May 5, 1953 J. R. EMERY, JR 2,637,336

PRINTING PRESS

Filed May 13, 1950 2 SHEETS—SHEET 1

Fig. 1.

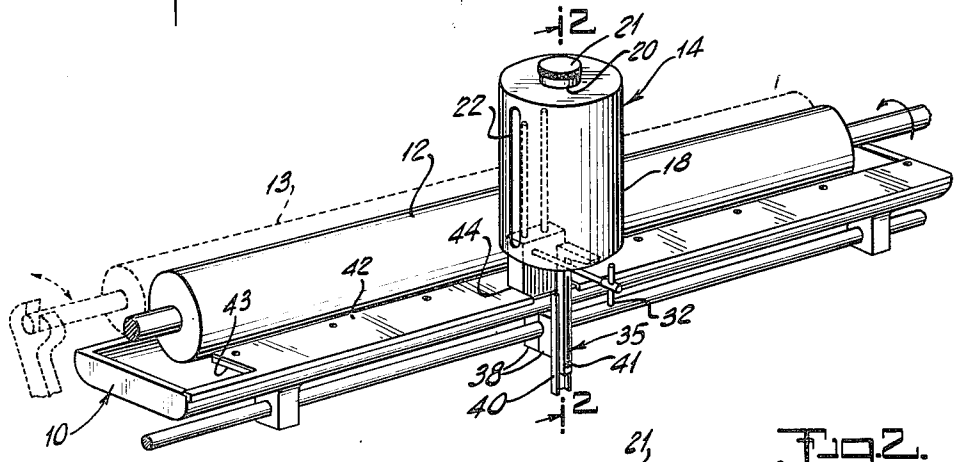


Fig. 2.

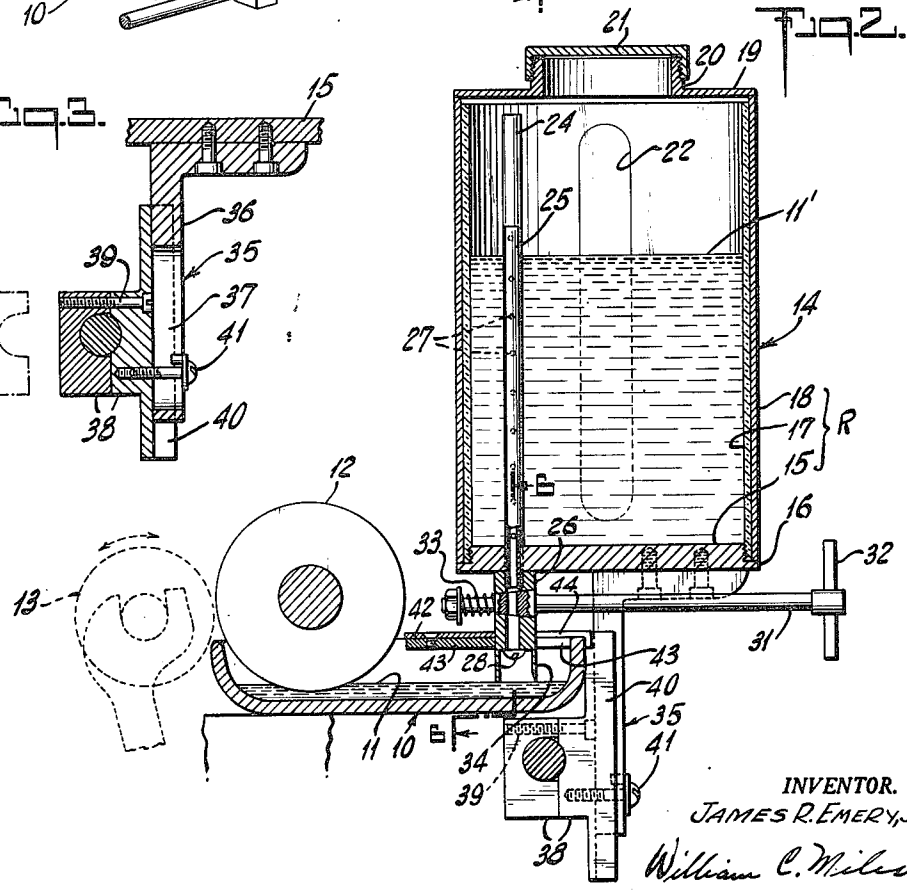


Fig. 3.

INVENTOR.
JAMES R. EMERY, JR.
William C. Miles
ATTORNEY

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Fig. 4.

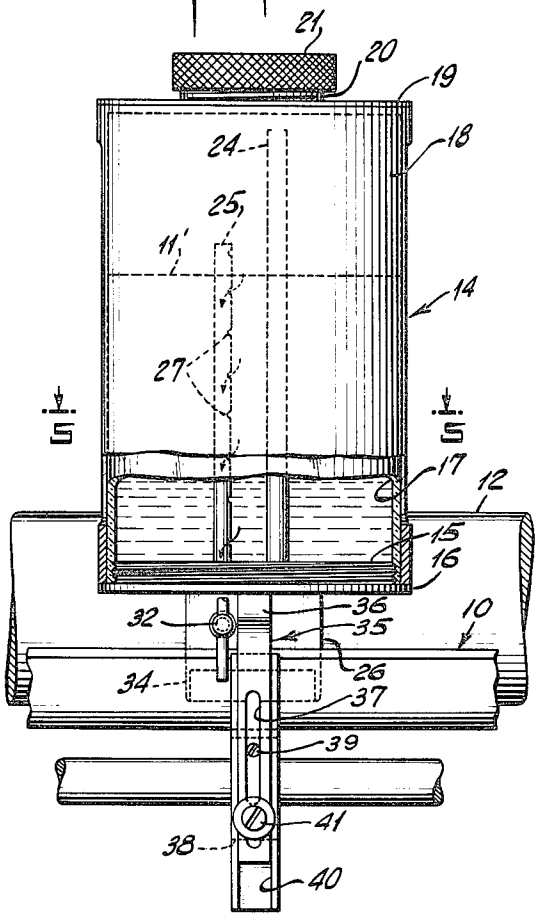


Fig. 6.

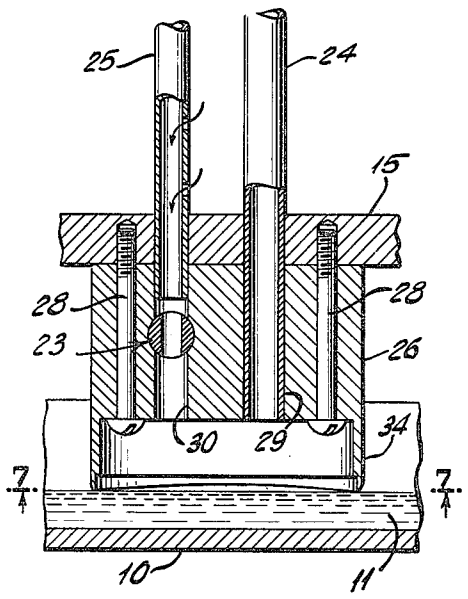


Fig. 7.

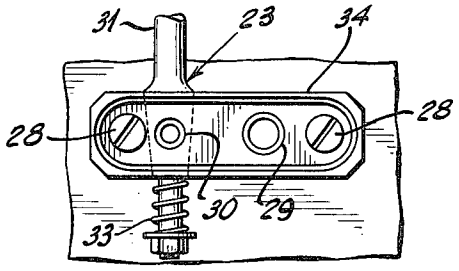


Fig. 5.

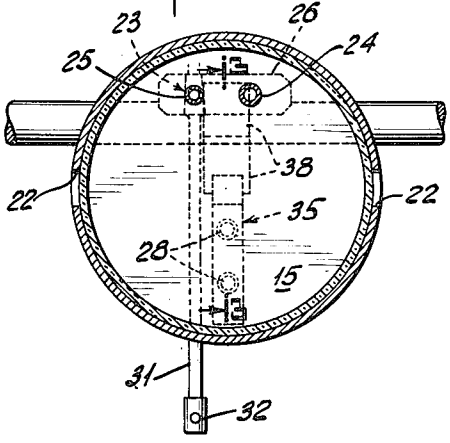
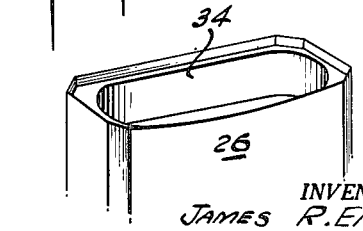


Fig. 8.



INVENTOR.
JAMES R. EMERY, JR.

BY William C. Miles

ATTORNEY

Patented May 5, 1953

2,637,336

UNITED STATES PATENT OFFICE

2,637,336

PRINTING PRESS

James R. Emery, Jr., Teaneck, N. J.

Application May 13, 1950, Serial No. 161,873

4 Claims. (Cl. 137—454)

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This invention relates to printing presses of the off-set type, which are characterized, at least in part, by the fact that the aqueous solution which is employed to moisten the image plate under operating conditions is delivered to that plate from a relatively shallow tray-like fountain by means of a series of rollers arranged horizontally and disposed in a parallel and contiguous relation to each other, one of said rollers, namely, the so-called fountain roller being so mounted with reference to the fountain that its peripheral face is partially submerged in said solution.

According to present day practice, the press operator is required, in addition to his other duties, to maintain the aqueous solution at proper level to insure satisfactory results in the printing operation, it being noted in this connection that if the fountain roller is submerged to substantially a lesser extent than is illustrated in Figure 2 the printing becomes blurred or smeared and that if the liquid level is raised to a greater extent than one-sixteenth inch above the level illustrated the printing becomes faint or indistinct.

At present, maintenance of the solution at a satisfactory level is accomplished only at the expense of much loss in time during the course of a day's run as will be readily appreciated when it is taken into account that the machine must be stopped, as a matter of due precaution, each time the operator supplies, as by pouring from a container, the necessary amount of solution to meet the fountain requirements. Here it should be noted that frequently during the course of a day's run, the operator, when replenishing the fountain, inadvertently pours into the same an excessive amount of solution, thus raising the liquid level too high for satisfactory results so that it becomes necessary, at a further expense of time, to carefully remove the excess, as by a sponge, to attain the proper liquid level.

The pronounced frequency with which the solution replenishing operations occur during the course of a day's run is not due to the fact that any great quantity of the solution is required during the course of such a run but rather to the fact that the volume of solution available between allowable maximum and minimum liquid levels is so small that it is insufficient to meet the requirements of the machine for longer than a relatively small fractional part of an hour.

An important object of the present invention is to obviate the above objections peculiar to printing presses of the character mentioned and to this, and other ends, the invention contemplates a simple, reliable, efficient and relatively inexpensive liquid-supply unit adapted to be readily installed in the standard press without necessitating any change in press construction, the unit being characterized by the fact that it includes a normally closed reservoir adapted for the storage of a substantial volume of aqueous solution, which, under the governing operation of hydro-statically controlled delivery means associated with said reservoir, is automatically transmitted to the fountain so as to maintain the solution therein at a proper operating level at all times.

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Other objects and advantages of the invention will become apparent from the following description when taken in connection with the accompanying drawings, in which—

Fig. 1 is a perspective view showing one embodiment of the present invention mounted in operating position with relation to the conventional fountain of a printing press,

Fig. 2 is a vertical sectional view taken substantially on line 2—2 of Figure 1 and illustrating, in relation to the fountain roller, the liquid level at which delivery of the solution from the reservoir to the fountain is initiated,

Fig. 3 is vertical sectional view of the adjustable support on which the reservoir is mounted,

Fig. 4 is a fragmental, sectional view, showing the unit as it would appear from the right in Figure 2,

Fig. 5 is a horizontal, sectional view taken on line 5—5 of Figure 4, the fountain and fountain roller being omitted in the interest of clarity,

Fig. 6 is an enlarged vertical sectional view taken substantially on line 6—6 of Figure 2 and illustrating, in relation to the lower end of the inverted control bell, the liquid level at which delivery of the solution from the reservoir to the fountain is initiated,

Fig. 7 is a fragmental view showing the control bell as it would appear when viewed from below in a direction perpendicular to the horizontal plane of line 7—7 of Figure 6, and

Fig. 8 is a fragmental perspective view showing the knife like edge which is presented by the control bell at the lower end thereof.

The typical off-set press, with which the present invention is adapted for use, includes a shallow tray-like fountain 10, suitably supported in a horizontal position and adapted to carry an aqueous solution which is indicated generally by the numeral 11 and which, as is well known in the art, serves as a moistening agent for the conventional image plate, not shown. The solution

11 is delivered from the fountain 10 by the usual series of suitably supported rollers, of which only the so-called fountain roller 12 and its associated delivery roller 13 are herein indicated, the former being depicted in full lines in Figures 1, 2 and 4 and the latter being outlined in broken lines in Figures 1 and 2.

The liquid-supply unit, herein illustrated as one embodiment of the present invention is indicated generally by the numeral 14 and is adapted, as shown in Figures 1, 2 and 4, to be mounted on one of the fountain-supporting members with which the conventional off-set press is equipped.

Referring particularly to Figures 1, 2 and 4, it will be noted that the unit 14 includes, a disk-like metal base 15 provided with a laterally extending ledge-like flange 16. To the base 15 there is screw threadedly connected the lower end of a transparent cylinder 17 of suitable plastic material. In order to insure an air and liquid tight connection between the base 15 and the cylinder 17, the meeting surfaces of these two elements are coated with a suitable cement before the cylinder is run down into abutting engagement with the flange 16.

Carried by the plastic cylinder 17 in a protective relation thereto, is a metal cylinder 18, the lower end of which engages the flange 16. The cylinder 18 snugly fits the cylinder 17 and is secured thereto through the medium of a coating of suitable cement applied to one or both of these cylinders before assembling them in a telescopic relation, the cement thus employed serving to provide an effective air seal between the outer surface of the inner cylinder and the inner surface of the outer cylinder.

To the upper end of the cylinder 18 and in air tight union therewith, there is suitably connected a metal cover 19 having a filling opening defined by an an upwardly extending screw threaded flange 20, adapted to receive a removable closure cap 21, affording an air tight seal for said opening.

From the foregoing description of the unit 14, it becomes apparent that the base 15, cylinders 17—18, cover 19 and cap 21 collectively constitute a reservoir R adapted for the reception of a solution 11' which is of the same character as the solution 11 hereinbefore mentioned and which, as will hereinafter more clearly appear, is adapted to be delivered to the fountain 10 in a controlled manner so as to maintain the liquid level in the fountain at a proper operating level at all times.

It is desirable, of course, that the operator be able to readily observe the interior of the reservoir R so that he may be prompted to introduce additional liquid into the reservoir as required and in order that he may guard against filling the reservoir to an extent greater than, say, three-fourths full, thus insuring the existence of a satisfactory air space between the liquid content and the reservoir cover 19 when press operation is resumed after the filling operation is carried out.

Reservoir observation for the purposes just mentioned is readily possible in connection with the present embodiment of this invention, since the metal cylinder 18 is provided with diametrically opposite, vertically elongated window-like openings 22 which expose portions of the transparent cylinder 17 through which the liquid content of the reservoir may be readily viewed.

Here it is to be observed that before the cap 21 is removed preparatory to replenishing the supply of liquid 11', it becomes necessary to guard against uncontrolled delivery to the fountain 10 of such liquid as may remain in the reservoir prior to the refilling operation and of such liquid as is being introduced into the reservoir while the refilling operation is being carried out. To this end, there is provided a conveniently accessible manually operated valve, indicated generally by the numeral 23 and hereinafter more particularly described.

According to the present invention, transfer of the liquid content from the reservoir R to the fountain 10 is governed by hydro-statically controlled means herein illustrated as including an air tube 24, a liquid tube 25 and a control bell 26.

Referring particularly to Figures 1, 2 and 4, it will be noted that the air and liquid tubes 24 and 25, respectively, are disposed vertically within the reservoir R and project downwardly through the base 15 to which they are so secured as to form therewith an air and liquid tight union, the air tube 24 being of such length that it extends well above the upper end of the liquid tube 25. In order that the liquid tube 25 may be fed at various points along its submerged length to insure delivery of the solution in a well mixed condition, such tube is provided with a series of relatively small inlet orifices 27 arranged in a spaced relation along the length of that tube. In view of the nature of the orifices 27 and their disposition with relation to each other, it becomes apparent that should the solution vary in concentration as to one or more of its constituents at different depths, such portions of the differently concentrated solution as are received by the liquid tube 25 commingle with each other and are delivered to the fountain 10 as a well mixed solution 11 containing the same percentages of the constituents which make up the reservoir solution 11' in its entirety.

The control bell 26 is connected in a depending relation to the base 15 of the reservoir R by a pair of screws 28 and is provided, as shown most clearly in Figure 6, with a pair of openings 29—30 adapted to accommodate the lower ends of the air and liquid tubes 24 and 25, respectively.

As shown most clearly in Figures 6 and 7, the valve 23 hereinbefore mentioned is of the rotary cone type and is so mounted in the control bell 26 at a point below the lower end of the liquid tube 25 as to enable the operator to establish or sever communication between that tube and the exit end of the opening 30, which opening may be regarded, in effect, as a continuation of the liquid tube itself. In order to render the valve 23 easily accessible to the operator, such valve is equipped with a relatively long shaft-like stem 31 projecting outwardly from beneath the reservoir R and provided at its outer end with a T-handle 32. As is customary in connection with the type of valve 23 herein shown, such valve is so maintained, as by the usual compression spring 33, in proper engagement with its correlated seat as to there afford a liquid tight seal at all times.

From an inspection of Figures 6, 7 and 8, it will be noted that the control bell 26 is so formed as to present at its lower end a depending skirt-like wall 34, which, in association with the upper portion of the bell, forms an air chamber, within which the air pressure varies from that of atmospheric to substantially less than atmos-

pheric under certain conditions of operation, as will hereinafter more clearly appear.

The above mentioned chamber which is open at its lower end, is of substantial height, as measured vertically along its relatively thin wall 34, and is of such lateral dimensions that its volumetric capacity is relatively large.

For the purpose hereinafter particularly mentioned, the lower margin of the wall 34 is reduced to a sharp or knife-like edge throughout its linear extent, as will be understood from an inspection of Figures 6, 7 and 8, and, as shown best in Figure 6, is shaped throughout one of its side lengths to present a slightly arched contour with reference to a horizontal plane such as that represented by the surface of the solution 11 after it has dropped to such position, as shown in Figure 6, as to initiate a flow of solution from the reservoir R to the fountain 10 by way of the liquid tube 26.

In order that the reservoir R may be mounted on the printing press in accordance with the maximum extent to which it is desired to submerge the fountain roller 12 under operating conditions, there is provided an adjustable bracket 35, which, as shown in Figures 1, 2, 3 and 4, includes an L-shaped support 36, the horizontal leg of which is suitably connected to the base 15 of the liquid-supply unit 14 and the vertical leg of which is provided with an elongated slot 37. Referring especially to Figures 1, 2, 3 and 4, it will be noted that the bracket 35 further includes a pair of clamp-blocks 38 which are adapted to be rigidly connected to the usual fountain-supporting member, by a clamp screw 39, and that one of said blocks is provided with a channel-like guide 40 within which is accommodated the vertical leg of the L-shaped support 36 so that such support may be vertically adjusted to attain the desired elevation of the reservoir R with relation to the fountain roller 12. Once the reservoir has been adjusted to its proper position, such position may be maintained by locking the support 36 against displacement, as by a suitable retaining screw 41 carried by one of the clamp blocks 38 and accommodated within the slot 37 of said support.

It will be understood, of course, that the conventional fountain-cover 42, which is provided with a series of transverse reinforcing members 43 (a pair of which are shown in Figure 2) may be cut away to provide a notch-like opening 44 adapted to accommodate the control bell 26.

From the foregoing description of the present embodiment of this invention, it becomes apparent, under the liquid-level conditions peculiar to Figure 6, that solution 11' is permitted to pass downwardly from the reservoir R into the fountain 10 by way of the liquid tube 25 while air is being drawn upwardly from the control bell 26 into said reservoir by way of the air tube 24. Since the solution 11' is supplied to the fountain 10 at a rate in excess of that at which the solution 11 is removed from the fountain under the action of the fountain roller 12, it follows that the reservoir solution quickly rises into such contact with the lower edge of the skirt-like wall 34 as to form an effective air seal therewith. After such air seal is established, further passage of the solution 11' downwardly through the liquid tube 25 quickly sets up a partial vacuum within the control bell 26, the air tube 24 and the space above the solution 11' remaining in the reservoir R, with the result that the delivery of reservoir solution is discontinued due to the existence of a negative air-

pressure above that solution. Here it should be noted that although a portion of the fountain solution is lifted or drawn up into the control bell 26 while the partial vacuum is being created therein such liquid rises at most only to a negligible extent above the lower edge of the wall 34 at its highest point which is represented by the mid point on the arched contour of one of its side lengths.

The above mentioned partial vacuum is maintained until such time as the level of the fountain solution 11 is so lowered, under the action of the fountain roller 12, as to open the control bell 26 to the outside atmosphere, whereupon the partial vacuum within that bell as well as within the air tube and the reservoir R is destroyed with the result that another delivery cycle, corresponding to that above described, is automatically carried out in replenishing the fountain solution 11 from the reservoir solution 11'.

Since the replenishing operation of the device herein illustrated as embodying the present invention is automatically initiated at about the instant the liquid level of the fountain solution 11 drops to the plane of the lower edge of the wall 34 and inasmuch as that operation is automatically discontinued at about the instant the liquid level of that solution rises at most to only a negligible extent above the lower edge of the wall 34 at its highest point, it follows, as will be well appreciated from an inspection of Figure 6, that the fountain solution is maintained between relatively close maximum and minimum liquid levels. In practice, a liquid-level differential, as between maximum and minimum, of only one-sixteenth inch has been found highly satisfactory and may be attained by arching one of the side lengths of the wall 34 to that dimension, such arching of that wall length, in the presence of its knife-like edge, serving to so break the surface tension of the fountain solution 11 as permit that solution to readily free itself from the knife-like edge of said wall length and thus open the control bell 26 to the surrounding atmosphere as the fountain solution drops to a level corresponding to the extreme lower end of said wall.

What is claimed is:

1. For use in a printing press of the type including a roller operating in only a partially submerged condition with relation to an aqueous solution carried within a fountain and there required to be maintained between relatively close maximum and minimum operating levels; a liquid-supply unit including a reservoir adapted for the reception of a liquid to be delivered to said fountain, hydro-statically controlled means governing the delivery of liquid from said reservoir to said fountain so as to maintain the fountain solution between said operating levels and including a control bell associated with said reservoir and having a depending skirt-like wall defining an air chamber adapted to open into said fountain and within which liquid is adapted to rise and fall to an extent comparable with the difference between said operating levels, the lower end of said skirt-like wall terminating in different horizontal planes one spaced above the other in accordance with the difference between said operating levels, an air tube leading from said chamber into said reservoir, a liquid tube leading from said reservoir to said chamber.

2. For use in a printing press of the type including a roller operating in only a partially submerged condition with relation to an aqueous

solution carried within a fountain and there required to be maintained between relatively close maximum and minimum operating levels; a liquid-supply unit including a reservoir adapted for the reception of a liquid to be delivered to said fountain, hydro-statically controlled means governing the delivery of liquid from said reservoir to said fountain so as to maintain the fountain solution between said operating levels and including a control bell associated with said reservoir and having a depending skirt-like wall defining an air chamber adapted to open into said fountain and within which liquid is adapted to rise and fall to an extent comparable with the difference between said operating levels, a portion of the lower end of said skirt-like wall being arched upwardly to a vertical extent comparable with the difference between said operating levels, an air tube leading from said chamber into said reservoir, a liquid tube leading from said reservoir to said chamber.

3. For use in a printing press of the type including a roller operating in only a partially submerged condition with relation to an aqueous solution carried within a fountain and there required to be maintained between relatively close maximum and minimum operating levels; a liquid-supply unit including a reservoir adapted for the reception of a liquid to be delivered to said fountain, hydro-statically controlled means governing the delivery of liquid from said reservoir to said fountain so as to maintain the fountain solution between said operating levels and including a control bell associated with said reservoir and having a depending skirt-like wall defining an air chamber adapted to open into said fountain and within which liquid is adapted to rise and fall to an extent comparable with the difference between said operating levels, the lower end of said skirt-like wall presenting a knife-like edge lying in different horizontal planes one spaced above the other in accordance with the difference between said operating levels, an air tube leading from said chamber into said reservoir, a liquid tube leading from said reservoir to said chamber.

4. For use in a printing press of the type including a roller operating in only a partially submerged condition with relation to an aqueous solution carried within a fountain and there required to be maintained between relatively close maximum and minimum operating levels; a liquid-supply unit including a reservoir adapted for the reception of a liquid to be delivered to said fountain, hydro-statically controlled means governing the delivery of liquid from said reservoir to said fountain so as to maintain the fountain solution between said operating levels and including a control bell associated with said reservoir and having a depending skirt-like wall defining an air chamber adapted to open into said fountain and within which liquid is adapted to rise and fall to an extent comparable with the difference between said operating levels, the lower end of said skirt-like wall presenting throughout its lateral extent a knife-like edge, a portion of which edge is arched upwardly to a vertical extent comparable with the difference between said operating levels, an air tube leading from said chamber into said reservoir, a liquid tube leading from said reservoir to said chamber.

JAMES R. EMERY, JR.

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