

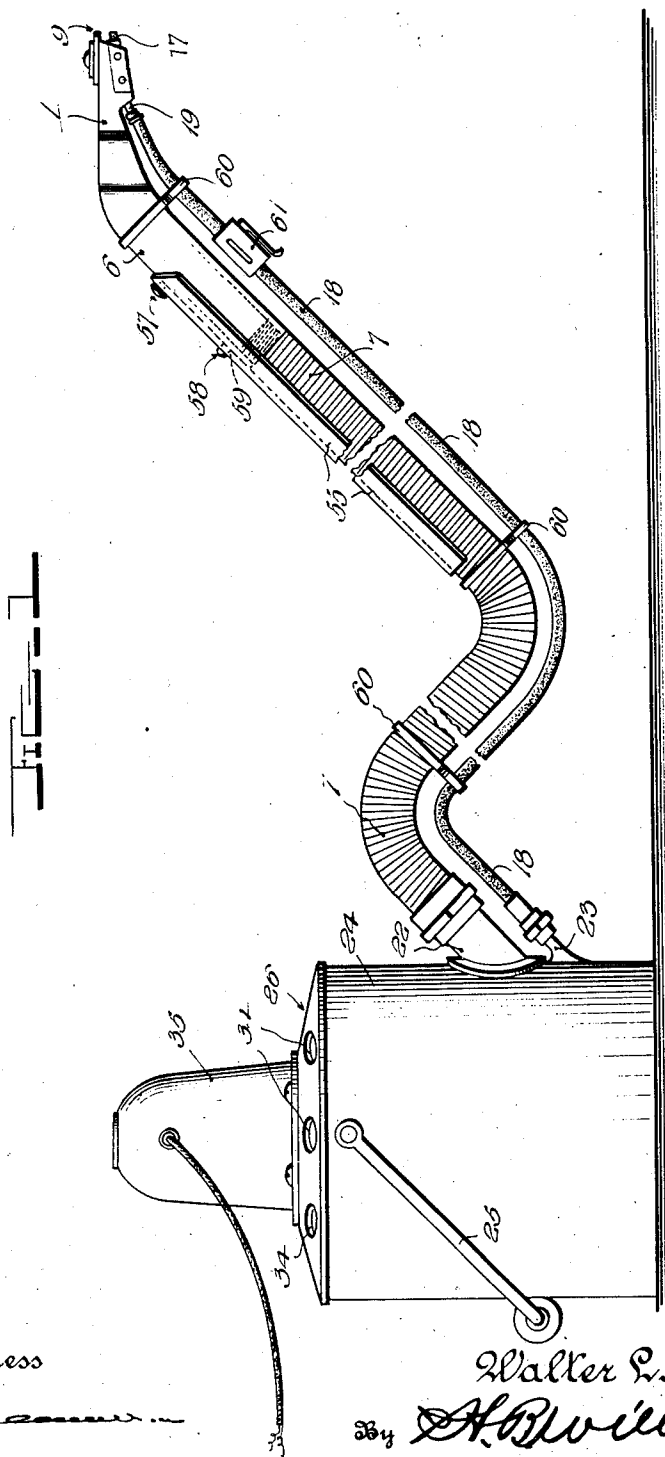
March 6, 1928.

1,661,480

W. L. KEEFER
SURFACE CLEANING MACHINE

Filed March 2, 1925

2 Sheets-Sheet 1



Witness

Inventor

Walter L. Keefer

By *H. B. Wilson*

Attorneys

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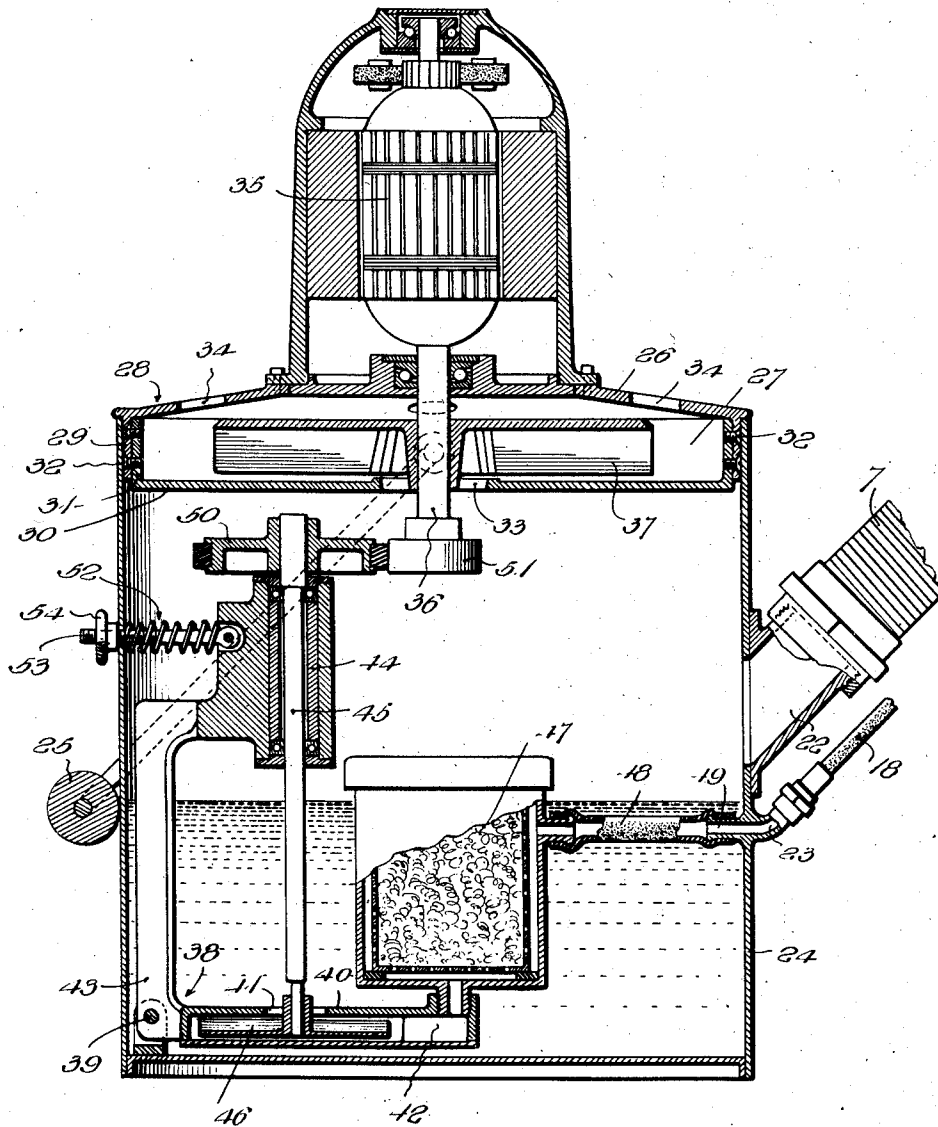
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Inventor

Walter L. Keefer

Witness

[Signature]

By

[Signature]

Attorneys

Patented Mar. 6, 1928.

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UNITED STATES PATENT OFFICE.

WALTER L. KEEFER, OF CHAMBERSBURG, PENNSYLVANIA.

SURFACE-CLEANING MACHINE.

Application filed March 2, 1925. Serial No. 12,691.

My invention relates to improvements in machines for cleaning surfaces and it is intended primarily for use as a window washer, although not restricted to such use.

5 One object of the invention is to provide a machine in which novel provision is made for feeding a washing liquid from a receptacle, applying it to the surface to be washed, and by means of suction, returning the liquid
10 to the original receptacle for further use, such liquid being preferably filtered before it is again fed to the surface being cleaned.

A still further object of the invention is to provide a unique receptacle and associated
15 means for pumping the washing liquid to the surface to be washed, and for creating a partial vacuum in said receptacle above the liquid level, to return the liquid from said surface. In this connection, a further
20 aim is to provide a hollow removable top or cover for the receptacle, the interior of said top or cover forming a fan chamber receiving a fan which exhausts air from the upper portion of the receptacle to induce return
25 of liquid thereto by suction.

Another object is to mount a driving motor for the suction creating fan directly upon the removable cover.

Yet another object is to provide a receptacle having a removable top which carries
30 air exhausting means including a shaft extending below said top, and to make unique provision for driving the liquid-exPELLING pump from said shaft. An operating shaft
35 for the pump and the first named shaft are preferably provided with co-acting friction wheels, and another object is to mount the pump and the pump shaft upon a novel form of movable support in the receptacle, so that
40 by effecting an adjustment of said support, the friction wheel of the pump shaft may be moved toward or from the friction wheel of the other shaft, when the receptacle top is to be removed or replaced.

45 A still further aim is to form a casing for the pump as an integral part of the above named movable member, and another object is to provide a construction in which this movable member also acts as a support for
50 a filter through which the liquid is forced as it is discharged from the receptacle.

With the foregoing and minor objects in view, the invention resides in the novel subject matter hereinafter described and
55 claimed, the description being supplemented by the accompanying drawings.

Figure 1 is a side elevation of a surface washing machine constructed in accordance with my invention.

Figure 2 is an enlarged vertical sectional
60 view through the liquid and vacuum receptacles and associated parts.

The subject matter illustrated in the drawings above briefly described, may be
65 considered as the preferred form of the invention and while this construction will be hereinafter rather specifically described, it is to be understood at the outset that numerous modifications may be made.

The numeral 1 on the drawings designates
70 a head having a liquid-applying pad 17, a squeegee 9, a nipple 19 for conducting liquid to said pad, and a tubular handle 6 communicating with the space under said squeegee. A liquid supply hose 18 is connected
75 to the nipple 19 and a liquid return hose 7 is connected with the tubular handle 6.

The liquid discharge hose 18 is coupled to a liquid outlet nipple 23 and the liquid return hose 7 is connected to a liquid return
80 nipple 22, both of said nipples being joined to the wall of a receptacle 24. This receptacle is adapted to contain a quantity of clear water or any other washing liquid, and in all instances, the hose 7 will connect with
85 said receptacle at a point above the liquid level. As will be hereinafter described, novel provision is made for pumping the liquid from the receptacle through the hose
90 18 to the pad 17, and for creating a partial vacuum in the upper portion of said receptacle to draw the liquid from the head 1 back into the receptacle, after such liquid has performed its function.

The body portion of the receptacle 24 is by
95 preference in the form of a bucket having an appropriate bail 25 by means of which it may be readily carried from place to place, and this receptacle is provided with a hollow
100 top 26 whose interior constitutes a fan chamber 27, the greater portion of said top preferably being fitted slidably within the upper portion of the receptacle body, so that the entire top and all parts carried thereby may be removed whenever desired for dumping
105 liquid from the receptacle, for cleaning the interior of the latter, or for supplying a new quantity of liquid thereto.

The top 26 preferably comprises a top
110 plate 28 to rest on the upper edge of the receptacle wall, said plate having a depending annular flange 29 to engage the inner

side of said wall, and a bottom plate 30 having an upstanding flange 31 secured to the flange 29 by suitable fasteners 32. The plate 30 is formed with at least one opening 33 communicating with the interior of the receptacle 24 and forming an air inlet for the fan chamber 27, and the top plate 28 is formed with a plurality of air exhaust openings 34, leading from said chamber. An electric motor 35 is supported upon the top plate 28 and its shaft 36 passes downwardly across the fan chamber 27 and projects through the opening 33 into the upper portion of the receptacle 24, said shaft being provided with a high speed air exhausting fan 37 in said chamber 27. This fan exhausts air from the receptacle 24, above the liquid level, and discharges such air through the openings 34, thereby producing suction through the head 1, through the tubular handle 6, and through the hose 7.

A supporting member 38 is pivotally mounted at 39 in the receptacle 24, said member having a horizontal portion including a casing 40, which casing is formed with a liquid inlet 41 and with a liquid outlet 42. The member 38 also includes a vertical portion 43 carrying an appropriate vertical bearing 44 which is positioned over the casing 40. Rotatable in this bearing is a vertical shaft 45 whose lower end carries a pump rotor 46 disposed in the casing 40, said rotor being operative to draw liquid into this casing and discharge it through the outlet 42. Communicating with this outlet and supported solely by the horizontal portion of the supporting member 38, I have shown a filter 47 which may be of any desired design, the outlet of said filter being connected by a flexible hose 48 with a nipple 49 which extends inwardly from the wall of the receptacle 24, in communication with the nipple 23. Thus, whenever the rotor 46 is operated, liquid from the receptacle 24 will be drawn into the casing 40, forced through the filter 47, the hose 48, and the nipples 49—23 to the hose 18, the latter serving to supply such liquid to the pad 17.

Provision is made for driving the shaft 45 from the shaft 36, without interfering with removal of the latter when the top 26 is removed. Preferably, this driving means consists of a relatively large rubber-tired friction wheel 50 on the upper end of the shaft 45, and a co-acting, relatively small friction wheel 51 on the lower end of shaft 36, the two wheels constituting a separable driving connection between the two shafts. A coiled compression spring 52 has been shown, interposed between the upper end of the member 38 and the wall of the receptacle 24, to move said member in a manner to hold the wheel 50 against the wheel 51, when the machine is to be operated. In order, however, that wheel 50 may be held against excessive

inward movement under the action of the spring 52, when the wheel 51 is removed bodily with the receptacle top 26, I provide suitable means such as a bolt 53 connected with the upper end of the member 38, passing through the spring 52 and the receptacle wall, and provided at its outer end with a thumb nut 54. This arrangement will also regulate the amount of pressure with which the spring 52 holds the wheel 50 against the wheel 51, and if it is desired to do so, the nut 54 may be tightened before removing the cover 26, so as to draw the wheel 50 away from the wheel 51, insuring easy detachment of said top 26 and re-application thereof. After such re-application, loosening of the nut 54 will permit the spring 52 to move the member 38, thereby bringing the wheel 50 against the wheel 51 so that the pump rotor 46 will be operated when the motor 35 is driven. Should it be desired however, the wheels 50 and 51 may be left out of contact with each other and the motor then operated to effect suction without application of the washing fluid.

In addition to the advantages above set forth for the member 38, attention is directed to the fact that this member forms a support for a number of the parts of the device, so that such parts may be readily assembled with said member outside of the receptacle 24 and then all inserted bodily as a single unit, this being of great advantage in the manufacture of the machine.

Under ordinary conditions, when it is not necessary to reach too high with the head 1, its handle 6 may be grasped and the head thus manipulated in the required manner. It is often necessary, however, to move the head to an elevation which cannot be reached by the user's hand. To meet this condition, I have provided an elongated extension handle 55, shown in Fig. 1. This handle is preferably of transversely arched form to tightly lie upon the upper side of the hose 7, so that said handle and hose may be jointly gripped in one or both hands. The front or upper end of the handle 55 is detachably connected by means 57—58—59 with the handle 6, but as these parts are not herein claimed, they are not shown in detail.

Preferably, the two hose 7 and 18 are connected with each other at intervals, as indicated at 60, and one of these connections may well engage the neck 6 of the head 1, instead of the hose 7. I also prefer to equip the hose 18 with a suitable cutoff 61 which may be used to regulate the discharge of the washing liquid therethrough.

The machine constructed as or substantially as shown and described, will be highly efficient and desirable for washing windows or any other surfaces, and even when the head 1 is entirely removed from such surface, there is no danger of the washing liquid

running from such head, as it will not discharge through the pad 17 in a stream or streams, but will merely ooze slowly through such pad, and instead of the liquid dripping from the pad onto the floor, it will be drawn back to receptacle 24 by suction.

While the liquid outlet passage for the receptacle 24, embodies the features of construction denoted at 40—41—42—47—48—49—23 and 18, in the present disclosure, it will be obvious that I am not restricted to this particular arrangement.

I claim:

1. In a surface washing device, a liquid applying nozzle and a suction nozzle, a single receptacle for a washing liquid, liquid outlet means leading from said receptacle to the liquid applying nozzle, a pump for effecting flow of liquid from said receptacle through said outlet means, a liquid return member leading from the suction nozzle and communicating with the part of said receptacle above the liquid level, and means for exhausting air from said part of said receptacle above the liquid level to create suction through said liquid return member.

2. In a cleaning device, a liquid applying nozzle and a suction nozzle, a substantially closed receptacle adapted to be partially filled with liquid and provided with a liquid outlet passage leading to the liquid applying nozzle, a liquid force pump associated with said liquid outlet passage for expelling liquid through said passage, a fan chamber having an air inlet communicating with the upper end of said receptacle and provided also with an air outlet, a fan in said fan chamber for exhausting air from the portion of the receptacle above the liquid level, said portion having a liquid return member leading from the suction nozzle, and driving means for said force pump and fan.

3. In a cleaning device, a liquid applying nozzle and a suction nozzle, a substantially closed receptacle adapted to be partially filled with liquid and provided with a liquid outlet passage leading to the liquid applying nozzle, a liquid force pump associated with said liquid outlet passage for expelling liquid through the same, a fan chamber having an air inlet communicating with the upper end of said receptacle and provided also with an air outlet, a fan in said fan chamber for exhausting air from the portion of the receptacle above the liquid level, said portion having a liquid return

member leading from said suction nozzle, a motor having a vertical shaft directly carrying said fan, and means driven by said shaft for driving said force pump.

4. In a cleaning device, a liquid applying nozzle and a suction nozzle, a substantially closed receptacle including a removable hollow top whose interior constitutes a fan chamber, said fan chamber having an air inlet communicating with the interior of the receptacle and being also provided with an air outlet, said receptacle being adapted to contain a quantity of liquid and having a liquid discharge passage leading to said liquid applying nozzle and provided with a pump located in the receptacle, said receptacle being provided with a liquid return member above the liquid level and leading from said suction nozzle, a motor mounted on the receptacle top and having a shaft extending into the receptacle, an air exhausting fan carried by said shaft and disposed in said fan chamber, and means for driving said pump from said shaft, including a separable driving connection permitting removal of the shaft with the receptacle top.

5. In a cleaning device, a liquid applying nozzle and a suction nozzle, a substantially closed receptacle including a removable top, said receptacle being adapted to contain a quantity of liquid and being provided with a liquid return member above the liquid level and leading from said suction nozzle, means carried by said top for exhausting air from the receptacle, including a shaft projecting below said top, a support movably mounted in the receptacle, said support comprising a horizontal portion including a casing having a liquid inlet, and a vertical portion having a vertical bearing over said casing; a vertical shaft mounted in said bearing and having a pump rotor in said casing, a liquid discharge passage from said casing to the liquid applying nozzle and embodying a flexible portion in said receptacle, co-acting driving wheels carried by the two shafts, and means for moving the aforesaid support to bring said wheels into or out of contact with each other.

6. A structure as specified in claim 5; together with a filter carried by said horizontal portion of said support and forming part of said liquid discharge passage.

In testimony whereof I have hereunto affixed my signature.

WALTER L. KEEFER.