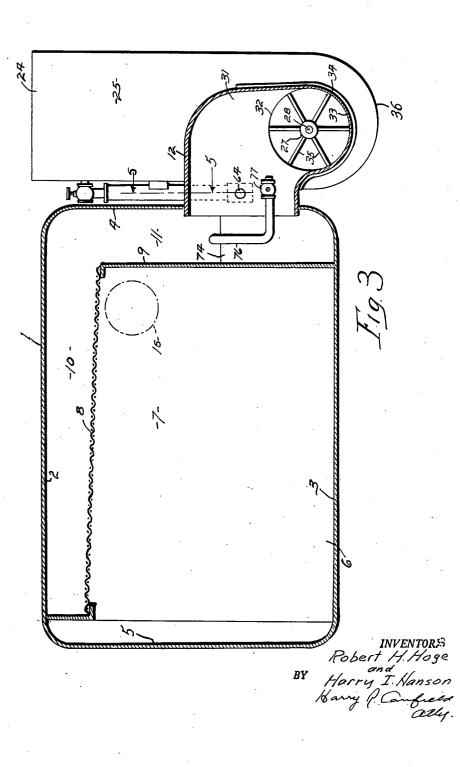
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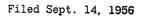
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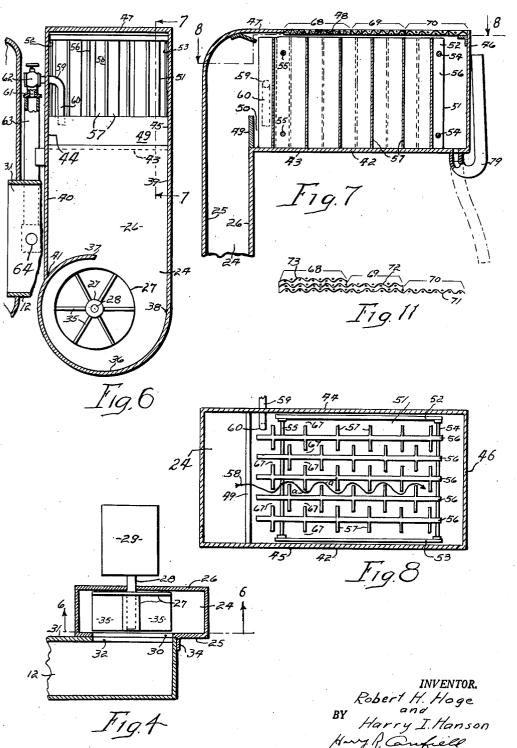
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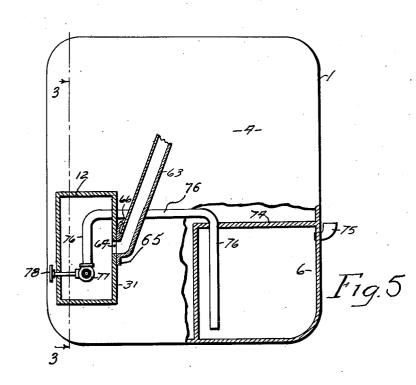
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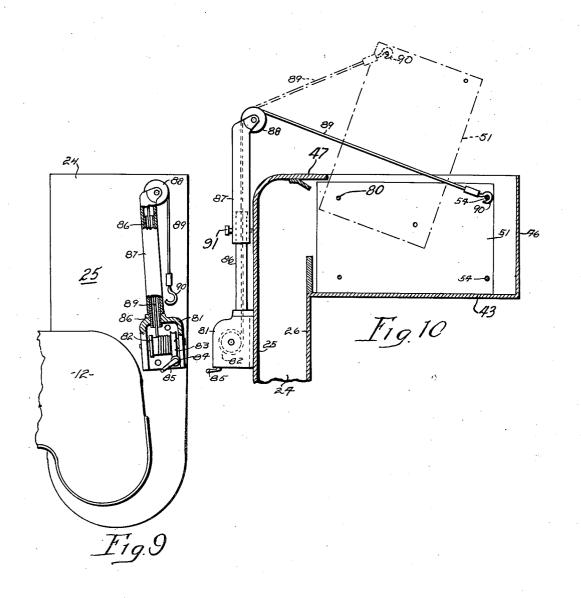


INVENTOR. Robert H. Hoge BY Harry I. Hanson Harry P. Dufield Olly.

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INVENTORS Robert H. Hoge BY Harry I. Hanson Harry F. Caufield

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ROAD CLEANING MACHINES Harry I. Hanson, Minerva, and Robert H. Hoge, Gates Mills, Ohio, assignors, by mesne assignments, to The Good Roads Machinery Corporation, Minerva, Ohio, a corporation of Pennsylvania

Filed Sept. 14, 1956, Ser. No. 609,993 6 Claims. (Cl. 15-353)

This invention relates to machines and methods for 10 cleaning streets, roadways, parks etc., by picking up, collecting and removing leaves and other refuse material therefrom.

There is a known type of machine for this purpose comprising, in general a vehicle propelled over the ground; 15 and having a power driven blower or pump thereon that pumps air out of a box like body of the vehicle, producing partial vacuum therein; and the vacuum is communicated to a pickup hose or the like; and causes a stream of air to enter the end of the hose and pick up the material and carry it into the body; and the material is separated from the air in the body; and the air, pumped from the body is discharged by the pump into the atmosphere.

The present invention relates to machines of this type and to their methods of operation.

There is an objection to such prior machines in that the material thus picked up usually contains dust; from the roadway surface or in the material itself; and while the heavier and larger pieces of the material remain collected in the body, the dust is carried along entrained in the air pumped out of the body and is discharged to atmosphere therewith, often as a cloud of dust; and, particularly when a city street is being cleaned, this is obviously highly objectionable.

dust-laden air, by using water to wet the dust and to collect the wet dust or mud in the machine.

Such dust collecting means have not been satisfactory. In some prior machines the entire mass of collected refuse including the dust is wetted, which renders it difficult to 40 remove it for final disposal at a dump or the like.

In other instances, the water is not brought into sufficiently intimate contact with all of the fine particles of the dust, and much of the dust therefore escapes being wetted, and goes on out with the air.

The principal object of this invention is to provide a machine of the type referred to which overcomes this objection to prior machines.

The invention, in the embodiment thereof fully de-50 scribed hereinafter, comprises, in general the following features; the actual invention being that set forth in the appended claims.

A machine of the general type referred to above is provided having a box like body out of which the air is drawn by a power driven blower or pump, through a 55 walled air conduit and discharged from the pump to atmosphere; producing partial vacuum in the body and in the conduit; and the vacuum in the body is utilized to pick up the refuse material and carry it into the body, where the heavier parts are separated from the air and 60 collected in the body.

Dust too light to be deposited in the body is entrained in the air going from the body through the air conduit to the pump; and at a point in the conduit ahead of the pump, water is drawn into the conduit by the vacuum 65 therein at a controlled rate, from a water supply tank.

This water enters the conduit in a stream of water in the liquid phase, as distinguished from water spray or a mixture of spray and vapor.

The high velocity of the dust-laden air in the conduit 70 under propulsion by the pump carries the water along with it into the pump.

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The pump is of a type having a rotor driven at high speed by a motor, and the water and dust laden air are propelled by the rotor into a walled outlet passageway.

The action of the rotor on the water is exceedingly violent and breaks it up into fine particles of water.

The walled passageway from the pump is thus filled with a turbulent mixture of dust, water particles and air; and the individual particles of dust are caused by turbulence to come into contact with and be wetted by individual particles of water.

The pump forces this mixture to flow into and through the walled passageway, in which is a separator comprising a system of baffle walls, over which the mixture flows, toward a final outlet to atmosphere.

The baffles have a construction providing a series of upright walls against and around which the mixture flows with successive changes of direction, and successive changes of velocity, such that centrifugal force is developed on the mixture, at successive points in the separator,

causing some of the wetted dust particles and water parti-20 cles to be thereby deposited on the baffle walls and to flow downwardly thereover into a tank under the baffles; and causing others, due to reduced velocity, to fall directly into the tank; and the wetted particles of dust collect in the 25 bottom as mud, and the water collects at the top of the tank as liquid water.

This water at the top of the tank is the tank supply of water referred to; and it will therefore be apparent that the water is used over and over again, or circulates in 30 cycles.

The disclosed means to cause the vacuum in the conduit to draw in water from the tank as referred to, comprises an inverted U-form tube of small diameter, one leg of which is a long leg dipping at its end into the water Attempts have been made to prevent this discharge of 35 supply, and the other leg of which is shorter and is sealedly joined to a larger tube, the later communicating with the conduit.

By this means, whenever the pump is started up, and vacuum develops in the conduit, flow of the water to the conduit is automatically initiated by the vacuum; and when the pump is at rest, or is stopped and pressure in the conduit becomes atmospheric, the water is syphoned back by the small tube into the supply tank, and flow to the conduit is thereby automatically cut off.

The refuse collecting body and the air conduit communicating therewith are integrally connected together; and the body is hinged to the chassis adjacent to its rear end so that it may be rocked to dump out material collected in it; but the pump and its driving motor and the separator and water supply tank, are, for practical reasons, mounted stationarily on the chassis; and means is provided to automatically break and remake the connection of the pump to the conduit, and the connection of the water tank to the conduit, when the body is rocked back and forth.

Some of the water in the circulating system referred to, after it is freed of dust, is inevitably lost, either by evaporation or by going out to atmosphere from the separator with the cleaned air; and the water in the supply tank may need to be replenished from time to time.

To this end an auxiliary water tank is provided mounted on the body, and arranged to be kept supplied with water from an outside source; and a pipe is permanently connected between the auxiliary tank and the air conduit, controlled by a manual valve, which may be opened from time to time to allow a quantity of water to be drawn into the conduit by the vacuum therein; and this water, being added to the circulating water of the supply tank, becomes added to the water in the supply tank to replenish it.

Other objects of the invention are:

To provide an improved means and method for remov-

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ing dust from a flowing stream of air in which it is entrained.

To provide, in connection with a flowing stream of air in which fine particles of dust are entrained, improved means and method for wetting the individual particles of dust with individual particles of water to render them readily removable from the stream.

To provide an improved separator means and method for separating water-wetted particles of dust from a stream of air in which they are entrained.

To provide, in connection with a flowing stream of air containing dust into which water is supplied for wetting the dust, improved means and method for turning on and off the supply of water automatically in correspondence with initation and interruption of the flow of air.

To provide in a road cleaning machine of the type in which dust is picked up by the machine and entrained in a stream of air flowing in a conduit at partial vacuum, improved means and method utilizing the vacuum to draw water into the conduit from a water supply tank, subsequently breaking up the water into fine particles to wet the dust, in the air, separating the water and wetted dust from the air, returning the water to the supply tank, and discharging the air to atmosphere.

To provide a machine as described in the foregoing ob- 25 ject and in which water is drawn periodically into the conduit by the vacuum therein, from an auxiliary water tank, to replenish the water in the supply tank.

To provide a road cleaning machine having, among others, the features described in the foregoing general 30 description.

The invention, in a preferred embodiment thereof, is fully described in the following description taken in connection with the accompanying drawing in which:

FIG. 1 is a perspective view of an embodiment of the 35 invention; with the parts in positions to pick up and collect refuse:

FIG. 2 is a view similar to FIG. 1 with a refuse collect-

ing body in a rocked position to dump out collected refuse; FIG. 3 is a longitudinal sectional view taken from the 40 plane 3 of FIG. 1;

FIG. 4 is a fragmentary sectional view taken from the plane 4 of FIG. 1;

FIG. 5 is a sectional view with parts broken away and in section taken from the plane 5 of FIG. 3; 45

FIG. 6 is a sectional view taken from the plane 6 of FIG. 1 or FIG. 2 and the view may be referred to the plane 6 of FIG. 4;

FIG. 7 is a fragmentary sectional view from the plane 7 of FIG. 1 or FIG. 6;

FIG. 8 is a sectional view from the plane 8 of FIG. 7;

FIG. 9 is an elevational view corresponding to a part of FIG. 1 showing additional apparatus added as a modification; and in out-of-use position;

FIG. 10 is a view in simplified form corresponding to FIG. 7 illustrating the use of the modification of FIG. 9.

FIG. 11 is a view showing a modification of part of FIG. 7.

The subject matter hereof may be considered as an improvement of the subject matter of copending patent application Serial No. 315,509, now Patent No. 2,887,714, assigned to the assignee hereof.

Referring to the drawing particularly FIGS. 1, 2 and 3 there is shown at 1 a large box-like main housing or body having, a top wall 2, a bottom wall 3, front and rear walls 4 and 5 and side walls 6.

A large chamber 7 is provided inside of the body by a top wall 8 in the form of a screen, spaced below the body top wall 2, and by a solid end wall 9 spaced inwardly from the front wall 4.

The space 10-11 thus provided communicates with a large walled air conduit 12 connected to the front wall 4 and the conduit goes to a power driven air pump to be chamber 7 and conduit 12 creating partial vacuum therein.

A large flexible hose 13 is connected at one end to a side wall 6 in communication with the chamber 7, and depends therefrom terminating in a nozzle 14 on its lower end.

In FIG. 3 which best shows the chamber 7, the point below the screen wall 8 and inwardly of the front wall 4 at which the hose 13 communicates therewith is indicated by the broken line circle 15.

Air being drawn out of the chamber 7 by the air pump, causes air to rush into the nozzle 14 at high velocity, and refuse indicated at 16 is thereby picked up and carried by the air up through the hose and into the chamber 7.

The screen wall 8 stops the heavier parts of the refuse and they fall to the bottom of the chamber and collect therein.

When dust is picked up by the hose, it passes on through the screen wall 8 with the air and becomes en-20 trained therein and goes on therewith through the conduit 12 to the pump; and in the absence of countervailing provisions would go through the pump and be discharged into the atmosphere by the pump; and to prevent this is a primary object of the invention as mentioned.

The main body 1 is supported on the frame of a vehicle chassis 17 having supporting ground wheels 18, and connected at its forward end by a hitch 19 to a propelling truck or tractor, only the driving wheels 20 of which are shown.

The rear end of the main body has a hinging connection with the chassis as indicated at 21 and the main body 1 and the conduit 12 connected thereto may be rocked on the hinging connection from the refuse collecting position of FIG. 1 to the rocked position of FIG. 2 whereby to dump out the collected refuse, the rear wall of the body being in the form of a door or doors not shown which can be opened at the time for this purpose.

Means is provided indicated fragmentarily at 22 to support the weight of the hose; and means is provided indicated fragmentarily at 23 by which an operator can manipulate and position the nozzle 14 to facilitate its pick-up action; and for more details as to these and other parts above referred to reference may be had to said copending application which shows a similar construction.

Mounted on the chassis, forwardly of the body, and not rockable with the body, are the air pump referred to and the motor for driving it and a passageway containing a separator which will now be described.

There is an upright walled passageway 24 comprising generally parallel side walls 25 and 26 between which is the rotor 27 of the air pump referred to, see FIG. 4. A shaft 28 connected to the motor, which is preferably an internal combustion engine mounted on the chassis, extends through the wall 26 and carries the pump rotor 27 55 thereon.

The motor is not shown complete but is indicated at 29 FIGS. 1 and 2, and diagrammatically in FIG. 4.

Coaxial with the shaft 28 and pump rotor 27 is a large circular opening 30 in the wall 25 of the passageway 24 60 constituting an intake opening to the rotor.

This wall 25 is substantially vertical; and the aforesaid conduit 12 has a vertical wall 31; and in the operating position of the parts these walls are in fiatly superimposed engagement with each other on a common vertical plane; 65 and the wall 31 of the conduit has a circular opening 32 therethrough matching and registering with the said circular hole 30 in the wall 25. See FIG. 4.

The forward end of the conduit 12 is closed by a circularly curved wall 33 that circumscribes the periphery 70of the circular hole 32 in its wall 31.

The circular holes 32 and 30 in the conduit 12 and passageway wall 25 are preferably of the same diameter and coaxially aligned, and to insure this alignment, and to provide a measure of sealing effect at said plane of endescribed, which draws air out of the space 10-11 and 75 gagement, the closed end 33 of the conduit 12 is seated

upon a circular flange 34 shaped to fit it, and extending from the passageway wall 25.

When the main body 1 is rocked to the dumping position of FIG. 2, the conduit 12 is lifted thereby and the air communication between the conduit and pump is, in 10 consequence, broken, and when the body is restored to the position of FIG. 1, the air communication is again automatically restored, as will be apparent, resulting from engaging the conduit 12 with the passageway 24 on a vertical common plane as described.

In the preferred construction, and as shown in FIGS. 4 and 6, the pump comprises a rotor 27 having radial vanes 35.

The lower end of the passageway 24 is closed by an end wall 36 which at 37, at the top of the rotor as viewed, is 20 munication of the large pipe 63 with the hole 64; and when close to the outer periphery of the vanes, and is of increasing radius proceeding around the vanes, and merging at 38 into an upright end 39 wall of the passageway 24.

The opposite end wall 40 of the passageway joins the curved end wall 36 at an intermediate point, thereof, as at 41.

Air entering the intake 32-30 to the rotor 27 is thus propelled by the vanes 35 upwardly through the passageway 24.

The passageway 24 upwardly beyond the rotor 27 is of 30 larger cross sectional area than at the entrance of air into it from the rotor, resulting in great turbulence in the passageway 24.

The upright passageway 24 at its upper end turns at a right angle into a horizontal portion, here identified as a 35 separator portion 42.

The separator portion 42, FIGS. 6, 7, 8 has a bottom wall 43 and side walls 44 and 45 and is closed at its outer end by an end wall 46, and at its top is covered partly by a top wall 47 and partly by a removable screen 40 cover 48 to be referred to later.

The side walls 44-45 are connected by a low wall 49 which, together with the bottom wall 43 side walls 44-45 and end wall 46, provide a tank 50, to be referred to later. Standing in the tank 50 and on the bottom wall 43 45

is a separator 51 having the following construction.

The separator 51 is preferably of unitary construction comprising opposite side walls 52-53 spaced apart and connected by transverse rods 54-55.

On the rods are mounted a plurality of upright, prefer- 50 ably vertical, parallel longitudinal baffle walls 56 spaced from each other transversely and from the side walls 53.

A plurality of transverse baffle walls 57 preferably 55vertical, extend in opposite directions from each longitudinal wall 56 being preferably of angle section welded to the longitudinal walls.

The transverse walls 57 are spaced apart along the longitudinal walls 56 and those of each longitudinal wall are staggered relative to those of the next adjacent longitudinal walls, and extend close to the longitudinal walls.

All of the baffle walls 56 and 57 thus provided, extend vertically all the way from the bottom wall 43 to the top wall 47 and screen cover 48 of the passageway.

Air flowing through the separator portion 42 of the passageway as described is thus constrained to flow in a plurality of sinuous flow paths, as indicated for one of them by the arrow 58, the effects of which will be referred to later.

As mentioned in the premises it is a part of the invention that the dust entrained in the air discharged from the pump into the passageway 24 will be wetted by water and prevented from being discharged into the atmosphere and this will now be described.

It will be assumed that the aforesaid tank 50 under the separator 51 has been filled with water.

A small diameter pipe 59 generally U-shape FIG. 6 is mounted on the wall 44 of the passageway, with a long leg 60, thereof projecting downwardly into the water in the tank 50. The bend of the pipe extends through the passageway wall 44 and on the outside thereof has a manual valve 62 controlling it, and beyond the bend a short leg 61 of the pipe is sealedly connected to a pipe 63 of larger diameter.

The large pipe 63 communicates with a hole 64 in the wall 31 of the conduit 12 which wall is vertical, see FIG. 5. The pipe 63 is not connected to the conduit wall but

is stationary relative thereto and terminates in a flange 15 65 coplanar with the side wall 31 and in engagement therewith.

By this means, when the body and conduit are rocked to the dumping position of FIG. 2, the conduit wall 31

slides upwardly on the flange 65 and breaks the comthe conduit is restored downwardly to the position of FIGS. 1 and 5, the communication is restored. The flange 65 has a lip 66 thereon which guides the conduit wall 31 into engagement with the flange, as the wall moves down-25 wardly.

The down movement of the conduit and the hole 64 therein is stopped as described at a predetermined position which insures registering of the conduit hole with the pipe.

When the parts are in operation, partial vacuum in the conduit 12 communicated to the large pipe 63 and Ushaped small pipe 59 draws water from the tank 50 into the conduit $1\overline{2}$ through the hole 64.

The water thus injected into the conduit is propelled along toward the pump by the flow of air in the conduit and reaches the intake of the pump as liquid water.

The pump throws the water outwardly radially along with the air into the passageway 24. The action of rotor vanes 35 on the water is exceedingly violent and breaks it up into small particles of water.

The air has dust entrained therein and the pump thus discharges a mixture of air, dust particles and water particles into and upwardly through the passageway 24.

The great turbulence in the passageway as described casuses the dust and air particles to come into intimate contact and the dust particles are wetted thereby.

The mixture of air, wetted dust particles and water particles is propelled on through the described sinuous flow paths of the separator.

When the flow path changes direction as at a in FIG. 8, the particles are thrown by centrifugal force against the longitudinal walls 56 and transverse walls 57 of the separator, and upon accumulating thereon flow downwardly thereover into the tank 50.

When the particles pass through and beyond the small spaces at 67 between the longitudinal walls and transverse walls, their velocity is suddenly reduced and some of them will fall by gravity directly into the tank 50.

The water and wetted particles in the tank separate by 60 gravity, the wetted dust particles sinking to the bottom of the tank as mud, and the water collecting at the top of the tank. This is the water that is drawn through the pipe 63 and into the conduit 12 as described.

As will be apparent therefore the water in the tank 50 circulates from the tank to the conduit 12 and back to the tank, and is used over and over again cyclically.

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In the usual operation of the apparatus, when the time comes to rock the main body to the dumping posi-

70 tion, the pump is first stopped. The conduit 12 then comes to atmospheric pressure and by way of the hole 64, its atmospheric pressure is communicated to the pipe 68, and thereupon the long leg 60 of the U-pipe syphons the water back into the tank 50. The flow of water to 75 the conduit 12 is thereby automatically cut off.

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In any event, whether the pump is first stopped as referred to, or not, the lower end of the pipe 63 becomes uncovered and exposed to atmospheric pressure, to cut off the flow of water as described.

The air, cleaned of dust, going through the separator 5 51, discharges upwardly therefrom and out to atmosphere through the screen cover 48.

It has been found that if the air discharged freely horizontally from the end of the separator, or if the discharge were directed upwardly and out of the top of 10 the separator through a free opening, the air, because of its high velocity, would in either case, pick up water from the top of the tank 50, and discharge it into the atmosphere and deplete the water in the tank.

To overcome this, horizontal discharge from the sepa- 15 rator is blocked off by the end wall 46 of the separator passageway 42; and the flow is directed upwardly thereby; and the upward flow passes through the screen cover 48.

It has been found experimentally that the action of 20 the separator 51 as described is rendered more efficient and the picking up of tank water by the air, is reduced to the minimum, if the fineness of the mesh of the screen cover 48 is graduated, to be coarsest at the outer end of the passageway.

This graduation of screen fineness is illustrated in FIG. 7 wherein the screen is shown with a portion 68 of greatest fineness, a portion 69 of intermediate fineness, and a final portion 70 of least fineness.

This graduation of screen fineness may be approximated as illustrated fragmentarily in FIG. 11.

Screen material all of the same fineness is used; and assembled in superimposed layers, 71-72-73, successively longer proceeding from left to right in the drawing. The bottom layer 71 is the cover proper and a portion of its right end corresponds to the portion 70 of FIG. 7.

The middle layer 72 has a right end portion which together with the part of the layer 71 under it corresponds to the portion 69 of FIG. 7. The top layer 73 together 40 with parts of the layers 72 and 71 under it, corresponds to the portion 68 of FIG. 7.

The layers 71-72-73 are preferably all connected together as a unitary screen cover.

Some of the water in the circulating system will in- 45 evitably be lost, by evaporation or by a small amount of it being discharged through the screen cover 48, with the cleaned air.

To replenish the water in the tank 50 from time to time, an auxiliary on "makeup" water tank 74 is provided, FIGS. 50 3 and 5, mounted on the main body, and preferably disposed in the space 11 between the chamber and end walls 9-4, and having a filling spout 75 extending outwardly for filling it.

A pipe 76 extending downwardly into the tank 74 goes 55 through the conduit wall 31 into the conduit 12 and terminates therein at a manual valve 77 having a valve handle 78 in the outside of the conduit.

Upon opening the valve 77 by the valve handle 78 the vacuum in the conduit 12 will draw water from the makeup tank 74 through the pipe 76 and into the conduit. While this is being done, the valve 62 controlling the Uform pipe 59 is preferably closed.

The system then operates, using water from the makeup tank 74 the same as when using water from the supply tank 50 but the water accumulates in the supply tank and is not recirculated, and the supply tank is thereby replenished; and when it is full, the valve 77 may be closed and the valve 62 opened to again utilize the circulating water feature.

This same method of operation of the make-up tank may be utilized to fill the supply tank initially.

The accumulated mud in the supply tank 50 may be flushed out by hose water from time to time and drained through a drain hose 79 connected to the bottom of the 75

tank 50 which when not in use may be bent up to the nondraining position illustrated.

In some cases it may be desirable to remove the unitary separator 51 from its passageway 42 when cleaning out the tank 50 and to facilitate this the arrangement illustrated in FIGS. 9 and 10 may be provided.

In FIG. 10 the separator 51 of unitary construction is shown in solid line outline to simplify the drawing, and at the upper left hand corner as viewed the side walls thereof have a hinging connection with the side walls of the passageway as indicated at 80.

A frame 81 is secured on the upright side wall 25 of the passageway 24 in which is rotatably mounted a hoist drum 82 having a worm gear 83 for rotating it and a worm 84 with a handle 85 on it for turning the gear.

An upwardly extending tubular post 86 is secured to the frame 81 and telescoped downwardly thereover is a slidable elevator tube 87 carrying a cable pulley 88 at its upper end.

A cable 89 wound on the drum 82 passes upwardly through the post 86 and tube 87 and over the pulley 88 and in the out-of-use position of the parts as in FIG. 9, the cable 99 hangs down along the outside of the post 86 and tube 87, and has a hook 90 on its lower end.

In operation, the elevator tube 87 is slid outwardly on the post 86 and fixed in an outward position by a pin 91 projected through aligned holes in the post and tube as in FIG. 10.

The screen cover 48 is removed from the top of the 30 passageway providing a free opening therefrom.

The cable hook 90 is then hooked over one of the rods 54 of the separator 51 as in FIG. 10 and the hoist drum 82 is rotated to wind up cable, and the separator 51 is thereby rocked on the hinge 80 upwardly through 35 the open top of the passageway 42 to the broken line position of FIG. 10, and the tank 50 and all of the baffle walls of the separator 51 as well, are thus exposed for flushing out with a water hose and drained at the drain 79, of FIG. 7.

We claim:

1. In a road cleaning machine of the vacuum type for collecting refuse, including dust, in a body of the machine, a walled air conduit extending from the refuse collecting body; an air pump in the line of the conduit drawing air from the collecting body and discharging it at a conduit outlet to atmosphere and creating partial vacuum in the body and in a portion of the air conduit on the intake side of the pump; a tank of water supply; a water conduit from the tank to the said portion of the air conduit, said water conduit having an inverted U-tube portion arranged above the water supply to prevent water flow therethrough due to gravity and caused to inject a stream of water into the conduit portion only when a partial vacuum exists in the conduit portion; whereby a mixture of air, and said water, and dust from the machine body entrained in the air, is forced to pass through the pump; the pump constructed to break up the water substantially into mist and mix it with the entrained dust to wet the dust particles; a horizontally elongated separator 60 above the said tank through which the water-wetted dust and air flow toward the conduit outlet, comprising a horizontal flow path having upright walls upon which the water and wetted dust impinge and adhere and from which they flow downwardly by gravity into said tank; the wetted dust by settling in the tank providing a quantity of water above it which constitutes the said tank supply of water.

2. In an apparatus in which dust laden air is propelled $_{70}$ through an air conduit by a pump intermediate the ends of the conduit; means for removing the dust particles from the air comprising; water conduit means having an inverted U-tube portion arranged to prevent water flow therethrough when the pump is not operating and for injecting water in the liquid phase into the air conduit at

the intake side of the pump only when the pump is operating; whereby a mixture of water and dust particles and air is propelled through the pump; the pump constructed so that it breaks up the water passing through it into water particles, and mixes them with the dust particles and causes them to wet the dust particles; whereby the air being propelled in the conduit beyond the pump has water particles and wetted dust particles entrained therein; a horizontally elongated separator between the pump and the conduit outlet end, comprising upright walls upon 10 which the wetted dust particles and water particles collect and on which they flow downwardly by gravity into a receptacle.

3. In an apparatus by which air is drawn from an air supply through an air conduit by a pump and the pump 15 when running produces partial vacuum in the conduit on the intake side of the pump; means to feed water into the conduit to be mixed with the air when the pump is running and to automatically interrupt the feeding of water upon stopping the pump; said means comprising: a supply tank of water; an inverted U-tube one leg of which projects at its lower end into the water in the tank, and the other leg of which is shorter than the one leg and sealedly communicates with a water conduit of larger diameter than that of the said other leg; the water conduit having sealed communication with the air conduit at the intake side of the pump; whereby when the pump is running and producing vacuum in the air conduit, water will flow into the air conduit through the U-tube and water conduit and be mixed with the air by the pumping action; and 30 to the air conduit and back to the tank. when the pump is not running and not producing vacuum, the flow of water will be terminated by the syphoning of the water in the U-tube back into the tank.

4. The apparatus described in claim 3, and in which the water after being mixed with the air is propelled by 35 the pump toward an outlet end of the air conduit, and the water is separated from the air by a separator disposed between the pump and the outlet end of the air conduit and above the water supply tank, whereby the separated water may fall by gravity back into the tank.

5. In a road cleaning apparatus, a box like refuse receptacle; means operable by partial vacuum in the receptacle, to pick up refuse which comprises solid matter and dust and deposit the solid matter in the receptacle; an air conduit communicating with the receptacle interior; a 45 power driven pump drawing air with the dust entrained therein, out of the receptacle and through the conduit

and producing partial vacuum in the receptacle and in the conduit; a water supply tank; water conduit means connecting the water supply to the conduit and having an inverted U-tube portion arranged above the water supply to prevent water flow through the water conduit due to gravity and to permit water flow through the water conduit only when a partial vacuum exists in the air conduit for injecting water of liquid phase from the tank into the air conduit; a walled passageway communicating with the output side of the pump and having an outer end open to atmosphere; the pump comprising means that propels the air, entrained dust particles, and injected water, out of the air conduit and concurrently breaks up the water into water particles and intimately mixes them with the dust particles in the air, to cause the water particles to wet the dust particles, and propels the mixture of air, water particles and wetted dust particles into the passageway, toward its open end; a horizontally elongated separator in the passageway through which the mixture therein 20 flows, comprising walls upon which the water particles and wetted dust particles accumulate and downwardly over which they flow by gravity; and a dust and water receptacle under the separator.

6. The apparatus described in claim 5 and in which the receptacle under the separator is the water supply tank and said water conduit communicates between the air conduit and water in the upper part of the tank collecting therein by settling of the wetted dust in the lower part thereof, whereby the water circulates from the tank

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