Jan. 15, 1963 J. E. DUFF ET AL 3,072,950

SUCTION WASHING APPLIANCE

Filed July 11, 1960 2 Sheets-Sheet 1

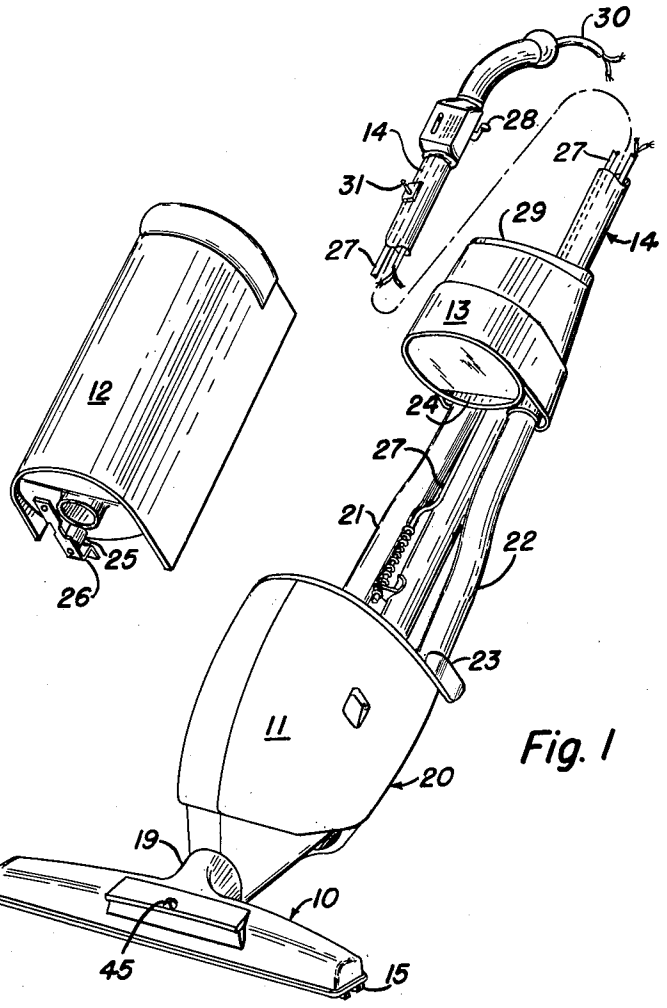


Fig. 1

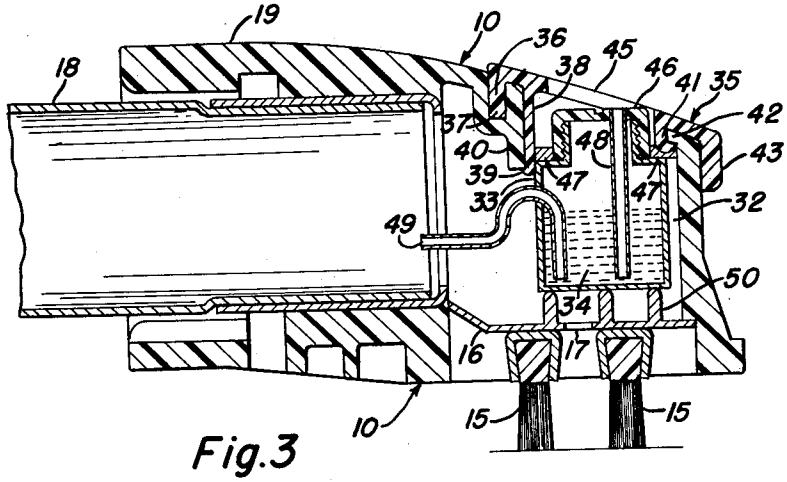


Fig. 3

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SUCTION WASHING APPLIANCE

Filed July 11, 1960 2 Sheets-Sheet 2

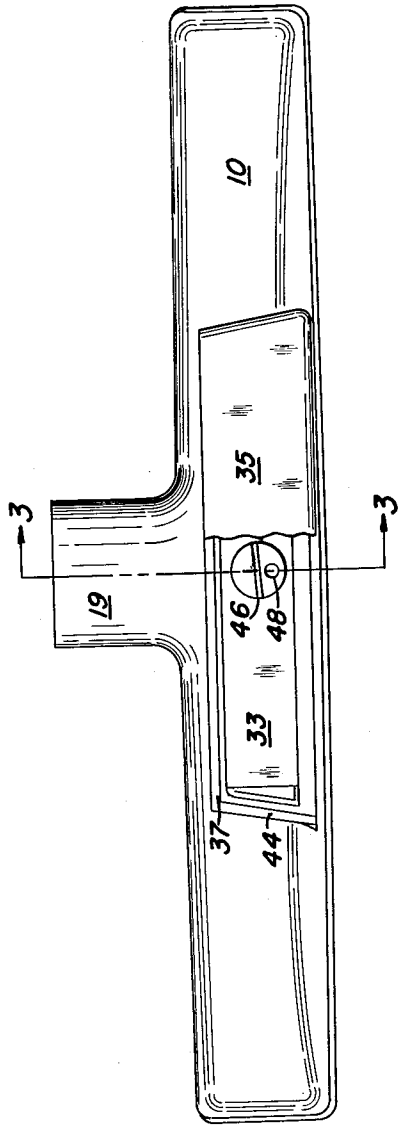


Fig. 2

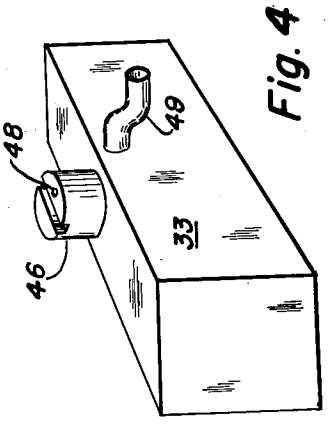


Fig. 4

United States Patent Office 3,072,950 Patented Jan. 15, 1963

3,072,950

SUCTION WASHING APPLIANCE

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8 Claims. (Cl. 15—320)

The present invention relates to a suction floor washer and more particularly to means for inhibiting or suppressing the formation of suds and foam in a unitary floor scrubber having all of the necessary adjuncts for dispensing a clean detergent solution onto a floor, for scrubbing the detergent over the floor to dissolve and loosen the dirt and grime therefrom and then to dry the floor by removing the dirty detergent, etc. from the floor by a suction air stream.

The appliance to which the present invention is applied is of the same general character as that disclosed in a copending application by Don C. Krammes, Serial No. 821,454, filed June 19, 1959 and now Patent No. 2,993,223.

According to the above mentioned application an antifoamant cake is positioned in the suction air stream so as to be contacted by the wet air. The cake is in the form of an active antifoamant dispersed in a water soluble carrier which is slowly eroded to release the active antifoamant.

According to the present invention an active liquid antifoamant is contained in a vessel or receptacle positioned in the suction air stream of a suction floor washer with an eduction tube so positioned relative to the direction of air flow that the air flow sucks the liquid antifoamant from the vessel into the wet air stream so that any foam present is dispersed and broken up and the latter formation of foam is inhibited.

The interior of the vessel is open to atmosphere while the eduction tube is positioned in the suction line so that the pressure differential aids in forcing the liquid antifoamant out of the eduction tube.

According to a preferred form of the invention the antifoamant container is positioned in the nozzle of the appliance.

The appliance to which the present invention is applied will produce 27 inches of water sealed suction and 8 inches of water at the nozzle when the latter is applied to a wet floor. A much higher suction will prevail in the suction air stream above the nozzle mouth so that there will be plenty of pressure differential to force the liquid antifoamant from its container.

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:

FIG. 1 is a perspective view of the appliance to which the present invention is applied,

FIG. 2 is a top view of the nozzle of the appliance of FIG. 1, partly broken away to show how the present invention is applied,

FIG. 3 is a cross sectional view of the nozzle taken on line 3—3 of FIG. 2 and looking in the direction of the arrows and

FIG. 4 is an enlarged perspective view of the antifoamant container or vessel of the present invention.

Referring to FIG. 1 of the drawing, the floor washer of the present invention includes a combined scrubbing and suction water pick-up nozzle **10**, a motor-fan unit **11**, a combined clean detergent dispensing and dirty water collecting tank **12**, a liquid separator **13** and a propelling handle **14**.

The nozzle **10** includes two rows of spaced apart bristle strips **15** which are secured to a bottom plate **16** having

a narrow suction slit **17**. The bristles of strips **15** are relatively stiff and close packed so as to form, in effect, the suction mouth for the nozzle **10**.

The suction tube **18** (FIG. 3) is detachably connected to the extension **19** of the nozzle **10** by a well known bayonet connection whereby the nozzle **10** may be removed from the appliance by rotating it 180° and moving it axially of the suction tube **18**.

The suction tube **18** extends upwardly and rearwardly through the motor housing **20** and at its upper end is connected to the wet suction tube **21**.

The manner by which the wet suction tube **21** forms a part of the suction air passage and the manner by which the suction air passage, including the separator **13**, is connected to the suction side of the motor-fan unit **11** is more clearly shown in a copending application by Don C. Krammes, Serial No. 754,093, filed August 8, 1958.

The tube **21** communicates with the upper left hand side of separator **13** and the dry suction tube **22** connects the upper right hand side of the separator **13** to the suction inlet of the motor-fan unit **11**, as shown by the aforementioned application Serial No. 754,093. The interior construction of the separator **13** is also shown in that application.

The tank **12** is clamped between the upper end of the motor-fan unit **11** and the lower end of the separator **13** by means of a clamp **23** which need not be described in detail herein.

The tank **12** forms a reservoir for the clean detergent solution and also a receptacle for the dirty water etc. as it is collected. A flexible bag is removably mounted on the top interior of tank **12** to receive dirty water from the opening **24** in the bottom of separator **13** when the tank **12** is in place and the appliance is operating to pick up dirty water.

The flexible bag, when empty, floats on top of the clean detergent in tank **12**, as the clean detergent is dispensed and the dirty water etc. is collected, the bottom of the flexible bag moves downwardly as the level of the clean detergent is lowered so that the dirty water etc., as it is collected, occupies the space in tank **12** formerly occupied by the clean detergent. The arrangement is shown in a copending application by Don C. Krammes, Serial No. 652,565, filed April 12, 1957. The bottom of tank **12** is provided with a valved opening normally closed by a spring closed valve **25** having an extension **26** adapted to be contacted by the lower end of a control rod **27** actuated by a control lever **28** at the upper end of handle **14**. The lid **29** for the separator **13** is pivoted at its rear end to the separator **13** and is for the purpose of venting the suction line to atmosphere except during water pick-up operations. It is opened and closed by the control lever **28** and control rod **27** in a manner more fully disclosed in a copending application by Don C. Krammes, Serial No. 753,900, filed August 8, 1958 and now Patent No. 2,986,764.

The appliance is supplied with electric current by means of an extension cord **30** connected to a switch **31** and to the motor-fan unit **11** in any suitable manner.

The handle **14** houses the upper end of the control rod **27** and the electric cord **30**. It extends downwardly through a bore in the rear of the separator **13** to support the latter and its lower end is rigidly attached to the motor-fan unit **11** so as to form, in effect, the supporting backbone for the entire appliance.

A pocket **32** is formed in the central forward part of nozzle **10** to receive an antifoamant vessel or receptacle **33** containing an active liquid antifoamant **34** such as a silicone compound having a molecular weight such that it is a liquid at normal room temperatures.

A flexible plastic cover generally indicated by the reference numeral **35** is removably attached to an opening

in the top wall of the nozzle 10. At its rear edge the cover is provided with a downwardly extending rib 36 interfitting with a groove 37 formed in the top wall of nozzle 10. Forwardly of the rib 36 the cover 35 is formed with a downwardly extending wall 38 having a hooked end 39 interfitting with the lower edge of a downward extension 40 formed on the top wall of the nozzle 10 to hold the rear edge of cover 35 in place and to form a seal with the top left hand wall of vessel 33 as shown by FIG. 3.

Adjacent to its forward edge the cover 35 is formed with a downward extension 41 which contacts the front top edge of vessel 33 to form a seal therewith and is extended forward to provide a shoulder fitting beneath a ledge 42 formed on the top wall of nozzle 10.

Forwardly of the downward extension 41 the cover 35 is formed with a downwardly extending lip 43 which fits closely against the front wall of nozzle 10 as shown by FIG. 3. The lip 43 serves as a hand hold for removing the cover 35 and also extends along the ends of cover 35 to fit into grooves 44 formed in the top wall of nozzle 10, as shown by FIG. 2.

At its mid portion the cover 35 is formed with a circular opening 45 to receive the upper end of a fill cap 46 for the vessel 33.

At its ends the cover 35 is provided with extensions 47 to fill the space between the ends of vessel 33 and the end walls forming the ends of pocket 32 so as to complete the seal between the pocket 32 and the opening 45. Thus the suction produced by the motor-fan unit 11 is confined to the pocket 32 on the interior of nozzle 10 in which the vessel 33 is positioned while the vent tube 48 extends downwardly from the cap 46 to adjacent the bottom of vessel 33. An aspiration tube 49 extends from adjacent the bottom of vessel 33, upwardly and through the rear wall of vessel 33 so as to extend into the suction tube 18 when the nozzle 10 is attached. The vessel 33 is supported by lugs 50 which extend upwardly from the plate 16 to position the bottom of vessel 33 well above the slit 17 to provide plenty of room for the passage of air from the slit 17 to the suction tube 18.

The vessel 33 is of unitary construction and is inserted into the pocket 32 when the cover 35 is removed with its bottom resting on the supporting lugs 50.

The cover 35 is then applied by pressing its rear edge downwardly to push the rib 36 into the groove 37 and to position the hooked end 39 of wall 38 beneath the lower end of extension 40 with the lower end of wall 38 in sealing engagement with the rear upper edge of the vessel 33. The front edge of cover 35 is then pressed downwardly to engage the shoulder of extension 41 beneath the ledge 42 and to form a seal with the front edge of vessel 33. At the same time the end seals enter the space between the ends of vessel 33 and the ends of pocket 32 to seal the pocket 32 at the ends. That operation completely seals the pocket 32 from the opening 45, it being noted that the vent 48 is open to atmosphere and the end of eduction tube 49 is in the suction tube 18.

To remove the cover 35 it is merely necessary to grasp the lip 43 and to sort of pivot or rotate the cover 35 upwardly and rearwardly.

Operation

The motor-fan unit 11 is energized by actuation of switch 31 and the control lever 28 actuated to open lid 29 to vent the suction line to atmosphere and to open valve 25 and dispense clean detergent solution onto the floor, which is spread about by moving the appliance back and forth.

The control lever 28 is intermittently operated to open and close valve 25 while the lid 29 remains open as the nozzle 10 is moved back and forth to loosen and dissolve dirt and grime by the action of the detergent which may also produce considerable suds and foam.

After an area of the floor is thoroughly scrubbed the

control lever 28 is actuated to close the lid 29 so that the suction produced by the motor-fan unit will be applied to the nozzle 10. The bristles 15 form a narrow suction mouth and the dirty water etc. including any suds or foam which has formed will be drawn beneath the lower ends of bristles 15 and be projected upwardly through slit 17 into the suction tube 18.

The end of the aspiration tube 49 will be at a suction pressure in excess of 8 inches of water while the interior of vessel 33 will be at atmospheric pressure. That will cause the liquid silicone in vessel 33 to be projected into the wet air stream in suction tube 18 which will effectively suppress and dissipate any suds or foam present and inhibit the formation of suds and foam in the suction passage of the appliance before it can reach the separator 13 and interfere with the proper operation of the appliance.

After leaving the suction tube the wet air stream passes through tube 21 to the separator 13 where the dirty water etc. is separated from the air and drains through opening 24 into the dirty water bag in the tank 12. The air freed of its moisture content continues to the suction inlet of the motor-fan unit 11 through suction tube 22.

Should the suction air stream contain suds and foam as it enters the separator 13 it would soon render that vessel inoperative with the result that at least a portion of the dirty water etc. would be carried over to the motor-fan unit 11 and eventually flow back onto the floor. That is effectively prevented by the antifoamant vessel of the present invention.

Depending upon conditions of use etc. it may be necessary to place a restrictor in the tube 49 in order to control the flow of liquid therethrough.

It is to be understood that it is not essential to the invention that the vessel 33 be positioned in the nozzle 10 as it would be just as effective if positioned anywhere in the suction line ahead of the separator 13.

According to the present invention the fan could be positioned ahead of the separator so as to handle the dirty wet air stream and discharge it under pressure into a water separator. In that case the receptacle of the present invention could have its aspirator tube positioned in the air line on the discharge side of the fan so as to suck the antifoamant from the receptacle into the moving air stream.

While we have shown and described but a single embodiment of our invention it is to be understood that that embodiment is to be taken as illustrative only and not in a limiting sense. We 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.

We claim:

1. A floor washing appliance comprising, a combined scrubbing and pick-up nozzle, a source of suction, a suction line connecting said source of suction to said nozzle and means responsive to the suction produced by said source of suction operative to dispense and antifoamant into said suction line, said means including a vessel containing a liquid antifoamant and having an aspiration tube extending from the interior thereof into said suction line for dispensing said antifoamant into said suction line.

2. An appliance according to claim 1 in which the interior of said vessel is vented to atmosphere.

3. An appliance according to claim 1 in which said vessel is positioned in said nozzle with said aspiration tube extending into said suction line as it leaves said nozzle.

4. A floor scrubbing appliance comprising, a suction nozzle, a source of suction, a suction line including a water separator connecting said nozzle to said source of suction, a walled container adapted to contain a liquid antifoamant positioned in said suction line ahead of said separator, and aspirating means on said walled con-

tainer adapted to dispense antifoamant from said container into said suction line in response to suction pressure.

5. An appliance according to claim 4 including a pocket formed in said nozzle in which said container is positioned.

6. An appliance according to claim 5 in which the interior of said container is open to atmosphere and said aspirating means includes an aspirating tube extending into said suction line as it leaves said nozzle.

7. A floor scrubbing appliance comprising, a liquid pick-up nozzle, an air flow line into which a mixture of water and air from said nozzle is projected, means for producing a flow of air in said line and means responsive to the pressure differential produced in said line operative to dispense an antifoamant into said line including a receptacle containing a liquid antifoamant and having an aspirator tube positioned in said air flow line to produce a pressure differential between the interior of said

receptacle and said air line sufficient to cause antifoamant in said receptacle to enter said air line.

8. A floor washing appliance comprising, a combined scrubbing and pick-up nozzle, a source of suction, a suction line connecting said source of suction to said nozzle, a walled container adapted to contain a liquid antifoamant, said container being positioned within said nozzle in said suction line and aspirating means responsive to the suction produced by said source of suction operative to dispense said antifoamant from said container into said suction line.

References Cited in the file of this patent

UNITED STATES PATENTS

1,984,789	Everett	Dec. 18, 1934
2,087,075	Velos	July 13, 1937
2,673,619	Martin	Mar. 30, 1954
2,972,769	Keating et al.	Feb. 28, 1961