Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

[0001] This invention relates to a suction sweeping machine which is designed for picking up debris from streets and other areas, and can be operated by a person walking or riding behind the machine.

[0002] In CA-A-1268306, a sit-on suction sweeping machine is disclosed which is large and cumbersome, and not particularly suitable for sweeping and cleaning pavements. The machine apparently does not have a dust control system, but a perforated collection bin is provided at a downstream end of a suction hose, the suction blower being located downstream of the bin. This machine does not have a sweeping action and cannot be pedestrian operated. To empty the bin, a lid has to be removed from the top of the bin.

[0003] In FR-E-5479, a carpet cleaner is disclosed which has a twin-compartmented container having a permeable sack in one compartment and a motor for a pump in the other compartment. A perforated door is provided in an end of the compartment.

[0004] In US-A-4007026, there is disclosed an industrial sweeper with cartridge filters which are cleaned by reverse jet pulses of air.

[0005] None of the above documents discloses a suction sweeping machine, which can be operated by a person walking behind the machine.

[0006] Such a machine is the subject of our U.K. Patent Application No. 2287418A. This machine includes at a front end thereof rotary brushes and a suction head at ground level, through which debris is drawn by an impeller, which is driven by a motor and which also acts as a fan, and breaks up and compacts large debris, and then blows all the debris in a fluid stream through a conduit, to an outlet duct, whereupon the debris is then collected in a container, which is preferably a large capacity refuse bag or sack located in a rigid box or compartment. The machine is provided with a porous filter member which allows the air drawn into the machine to be returned to the atmosphere, after any dust and other solids have been filtered from it and deposited in the bag or sack. At its rear end, the machine has an operator station with handles, so that it can be guided and controlled by an operator walking behind the machine. While such a machine works very satisfactorily, it suffers from one disadvantage, which is that in due course, the filter arrangement begins to become clogged with fine dust particles. Also debris filled containers are difficult to remove and replace with a new, empty container. They have to be lifted out of the machine through the open end of a compartment in which they are supported, or through a rear door incorporating a secondary filter, and located beneath the operating handles. This can be a dirty task, which is awkward to perform.

[0007] It is among the objects of the present invention to provide a suction sweeping machine which is pedestrian operable and which has a filter arrangement and debris collection arrangement which is more convenient to use than known suction sweeping machines.

[0008] According to the present invention, we provide a suction sweeping machine including means at the rear of the machine to allow operation by a person walking or riding behind the machine, a motor, a fan driven by the motor, a suction head connected by an inlet duct to the fan, whereby debris collected from the ground in a fluid stream generated by the fan, is forced by the fan into an outlet duct extending from the fan to a container, wherein the outlet duct terminates in an outlet in the top of a compartment for the container and communicating with the container, there being a porous filter member extending from the outlet into the container through an opening in an upper portion thereof, whereby debris from the fluid stream in the outlet duct is collected within the container, whereas the fluid in the fluid stream flowing from the outlet may diffuse through the porous member and out of the opening, characterised in that an access opening closeable by a door is provided in a lateral side wall of the compartment, and in that support means is located within the compartment, said support means supporting said container and said porous filter member, and being moveable from a position of use through said access opening when said door is open to a container replacement position at least partly outside said compartment, so that the container may be replaced with another container.

[0009] The fluid stream flowing from the outlet may carry the remains of papers, drinks cans, cigarette ends and the like. This debris, which is chopped as it passes through the fan, will collect in the container which may be periodically emptied or removed for disposal. Also, when used in a machine provided with water mist dust suppression, the "wet" dust and dirt will remain in the container and may thus be easily and cleanly removed from the machine. Similarly, when the suction sweeping machine passes over a puddle, the water drawn into the machine will be retained in the container and will not result in the machine leaving a trail of dirty water behind it as occurs with conventional machines. A special container is used in wet weather.

[0010] The container may be a rigid or semi-rigid box but is preferably in the form of a sack or bag. In the majority of applications a simple plastic "bin bag" or "plastics bin liner sack" will suffice, such that filled bags or sacks may be readily removed, sealed and disposed of, and a supply of replacement bags may be carried on the machine. The ability to use such bags also reduces the running costs of the machine; these bags are relatively inexpensive and available from a wide variety of sources. The bag may be located within a compartment which provides protection for the bag and improves the appearance of the machine.

[0011] Preferably the porous member is a flexible tube, the lower end of which is located within the bottom of the container, and the upper end of which is in communication with said outlet. Preferably said flexible tube is supported at its upper end on a rigid support which is
removably located within said compartment through said access opening in the side wall thereof, the rigid support being shaped to match the shape of said outlet.

Preferably the rigid support and the outlet are located relative to the opening in the container centrally towards the front thereof, so that spaces are left between the walls of the container and porous member over the whole areas of two side faces of the container for the passage of air from said fluid stream.

In the preferred embodiment the container comprises a generally rectangular compartment towards the rear of the machine, and towards one side thereof, said compartment being defined by generally rigid mesh screens on the side thereof opposite said one side and to the rear thereof, by a generally impervious front wall, and by a generally impervious floor and roof walls, and by a door providing said access opening. One or more trays for collecting liquid and/or dust may be located in the bottom of the compartment. Preferably, also the sides of the compartment defined by said mesh screens are further defined by filter means which may comprise fine screens of textile material.

Also in the preferred embodiment, the fine screens preferably comprise a plurality of vertically extending candle filters, the candle filters comprising felt like socks each supported on a skeletal frame, and open at its upper end, the open upper end communicating with an overall machine casing which directs filtered air forwardly and downwardly. Preferably the skeletal frame can lifted or slid out of the compartment. Preferably, in order to prevent clogging of the candle filters, a shaker mechanism is provided for shaking fines collected by the candle filters off the candle filters, for subsequent removal. Preferably also, the filter arrangement includes a second filter member, through which the fluid stream flows after exiting the container, to remove fines from the fluid stream which do not remain in the container. In the majority of applications most of the finer dirt and dust will still tend to collect in the container such that replacement or cleaning of the filter arrangement, e.g. filter tube will only be required relatively infrequently. Alternatively or additionally, the filter arrangement may form a wall of a conduit in which the container is located or an end wall of a conduit, and may be adapted for periodic replacement or cleaning. Most preferably, the container is replaceable without disturbing the filter arrangement.

Preferably also, the tubular porous member extends to the base of the container. Most preferably, the porous member and the container are arranged such that a gap is maintained therebetween, to facilitate airflow through a large area of the porous member. Most preferably, the porous member is frusto-conical or flared, and widens from the outlet towards the base of the container.

The porous member is preferably formed of flexible material, for example woven polypropylene, but it may be rigid, and formed for example of a metal mesh. A single porous member may be provided. Alternatively, two or more porous members, of successively finer pore size, may be provided such that larger debris is retained in the container by the first porous member, while finer particles are retained by the succeeding members. In a suction sweeping machine, such an arrangement may obviate the need for an outer bag or a second filter member. Preferably each skeletal frame comprises a spring-like device depending from a cylindrical tube, with the socks being located on the tubes by suitable ties, and being held open along the spring-like device, over which the socks are stretched. According to another aspect of the present invention, we flare the upper ends of the tubes, so that the upper end of each tube is trumpet shaped. This improves the performance of the candle filters by increasing the air flow through the tubes, by up to about 15%.

Preferably, a shaker mechanism is mounted on the filter support frame, and may comprise an electric motor which drives an offset weight. The shaker mechanism may shake just the candle filters, or all the filters defining the walls of the compartment, thus causing dust thereon to be shaken off and deposited in said one or more trays in the bottom of the compartment for subsequent removal.

Preferably, the switch means associated with the door is such that the electric motor will only be activated to operate the shaker mechanism when the door is closed. This can be achieved in known manner, e.g. by having a control device associated with the switch. There may be a time delay device to ensure that once the electric motor operates, it is automatically switched off after a preselected time.

While the shaker could be operated from the
machine controls if the motor is off and the door is closed, it is preferred that there be a proximity detector fitted to the door which has to be activated, as well as a timer monostable which must also not be off, before the shaker motor operates. It is preferred that the shaker motor be timed to operate for about one minute. Obviously, the machine must not be in operation when the shaker is in operation, otherwise dust on the filter socks would be held on the socks.

Another preferred feature of this invention is the provision of a skeletal frame for supporting a suction hose fitted to the machine for removing debris and rubbish from awkward areas. Preferably, the hose is carried on the frame by one or more support stirrups and/or straps and the frame is pivotally supported on the chassis of the machine about a vertical axis adjacent a front end of the machine. Preferably also, at its end remote from its pivotal connection to the chassis, the hose frame carries an over dead centre latch of known construction, for securing the frame to the side of the machine. Preferably, the door in this lateral side wall of the machine does not have a latch, but is held closed by the latch of the hose frame, which engages a catch on the machine chassis, there being suitable pressure members on the hose frame to bear against the outside of the door to keep it shut when the latch is engaged with the catch.

This and other aspects of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view, from one side and to the rear, of a suction sweeping machine of the present invention, with part of the overall machine casing removed, and with various parts from within the machine removed to show the interior thereof;

Figure 2 is a perspective view from above of a flexible porous member for location within the interior of the machine of Figure 1;

Figure 3 is a perspective view of the interior of part of the machine, showing an outlet for a fluid stream containing debris, and a rectangular frame and supporting slideway therefor, the frame being in a sack replacement position, but without a porous member or sack in position;

Figure 4 is another perspective view, similar to Figure 3, but with the frame in a position of use;

Figure 5 is a view similar to Figure 3, but with the porous member and sack fitted;

Figure 6 is another perspective view, similar to Figure 4, but with the porous member and sack fitted.

Figure 7 is a partly schematic, perspective view of a modified constructions of machine showing a pivoting hose frame, with the hose in a stowed position;

Figure 8 is a view similar to Figure 7, with the hose in a position of use; and

Figure 9 is a block diagram showing a circuit arrangement for a filter shaker mechanism.

Reference is first made to Figure 1 of the drawings which illustrates a suction sweeping machine which is wheel mounted and is operable by a person walking behind the machine and directing the machine by means of handles 14. Power for the machine is provided by a small IC engine which also drives a pair of side brushes 18 to direct dirt, dust and debris into a vacuum intake between and to the rear of the brushes 18. A conduit leads from the intake to an impeller or fan driven by the engine which, in addition to drawing the air through the intake, breaks up any larger debris carried into the machine. From the impeller, the debris-carrying airstream is directed through an upwardly, then rearwardly and then downwardly extending conduit 26, the outlet 28 of which leads into a filter arrangement. There is a smooth transition of the conduit where it changes from a horizontal to a generally downwardly extending orientation immediately upstream of the outlet 28, so that at the outlet 28, there is a generally rectilinear non helical flow of the airstream.

The duct outlet 28 is oriented so as to direct the fluid stream containing debris downwardly into a container, provided by a plastic bag or refuse sack 32. The outlet 28 is rectangular as shown in Figures 3 and 4, and terminates in the top of a compartment for the container, which is generally rectangular, and defined by an impervious front wall 120, a side wall and a rear wall (not shown) each defined by a rigid mesh filter 122, a side door 124, a generally waterproof floor 126 in the form of a rectangular tray to the upstanding rim of which the three side walls are connected, and a roof 128.

The outlet 28 is supported by a rectangular framework 130 of the same general dimension as the compartment, the framework 130 being supported by the machine chassis, with the outlet being located generally centrally of the front wall 120 (see Figure 4). The container is located laterally offset on the machine, to the side defined by the door 124.

The filter arrangement for the fluid stream containing debris exiting from the outlet 28 includes a flexible porous tube or sleeve 132, which is supported at one end on a rigid rectangular support 134 (see Figs. 2 and 5) of the same dimension as the outlet 28. The sleeve 132 tapers and is larger at its base than where it is connected to the support 134, and its length is such that, in use, it will, with its support 134, extend from the outlet 28 almost to the floor 126.

Prior to using the sweeping machine, a plastics sack 32 is located within the compartment by wrapping its upper edge region over a rectangular frame 136 which is slidably supported on two inclined slideways 138 supported from the framework 130, as shown in Figures 3, 4 by stirrups 140. Figure 3 shows the frame slid out of the open side doorway of the machine, ready to receive a sack 32 whereas Figure 4 shows the frame in a position of use (but without a sack fitted thereto), and
held in that position by a latch 142.

[0030] Figures 5 and 6 show a sack 32 supported on the frame 136; the support 134 of the sleeve 132 is provided with a U-shaped support bracket 144 at its rear, and with two support hooks 146 at its front, the former being designed to rest on a support ledge 148 formed on the frame 136, at its 'rear' and the latter to hook over a 'front' member of the frame 136. As can be seen from Figure 5, the presence of the support 134 on the frame 136 is designed to hold an upper edge region of the sack 32 in position on the frame 136. When the latter has been slid back into its position of use, and latched in that position by the latch 142, as seen in Figure 6, the whole of the upper edge region of the sack 32 will be clamped to the frame 136, and the sleeve support 134 will be held up in communication with the outlet 28.

[0031] Once the door 124 has been closed, the sweeping machine is ready to use. In use, the debris laden fluid stream will exit into the porous sleeve 132, and the air therefrom will diffuse through the porous sleeve 132, leaving a majority of the debris in the sack. This air will move upwardly in the two gaps between the side and rear walls of the sack and sleeve respectively; these gaps are readily apparent in Figure 5. This air, which may contain light and/or fine debris, will then pass through the spaces between the outlet 28 and framework 130 (see Figure 4), into the general area of the compartment defined externally by the mesh screens 122 and the door 124, and internally by the sack 32. To keep the sack spaced from the door, a U-shaped plate 150 is secured to the inner face of the door. This air is then filtered again by rows of candle filters 152 located to the rear of the compartment and on the side thereof remote from the door 124.

[0032] Candle filters are known per se, and comprise slim tubular socks made of felt or the like, supported on skeletal frames, such as helically coiled wire 'springs'. The candle filters 152 are open at their upper ends as shown in Figure 1, and are supported at their upper ends in an apertured plate, and the air under pressure in the compartment is forced by the fan 24 through the felt, which screens out fine debris, dust and other particles, and then escapes through the open top of the candle filters.

[0033] There is an overall casing (not shown) for the sweeping machine, into the interior of which this filtered air escapes. This casing is designed to direct the air forwardly and downwardly for discharge into the surrounding atmosphere.

[0034] Beneath each of the rows of candle filters 152 there is a removable tray 154, 156 for collecting dust collected on the exterior of the filters 152. This dust can periodically be shaken off the felt material with the aid of a shaker mechanism (for example, an electric motor and counterweight acting on a subframe for the filters, the subframe being spring mounted (not shown) on the chassis of the machine). A suitable resiliently deformable diaphragm seal is provided between the machine and subframe for the filters.

[0035] A typical shaker motor circuit block diagram is shown in Figure 8 of the accompanying drawings.

[0036] If the filters are shaken before the door is opened, this will result in the compartment being filled with airborne dust which would make emptying the container a most unpleasant task. Hence, by shaking the filters after the door has been closed, it means that when the door is next opened to empty or replace the container, the dust in the compartment will have settled into the said one or more trays, and these can be emptied when the container is emptied or replaced. Accordingly a proximity detector is fitted to the door 124, and the act of closing the door will activate the detector, to bring into operation a timer device and to activate the shaker motor. After a predetermined period of time, e.g. 1 minute, the timer device will cause the shaker motor to be switched off, by which time the dust on the candle filters should have been shaken off. During the period that the shaker motor is in operation it is preferred that the machine itself is rendered inoperative, for the reason mentioned above.

[0037] A further tray (not shown) is located in the floor of the compartment for collecting liquids sucked up by the machine. This may be provided with a drain plug.

[0038] In the event of the machine being used in wet weather, the plastic sack has one or more drain holes formed therein to allow water continuously to drain out of the machine as it sweeps along. However, in fine weather, if there is little water on the surface being swept, water would be collected in a normal plastic sack and be absorbed by the debris therein. When it is raining, instead of using a plastic sack with holes therein, it is preferred to use a porous plastic bag which will allow the water to drain out of the bag and through the drain hole in the tray beneath it. When the machine is operated in wet weather it can soak up to about 5 litres of water per minute quite easily. There is also a water door or sludge door (not shown) in the fan housing which should be opened in wet weather, but even when this is open the machine will still push water into the plastic bag or sack. If there are no holes in the sack or bag it can quickly fill up with water and is then almost completely impossible to handle. Accordingly, in wet weather a bag or sack from which water can drain must be used as the container and the water must also be allowed to exit through the tray in the compartment for the bag or sack. Of course, when it is raining it does not matter that water picked up by the machine is allowed to drain out through the bottom thereof since the trail of water is not visible.

[0039] It is preferred that the subframe for the filters is removable from the overall casing of the machine. This may be achieved by lifting the candle filters and the subframe upwards through a suitable opening in the top of the machine, but it is preferred that this is achieved by sliding the filters and subframe sideways out of the casing, for example through a side door immediately to
the rear of the door 124, or through a side door on the side of the machine opposite the door 124. Removal of the filters from the machine assists with servicing of the machine and the filters, but more importantly, allows the filters to be hosed down, e.g. after they have clogged up after use in wet weather.

[0040] It is preferred that the sweeping machine is provided with a water operated dust suppression system, and a water tank for this purpose is preferably located in a side door of an engine compartment of the machine, or as a "saddle" tank over an internal suction casing.

[0041] Preferably, the machine is fitted with a towing device, so that a wheeled seat can be drawn behind it for use by the operator. This seat may be collapsible and stowable beneath the rear of the machine when not required and could be of the type disclosed in our pending U.K. Patent Application No. 9510701.5 dated 26.5.95. Accordingly, the rear of the machine is designed to accommodate the collapsed wheeled seat. Part of the rear most portion of this machine may be supported on a horizontal pivot axis for this purpose.

[0042] In the modified embodiment of machine shown in Figure 7, a hose 201 which is used for sucking up rubbish from confined spaces is supported, when not in use, on a support frame 203, which is of generally U-shaped construction, and pivotally supported on the machine chassis at the ends of the arms of the U, about a generally vertical pivot axis 205, there being suitable stirrups 207 on the opposite curved end of the frame to receive the hose. When not in use, the frame 203 is secured to the side of the machine casing by a latch 209, which engages with a catch on the casing. The curved end of the frame 203 overlies the door 124, and has a plurality of fingers or soft pressure pads on its inner face, which bear against the outer face of the door when the latch 209 is closed, so as to hold the door in a closed position, and in sealing engagement with a suitable seal formed between the door 124 and the machine casing. The frame 203 is merely to support the hose when this is not in use, but a hose support arm 211 is associated with the frame 213, and is also pivoted to the machine chassis about the axis 205. This arm 211 carries a support strap 213 for holding the hose 201 off the ground when it is in use. The position of use of the hose is shown in Figure 8.

[0043] All the controls for the machine are located on and/or between or in the vicinity of a pair of rearwardly extending handlebars 14. By providing a side access door for changing the sack 32, as distinct from a rear door, there is no need to articulate the handle bars before opening the door. To replace a sack, the machine is stopped, the door 124 is opened, and the frame 136 for the sack 32 is unlatched from the framework 130, so that the frame 136, together with the sack 32 and the support 134 carrying the flexible porous sleeve 132 can be slid to the Figure 11 position. The support 134 and attached sleeve 132 are then lifted off the frame 136 and out of the sack 32, allowing all the debris in the sack to fall to the bottom thereof. This filled sack 32 can then be lifted out of its frame 136, disposed of, and be replaced with a fresh empty sack 32.

[0044] It will be apparent to those of skill in the art that the above-described embodiments of the present invention obviate the need for a porous internal bag and also allow replacement of the internal bag or sack without disturbing the filter member.

[0045] It will also be apparent to those of skill in the art that the above-described embodiments are merely exemplary of the present invention and that various modifications and improvements may be made thereto without departing from the scope of the invention as defined by the appended claims; for example, various component parts of a particular embodiment of sweeping machine described above can be used in one of the other described embodiments of machine, in place of, or in conjunction with, component part(s) thereof, as appropriate.

Claims

1. A suction sweeping machine including means (14) at the rear of the machine to allow operation by a person walking or riding behind the machine, a motor, a fan driven by the motor, a suction head connected by an inlet duct to the fan, whereby debris collected from the ground in a fluid stream generated by the fan, is forced by the fan into an outlet duct (128) extending from the fan to a container (32), wherein the outlet duct (128) terminates in an outlet (28) in the top of a compartment for the container and communicating with the container (32), there being a porous filter member (132) extending from the outlet (28) into the container through an opening in an upper portion thereof, whereby debris from the fluid stream in the outlet duct (128) is collected within the container (32), whereas the fluid in the fluid stream flowing from the outlet may diffuse through the porous member (132) and out of the opening, characterised in that an access opening closeable by a door (124) is provided in a lateral side wall of the compartment, and in that support means (130-144) is located within the compartment, said support means supporting said container (32) and said porous filter member (132), and being movable from a position of use through said access opening when said door is open to a container replacement position at least partly outside said compartment, so that the container (32) may be replaced with another container.

2. A suction sweeping machine according to claim 1, wherein the porous member (132) is a flexible tube, the lower end of which, in use, is located within the bottom of the container (32), and the upper end of
which is in communication with said outlet (28).

3. A suction sweeping machine according to claim 2, wherein said flexible tube (132) is supported at its upper end on a rigid support (134) which is removably located within said compartment through said access opening in the side wall thereof, the rigid support (134) being shaped to match the shape of said outlet (28).

4. A suction sweeping machine according to claim 3, wherein the rigid support (134) and the outlet (28) are located relative to the opening in the container (32) centrally adjacent a front thereof, so that spaces are left between the walls of the container and porous member over the whole areas of two side faces of the container for the passage of air from said fluid stream.

5. A suction sweeping machine according any one of claims 1-4 and further including a plurality of vertically extending candle filters (152), each comprising a felt-like sock supported on a skeletal frame, and opening at its upper end, the open upper end communicating with an overall machine casing (26) which directs filtered air forwardly and downwardly.

6. A suction sweeping machine according to claim 5 wherein in order to prevent clogging of the candle filters, a shaker mechanism is provided for shaking fines collected by the candle filters off the candle filters, for subsequent removal from within the casing (26), the shaker mechanism being controlled by switch means associated with the door for closing the access opening.

7. A suction sweeping machine according to any one of claims 1-6, wherein the container is a flexible plastic sack (32) located within said compartment.

8. A suction sweeping machine according to claim 7, wherein the sack is supported at its upper end on a rigid rectangular frame (136), the dimensions of which correspond generally with the cross sectional shape of the compartment.

9. A suction sweeping machine according to claim 8, wherein the frame (136) is slidable relative to a framework (130, 138) supporting the outlet (28), between a position of use generally surrounding the outlet (28), and a sack replacement position achievable only when said access opening is open.

10. A suction sweeping machine according to claim 9, including clamping means (142) for clamping said frame in its position of use, in which upper end portions of the sack (32) will also be held in engagement with the frame (136).

11. A suction sweeping machine according to claim 8, 9 or 10 wherein said rigid rectangular frame (136) and said framework (130, 138) are provided with cooperating support means (138, 140) whereby the rigid rectangular frame (136) may be removably supported in a predetermined location on said framework (130, 138), so that when said framework is in its position of use, the porous member (132) is in fluid communication with said outlet (28).

12. A suction sweeping machine according to any one of claims 7-11 when dependent on claim 3 or 4 wherein the porous member (132) and its rigid support (134) are removably supported on said rigid rectangular frame (136).

13. A suction sweeping machine according to claim 5 or any one of claims 6-12 when dependent on claim 5 wherein the upper ends of each candle filter (152) is flared, so that the upper end of each filter is trumpet shaped.

14. A suction sweeping machine according to claim 6 or any one of claims 7-13 when dependent on claim 6 wherein the shaker mechanism is mounted on the skeletal frame, and comprises an electric motor which drives an offset weight.

15. A suction sweeping machine according to claim 14 wherein the switch means associated with the door is such that the electric motor will only be activated to operate the shaker mechanism when the door is closed.

16. A suction sweeping machine according to claim 15 wherein a control device is associated with the switch and a time delay device is provided to ensure that once the electric motor operates, it is automatically switched off after a preselected time.

17. A suction sweeping machine according to any one of the preceding claims wherein a further skeletal frame (203) is provided for supporting a suction hose (201) fitted to the machine for removing debris and rubbish from awkward areas.

18. A suction sweeping machine according to claim 17 wherein the hose (201) is carried on the frame (203) by one or more support stirrups (207) and/or straps (213) and the frame is pivotally supported on the chassis of the machine about a vertical axis (205) adjacent a front end of the machine.

19. A suction sweeping machine according to claim 17 or 18 wherein at its end remote from its pivotal connection to the chassis, the hose frame (203) carries an over dead centre latch (209) for securing the frame to the side of the machine.
20. A suction sweeping machine according to claims 17, 18 or 19 wherein the door (124) in the lateral side wall of the machine does not have a latch, but is held closed by a latch (209) of the hose frame (203), which engages a catch on the machine chassis, there being suitable pressure members on the hose frame (203) to bear against the outside of the door (124), to keep it shut when the latch (209) is engaged with the catch.

Patentansprüche


3. Kehrsaugmaschine nach Anspruch 2, wobei dieser flexible Schlauch (132) an seinem oberen Ende an einem steifen Stützteil (134) befestigt ist, das durch die Zugangsoffnung der Seitenwand entfernbar in dieser Aufnahmeverrichtung angeordnet ist, wobei das starre Stützteil an die Form dieses Auslasses (28) angepaßt ist.


5. Kehrsaugmaschine nach einem der Ansprüche 1 bis 4, die weiter eine Vielzahl von vertikal verlaufenden Kerzenfiltern (152) aufweist, von denen jeder einen filzartigen, auf einem Gerüst angeordneten Socken und eine Öffnung an seinem oberen Ende aufweist, wobei das obere Ende mit einer Verkleidung (26) der Maschine in Verbindung steht, die gefilterte Luft nach vorne und unten leitet.


8. Kehrsaugmaschine nach Anspruch 7, wobei dieser Sack an seinem oberen Ende auf einem starren, rechteckigen Rahmen (136) angebracht ist, dessen Abmessungen im wesentlichen der Querschnittsform der Aufnahmeverrichtung entsprechen.


12. Kehrsaugmaschine nach einem der Ansprüche 7 bis 11, wenn diese sich auf Anspruch 3 oder Anspruch 4 rückbeziehen, wobei das poröse Element (132) und sein starres Stützteil entferbar auf diesem starren rechteckigen Rahmen (136) abgestützt sind.

13. Kehrsaugmaschine nach Anspruch 5 oder nach einem der Ansprüche 6 bis 12, wenn diese sich auf Anspruch 5 rückbeziehen, wobei sich das obere Ende jedes Kerzenfilters (152) aufweitet, so daß das obere Ende jedes Filters trompetenförmig ist.


15. Kehrsaugmaschine nach Anspruch 14, wobei die Tür zugeordnete Schalteinrichtung derart ist, daß der elektrische Motor nur zum Antreiben des Rüttelmechanismusses aktiviert wird, wenn die Tür geschlossen ist.


17. Kehrsaugmaschine nach einem der vorhergehenden Ansprüche, wobei ein weiterer Gerüstrahmen (203) bereit gestellt wird, um einen an der Maschine befestigten Saugschlauch (201) zum Entfernen von Schmutz und Abfall aus unzugänglichen Bereichen zu stützen.

18. Kehrsaugmaschine nach Anspruch 17, wobei der Schlauch (201) an dem Rahmen (203) durch einen oder mehrere Stützbügel (207) und/oder Schnüre (213) gehalten ist und der Rahmen auf dem Fahr gestell der Maschine um eine vertikale Achse (205) nahe am vorderen Ende der Maschine schwenkbar gelagert ist.


20. Kehrsaugmaschine nach einem der Ansprüche 17, 18 oder 19, wobei die Tür (124) in der Seitenwand der Maschine keine Lasche aufweist, sondern durch eine Lasche (209) des Rahmens (203) für den Schlauch geschlossen gehalten wird, die in eine Falle am Fahrgestell der Maschine eingreift, wobei geeignete Druckelemente auf dem Rahmen (203) für den Schlauch angeordnet sind, um gegen die Außenseite der Tür (124) zu drücken, um diese geschlossen zu halten, wenn die Lasche (209) mit der Falle in Eingriff steht.

**Revendications**

1. Balayeuse aspirante comportant des moyens (14) situés à l’arrière de la balayeuse destinés à permettre à une personne marchant ou se déplaçant derrière la machine de la manoeuvrer, un moteur, un ventilateur entraîné par le moteur, une tête d’aspiration connectée au ventilateur par un conduit d’entrée, de sorte que des débris récupérés sur le sol dans un flux de fluide créé par le ventilateur, sont poussés par le ventilateur dans un conduit de sortie (128) s’étendant du ventilateur vers un conteneur (32), le conduit de sortie (128) se terminant dans une sortie (28) située dans la partie supérieure d’un compartiment destiné au conteneur et communiquant avec le conteneur (32), avec un élément filtrant poreux (132) s’étendant à partir de la sortie (28) dans le conteneur à travers une ouverture située dans une partie supérieure de celui-ci, de sorte que des débris provenant du flux de fluide situés dans le conduit de sortie (128) sont recueillis à l’intérieur du conteneur (32), tandis que le fluide du flux de fluide qui s’écoule à partir de la sortie peut se diffuser à travers l’élément poreux (132) et à l’extérieur de l’ouverture, caractérisée en ce qu’une ouverture d’accès pouvant être fermée par une porte (124) est agencée dans une paroi latérale du compartiment, et en ce que des moyens de support (130 à 144) sont positionnés à l’intérieur du compartiment, lesdits moyens de support supportant ledit conteneur (32) et lèdent élément filtrant poreux (132), et étant mobiles à partir d’une position d’utilisation à travers ladite ouverture d’accès lorsque ladite porte est ouverte vers une position de remplacement de conteneur située au moins partiellement à l’extérieur dudit compartiment, de sorte que
le conteneur (32) peut être remplacé par un autre conteneur.

2. Balayeuse aspirante selon la revendication 1, dans laquelle l'élément poreux (132) est un tube flexible, dont l'extrémité inférieure, en utilisation, est positionnée dans le fond du conteneur (32), et dont l'extrémité supérieure communique avec ladite sortie (28).

3. Balayeuse aspirante selon la revendication 2, dans laquelle ledit tube flexible (132) est supporté à son extrémité supérieure sur un support rigide (134), qui est positionné de manière amovible à l'intérieur dudit compartiment à travers ladite ouverture d'accès de ladite paroi latérale de celui-ci, le support rigide (134) étant mis en forme pour s'apparier à la forme de ladite sortie (28).

4. Balayeuse aspirante selon la revendication 3, dans laquelle le support rigide (134) et la sortie (28) sont positionnés par rapport à l'ouverture du conteneur (32) en étant centralement adjacents à l'avant de celle-ci, de sorte que des espaces sont laissés entre les parois du conteneur et l'élément poreux sur les surfaces totales de deux faces latérales du conteneur pour le passage de l'air provenant dudit flux de fluide.

5. Balayeuse aspirante selon l'une quelconque des revendications 1 à 4, et comportant de plus une pluralité de filtres en forme de bougie s'étendant verticalement (152), comportant chacun une chaussette analogue à un feutre supportée sur un cadre d'ossature, et une ouverture à son extrémité supérieure, l'extrémité supérieure ouverte communiquant avec un carter global de machine (26) qui dirige l'air filtré vers l'avant et vers le bas.

6. Balayeuse aspirante selon la revendication 5, dans laquelle pour empêcher un encrassement des filtres en forme de bougie, on fournit un mécanisme d'agitation pour secouer les grains fins recueillis par les filtres en forme de bougie à partir de ceux-ci, pour les enlever par la suite de l'intérieur du carter (26), le mécanisme d'agitation étant commandé par des moyens de commutation associés à la porte destinée à fermer l'ouverture d'accès.

7. Balayeuse aspirante selon l'une quelconque des revendications 1 à 6, dans laquelle le conteneur est un sac en matière plastique souple (32) positionné à l'intérieur dudit compartiment.

8. Balayeuse aspirante selon la revendication 7, dans laquelle le sac est supporté à son extrémité supérieure sur un cadre rectangulaire rigide (136), dont les dimensions correspondent globalement à la forme en coupe transversale du compartiment.

9. Balayeuse aspirante selon la revendication 8, dans laquelle le cadre (136) peut coulisser par rapport à une ossature (130, 138) supportant la sortie (28), entre une position d'utilisation entourant globalement la sortie (28), et une position de remplacement de sac pouvant être atteinte seulement lorsque ladite ouverture d'accès est ouverte.

10. Balayeuse aspirante selon la revendication 9, comportant des moyens de serrage (142) pour serrer ledit cadre dans sa position d'utilisation, dans laquelle des parties d'extrémité supérieure du sac (32) vont également être maintenues en prise avec le cadre (136).

11. Balayeuse aspirante selon la revendication 8, 9 ou 10, dans laquelle ledit cadre rectangulaire rigide (136) et ladite ossature (130, 138) sont munis de moyens de support complémentaires (138, 140), de sorte que le cadre rectangulaire rigide (136) peut être supporté de manière amovible dans un emplacement prédéterminé de ladite ossature (130, 138), de telle sorte que lorsque ladite ossature est dans sa position d'utilisation, l'élément poreux (132) est en communication hydraulique avec ladite sortie (28).

12. Balayeuse aspirante selon l'une quelconque des revendications 7 à 11, lorsque dépendantes de la revendication 3 ou 4, dans laquelle l'élément poreux (132) et son support rigide (134) sont supportés de manière amovible sur ledit cadre rectangulaire rigide (136).

13. Balayeuse aspirante selon la revendication 5 ou l'une quelconque des revendications 6 à 12 lorsque dépendantes de la revendication 5, dans laquelle les extrémités supérieures de chaque filtre en forme de bougie (152) sont évasées, de sorte que l'extrémité supérieure de chaque filtre a la forme d'une trompette.

14. Balayeuse aspirante selon la revendication 6 ou l'une quelconque des revendications 7 à 13 lorsque dépendantes de la revendication 6, dans laquelle le mécanisme d'agitation est monté sur le cadre d'ossature, et comporte un moteur électrique qui entraîne un poids décalé.

15. Balayeuse aspirante selon la revendication 14, dans laquelle les moyens de commutation associés à la porte sont tels que le moteur électrique va être actionné afin de faire fonctionner le mécanisme d'agitation seulement lorsque la porte est fermée.

16. Balayeuse aspirante selon la revendication 15,
17. Balayeuse aspirante selon l'une quelconque des revendications précédentes, dans laquelle un cadre d'ossature supplémentaire (203) est fourni pour supporter un tuyau d'aspiration (201) agencé sur la machine pour enlever des débris et des déchets provenant de zones encombrées.

18. Balayeuse aspirante selon la revendication 17, dans laquelle le tuyau (201) est porté sur le cadre (203) par un ou plusieurs étriers de support (207) et/ou colliers (213), et le cadre est supporté de manière pivotante sur le châssis de la machine autour d'un axe vertical (205) adjacent à une extrémité avant de la machine.

19. Balayeuse aspirante selon la revendication 17 ou 18, dans laquelle au niveau de son extrémité éloignée de sa connexion pivotante au châssis, le cadre de tuyau (203) porte un verrou à passage brusque (209) pour fixer le cadre sur le côté de la machine.

20. Balayeuse aspirante selon les revendications 17, 18 ou 19, dans laquelle la porte (124) située dans la paroi latérale de la machine n’a pas de verrou, mais est maintenue fermée par un verrou (209) du cadre de tuyau (203), qui vient en prise avec un loquet situé sur le châssis de machine, avec des éléments de pression appropriés situés sur le cadre de tuyau (203) pour appuyer contre l'extérieur de la porte (124), afin de la maintenir fermée lorsque le verrou (209) vient en prise avec le loquet.
FIG. 9

(A) DOOR CLOSED (AND) TIMER MONOSTABLE ON
(B) SHAKER NOT ENABLED IF EITHER MONOSTABLE TIMER IS OFF OR IF DOOR IS OPEN
(C) SYSTEM INOPERATIVE IF MACHINE MOTOR IS ON