

Oct. 2, 1934.

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SOLUTION TANK

Filed Aug. 31, 1931

2 Sheets-Sheet 1

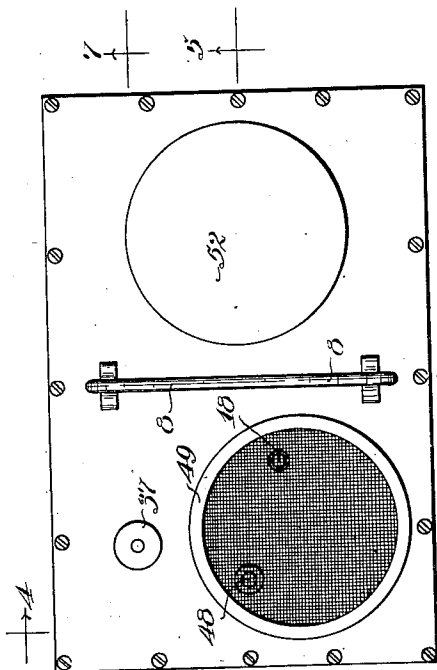


Fig. 1

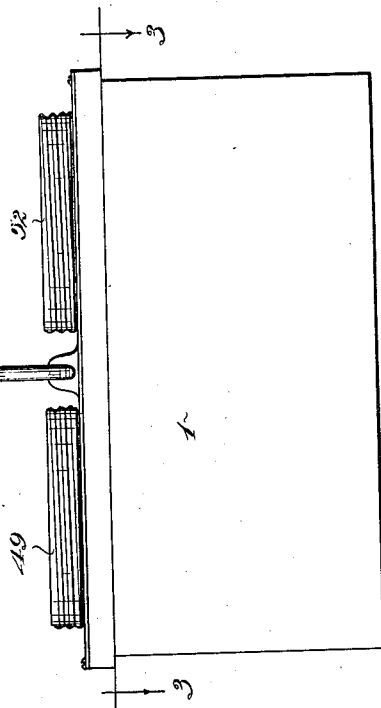


Fig. 2

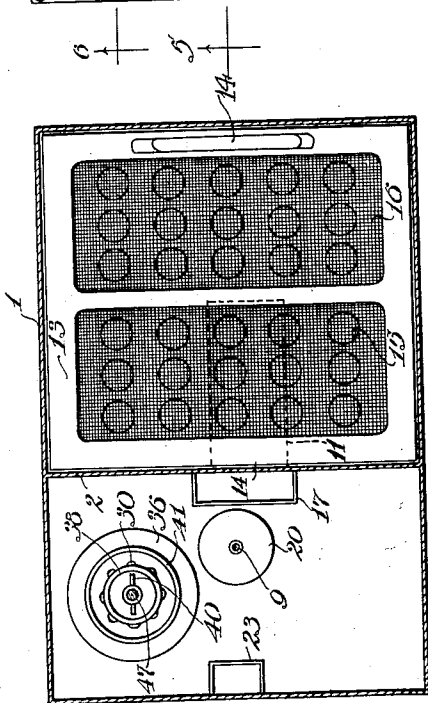


Fig. 3

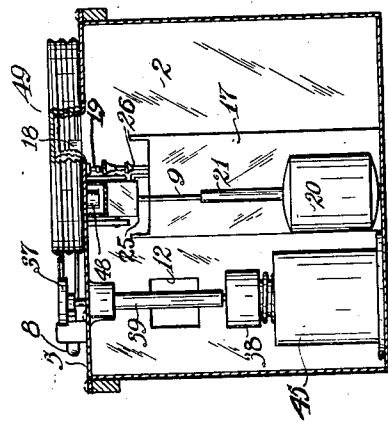


Fig. 4

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2 Sheets-Sheet 2

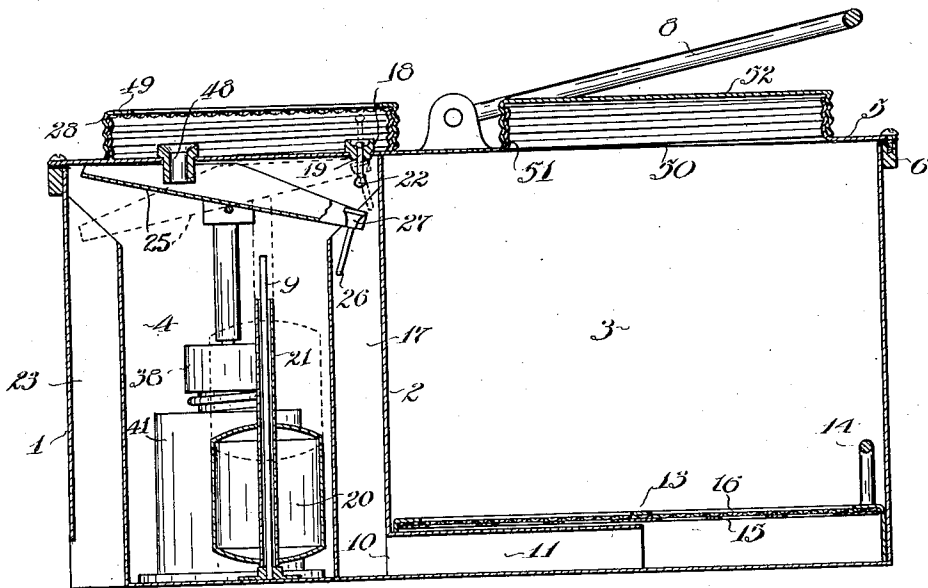


Fig. 5

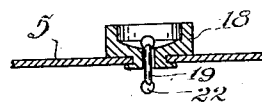


Fig. 6

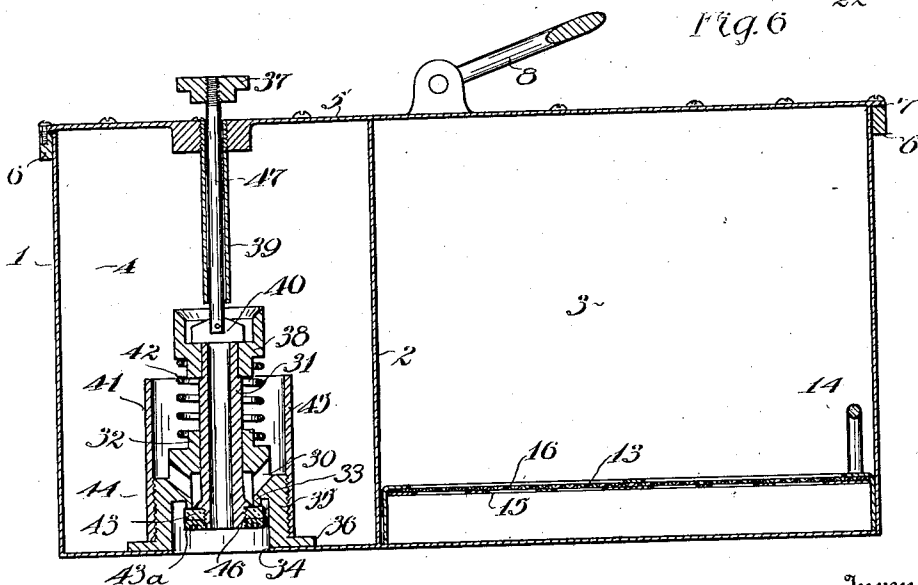


Fig. 7

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# UNITED STATES PATENT OFFICE

1,975,749

## SOLUTION TANK

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Application August 31, 1931, Serial No. 560,380

9 Claims. (Cl. 141-9)

The present invention relates to a mechanism for feeding concentrated cleaning solution into the tank of a dishwashing machine.

In dishwashing machines of the type in general use in restaurants, a tank filled with a hot dilute solution of cleansing material is provided in the machine. This hot solution is pumped up through a spray head mounted above a rack for holding dishes to be washed therein and is sprayed over the dishes to clean them. After the cleaning operation is completed, a spray of hot, clear water is sprayed over the dishes to rinse them. An overflow pipe is connected to the solution tank of the dishwashing machine to maintain the liquid therein at a constant level. Each time the dishes are sprayed, the clear water used in the spraying process flows down into the solution tank and dilutes the solution slightly. It is customary, in order to maintain the solution in the dishwasher tank at a required degree of concentration, to throw in a small quantity, approximately a handful, of soluble cleaning powder or similar substance from time to time during the operation of the dishwashing machine. This, of course, is a more or less haphazard arrangement and usually results in wide variations in the degree of concentration of the solution which inevitably affects the cleanliness of the dishes washed in the machine.

An object of the present invention is to make an improved and simplified mechanism to discharge a controlled flow of concentrated cleaning solution into the tank of a dishwashing machine during the operation of said dishwashing machine, and to automatically cease the feeding of said concentrated solution when the dishwashing machine is idle.

A further object is to make such a tank having a manually controlled valve therein to discharge a predetermined portion of the contents of the solution tank into the dishwashing machine when the tank thereof is drained and filled with fresh water.

In order to attain these objects, there is provided, in accordance with one feature of the invention, a container having a compartment therein adapted to hold a quantity of soluble cleaning material and having another compartment to hold a quantity of concentrated cleaning solution, the mechanism being adapted to feed a dishwashing machine during the periods of operation of said dishwashing machine.

These and other features of the invention will be more fully brought out in the following description and the accompanying drawings, wherein:

Figure 1 is a plan view of a mechanism embodying the present invention.

Figure 2 is a view in side elevation of the mechanism shown in Figure 1.

Figure 3 is a sectional view on the line 3-3 of Figure 2.

Figure 4 is a sectional view on the line 4-4 of Figure 1.

Figure 5 is a sectional view on the line 5-5 of Figure 1.

Figure 6 is an enlarged view of a metering gland; and

Figure 7 is a sectional view on the line 6-6 of Figure 1.

Referring to the drawings in detail, a container 1 is preferably made of non-corrosive sheet metal and is divided by a transverse wall 2 into two compartments 3 and 4. A sheet metal cover 5 is preferably provided over the entire top of the container 1, and is screwed to a strip 6 of metal, welded to the outer face of the upper edge of the container, a gasket 7 being provided between the container and the cover to form a water-tight joint between these parts. A handle 8 is hingedly connected to the cover member 5 to provide a convenient means for handling the device.

The division wall 2 between the compartments 3 and 4 is of sheet metal and is secured to the sides and bottom of the container to form a water-tight joint therewith. A rectangular notched opening 10 is provided in the lower edge of the partition wall 2 and a horizontal channel 11 extends from this opening into the compartment 3 so that liquid flowing through this channel will be discharged substantially centrally of the compartment 3. A second opening 12 shown in Figure 4 is also provided in the partition wall 2, as an overflow opening from the compartment 3 into the compartment 4, the bottom of this opening being above a normal liquid level in the compartment 3.

A bottom member 13 is removably positioned in the compartment 3 to lie above the channel 11 and this bottom member is provided with a handle 14 by means of which it may be removed from the compartment 3, if desired. The raised bottom member 13 is of sheet metal having a plurality of openings therein and is covered on its upper side with a screen 16 to support a quantity of soluble cleaning material thereon. On the other side of the partition 2 from the channel 11 and in open communication with the notched opening 10 and extending vertically upward therefrom, is a channel member 17. The upper end of this channel member 17 is above the normal liquid level in the compartment 4, and is also above the lower edge of the overflow opening 12.

Positioned forwardly of this vertical channel member 17 is a float 20, mounted to have free slidable movement on a rod 9 secured perpendicularly to the bottom of the compartment 4. The float is provided with an upwardly extending tube

21 rigidly secured thereto to engage a trough 25 and tilt it to the dotted line position shown in Figure 5 when the float rises to a predetermined height. A second vertical channel member 23 is provided on the inner face of the outer wall of the compartment 4, longitudinally opposite the vertical channel member 17, and is in open communication at its lower end with a bypass opening 24.

The tiltable, trough-shaped member 25 is mounted pivotally at a point slightly to the left of its center of gravity, as shown in Figure 5, the ends of said trough being positioned, one above the vertically disposed channel member 17, and the other above the channel member 23. The mounting of the tiltable trough 25 with its center of gravity slightly to the left of its axis of pivotal support, as shown in Figure 5, will normally cause the right or inner end of the trough to be lowermost, as shown in Figure 5.

Secured to the right, or inner, end of the trough-shaped member, as shown in Figure 5, is a bent wire member 26 having a cap 27 mounted on the upper end thereof, said cap being positioned slightly to one side of the trough-shaped member 25, but directly above the upper end of the vertical channel member 17.

A metering opening 18 is provided in the cover 5 of the container above the cap 27 and a pin 19 is mounted to slide freely in this opening. The upper and lower end portions 22 of this pin are flattened to retain it in position in the opening. The clearance space between the pin 19 and the opening 18 is sufficient to permit a predetermined quantity of liquid to pass therethrough during the operation of the mechanism.

The slidably mounted pin 19 positioned in the opening and adapted to be raised by the cap 27 carried by the wire 26 upon each tilting of the trough has two very important features. One, that the motion of the pin up and down in the opening tends to dislodge food particles which might tend to clog the opening; and the other, that liquid passing through the opening tends to flow down the sides of the pin and there is thus no chance for a drop to form over the opening and retard the flow of liquid by surface tension.

A dump valve 41 is provided for releasing a large quantity of concentrated cleaning solution from the compartment 4 for charging a fresh tank of water for the dishwashing machine with which the device is to be used. The valve mechanism is best shown in Figure 7. A valve seat member 44 has a radially projecting flange 36 around the lower end of a tubular body portion 35. This flange 36 is mounted circumferentially around an opening 34 in the bottom of the container and is secured to the container bottom as by soldering.

An inwardly offset valve seat 33 is provided within the upper end of the tubular portion 35 and a second inwardly offset portion 32 provides a guide for a tubular valve stem 31 slidably mounted therein. A plurality of holes 30 are drilled through the portion 33 above the valve seat to provide a passage for liquid when the valve is open. A valve head 46 is provided on the lower end of the tubular valve stem, and comprises a washer 43 supported by an annular nut 43a threaded on the lower end of the valve stem. An enlarged, cup-shaped top portion 38 is fixedly secured to the tubular valve stem 31, as by brazing. An operating plunger 47 is slidably mounted in a tubular member 39 carried by the cover and has a narrow blade 40 affixed to its lower end to de-

press the valve stem to open the valve. The blade is shorter than the diameter of the interior of the cup-shaped member 38 to permit a relative lateral movement of the valve stem and the plunger so as not to interfere with the proper seating of the valve. The blade 40, being thinner than the diameter of the opening through the tubular valve stem, does not interfere with the flow of liquid through this opening. An operating button 37 is provided on the upper end of the operating plunger 47 so that upon depressing this operating button the valve will be opened to discharge the contents of the container therethrough down to the height of the upper edge of a surrounding tubular member 45. No provision is made to prevent the passage of liquid from the exterior of the cover downwardly between the tubular guide member 39 and the plunger 47 since any liquid passing downwardly therethrough will pass directly on through the tubular valve stem. In fact, any dilute cleaning solution which seeps through in this manner assists in keeping the interior of the valve stem clean. A coil spring 42 is held in compression between the valve seat member 44 and the valve top 38 to normally hold the valve in raised, closed position. A plug 48, having a large opening therein, is provided in the cover 5 directly over the trough 25. The length of the tube 21, carried by the float, is such that the trough 25 will be engaged by this tube and swung to the dotted line position of Figure 5 just before the level of the liquid in the container reaches the height of the upper edge of the cup-shaped member 38. When this tilting of the trough occurs the water entering through the large opening in the plug 48 will flow from the trough into the vertical channel member 23 and thence outwardly through the opening 24. As soon as this tilting occurs the only liquid which can enter the container must pass through the space between the smaller metering opening 18 and the pin 19. This liquid will pass downwardly through the vertical channel member 17 through the horizontal channel member 11, and upwardly through the soluble cleansing material in the cleanser compartment 3. It will then overflow through the overflow opening 12 in the partition wall 2 and will raise the level of the liquid in the solution compartment 4 so that it will overflow the upper edge of the cup-shaped member 38, passing downwardly through the tubular valve stem and thence into the solution in the tank of the dishwashing machine, not shown.

This gives a substantially constant flow of the concentrated cleaning solution into the tank of the dishwashing machine during its operation, and constitutes an important improvement, in that the metering orifice passes the dilute solution from the dishwashing spray heads alternately with fresh water from the rinsing heads instead of passing the concentrated solution from the tank, as is the case where a metering orifice is provided on the discharge end of the mechanism, as shown in the co-pending application, Serial No. 519,025, filed February 28, 1931.

An annular rim 27 is secured to the cover to encircle the openings 18 and plug 48 and an annular ring 49 is adapted to thread onto the rim 27 and is provided with a screened covering across to prevent the entrance of food particles into the basin formed by the rim 27. A circular opening 50 is provided in the cover above the cleanser compartment and is provided with an upwardly disposed encircling flange 51 threaded to receive a cover member 52.

A tubular member 45 is provided surrounding the valve 41 and is of a height determined by the amount of liquid it is desired to discharge from the compartment 4 upon opening the valve 41 for charging. This tubular member 45 is connected at its lower end to the valve seat 44 or to the bottom of the container so as to form a liquid-tight seal therewith. It is apparent that upon opening the valve 41 by depressing the operating knob 37 that the liquid in the compartment 4 will be discharged through the opening 43 to the level of the top edge of this tube. Thus, by using a longer tubular member 45 a smaller amount of liquid will be discharged from the compartment upon opening the valve 41 and by using a shorter tubular member 45 a larger amount of solution will be discharged. These tubular members are not intended to be interchangeable in use, but are supplied by the factory of a required height for the particular type of dishwashing machine with which the device is intended to be used.

The operation of the mechanism is as follows:

In preparing the mechanism for use, a quantity of dry, soluble cleaning material is placed in the compartment 3, which may be readily accomplished by unscrewing the cover. The soluble cleaning material is supported by the perforated, gauze covered, bottom member 13, and this cleaning material should preferably not come above the lower edge of the overflow opening 12 in the partition wall 2 so as to avoid having undissolved cleaning material wash over into the solution compartment 4.

We will assume now that the compartment 3 has been filled to the proper level with soluble cleaning material, and that the device has been placed in the dishwashing machine. Upon operating the dishwashing machine, part of the spray from the washing and rinsing heads will fall onto the screen 9 mounted on the cover 5. Since there is no water in the solution compartment 4, the float 20 will be in its lowermost or solid line position, as shown in Figure 6, and the trough 25 will be tilted to the solid line position shown in Figure 5. A comparatively large amount of water will flow through the large opening in the plug 48 onto the trough and thence downwardly into the vertical channel 17, while a much smaller quantity will flow between the pin 19 and the metering opening 18 and will drop directly down the vertical channel 17. From the lower end of this channel this water from both openings will flow through the notched opening 10, along the horizontal channel 11, and will gradually fill the compartment 3, seeping upwardly through the meshed openings in the floor plate to saturate and dissolve a portion of the soluble cleaning material therein. When the liquid in the compartment 3 reaches the level of the overflow opening 12, the liquid, now a concentrated solution, will flow through this overflow opening into the solution compartment 4 and its level will gradually rise in the compartment 4 until the liquid carries the float up to engage the trough 25 and move it into the dotted line position shown in Figure 5. When the trough 25 is moved to the dotted line position shown in Figure 5, water flowing through the large opening in the plug 48 will flow down the trough and into the channel 23 and will pass out through the opening 24 in the wall and bottom of the container. The level of the top of the large opening in the plug 48 is slightly above the top of the metering opening so that a slight head of water will be maintained on the metering opening in the intervals between wash-

ing and rinsing operations of the dishwashing machine. In this manner a practically constant stream of water will flow from the cover receptacle downwardly through the space between the pin 19 and the opening in the metering gland 18 into the container. Therefore, once the container has been filled to the required level after an original charging operation, as above described, and the float has tilted the trough to the dotted line position shown in Figure 6, a substantially constant amount of water will be admitted through the metering opening and will follow the hereinbefore described course down through the vertical channel member, upwardly through the compartment 3, through the overflow opening 12, into the solution compartment 4. To increase or decrease the flow of incoming water, and thereby the discharge of concentrated solution, smaller or larger metering pins 19 may be used.

The controlling of the rate of discharge by controlling the rate of inflow of liquid into the container is a very material advantage, since prior to the invention contained in the present application, other mechanisms for accomplishing a similar purpose as the present device were developed, wherein the rate of discharge of the cleaning solution from a container was controlled by a restricted discharge orifice. It has been found, in attempting to thus regulate the rate of feeding of the concentrated cleaning solution, that although the device would function, there was a tendency under certain conditions for the discharge orifice to become clogged by crystallization of the cleaning material upon evaporation of the concentrated solution after stopping the dishwashing machine, and also by impurities, such as food particles carried by the water itself. Stoppage of the discharge opening by crystallization of the cleaning solution is avoided in the present construction, and, furthermore, the discharge opening, being considerably larger than the meshes of the screen through which the water must pass before entering the cleaning solution compartment, any food particles which may find entrance into the solution compartment 4 readily pass through the discharge opening without danger of clogging said discharge opening.

I claim:

1. A solution tank of the character described, having a compartment for soluble cleaning material and a solution compartment therein, a liquid catch basin carried by said tank having a metering orifice to admit a predetermined quantity of water from said catch basin into said cleaning material compartment, and having an overflow opening from said cleaning material compartment into said solution compartment, and having a comparatively large normally open discharge opening in said solution compartment to discharge solution therefrom exteriorly of said container.

2. A solution tank of the character described, comprising a two-compartment tank having an overflow opening from one to the other of said compartments, a metering opening in said tank to admit a predetermined quantity of water into one of said compartments, a valve mounted in the other of said compartments and operable exteriorly of said tank, said latter compartment having a comparatively large normally open discharge opening therein spaced upwardly from said valve.

3. A solution tank of the character described, having a soap compartment therein and having a closed top except for a metering orifice therein,

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a rim surrounding said orifice, a discharge valve mounted adjacent the lower portion of said tank, said valve having a hollow stem terminating below the top of said tank and opening exteriorly of said tank, to discharge liquid overflowing the upper end of said valve stem, and manually controlled valve operating means to open said valve to discharge liquid from said tank through said valve.

10 4. A solution tank of the character described, adapted to contain soluble cleaning material, said tank having a liquid catch basin on the top thereof, said catch basin having a metering orifice opening from said basin into said container, said container having an overflow opening from said container exteriorly thereof, a discharge valve mounted adjacent the lower end of said container, control means mounted to operate said valve, and a water-tight wall surrounding said valve extending to a predetermined height above said valve to limit the amount of liquid to be discharged from said tank upon opening said valve.

20 5. In a solution tank of the character described, comprising a container having a large inlet opening therein to initially fill said tank, and having a small inlet opening to supply a small, continuing stream of water to said tank, a rim surrounding said openings to provide a catch basin for retaining liquid falling thereon, a tiltable trough mounted beneath said large opening, one end of said trough being positioned over a by-pass outlet, said trough being normally tilted to discharge liquid entering said larger opening into the interior of said tank, float means mounted to tilt said trough to discharge liquid falling on said trough outwardly through said by-pass outlet when said float is raised by liquid in said container to a predetermined height, said container having an overflow opening at a lower level than said by-pass outlet, said overflow opening being adapted to discharge exteriorly of said container.

40 6. In a solution tank of the character described, a container having an overflow opening therein adapted to discharge exteriorly of said container, a metering orifice opening into the interior of said container, a pin mounted in said opening and spaced inwardly from the sides thereof to provide a passage for liquid into said

container, and float means mounted to engage said pin on a predetermined rise of liquid in said tank to move said pin in said opening to free said opening from foreign matter which may lodge therein.

7. In a solution tank of the character described, a container adapted to contain soluble cleaning material having a liquid catch basin on the top thereof, said catch basin having a metering orifice opening from said basin and into said container, said container having an overflow opening from said container exteriorly thereof, said overflow opening being materially larger than said metering orifice, a discharge valve mounted adjacent the lower end of said container, control means mounted to operate said valve, and a water-tight wall surrounding said valve and spaced outwardly therefrom, said wall extending to a predetermined height above said valve to limit the amount of liquid discharged from said tank upon opening said valve.

8. In a solution tank adapted to contain soluble cleaning material, a liquid catch basin thereon, said catch basin having a metering orifice opening from said basin into said tank, a pin mounted in said opening and spaced inwardly from the sides thereof to provide a passage for liquid into said container, said pin being movable within said opening to free said opening from foreign matter, which may lodge therein, and an outlet opening at a lower level than said metering orifice adapted to discharge exteriorly of said tank.

9. In a solution tank adapted to be placed in a shower of water, a container adapted to contain soluble cleaning material, a catch basin supported thereby and exteriorly open whereby to catch and retain a portion of a shower of water falling thereon and to overflow surplus water falling thereon, said catch basin having a metering orifice opening from said basin into said container, said container having an overflow opening from said container exteriorly thereof, said overflow opening being sufficiently larger than said metering orifice so that the rate of flow is controlled solely by the size of the inlet orifice, said overflow opening being shielded from a shower of water falling on said device.

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