

May 22, 1928.

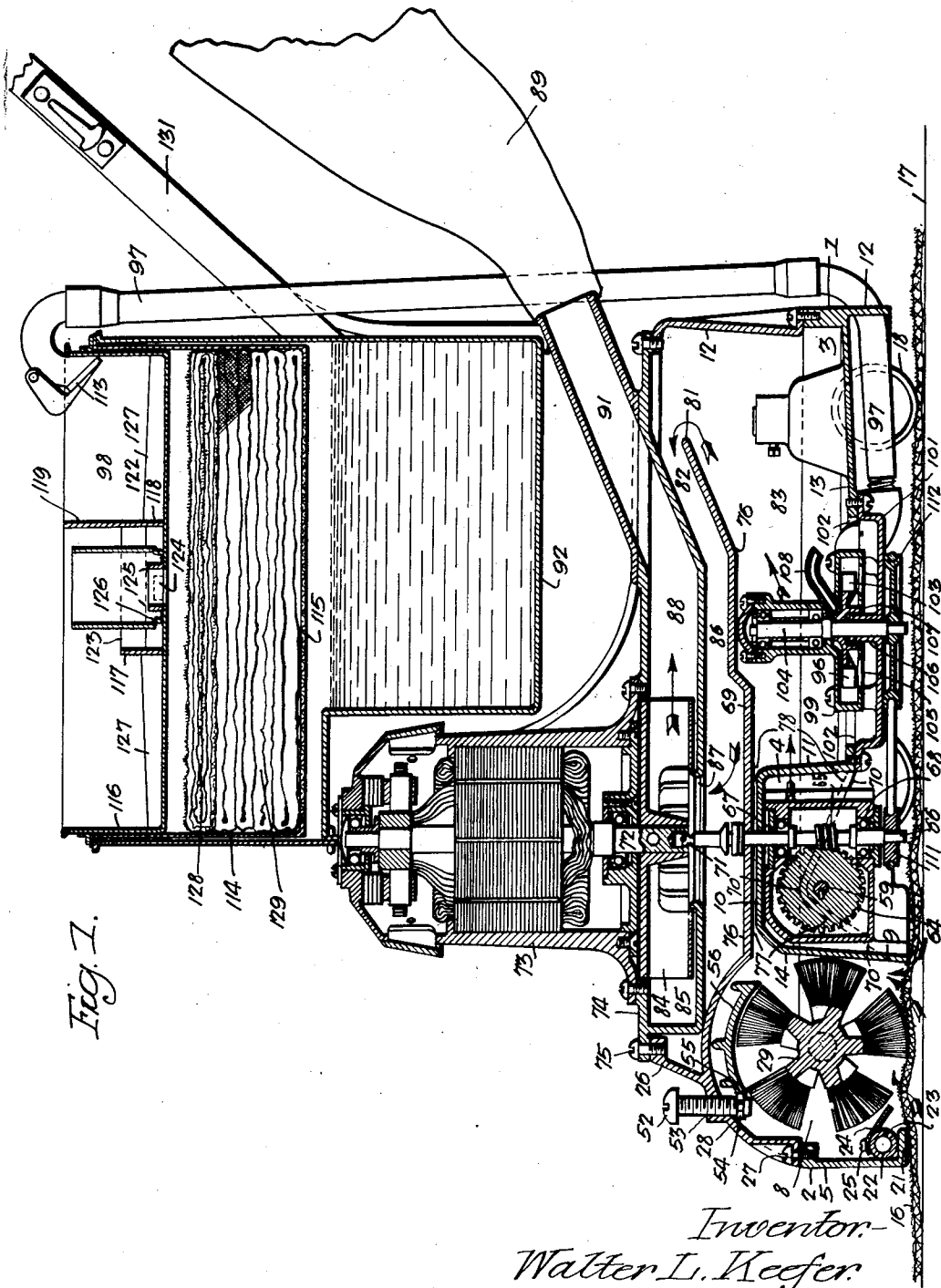
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SCRUBBING AND CARPET WASHING MACHINE

Filed April 1, 1925

3 Sheets-Sheet 1



Inventor.
Walter L. Keefer.
by his Attorneys.
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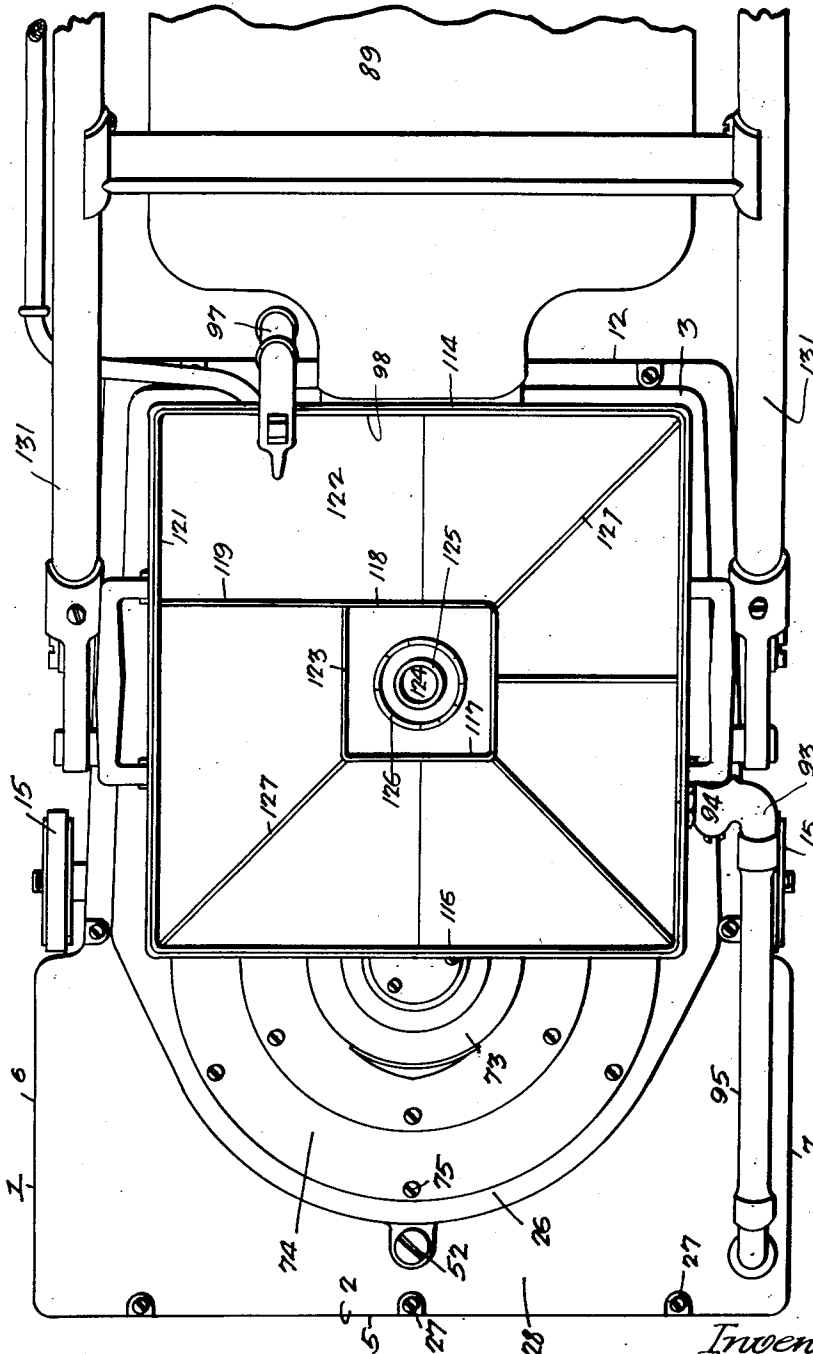
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Fig. 2.



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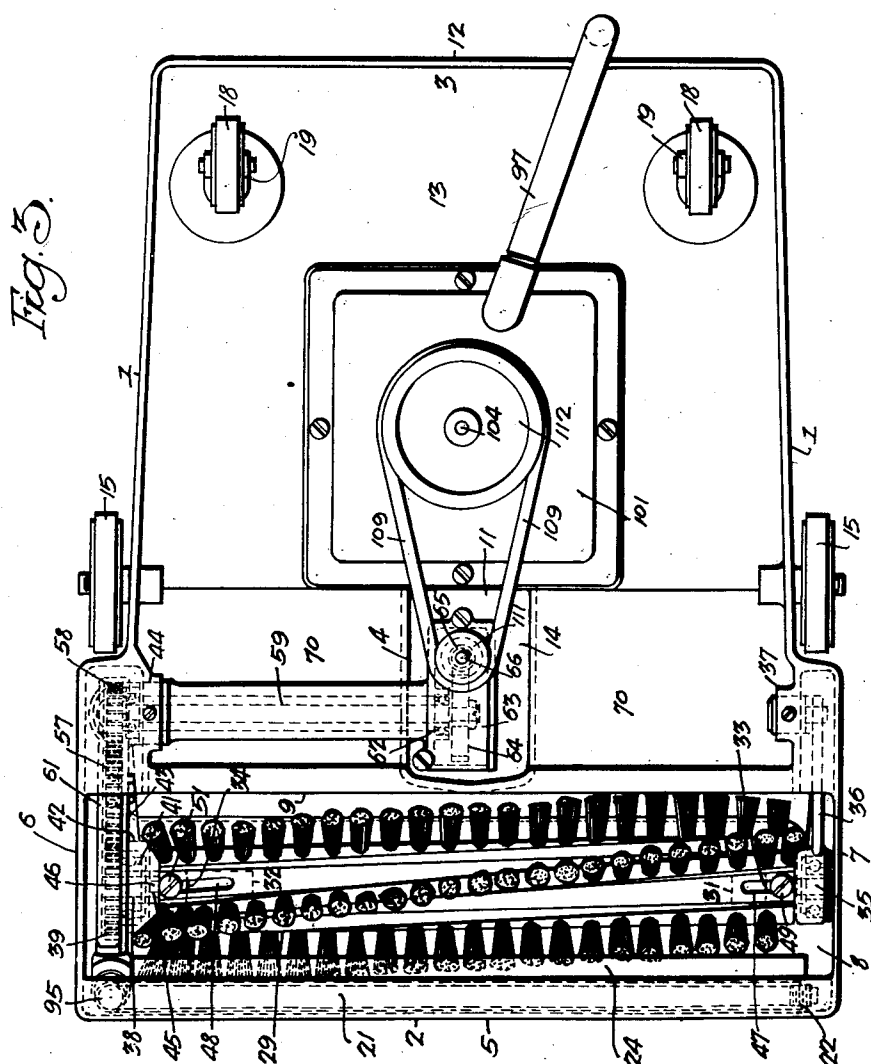
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

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SCRUBBING AND CARPET-WASHING MACHINE.

Application filed April 1, 1925. Serial No. 19,871.

My invention relates to cleaning machines, and it has particular relation to such machines as are adapted to clean carpets or like material.

5 In its broadest aspect, an important object of my invention is to provide a portable, power-driven machine of the class described that shall be particularly characterized by its simplicity and compactness of design and
10 its ease of operation.

A more specific object of my invention is to provide a portable machine for removing the imbedded dust and dirt from floor coverings such as carpets and the like as well
15 as cleaning the soiled surface thereof, said cleaning operation being effected without the removal of the floor covering.

Another object of my invention is to provide a method of cleaning carpets, rugs and
20 the like, wherein the underneath surface thereof is dry cleaned simultaneous with the wet cleaning of the upper surface.

With these and other objects and applications in mind, my invention further consists
25 in the details of construction and operation and arrangements, hereinafter described and claimed and illustrated in the accompanying drawing, wherein—

Fig. 1 is a longitudinal sectional view of
30 one form of embodiment of my invention, a portion of the handle and the air-bag being removed; and

Figs. 2 and 3 are top and bottom plan views, respectively, of the structure of Fig. 1.
35 In the illustrated embodiment of my invention shown in the drawing, a supporting framework 1 comprises front and rear end portions 2 and 3, respectively, and an intermediate portion 4. The end portion 2 comprises a front wall 5 and side walls 6 and 7
40 which define a lower portion of a vacuum scrubber chamber 8. A rear wall 9 of the scrubber chamber 8 is spaced from the front wall 5, and an upper edge thereof is extended horizontally to define a portion 10 and then
45 downwardly to define a vertical portion 11. The lower edge of the vertical portion 11 is next extended to a rear wall 12 of the end portion 3 in order to provide a base 13 for said rear end portion 3. The wall sections 9, 10 and 11 forming the intermediate portion 4 define a housing 14 referred to hereinafter.

55 The frame 1 may be provided with a pair of centrally positioned supporting wheels 15, 15, which are secured to the side walls of

the frame 1, whereby the latter may be moved over a fabric 16 positioned on a floor 17. A pair of caster wheels 18, 18, which are
60 journaled in bearings 19 extending upwardly from the rear base portion 13, also serve to support the frame 1.

The lower edge of the front wall 5 of the scrubber or suction chamber 8 is provided with a horizontal flange 21 for the support
65 of a fluid discharge pipe 22 having a plurality of apertures 23 therein. The cleansing fluid from the pipe 22 is adapted to be directed towards the carpet or rug 16 in a spray, and in order to prevent the fluid from
70 splashing upwardly after it strikes the carpet, an inclined plate 24 is secured to the upper side of the pipe 22 by screws 25. This plate is extended inwardly of the scrubbing chamber 8 in such a way that the fluid from
75 the pipe 22 will be delivered in the form of small jets that will be confined to a zone just to the rear of the front wall flange 21, as will appear more fully hereinafter.

The upper side of the framework 1 may
80 be closed by a housing 26, the walls of which are secured by screws 27 to the adjacent walls of said framework 1. A front end portion 28 of the housing 26 forms a closure for the upper side of the scrubber chamber 8. As
85 shown in Fig. 3, a rotary brush or scrubber 29, which is to be positioned in the chamber 8, is provided with recesses 31 and 32 in the respective ends thereof for the removable reception of pins 33 and 34. The pin 33
90 extends into a bearing 35 on the outer end of an arm 36. The arm 36 is pivoted on a bearing 37 mounted on the framework 1. The other pin 34 extends into a recess 38 formed in a gear wheel 39, a hub portion 41 of which
95 is revolvably mounted in a bearing 42 carried by an arm 43.

The arm 43 is pivotally mounted on a bearing 44 disposed on the opposite side of
100 the frame 1 to the bearing 37. The hub 42 has in addition to the recess 38 a second recess 45 for the removable reception of a projecting lug 46 on the pin 34, whereby the latter may be moved upon the actuation of the gear wheel 39. The recesses 31 and 32 in the
105 opposite ends of the scrubber 29 are respectively provided with longitudinally extending slots 47 and 48. Set screws 49 and 51, which are respectively disposed in the slots 47 and 48, serve to secure rigidly the pins 33 and
110 34 to the scrubber 29. The depth of the recesses 31 and 32 is such that when the set

screws 49 and 51 are loosened the pins 33 and 34 may be moved inwardly of the scrubber sufficiently to clear their respective supporting bearings, thereby permitting the ready removal of the scrubbing brush 29 from the chamber 8.

The vertical position of the brush 29 may be varied to compensate for the wearing of the same by means of an adjusting screw 52 which is in threaded engagement with a perforation 53 in the upper wall of the scrubber chamber 8. The inner end of the adjusting screw 52 is provided with an annular recess 54 which is embraced by a slot 55 in a brace member 56 extending between the pivoted, brush supporting arms 43 and 36.

The gear wheel 39 is connected by means of a gear wheel 57 to a gear wheel 58, which is mounted co-axial with the bearing 44 for the pivot arm 43, and it may be secured to a shaft 59 extending inwardly of the frame 1 to the housing 14 illustrated in Figs. 1 and 3. The gear wheels 39, 57 and 58 may be protected by means of a housing 61 which is secured to the pivoted arm 43.

An inner end of the driving shaft 59 is mounted in a bearing 62 (Figs. 1 and 3) positioned on the inner side of a casing 63 that is secured within the centrally positioned housing 14. The casing may be supported on the underside of the horizontal portion 10. A worm wheel 64 is mounted on the inner end of the driving shaft 59 and it meshes with a worm 65 constituting an integral part of a vertical shaft 66 journaled in upper and lower bearings 67 and 68 provided by the casing 63. The upper end of the vertical shaft 66 extends through the horizontal section 10 and adjacent spaced portion 69 of the upper casing 26, and it is secured by means of a universal connection 71 to a lower end 72 of the armature shaft of a main driving motor 73. The motor 73 may be mounted on a closure plate 74 which in turn is secured to the upper edges of the walls of the casing 26 by means of screws 75, as shown particularly in Fig. 1 of the drawing.

The front end portion 28 of the housing 26, which encloses the upper side of the scrubber chamber 8, may be provided with a substantially horizontal wall 76 extending toward the rear wall 12. This wall may comprise the horizontal portion 69 which is spaced from an adjacently disposed substantially horizontal portion 70 to provide a suction nozzle 77 and a passage 78. An end portion 81 of the wall 76 is spaced from the rear wall 12 to provide an outlet passage 82. A sedimentation chamber 83 is thus formed at the rear end 3 having an inlet passage 78 and an outlet passage 82.

A suction may be created in the nozzle passage 78 so as to establish a vacuum in the scrubber chamber 8 sufficient to cause a flow

of air through the carpet or other fabric 15 by means of a fan or other air-propelling means 84 (Fig. 1) which is mounted on the lower end portion 72 of the motor shaft. The flow of air through the carpet 16 is preferably such as to cause said carpet to be actuated clear of the floor surface 17 and up into engagement with the scrubber 29 and lower edge of the scrubber chamber 8, as shown in Fig. 1. The flow of air through the carpet 16 also operates to prevent the fluid discharge from the pipe 22 from passing completely through the same, with the result that the under surface of said carpet is dry cleaned, while the upper surface is wet cleaned, as will be set forth in greater detail hereinafter.

The fan 84 may be enclosed by a casing 85 constituting an integral part of the cover plate 74, said casing being spaced from the horizontal wall 76 to provide a passage 86 establishing communication between the air passage 82 and an air inlet opening 87 in the fan casing 85. An outlet passage 88 for the fan 84 is provided by the casing 85 and the closure plate 74. The fan outlet passage 88 may be connected to an air bag 89 through a tubular member 91 which is removably secured to the closure plate 74.

When the motor 73 is energized, the fan 84 and the brush 29 are rotated simultaneously. The resulting vacuum in the chamber 8 causes a flow of air through the carpet 16 carrying along with it the dust and dirt imbedded in the same. The air on leaving the chamber 8 passes through the passage 78, the sedimentation chamber 83, the outlet opening 82, the passage 86, the fan opening 87, the passage 88 into the bag 89.

As above-noted, my invention also contemplates the washing of the upper surface of the carpet 16 simultaneous with the dry cleaning of the under surface thereof. To this end, a supply tank 92 is mounted on the rear end portion of the upper casing 26, as shown in Fig. 1, and it is connected by means of a discharge pipe 93 (Fig. 2) through a valve 94 to an extension 95 of the fluid discharge pipe 22 heretofore mentioned.

When the valve 94 is opened, a supply of cleansing fluid is provided for the brush 29, which passes through the pipe 93, the extension 95 and the discharge pipe 22 into the scrubber chamber 8, where it strikes against the spreading plate 24, forming a substantially continuous sheet of liquid just in front of the scrubber 29. This liquid, however, is prevented from passing through the carpet 16 by the reverse flow of air through the same, with the result that the upper surface thereof is wet cleaned by the action of the brush 29, while the under surface is dry cleaned. The resulting mixture of air, dirt and cleansing fluid is removed from the carpet 16 by said flow of air and it passes

through the passage 78 into the sedimentation or expansion chamber 83, where the air is permitted to expand sufficiently to allow the cleansing fluid and dirt to settle and the air to pass on into the air bag 89 in a substantially dry condition.

In accordance with my invention the supernatant liquid or effluent in the sedimentation chamber 83 is removed by means of a centrifugal pump 96 and discharged through piping 97 into a filtering or sedimentation pan 98. The centrifugal pump 96 comprises a casing 99 which is mounted on a removable cover plate 101 for an opening 102 in the base 13 of the sedimentation chamber 83. A rotary element 103 of the pump 96 is mounted on a vertically positioned shaft 104 and it operates to draw in the effluent through a lower open side 105 and to discharge the same into the piping 97. The necessity for packing the lower end of the rotor shaft 104 may be overcome by providing a vertical tubular extension 106 on the cover plate 101, the upper edge of which is disposed above the level of the fluid in the sedimentation chamber 83. A hub portion 107 of the rotor element 103 is extended downwardly to form a concentric tubular projection that is disposed around the upper edge of said vertical extension 106, whereby a seal may be formed. An air vent pipe 108 communicates with the interior of the pump 96 to relieve the same of any air that might accumulate during the periods of inoperation.

The rotor element 103 of the pump 96 may be normally actuated by the main motor 73 by means of a belt 109 and pulley wheels 111 and 112, the latter being respectively mounted on the lower end portions of the vertical shafts 65 and 104. A check valve 113 is mounted on the upper end of the piping 97 to prevent any back flow of air. When the centrifugal pump 96 is once primed, the discharge therefrom automatically releases the check valve 113.

The fluid discharged from the sedimentation chamber 83, can be filtered whereby the same cleansing fluid may be used over and over again so as to avoid the necessity for frequent replenishment of the main supply tank 92 with clean fluid and the removal of the dirty fluid. As shown in Figs. 1 and 2 the dirty fluid is initially subjected to two positive separations in the filtering pan 98 and thereafter discharged into a second filtering pan 114, where the final cleansing occurs before it is discharged through a perforated base 115 of said pan 114 into the main supply tank 92.

The trays 98 and 114 are mounted in telescopic engagement in the upper end of the tank 92 with the first-mentioned tray uppermost. This tray comprises an outer wall 116 and an inner wall 117 of rectangular form. The inner wall 117 has one side 118 connect-

ed by an extension 119 to an adjacent side wall section 121 of the outer wall 116, and it is in this portion of the upper tray 98 that the piping 97 is caused to discharge. The outer and inner walls 116 and 117 define a passage 122 for the fluid discharged from the piping 97. The passage 122 terminates at a side wall section 123 of the inner wall 117. The height of the wall section 123 is much less than that of the adjacent portions, so that the cleansing fluid flows over the same and into the space within the inner wall 117. A discharge opening 124 is provided within this space and the upper edge thereof may be raised above the base of the tray 98 by means of a tubular extension 125. The tubular extension 125 may be surrounded by a second tubular extension from the base of the tray 98, the latter being provided with apertures 126 which are disposed beneath the upper edge of the discharge opening 124.

The undesirable material in the cleansing fluid having a specific gravity lighter than water is thus caused to float on the upper surface of the fluid in the space between the inner wall 117 and the intermediate tubular extension 125. The undesirable material having a specific gravity heavier than water is principally deposited in the passage 122, and it may be prevented from being carried along by the flow of said fluid by means of a plurality of vanes 127 extending between the inner and outer walls 116 and 117. The vanes 127 also serve to prevent any material agitation of the fluid in the passage 122 during the normal operation of the machine.

The next stage in the process of filtration is accomplished in the pan 114, which is disposed directly below the pan 98 and adapted to receive the partially cleansed fluid therefrom. The lower pan 114 may be filled with any coarse material 128 having good absorbent qualities. A finer material 129 may be disposed intermediate the material 128 and the perforated base 115. When the filtering materials 128 and 129 become unfit for further use, they may be readily replaced with a new charge and the other charge reclaimed by the usual laundering processes. The materials 128 and 129 of course may be replaced by sand, sawdust, crushed coke, charcoal or other filtering substances adapted to the present process. The cleansing fluid thus clarified passes from the base 115 of the tray 114 into the tank 92, whereupon it may be again supplied to the fluid discharge pipe 22.

The machine above described may be actuated over the carpet or rug 16 by means of a handle 131 of usual design, the upper end of said handle being adapted to support the free end of the air bag 89.

When the control valve 94 is opened to permit the cleansing fluid to pass from the tank 92 to the chamber 8, the operation of the brush 29 causes the upper surface of the

rug 16 to be cleansed. This fluid, however, is not permitted to pass completely through the carpet by reason of the upward flow of air due to suction action of the scrubber chamber 8, with the result that the under surface of the rug or carpet 16 is dry cleaned and the upper surface or nap of said carpet is left practically dry. The dust that is drawn from the rug 16 mixes with the cleansing fluid and the whole is drawn into the sedimentation or expansion chamber 83, wherein the air and cleansing fluid are separated, the air passing off to the air bag 89. The bag 89 thus eliminates the possibility of blowing dust into the atmosphere through the failure of the operator to open the control valve 94 before starting the fan 84, or through a failure in the supply of fluid in the tank 92.

The sedimentation chamber 83 effects an initial separation of the heavier foreign material and the resulting effluent is removed by the pump 96 and discharged into the upper tray 98. The tray 98 effects two positive separations, one for the materials having a specific gravity heavier than water and one for those having a specific gravity lighter than water. The cleansing fluid passing from the tray 98 is further purified in the pan 114, which contains the filtering materials 128 and 129, and it finally passes into the main supply tank 92.

While I have shown and described one specific embodiment of my invention, for the purpose of illustrating the principles of construction and operation thereof, it is apparent that various changes and modifications may be made therein without departing from the spirit of my invention, and I desire, therefore, that only such limitations shall be imposed thereon as are indicated in the appended claims or as are demanded by the prior art.

I claim:

1. A machine comprising a chamber having its bottom formed with a suction opening, means for establishing a vacuum in said chamber, said chamber having a fluid

inlet along one side of the said suction opening near the lower edge thereof, an outlet formed in the side of the chamber opposite to said inlet, a brush mounted within the chamber, and means for rotating the brush so that the lower portion thereof moves towards the said outlet.

2. A machine comprising a chamber having its bottom formed with a suction opening, means for establishing a vacuum within the said chamber, a brush mounted in said chamber, the lower portion of said brush being rotatable towards the rear side of the chamber, a fluid discharge pipe mounted on the lower edge of the front wall of said chamber, an outlet formed in the rear portion of said chamber, and a baffle plate inside said chamber between the fluid inlet and the brush.

3. A cleaning machine comprising a chamber movable over the material to be cleaned, an inlet formed on the lower edge of one side of the said chamber, an outlet formed in the side of the chamber opposite to said inlet, a rotary brush mounted within the said chamber, the periphery of the brush being normally spaced above the surface of the said material, means for revolving the brush so that the lower portion thereof moves towards the said outlet, means for delivering a cleaning fluid through said inlet, and means for creating a vacuum in said chamber sufficient to establish a flow of air upwardly through the said material whereby the material will be brought into contact with the said brush.

4. A machine comprising a chamber having its bottom formed with a suction opening, means for establishing a vacuum within said chamber, a brush rotatably mounted in said chamber, a flange formed on the lower portion of the front wall of said suction opening, a fluid discharge pipe mounted on said flange, and a baffle plate secured to the upper side of the said pipe and extending inwardly of the chamber towards said brush.

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