

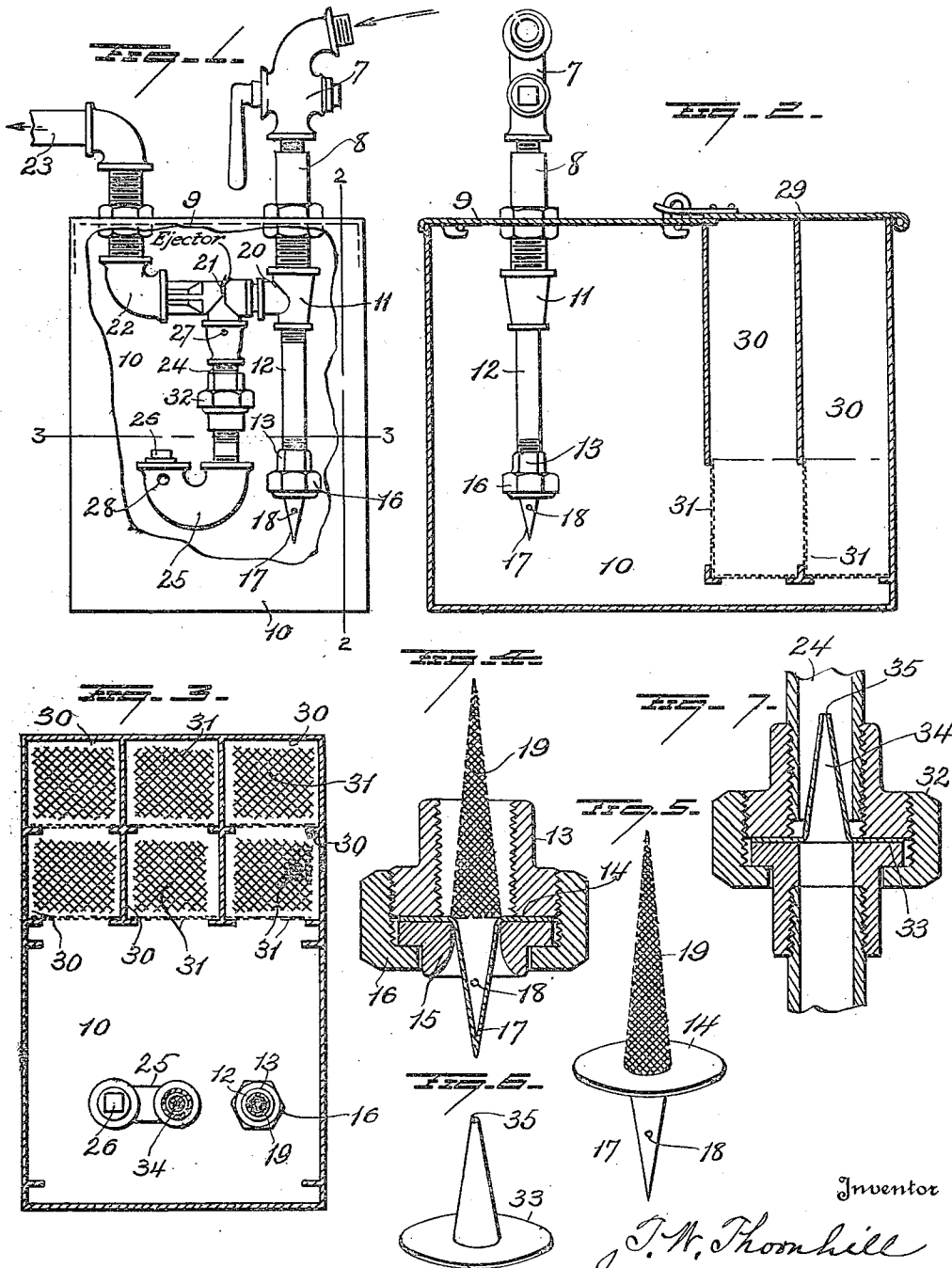
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METHOD AND APPARATUS FOR MAKING SOAPY SOLUTIONS OR THE LIKE

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METHOD AND APPARATUS FOR MAKING SOAPY SOLUTIONS OR THE LIKE

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This invention relates to an improved system of making a mixture of a liquid, such as water, a gas, such as air, and soap or the like in order to produce soapsuds for use in washing various articles.

The primary object of the invention is to provide an improved system for this purpose in which a confined flowing stream of water or the like will function to entrain soapy water and air and will also act to mix the soapy water and air with the flowing stream to produce a particularly desirable cleaning fluid.

With the foregoing object outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawings, and more particularly pointed out in the appended claims.

Referring to the drawings:—

Fig. 1 is an end elevation of the improved apparatus, partly broken away to facilitate illustration.

Fig. 2 is a longitudinal vertical sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a horizontal sectional view on the line 3—3 of Fig. 1.

Fig. 4 is a vertical sectional view of a detail.

Fig. 5 is a perspective view of a part of said detail.

Fig. 6 is a perspective view of an orifice member or nozzle forming part of the apparatus.

Fig. 7 is a vertical sectional view of a detail.

In the drawings, 7 indicates a hand-controlled valve that is adapted to be connected to a water line or pipe and forms the inlet of the present apparatus. This valve is joined to a pipe 8 which extends through the top 9 of a receptacle 10 and is connected at its inner end to a cone or reducing fitting 11, the apex or smaller end of which is joined to a down-pipe 12 which terminates in a structure of the type shown in Fig. 4. This structure includes a flanged sleeve 13 having internal threads which engage external threads on the lower end of the pipe 12. A disk 14 (Fig. 5) is clamped against the lower end

of the member 13 by means of a washer 15 and a flanged nut 16, the latter engaging external threads on the member 13.

A cone 17, preferably integral with the disk 14, depends from the latter and extends through the washer, and at a point below the latter it is provided with an orifice 18 through which a relatively small amount of the water entering by way of valve 7 may flow into the receptacle 10.

To prevent any clogging of the aperture 18, suitable straining means such as a conical screen 19 is attached to the disk 14 and projects vertically into the pipe 12. To allow the main portion of the stream of water entering the system to be discharged without flowing through the cone 17, the restricting member 11 is provided with a side branch or outlet 20 which terminates in an ejector nozzle 21 which is joined by an elbow 22 to an outlet conduit 23 which leads the soapy mixture to the point of disposal or use.

The annular space of the ejector nozzle which surrounds the centrally disposed ejector tube, communicates by means of a pipe line 24 with a U-shaped fitting 25, one end of which is closed by a plug 26. An aperture 27 in a part of the pipe line 24 permits air to flow into this pipe line and enter the ejector nozzle 21, and an aperture 28 in the U-shaped member 25 permits air and soapy water from the receptacle 10 to flow into the pipe line 24 under suction exerted in the ejector nozzle 21.

To allow soap powder or the like to be placed in the receptacle, a portion of the top 9 is formed by a hinged door 29 which covers one end portion of the receptacle. This end portion is divided by vertical partitions into a number of compartments 30, the lower ends of which are formed by wire screen walls and bottoms 31. The screen portions of these compartments extend into the receptacle to points below the outlet aperture 28 so that the pool of water which forms in the receptacle has free access to the soap or the like contained in the lower ends of the compartments. Furthermore, as the inlet orifice 18 is also arranged below the water line, the incoming water tends to agitate the pool so that there

will be a thorough mixture of the incoming water with the soap.

This apparatus is a complete unit and can be made in any size desired, depending upon the quantity and quality of the product desired as its output.

The valve 7 is to be connected with a source of water having a pressure of at least thirty pounds per square inch, so that the water flows down through the reducing T 11—20. The main portion of this stream will flow through the ejector nozzle 21 and out into the discharge line 23 while a minor portion of the stream will pass through the orifice 18 into the receptacle. When the water level in the receptacle is above the aperture 28, the suction created by the ejector nozzle 21 will raise water from the receptacle through the pipe line 24 and consequently this entrained soapy water will be mixed with the clear water flowing through the ejector nozzle and will be discharged with the latter through the line 23.

The cone 17 is imperforate with the exception of the orifice 18 while the cone 19 is preferably of mesh wire. The mesh wire is smaller than the opening 18, thus eliminating the stoppage of the small orifice and allowing a continuous supply of water to the receptacle 10. The hole 18 is so placed that it is always below the level of the pool of water in the container, which level is preferably maintained at about the height of the aperture 28, thus the entrance of water under pressure through the small hole 18 automatically agitates the solution in the receptacle.

In the U-shaped fitting 25 there may be one or more holes 28, only one of which is shown; consequently, when the level reaches 28, it closes the opening in the U tube and the siphon or suction, which is created by the effect of the water passing through the ejector nozzle 21, draws up the liquid and air into the vacuum chamber of the ejector.

In the part 32 of the pipe line 24, I arrange a disk 33 (Fig. 6) having an upstanding cone 34, the apex of which is apertured at 35. By using interchangeable members 33, they may be employed to regulate to some extent the supply of the soapy solution which is delivered to the ejector nozzle.

Air is mixed with the solution going to the ejector nozzle by means of the orifice 27. In case of improper operation, where the level of water is allowed to rise above the aperture 28, this opening 27 will furnish air to the ejector. In proper operation, the water, as supplied through the aperture 18, is of a quantity considerably less than the capacity of 28 and thus, air is fed along with the solution through the opening 27, and the supply of solution is regulated by the supply of clear water at 18.

In operation, the compartments 30 are filled with soap and then water is poured in

up to the level 28. The apparatus is then allowed to remain idle for a while, or the water in the receptacle can be agitated by hand, to a point where a saturated solution of soap and water occupies the lower portion of the receptacle. The stream of water is then turned on by manipulating valve 7 and the main portion of this stream in passing through the ejector 21 creates a vacuum and sucks through 28 a quantity of air and the soapy solution, dependent on the rise of the level of the pool in the receptacle, which is regulated by the admittance of a small amount of water at 18. This supply of water is less than that capable of being discharged through the openings 28 and 35, and consequently the difference is made up by the quantity of air entering at 28. Thus, in the ejector there is a mixture of air, soapy water and clear water, which produces the soapy solution that is discharged at 23.

The regulation of this apparatus for the supplying of weak or strong suds, in case soap is used, is made by increasing or decreasing the size of the hole 18. As the saturated solution of soap and water is taken out of the container at 28, the admittance and agitation of the water, due to the entrance at 18, continues to form a saturated solution. As the solid soap is dissolved, the weight of the soap above supplies additional quantities of soap.

The screen on the lower parts of the compartments 30 is of such mesh as to be smaller than the opening or openings 28. This prevents particles of matter, larger than the opening 28, from passing through the screen, which would probably clog the opening 28.

From the foregoing it is believed that my improved system and its operation may be readily understood by those skilled in the art, and I am aware that various changes may be made in the details disclosed without departing from the spirit of the invention as expressed in the claims.

What is claimed and desired to be secured by Letters Patent is:—

1. In a system for making a soapy solution, passing a stream of liquid through a passageway, contacting a portion of the stream in a chamber with material to be dissolved and thereby forming a solution, utilizing suction created by a second portion of the stream for sucking the solution through a second passageway arranged within the chamber, introducing air into a medial portion of said second passageway, and mixing said air and solution with the second portion of the stream.

2. In an apparatus of the character described, a receptacle containing a perforated compartment for the storage of a material to be dissolved, a pipe line leading into the receptacle and provided with a branch and with a restricted outlet, an ejector connected

to said branch, another pipe line connected to the ejector and having an inlet port located in the receptacle, an air inlet in a medial portion of the last mentioned pipe line, and a discharge pipe connected to said ejector.

3. In an apparatus of the character described, a receptacle having a perforated compartment adapted to contain material to be dissolved, a pipe line leading into said receptacle and having a restricted portion and a restricted discharge orifice, an ejector connected to said restricted portion, another pipe line connected to said ejector and having a combined liquid and air inlet orifice and also an air inlet orifice, and a discharge line connected to said ejector.

4. In an apparatus of the character described, a receptacle provided with a compartment adapted to contain material to be dissolved and having a perforated portion to permit liquid in the receptacle to contact with material contained in the compartment, a pipe line through which liquid under pressure is adapted to flow, a branch leading from said pipe line and having an outlet orifice positioned in the lower portion of the receptacle, an ejector interposed in said pipe line, a second branch arranged in the receptacle and connected to said ejector, said second branch having an inlet orifice to permit a solution in the receptacle and air to flow into the second branch under suction exerted by the ejector, and a second air inlet in the second branch positioned above the solution inlet orifice.

5. An apparatus of the character described including a receptacle provided with a compartment adapted to contain material to be dissolved and having a perforated portion to permit liquid in the receptacle to contact with said material, a pipe line through which a stream of liquid is adapted to flow under pressure, said pipe line having a restricted portion, a first branch pipe leading from the restricted portion of the pipe line into the lower portion of said receptacle and having a restricted orifice, an ejector interposed in said pipe line, a second branch extending from the ejector into the lower portion of the receptacle and having a restricted orifice for the admittance of air and a solution from the receptacle, and a second air inlet in the medial portion of the second branch.

6. An apparatus of the character described, including a receptacle provided with a compartment adapted to contain material to be dissolved and having a perforated portion to permit liquid in the receptacle to contact with said material, a pipe line through which a stream of liquid is adapted to flow under pressure, said pipe line having a restricted portion, a first branch pipe leading from the restricted portion of the pipe line into the lower portion of said receptacle and having a restricted orifice, an ejector interposed in

said pipe line, a second branch extending from the ejector into the lower portion of the receptacle, and a restricted orifice in said second branch for the admittance of air and a solution from the receptacle, said second branch being provided with a U-shaped member in which the solution orifice is positioned.

7. An apparatus of the character described, including a receptacle provided with a compartment adapted to contain material to be dissolved and having a perforated portion to permit liquid in the receptacle to contact with said material, a pipe line through which a stream of liquid is adapted to flow under pressure, said pipe line having a restricted portion, a first branch pipe leading from the restricted portion of the pipe line into the lower portion of said receptacle and having a restricted orifice, an ejector interposed in said pipe line, a second branch extending from the ejector into the lower portion of the receptacle and having a restricted orifice for the admittance of air and a solution from the receptacle, a removable restricted orifice nozzle intermediate the ends of said second branch for restricting the amount of solution flowing from the receptacle into the ejector, and a second air inlet in the second branch positioned above said orifice nozzle.

8. An apparatus of the character described, including a receptacle provided with a compartment adapted to contain material to be dissolved and having a perforated portion to permit liquid in the receptacle to contact with said material, a pipe line through which a stream of liquid is adapted to flow under pressure, said pipe line having a restricted portion, a first branch pipe leading from the restricted portion of the pipe line into the lower portion of said receptacle and having a restricted orifice, an ejector interposed in said pipe line, a second branch extending from the ejector into the lower portion of the receptacle and having a restricted orifice for the admittance of air and a solution from the receptacle, and an air admission port in said second branch, located above the solution inlet.

In testimony whereof, I have signed this specification.

THEODORE WILBUR THORNHILL.