

Oct. 3, 1961

D. C. KRAMES  
SUCTION FLOOR SCRUBBER

3,002,214

Filed Dec. 17, 1959

2 Sheets-Sheet 1

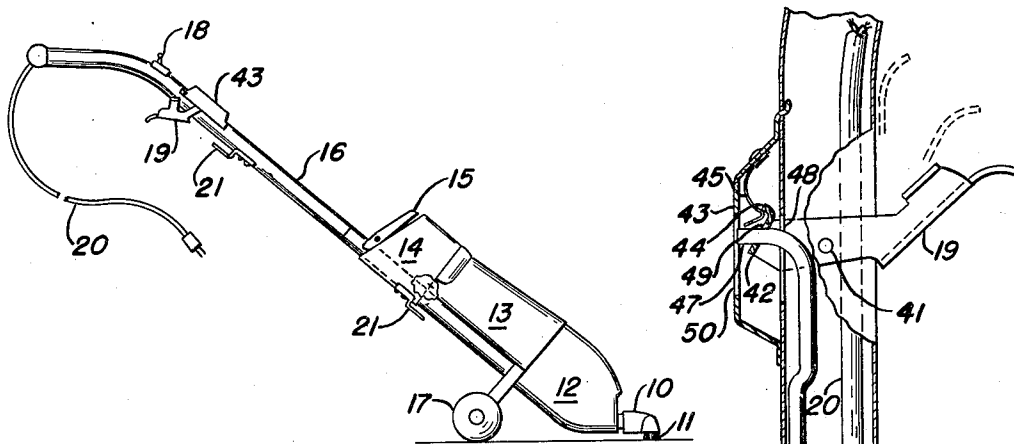


Fig. 1

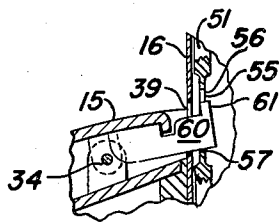


Fig. 3

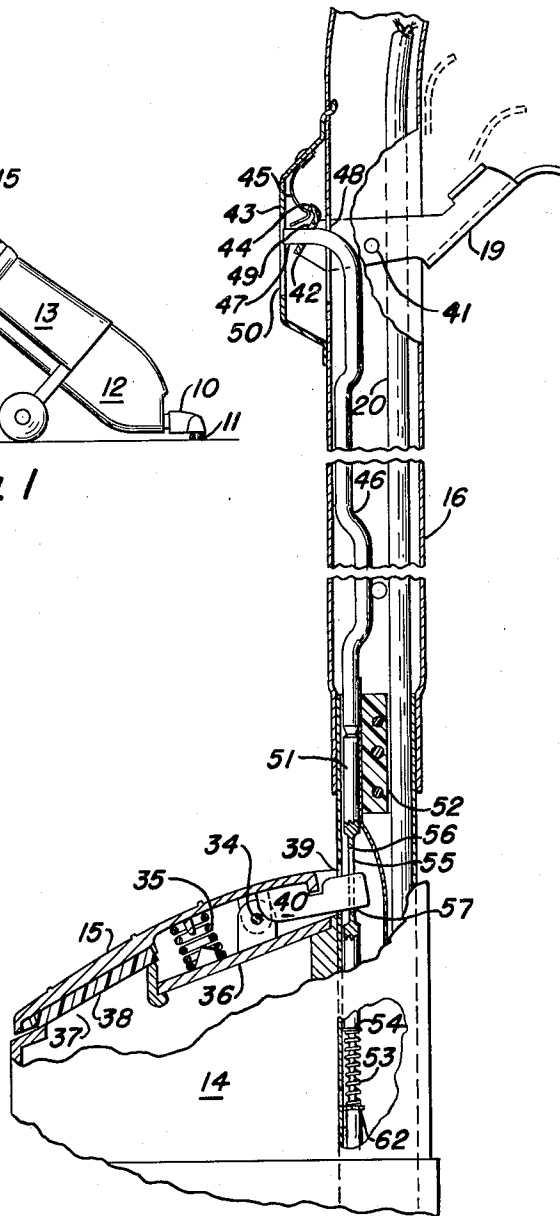


Fig. 2

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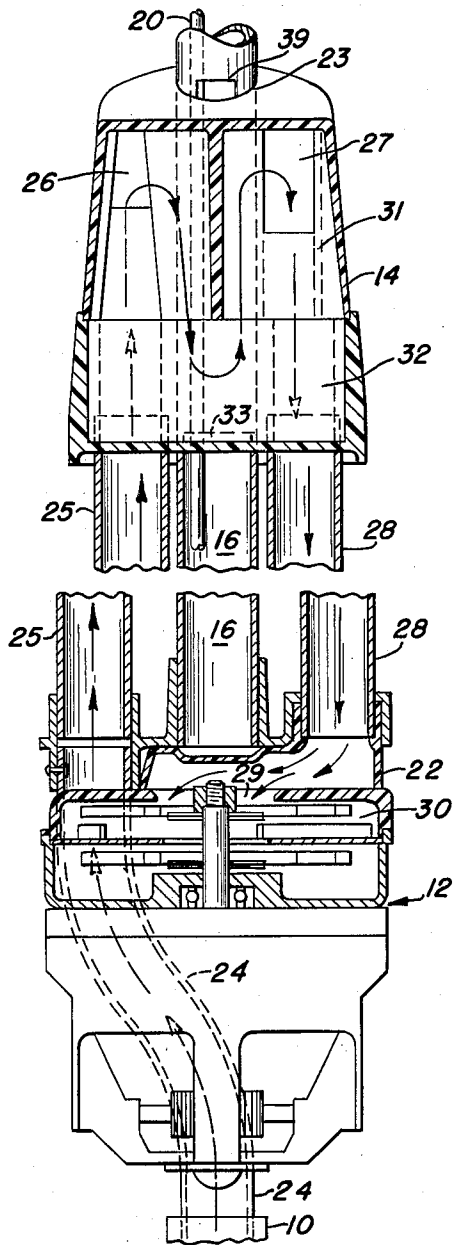


Fig. 4

1

3,002,214

## SUCTION FLOOR SCRUBBER

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Filed Dec. 17, 1959, Ser. No. 860,272  
6 Claims. (Cl. 15—320)

The present invention relates to a self-contained combined detergent dispensing, scrubbing and water pick-up or drying appliance and is an improvement over the invention disclosed and claimed in my copending application, Serial No. 753,900, filed August 8, 1958.

The device of my copending application has gone into wide use but due to manufacturing tolerances it could not be easily produced on a mass production basis.

The device of my prior invention includes a closure cap for a water separator which must be closed during suction water pick-up operations and open during detergent dispensing and scrubbing operation. The closure cap is opened and closed by a linkage mechanism which includes a lever pivoted to the top end of the manipulating handle which in turn reciprocates a two part rod extending downwardly through the handle and having a slot therein into which a tail piece extending rearwardly from the closure cap extends so that the ends of the slot engage the tail piece to move it both to its open and closed positions past an over-center spring which holds the cap in both open and closed positions. The lower rod section is biased to move upwardly to close the closure cap.

As is well known, by mass production methods, all parts are not held to an exact dimension but manufacturing tolerance must be permitted. When the parts are assembled and it so happens that the parts so assembled are all oversize or are all undersize, it sometimes happens that the closure cap may not be moved to its open position or to its closed position depending upon which of the above conditions exists in that particular appliance assembly.

According to the broadest aspects of the present invention, the closure cap for the water separator is positively moved to its closed or open positions regardless of the arrangement of the manufacturing tolerances in any given appliance.

According to the present invention the closure cap is spring biased to its open position and positively held in its closed position by the linkage mechanism. The lower rod is spring biased upwardly by a strong spring and the lower edge of the slot through it is so positioned that it will positively hold the cap closed against its spring bias even though all of the parts assembled to a particular machine have tolerance sizes which are additive in a direction to prevent such closure. In case the tolerance sizes are additive in the opposite direction that would make no difference since the cap would be closed anyway by the spring which biases the lower rod section upwardly.

The motor-fan unit is intended to be in operation at all times and when the closure cap is completely closed the suction applied below it may have to be broken before the spring can open it.

According to another feature of the present invention, positive means is provided for breaking the suction by the provision of means on the closure actuating means for positively lifting the closure cap at the start of its opening movement and which will move out of the way of the upper edge of the slot in the actuating rod when the closure cap is open.

Other objects and advantages of the present invention will become apparent as the description proceeds when taken in connection with the accompanying drawings in which:

2

FIG. 1 is a small side plan view of the appliance of the present invention in completely assembled relationship;

FIG. 2 is a segmental view partly in section of a portion of the device showing how the closure cap is actuated;

FIG. 3 is a segmental sectional view of a modified form of the closure cap actuator according to the invention; and

FIG. 4 is a sectional view showing the air circuits of the appliance of the present invention.

The appliance of the present invention includes a suction nozzle 10 having surface contacting bristles 11, a motor-fan unit 12, a combined detergent dispensing and dirty water collecting tank 13, a water separator 14 having a closure cap 15, a propelling handle 16 and supporting wheels 17.

Adjacent the upper end of the handle 16 is a switch 18 for controlling the motor-fan unit 12 and a dispensing control lever 19. The appliance is supplied with electricity from any suitable outlet by cord 20 which may be supported on brackets 21 when the device is not in use.

As shown in FIG. 4, the handle 16 extends downwardly to a casting 22 which supports the motor-fan unit 12. The handle forms the main supporting framework of the appliance and extends upwardly through an opening 23 in the rear of water separator 14.

As shown in FIG. 4, the air circuit includes the nozzle 10, connected by a lower suction duct 24 to a bore in the casting 22, which also receives the lower end of a left hand suction duct 25 communicating with the interior of separator 14 through opening 26, the interior of separator 14, opening 27, right hand suction duct 28, fan eye 29 and fan chamber 30 which communicates with an exhaust duct (not shown).

The water separation chamber 14 includes an upper separating chamber 31 and a lower dirty water collecting chamber 32 connected to an opening 33 which empties into the top of tank 13. The opening communicates with the interior of chamber 32 in such a manner that dirty water may flow from chamber 32 into the tank 13 but not in the opposite direction. That feature is disclosed and claimed in my copending application, Serial No. 754,035, filed August 8, 1958, now Patent No. 2,955,674.

The closure cap 15, its mounting and mode of control, are shown in detail in FIG. 2. It is hinged to the top of separator 14 by a hinge 34 and is spring biased upwardly by a spring 35 resting on a supporting ledge 36 which forms a part of the closure for the separator 14. An air inlet opening 37 is formed in the top front of vessel 14 adapted to be sealed closed by a gasket 38 when the cap 15 is closed as shown in FIG. 2.

Extending rearwardly from the hinge 34 and through an opening 39 in handle 16 is an actuator tail piece 40 by which the closure cap 15 may be held closed against the bias of spring 35 in a manner which will presently appear.

The hand lever 19 straddles the handle 16, is pivoted thereto at 41 and is provided with a reverse bend 42 extending across the top side of the handle 16 within a housing 43. The reverse bend 42 is provided with a lug 44 which cooperates with a spring detent 45 attached to the interior of housing 43 for a purpose which will later appear.

An upper actuating rod 46 is reciprocally mounted within the handle 16 and has a forwardly extending end 47 which extends through a slot 48 in the forward wall of handle 16, through an opening 49 in member 42 and is visible through a slot 50 in housing 43 to serve as an indicia to indicate whether the appliance is set for dis-

pensing water, for scrubbing or for water pick-up operation.

The lower end of rod 46 abuts against the upper end of lower operating rod 51 which extends through a plug 52 to form a guide for the upper end of rod 51 which extends downwardly to actuate a valve as disclosed and claimed in my previously mentioned application Serial No. 753,900.

The rod 51 is spring biased upwardly by a spring 53 which surrounds the rod 51, rests on lug 62 and abuts at its upper end against a shoulder 54 formed on rod 51. The spring 53 is made stronger than spring 35 for a purpose which will appear later.

The rod 51 is provided with a slot 55 through which the tail piece 40 extends. The position of the upper edge 56 of slot 55 is not critical except to permit downward movement of rod 51 to its valve opening position when the closure 15 is in its open position. However, the position of the lower edge 57 of slot must be such that the closure 15 will be held closed regardless of the distribution of manufacturing tolerances in the parts forming the control elements.

In manufacturing parts by mass production methods, it is obvious that each like part may vary slightly from its counterpart. Thus, the pivot point 41 may not be at exactly the same place for each assembly, the opening 49 in member 42 may vary from one piece to another, the bend 47 of rod 46 may vary from piece to piece or the length of the rods may vary, the joint between the upper and lower handle section may not be the same, the position of the hinge 34 may vary and the position of the tail piece 40 may vary with different assemblies.

Taking all those variables into consideration, the lower edge 57 of slot 55 must be so positioned that, with all the variables arranged most disadvantageously, the closure 15 will be held closed with the parts in the position shown in FIG. 2.

If all of the variables should be arranged in the reverse manner that would make no difference since the spring 53 would move the closure 15 to its closed position without interference.

Thus by spring biasing the closure 15 to its open position when the closing force is removed, it is possible to so design the control that the closure 15 will close regardless of the distribution of the manufacturing tolerances in any particular assembly.

### Operation

The appliance is moved to the scene of operations, the cord 20 plugged into any suitable outlet and the motor-fan unit 12 energized by actuation of switch 18. The motor-fan unit 12 is intended to be in operation at all times during operation of the appliance even though water is not being picked up at the nozzle 10.

The normal position of lever 19 is its middle position shown in dotted lines, FIG. 2, at which position the detergent dispensing valve is closed and the closure cap 15 is open as described in my previously referred to co-pending application, Serial No. 753,900.

The lever 19 is then drawn upwardly against the handle to its upper dotted line position of FIG. 2 which will open the detergent dispensing valve and detergent will be deposited on the floor and the closure cap 15 will remain open and no vacuum will be produced at nozzle 10. When the lever 19 is released it will automatically return to its middle position. The lever 19 may then be thus intermittently actuated as the nozzle 10 is moved about to cause the bristles 11 to spread the detergent about as it is dispensed and as the bristles are loosening soil and grime from the floor.

After a small area of the floor has been thus scrubbed the lever 19 is moved downwardly to its full line position shown in FIG. 2 which will move the lug 44 behind detent 45 and thus latch the lever 19 in its lowermost position. That operation will move the upper rod 46 upwardly

and permit the spring 53 to move the lower rod section 51 upwardly and cause the lower edge 57 of slot 55 to engage the tail piece 40 and close the closure cap 15 against the bias of spring 35.

That will cause a suction to be produced in the separator 14 which will be reflected to the nozzle 10. Dirty water will be sucked up at the nozzle 10 along with the air stream produced by the fan.

The moisture laden air stream will pass into the separator 14 by way of suction ducts 24 and 25 where the dirty water will be separated from the air and flow by gravity through opening 33 into the top end of tank 13, while the dry air will pass by way of suction duct 23 and fan eye 29 into the fan chamber 30 where it will be placed under pressure and discharged to atmosphere through the discharge opening (not shown).

When the scrubbed area has been thoroughly dried, the lever 19 is moved back to its mid position which will move the lug 44 from behind the detent 45, move the rods 46 and 51 downwardly against the bias of spring 53 and move the lower edge 57 of slot 55 away from the tail piece 40 and permit the spring 35 to open the closure 15 and thus break the suction within the separator 14 and consequently within the tank 13 so that detergent may again be dispensed as previously described.

It may happen that if a tight seal is formed at the nozzle 10 that the spring 35 will not be strong enough to break the seal between the closure 15 and the top of the separator 14. FIG. 3 shows an arrangement for remedying that difficulty without at the same time destroying the arrangement for avoiding the previously described manufacturing tolerance difficulties. Where the parts are the same they have been given the same reference numerals.

A special tail piece 60 is provided extending rearwardly from the closure 15 and extending through the opening 39 and the slot 55 in rod 51. The rear end of tail piece 60 is provided with an upwardly extending lug 61.

If the closure 15 should stick, the upper edge 56 of slot 55 will engage the lug 61 and positively break the seal between the closure 15 and the separator 14, after which the spring 35 will act to move the closure 15 to its fully open position.

As the closure 15 is opened, the lug 61 swings behind the flattened portion of rod 51 out of the way of the upper edge 56 of slot 55 so as to avoid interference with the downward movement of the rod 51 to its valve opening position.

From the foregoing it can be seen that the present invention provides a control arrangement by which the closure for the water separator of a suction scrubbing device may be positively opened to break the suction in the separator and in which it may be positively closed even though the most adverse manufacturing tolerance arrangement may be present.

While I have shown and described but two arrangements, according to my invention it is to be understood that those arrangements are to be taken as illustrative only and not in a limiting sense. I do not wish to be limited to the particular structure shown and described but wish to include all equivalent variations thereof except as limited by the scope of the claims.

I claim:

1. A floor washer comprising a water pick-up suction nozzle, suction creating means, means connecting said suction creating means in fluid flow relationship to said nozzle, said connecting means including a water separator interiorly connected to said suction creating means, a propelling handle for said washer, said separator being mounted on said handle and having a top opening, a closure cap for said top opening pivoted to said separator operable to relieve the suction pressure therein and having an extension extending through an opening in said handle, means reciprocally mounted within said handle having a lost motion connection with said extension and constructed to positively close said closure cap.

2. A floor washer according to claim 1 including first spring means for biasing said closure cap to its open position.

3. A floor washer according to claim 2 including second spring means acting on said reciprocally mounted means operative to close said closure cap against the bias of said first spring means.

4. A floor washer according to claim 1 in which said reciprocally mounted means includes a rod slidably mounted within said handle and having a slot through which said extension passes and in which the lower edge of said slot is so positioned relative to said extension as to positively hold said closure cap in its closed position.

5. A floor washer according to claim 4 including spring means for holding said rod in its closure cap closing position.

6. A floor washer according to claim 4 including means on said extension positioned to engage the upper end of said slot as said rod is moved downwardly to positively open a disclosure cap against the suction prevailing in said separator and being movable out of the path of said rod as said closure cap opens so as to permit further downward movement of said rod.

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UNITED STATES PATENT OFFICE  
CERTIFICATE OF CORRECTION

Patent No. 3,002,214

October 3, 1961

Don C. Krammes

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 52, for "operaton" read -- operation --;  
column 6, line 4, for "a disclosure" read -- said closure --.

Signed and sealed this 3rd day of April 1962.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

DAVID L. LADD

Commissioner of Patents