

Nov. 22, 1960

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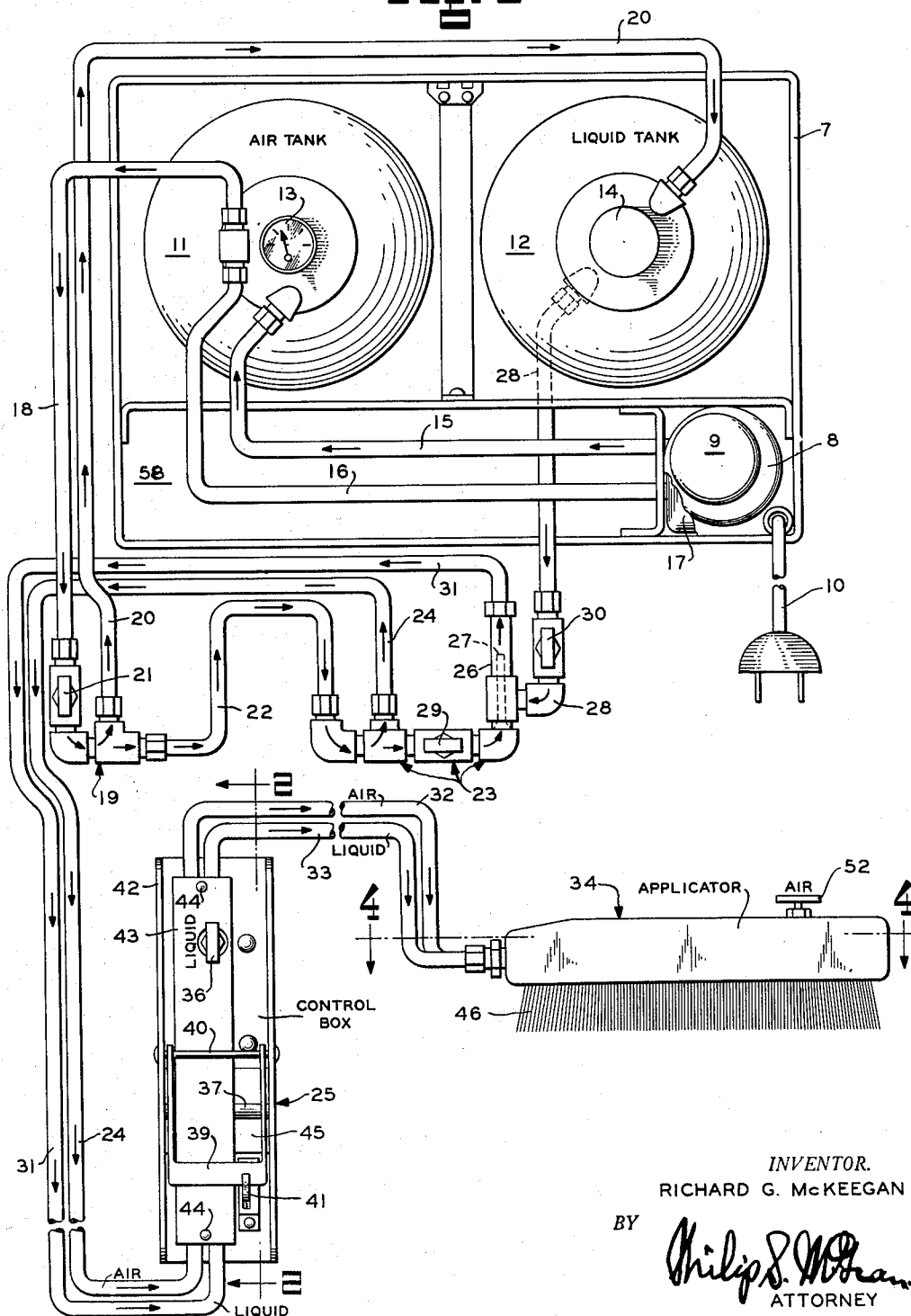
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PORTABLE CLEANER FOR UPHOLSTERY, WALLS AND THE LIKE

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3 Sheets-Sheet 1

Fig. 1



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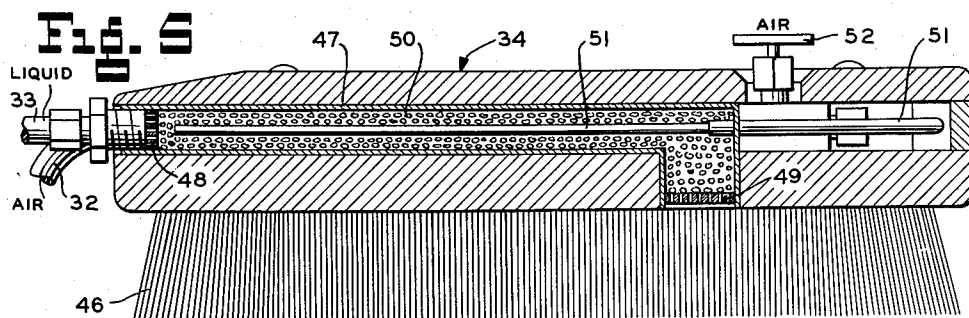
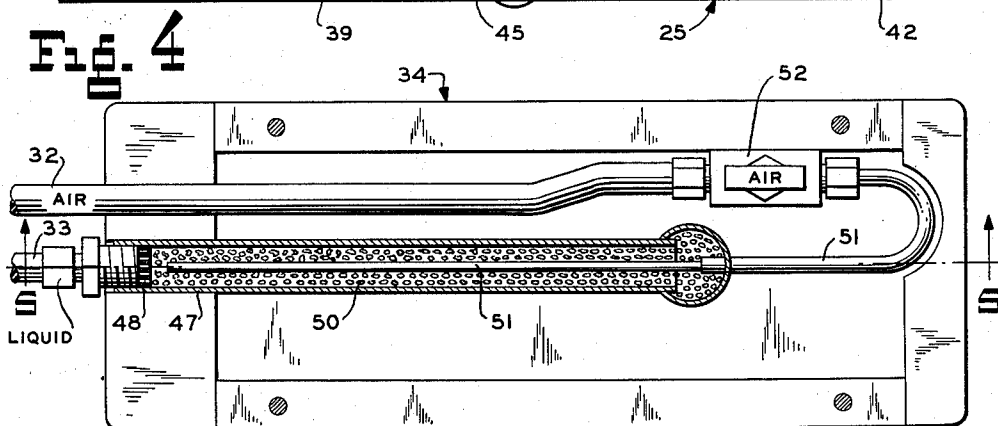
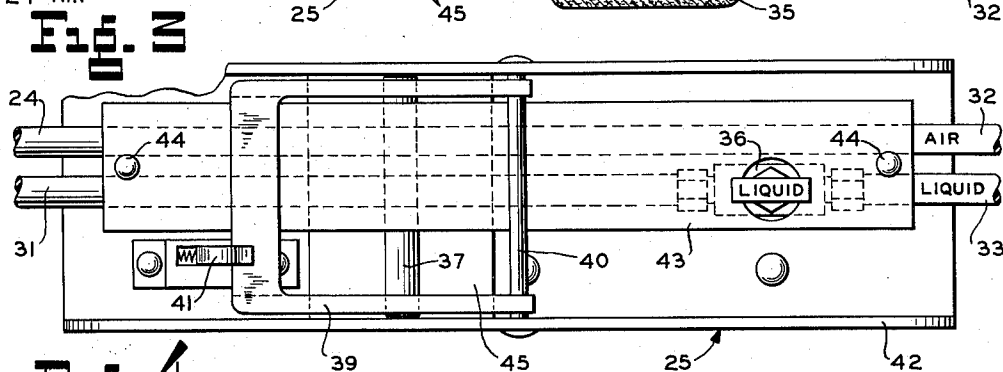
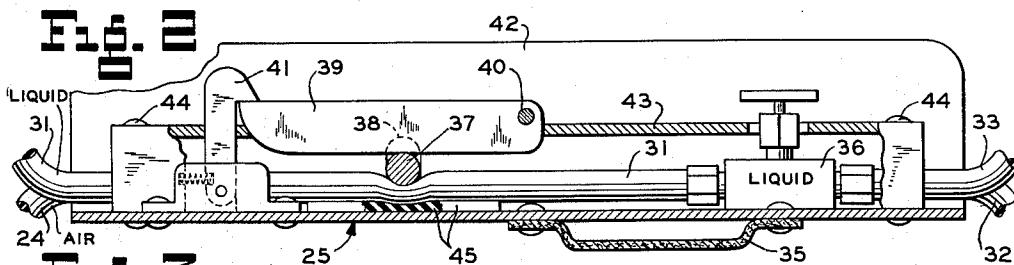
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Fig. 6

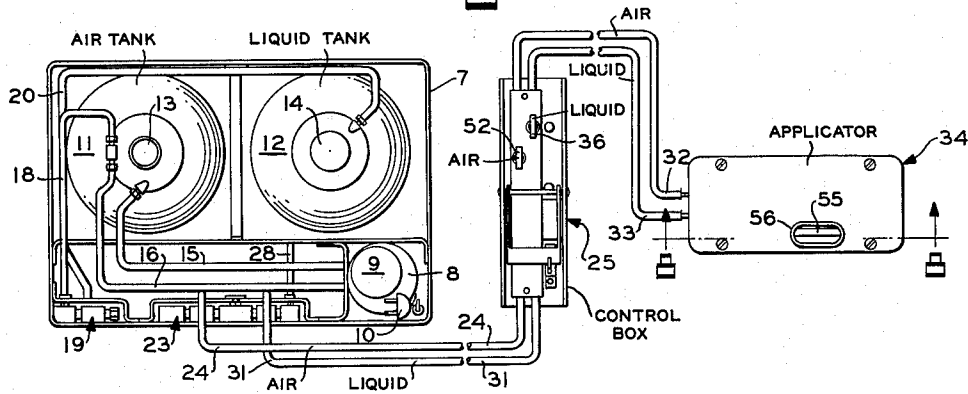


Fig. 7

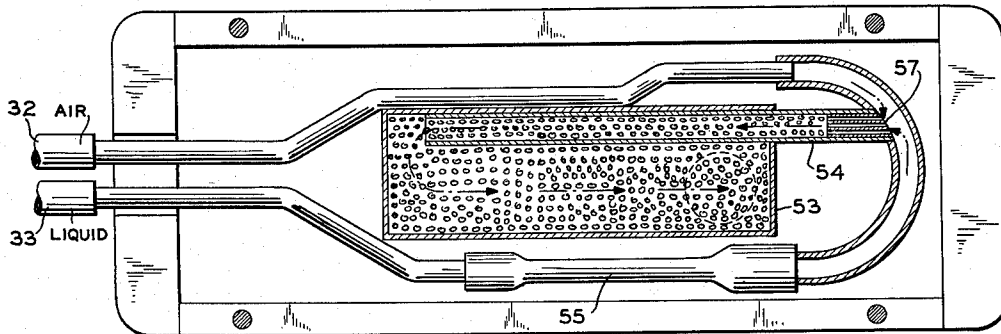
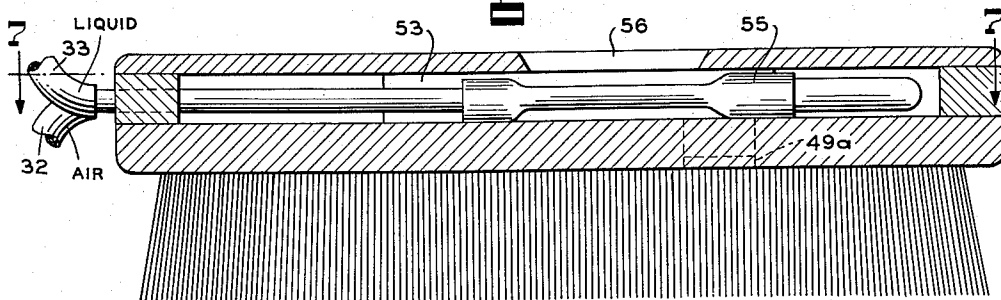


Fig. 8



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PORTABLE CLEANER FOR UPHOLSTERY, WALLS AND THE LIKE

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1 Claim. (Cl. 15—128)

The invention disclosed herewith is a shampooing and cleaning device for upholstery, wall surfaces, carpeting, auto interiors and the like, and the general purposes of the invention are to provide a compact, readily portable construction which can be used for such general cleaning purposes.

The present application is a continuation-in-part of my application Serial No. 421,000, filed April 5, 1954, now abandoned.

Special objects of the invention are to provide a device of this nature which can be readily carried about and be quickly set up by merely plugging into an electric service outlet and which will then provide an easily regulated, adequate supply of shampooing solution, foamable dry cleaning solution or other liquid detergents.

Further important objects of the invention are to provide an apparatus according speed in setting up to operate, in operating, in securing and flushing out when the work is completed.

Further objects of the invention are to provide an applicator to be fed with a continuous supply of cleaning solution; operate to automatically convert the solution to a dry, air saturated foam, controllable at points remote from the source of supply; accommodate a time saving, uninterrupted application to the work and be operative with speed and ease due to light weight and size with minimum dripping and over-wetting.

Other objects of the invention are to provide light weight apparatus having the advantages indicated which will be relatively simple in construction and which can be assembled at relatively low cost.

Other desirable objects attained by the invention and the novel features of construction, combination and relation of parts constituting the invention are set forth and will appear further in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate present commercial embodiments of the invention but structure and combination of elements may be modified and changed as regards the immediate disclosure, all within the true intent and scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a general plan view of the complete apparatus, partly broken away;

Fig. 2 is an enlarged broken sectional view of the control valve unit on substantially the plane of line 2—2 of Fig. 1;

Fig. 3 is a broken plan view of this same unit;

Fig. 4 is an enlarged broken sectional view of the brush or applicator unit on substantially the plane of line 4—4 of Fig. 1;

Fig. 5 is a vertical sectional view of the applicator on substantially the plane of line 5—5 of Fig. 4.

Fig. 6 is a plan view of a slightly modified form of the invention;

Fig. 7 is a broken sectional view of the applicator and foam generator as viewed on substantially the plane of line 7—7 of Fig. 8;

2

Fig. 8 is a vertical sectional view of the applicator on substantially the plane of line 8—8 of Fig. 6.

In Fig. 1 the main parts of the machine include a motor driven compressor, air tank and liquid tank as a supply source and are shown mounted and enclosed within a case 7 of suitable size to be carried about from place to place, as required.

The pump or compressor 8 and motor 9 for driving the same are shown mounted in one corner of the case with an extension cord 10 for connection with an available electric outlet.

An air tank 11 and liquid tank 12 with necessary connections occupy most of the balance of the case. The air tank is shown as carrying a pressure gage 13 and the liquid tank is shown as having a removable filling cap 14.

A pressure line 15 is shown running from the air pump to the air tank and a pressure control line 16 is shown extending from the air tank back to a pressure control switch 17, set to control the pump motor to maintain a desired pressure in the air tank.

An air supply line 18 is shown extending from the air tank to a header or manifold 19 with a branch 20 running off from this manifold to the top of the liquid tank 12, thus to put air tank pressure on top of liquid in tank 12. A valve 21 in air supply line 18 may be shut off to isolate the air tank and enable pressure in that tank to be conserved when the liquid tank is opened up for refilling or other purposes.

From manifold 19 a through line 22 is extended to a second manifold 23, and from this manifold an air line 24 is taken off and extended to the control unit 25 and continued as air line 32 therefrom to the applicator 34. The manifolds 19 and 23 are shown as two instead of one continuous piece for ease of accommodation in the case 7, of the common fittings comprising them and the lines and valves attached thereto. Air line 22 serves to connect said manifolds.

A liquid supply line 28 is shown extending from the bottom of the liquid tank 12 to the manifold 23 and a liquid supply line 31 taken from the manifold 23 to continue the supply of liquid from the liquid supply source 12 to the control unit 25 and therefrom via liquid line 33 to the applicator 34.

For work not requiring the injection of air into the liquid line 31 the lines 22 and 28 could run directly to the control unit 25 and via lines 32 and 33 to the applicator. Said work includes general furniture, auto interior and rug cleaning and such work not requiring large vertical variations in the positioning of the delivery or downstream end of the liquid carrying line 31, 33.

On work such as in wall washing or stairway carpet cleaning, the large vertical distances transcended cause the liquid carrying line 31, 33 to extend through varying vertical distances and this in turn creates a problem of varying back pressures due to the weight of liquid in the liquid line 31, 33. A change in back pressure will give rise to an accompanying change in liquid delivery pressure on the liquid and consequently a variation in foam consistency since metering of air and liquid, for proper consistency, will depend, to some extent, upon the delivery pressures. Since it is desirable to maintain a steady foam consistency even on such work where the large elevation changes are encountered, the valve 29 is utilized and valve 30, injector 26 and nozzle 27 aid it in its function, the operation of which will be described further on. The above mentioned liquid delivery pressure is approximately equal to the pressure at the supply source minus the back pressure that would be developed by a column of liquid equal in height to the vertical difference between the liquid supply source and the liquid outlet at the point of work application.

The metering valve 29, used to meter air into the liquid line 31, is located on the manifold 23 intermediate between the air containing and the liquid containing sides. The air containing side of manifold 23 includes connections of air lines 22 and 24, while the liquid containing side includes the connections of the liquid lines 28 and 31. The valve 29 is normally used in the fully closed position.

A liquid metering valve 30, used in conjunction with the valve 29, is positioned intermediate of the line 28 and is normally fully open to allow a free flow of liquid via line 31 to the liquid metering valve 36 on the control unit 25.

The injector tube 26 is in register with the liquid lines 28 and 31 forming a continuation between them while the injector nozzle 27 in register with valve 29 forms a continuation of the air supply line 22.

Extensions 24 and 31 may be of any length of flexible tubing permitting air and liquid metering control and work application at points remote from the source of air and liquid supply so as to assure a minimum amount of positioning of the case 7 housing said supply source when working over large areas.

Line 31, or a portion thereof, is preferably of transparent plastic tubing so that when using the valves 29 and 30 to meter a proportionment of air and liquid into the liquid line 31, practical means will be present to afford visual aid to such metering adjustments.

Lines 32 and 33 are continuations of lines 24 and 31, respectively. The separation of control unit 25 and the applicator 34 by lines 32 and 33 of possibly five feet or so, permits ease of handling the applicator and control unit. In this manner the control unit may be attached to the operator's belt or a holster by a clip or loop 35 as when washing walls, or left to trail on the floor as when shampooing upholstered furniture, or held in the hand as conditions may suggest.

The control unit comprises in the present disclosure, a liquid metering valve 36 interposed between adjoining ends of the flexible liquid carrying lines 31, 33, the air carrying lines 24, 32 and a combination shut-off valve for the air and liquid shown as a bar 37 guided in slots 38 over the air and liquid lines 24 and 31 and adapted to be forced down into closing position over these lines by a switch lever or yoke 39 pivoted at one end, at 40, and adapted to be held in closed position at the opposite end by a spring pressed latch 41.

The body or base of the control unit is shown as a channel 42, and the tubing and metering valve are shown encased within a smaller, reversely placed channel 43 secured by rivets or other fastenings 44 to the bottom of the main channel. The guide slots 38 for the tube squeezing roll or pin 37 are shown located in the side walls of the inner channel 43.

The sides of the channel 42 serve to hinge the pivot bar 40, hold the tube squeezing pin 37 in position and provide runners or extensions to protect the adjustments made to the controls contained therein when the unit is dragged along the floor, etc., when working.

An elastic pad 45 is shown supporting the flexible elastic tubes 24 and 31 beneath the shut-off bar or pin 37, cushioning these tubes against injury from squeezing pressure of the bar.

In the illustration the applicator is shown as a brush having bristles or fibres 46 on the face of the same and having a foam generator on the back thereof.

The type or form of the applicator may vary according to work to be performed, such for instance as substituting a supported sponge member for the brush member.

Figs. 4 and 5 show an arrangement where the air tube 47 set lengthwise in the back of the brush, having a screened inlet 48 at one end connected with the liquid line 33, and having a downwardly directed screened out-

let 49 at the opposite end discharging into the bristles or brush body 46.

Figs. 4 and 5 shown an arrangement where the air metering valve is located on the applicator 34, this position being convenient for easy and quick finger and thumb control of the air flow, a particularly desirable feature as explained in the following. The location of valve 52 makes convenient an arrangement whereby the air delivered in air line 32 may be injected into the tube 47 via tubing 51 of reduced diameter entering at a convenient point at the front of the bead enclosing tube 47 and running to a point in close proximity to the liquid inlet 48 whereby both liquid and air are required to traverse the full length of the bead tube 47 intermingling therein and creating a voluminous air saturated lather. The reduced diameter tubing 51 imparts speed to the jet of air metered thereto, causing a desirable fine dispersal of liquid entering the dispersing medium.

The valve 52 shown in Figs. 4 and 5, may be placed on the control unit 25 except for the desired feature of quick finger control by the hand holding and working the applicator 34. This adds to a more practical control over the metering system, valves 36 and 52 under certain conditions, to be adjusted as needed when working.

Different forms of foam generators may be constructed to give suitable results and the following alternate methods of construction may produce substantially the same results while eliminating the protruding valve 52 from the applicator 34 and providing another readily adaptable method of finger control at the applicator.

Figs. 6, 7 and 8 show the air metering valve 52 replaced in the control unit 25, intermediate air carrying lines 24 and 32, by finger control at the applicator in a portion of soft, resilient tube 55 which may be squeezed by finger pressure through hole 56 cut in the cover of the applicator.

In Figs. 6, 7 and 8, also, the foam generator 53 is shown as a short rectangular tube with a small tube 54 enclosed within and the air line 32 and the liquid line 33 connected therewith via an elbow forming a juncture and common connection at the inlet tube 54. A screen 57 is placed to hold the beads in position.

The applicator arrangement shown in Figs. 4 and 5 where air valve 52 is accommodated on the applicator, and the applicator arrangement shown in Figs. 6, 7 and 8 where the tube 55 is employed to provide action resulting in similar effect, are constructions whereby the valve 52 or tube 55 find convenient positions for practical operation by the hand holding and working the applicator.

The primary purpose for positioning a control on the applicator is to provide means whereby a too wet flow of foam that may be delivered to the bead tube by an incorrect or accidentally altered adjustment of a control valve or valves may be quickly corrected to insure a minimum amount of over-wetting, bearing in mind that the control unit 25 may at times be in a comparatively inaccessible position as when trailed along the floor in furniture cleaning work or as when both hands are occupied. The air valve would in this case be quickly opened to deliver an excess of air to dry the too wet mixture and provide a jet stream of air the velocity of which will act to decrease the liquid delivered to the bead enclosure 50, or the tube 55 of Fig. 7 be compressed to restrict the liquid flow, thereby allowing the then excessive volume of air delivered to create a drier mixture.

The arrangements of controls described herein and set forth as features of the invention embrace arrangements providing practical, rapid and accurate control adaptations to various work requirements encountered in multiple purpose work applications.

Operation

With liquid detergent in the liquid tank 12 the machine may be started by simply plugging it, by extension cord 10, into an electric outlet. The automatic pressure switch

17 will then govern the pump motor 9 to maintain within practical limits, uniform pressure in air tank 11, the flow from the pump being by way of air line 15 to air tank 11 and the pressure transmitted through line 16 to pressure control switch 17.

Air tank pressure is transmitted by tubing 18, manifold 19 and tubing 20 to the top of the liquid tank 12, thus to put the supply of liquid detergent enclosed under air tank pressure.

With valve 21 open, air tank pressure will be on the liquid and the air supply will be extended through line 22 and out through extension line 24 to the control box 25 and air line 32 to applicator 34.

With valve 30 open, the normal position, liquid under pressure from the liquid tank 12 will extend through line 28, 31, metering valve 36 and line 33 to the applicator 34. The amount of liquid passing to the applicator through liquid lines 28, 31, 33 may be regulated by the metering valve 36 on the control unit 25 and the amount of air supplied to the applicator through air lines 22, 24, 32 may be regulated by the metering valve 52 located on the applicator 34 in Figs. 4 and 5 and on the control unit 25, Figs. 6, 7 and 8.

In most work, such as upholstery, auto interiors and rug shampooing, the apparatus is simply operated by opening valve 21 and adjusting valves 36 and 52, leaving valve 29 closed and 30 opened. No air passes through the injector nozzle 27 and into the liquid line 31.

However, the special problem of varying delivery pressures on the liquid when large vertical distances of work application are encountered requires means whereby the air and liquid metered to the foam generator 47 will provide a continuous flow of even consistency foam over a wide range with one setting of the metering valves 36 and 52. This is accomplished by the use of the injector metering valve 29. Since a column of air and liquid weigh less than an equal column of the liquid, valve 29 may be used to inject air into the liquid line to operate as a pressure equalizer.

The liquid metering valve 30 is used in conjunction with the valve 29 to get a steady proportionment of air and liquid in line 31. The injector 26 and nozzle 27 serve in this case to insure a fine surge-free metering and proportioning of the air and liquid. Parts 30, 26 and 27 serve to aid valve 29 in the function of air introduction.

To operate the apparatus, the valve 21 being open, valves 29 and 30 are adjusted with the visual aid of the transparent line 31 and the liquid valve 36 adjusted to meter a liquid and air combination to the foam generator and the air valve 52 to meter additional air as required.

The air and liquid in line 31 weigh less than the liquid alone and therefore develop less back pressure changes and one adjustment as described may allow transcension of 30 feet or more with no additional adjustments made at valves 29 and 30, thereby placing full control over volume and consistencies in the hands of the operator remote from valves 29 and 30 which are positioned with manifold 23 in the case 7.

If a wet foam or lather is desired less air may be used, and if a dry foam is required less liquid and more air be used, and in all events the supply is continuous and substantially uniform.

The latch 41 at the control unit may be shaped for easy manipulation by the thumb and when so actuated it will release the switch lever 39 to let go the tube squeezing bar 37 and permit flow through both the air and liquid lines 24 and 31.

At any time the supply of both liquid and air can be immediately cut off by simply closing down the switch lever 39, where it will be automatically caught and held closed by the thumb latch 41.

When liquid is exhausted pressure on the liquid container may be shut off by closing valve 21, the operation of which isolates the air under pressure contained in the

air tank 11 ready for the next operation, while the cover 14 is removed from the tank 12 for replenishing the detergent supply or for other purposes.

Then with the tank closed on a fresh supply of liquid the machine is ready to operate instantly from compressed air stored in air tank 11 on reopening valve 21.

The liquid lines may be completely reverse flushed by air to clear out the lines when securing after the work is completed, to help keep the lines clear of deposits and to allow detachment of the wet applicator for separate storage where desirable. The system is reverse flushed by closing valve 21 to isolate the air under pressure in the separate air tank 11 and the air pressure relieved from the liquid tank 12 as by opening the cap 14. With air line 20 crimped, as if folded between the air gauge 13 and adjacent fittings, valve 30 open, valve 29 closed, valves 36 and 52 open and the thumb held over the foam outlet on the foam generator 47 or 53, opening valve 21 causes air to traverse the air line system and back in a reverse direction through the liquid line system 33, 31, 28 to the bottom of the liquid tank 12.

When it is desirable to clean and flush out the apparatus, as when the work is completed, a supply of fresh water may be placed in the liquid tank 12, with air pressure built up in the air tank 11 and the shut-off valve 21 opened, the liquid line valves 30 and 36 left open, the fresh water will serve to flush out the liquid lines. In this operation the applicator may be left in a receptacle, the air pump extension cord disconnected and the apparatus left to flush itself out unattended.

Fig. 1, as a matter of illustration, shows the parts in a separated relation, but in practice they may be closely combined and all contained within the box or case, as shown in Fig. 6. In such construction, then, the manifolds 19 and 23 and control valves 21, 29 and 30 will be mounted in convenient relation, as on an inner wall of the box, and remaining space in the compartment indicated at 58 be utilized for storage of control unit 25, applicator 34 and the connecting flexible tubing.

The case then may have a cover and a carrying handle so that the complete system may be carried about as a single unit.

The system is made up of relative few, simple parts, most of them of conventional design and readily assembled at reasonable cost. The two separate tanks, as well as serving practical purposes such as featured in refilling and reverse flushing, provide an easily assembled, economical construction. The tanks may be made each of two low-cost stock stainless steel mixing bowls welded together. The channels forming the control unit 25 may be made of common aluminum channel stock.

The apparatus will operate with any amount of liquids in the liquid tank 12 and is readily transportable with liquid enclosed.

What is claimed is:

A portable cleaner for upholstery, walls and the like comprising a supply unit, applicator and control valves; said supply unit including interconnected compressed air and liquid containers, means for maintaining the air and liquid in said containers under substantially constant air pressure, flexible air and liquid tubing extending from said compressed air and liquid containers, respectively, to said applicator; said applicator unit adapted to be held by the hand and comprising a scrubbing member and a foam generator mounted on the back of said scrubbing member, said foam generator having a mixing passage with a foam outlet at one end of the mixing passage in communication with said scrubbing member and inlet conduit means connected to the flexible air and liquid tubing, said mixing passage having air and liquid stream restricting medium therein to diffuse the flow of and mix the air and liquid passing therein; said control valves comprising means remote from said supply unit for separately metering the air and liquid flow through said tubing

and additionally for cutting off all flow as desired where-
dependently of and remote from said supply unit.

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