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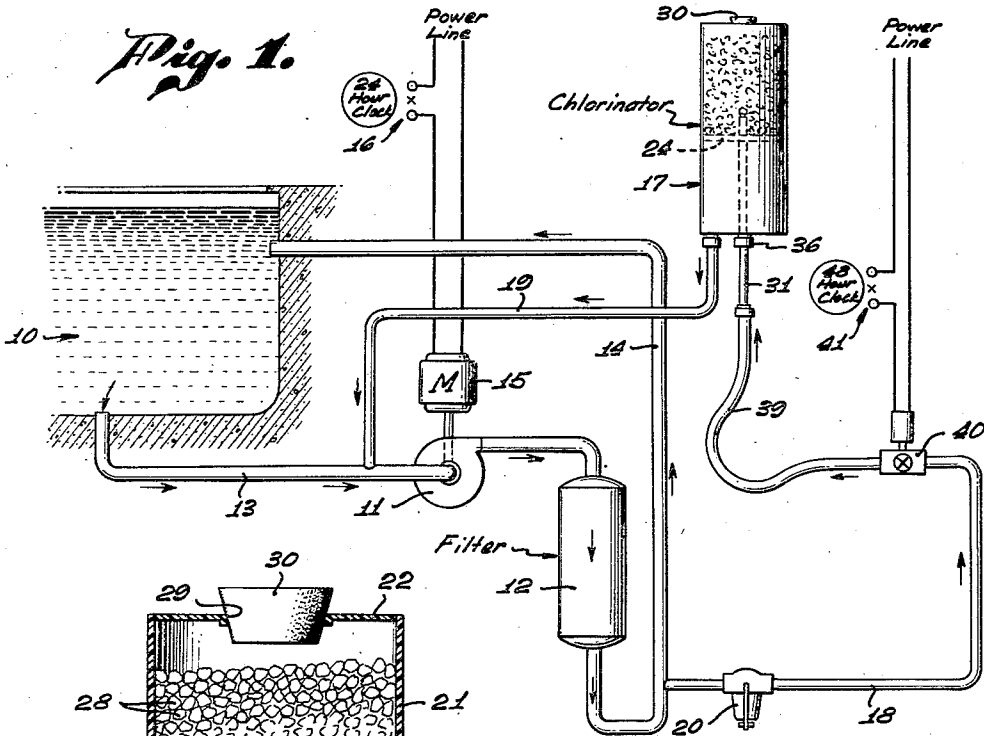
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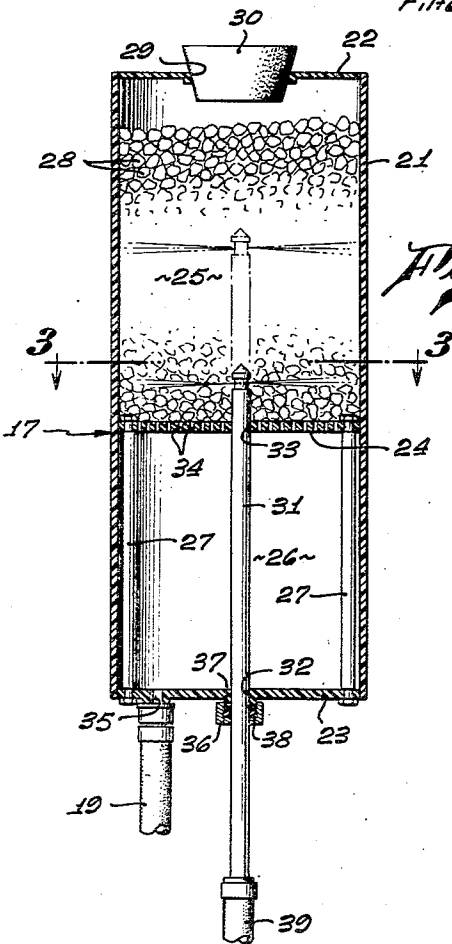
APPARATUS FOR CHLORINATION

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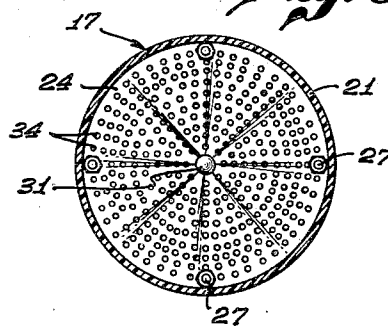
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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## APPARATUS FOR CHLORINATION

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1 Claim. (Cl. 23—271)

This invention relates to a system and apparatus for introducing soluble constituents into a liquid. Specifically, the invention relates to the chlorination of water, such as for a swimming pool.

Since chlorine is offensive to many persons, it is desirable that the concentration of chlorine be kept as low as possible without sacrifice of satisfactory germicidal effects. Maintaining the concentration low also reduces the cost involved in this connection. Since chlorine combines with water in the presence of sunlight (liberating oxygen and producing hydrochloric acid) and also dissipates to some extent into the atmosphere, it is necessary from time to time to introduce additional chlorine. Maintaining the concentration of chlorine low obviously reduces the cost of material for chlorination of water.

For these considerations, it has been found that appropriate germicidal effects can be achieved with a minimum amount of chlorine by periodically and quickly introducing chlorine in relatively high concentrations during the night. It is an object of this invention to provide an improved system for automatically introducing chlorine in controlled amounts in this manner.

It is another object of this invention to provide a simple system of this character using easily handled soluble masses of material readily yielding chlorine, obviating the handling of concentrated chlorine solutions.

It is another object of this invention to provide an improved apparatus for dissolving such material, using a jet or spray of water impinging thereupon, and in which the rate of dissolving the material is easily adjusted. This is accomplished by positioning the spray head in a container for the material so that the water acts upon more or less thereof.

It is another object of this invention to provide a system incorporating an apparatus of this character that is intermittently operable and in which the amount of active constituent introduced into the system during each cycle is accurately predetermined.

It is another object of this invention to provide a system of this character that utilizes only simple and inexpensive structure requiring little maintenance.

It is another object of this invention to provide a chlorinator or the like that can satisfy the requirements of systems of different capacities.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of one embodiment of the invention. For this purpose, there is shown a form in the drawings accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of this invention is best defined by the appended claim.

Referring to the drawings:

Figure 1 is a diagrammatic view of a system embodying the present invention, the chlorinator elements being shown on an enlarged scale;

Fig. 2 is an enlarged longitudinal sectional view of the chlorinator shown in Fig. 1; and

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Fig. 3 is a sectional view, taken along the plane indicated by line 3—3 of Fig. 2.

In Fig. 1 there is shown, by way of example, a swimming pool 10 into which there is desired to be intermittently introduced a certain amount of chlorine.

A pump 11 is adapted to circulate the water from the swimming pool 10 for filtering purposes.

A conduit 13, communicating with the bottom of the pool 10, charges the pump 11. The pump circulates the water back to the pool through a return conduit 14. A filter 12 is interposed in this return conduit. The pump 11 may also be charged by water flowing over a skimming ledge (not shown).

A motor 15 for the pump has an energizing circuit including a clock-operated switch 16. This usual arrangement makes it possible automatically to circulate the water during the nighttime when the pool is ordinarily not used.

In order to introduce chlorine into the system, a chlorinator 17 is provided. Water passes through the chlorinator, taking in solution a quantity of chlorine, and then rejoins the main body of water. To supply water under pressure to the chlorinator 17, a pipe 18 is provided that connects with the return conduit 14. The water from the chlorinator 17 is withdrawn through a pipe 19 that connects with the inlet conduit 13 for the pump 11. A trap or small filter 20 is shown in the chlorinator supply conduit 18.

Referring now to Fig. 2, the chlorinator 17 comprises a translucent or transparent container 21, in this instance generally of cylindrical form. It is closed at opposite ends by a ported cover 22 and a bottom wall 23. A perforated plate or disc 24, located at an intermediate height in the container 21, divides the inside of the container into an upper space 25 and a lower space 26. Rods 27, projecting upwardly through the container bottom 23, serve to support the plate 24. The periphery of the plate or disc 24 conforms in size and configuration to the interior wall of the container 21.

Pellets or chunks 28 are adapted to be placed in and substantially fill the upper space 25, the plate 24 providing a base preventing their passage to the lower space 26. These pellets or pieces may be of calcium hypochlorite or other water-soluble material capable of yielding the desired constituent, in this instance chlorine in elemental form. Calcium hypochlorite in a well known manner reacts with water to produce elemental chlorine. The transparent container 21 makes it possible visually to ascertain whether the chlorinator is appropriately supplied with material.

The pellets or chunks 28 are introduced into the space 25 through the port 29 in the container cover 22 to substantially fill the space 25. A removable plug or stop 30, which may be of resilient material, is provided for closing the port 29.

A spray pipe 31, connected to the end of the pipe 18, supplies water to the upper space 25 to dissolve the pellets 28. The spray pipe 31 projects upwardly through a central opening 32 in the container bottom wall 23, and upwardly with minimum clearance through a central opening 33 in the supporting plate 24.

The upper end of the spray pipe 31 has a series of small spray orifices substantially equiangularly spaced about the axis of the pipe 31. These orifices form the only discharge openings from the spray pipe 31. The size and configuration of the orifices and their number with respect to the pressure available at the pipe 31 are such that relatively high velocity jets are provided. These jets impinge upon the pellets or chunks with substantial force and cause them to be disintegrated and dissolved.

The water in which the chlorine active ingredient has been dissolved settles through the pellets to the plate 24.

Small perforations 34, extending throughout the area of the plate 24, permit the water to pass to the lower container space 26. The lower container space 26 communicates with the pipe 19 through an outlet passage 35 formed in the container bottom 23. A suitable fitting is provided for establishing appropriate connection of the pipe 19. The water from the chlorinator returns to the inlet side of the pump 11.

The pump 11 effectively exhausts the water from the lower chlorinator space 26, and also withdraws some of the air from the container 21. Since a partial vacuum exists in the container 21, the plug 30 is urged tightly to close the port 29 by the preponderance of atmospheric pressure. The plug 30, despite its simplicity, thus effectively seals the container 21.

Since the pipe 19 from the chlorinator connects with the inlet side of the pump 11, the water from the chlorinator is mixed with that about to be passed through the pump. The pump and circulating system are availed of efficiently to bring about uniform concentration in the pool, substantial diffusion being accomplished by virtue of the turbulence where the water from the conduit 14 reenters the pool.

The higher the location of the water jets with respect to the plate 24 in the upper container space 25, the more pellets or chunks there are through which the water gravitates. Accordingly, the higher the spray pipe 31, the higher the concentration of the solution obtained and the greater the rate at which chlorine is added to the system. Adjustment of the concentration is thus accomplished by providing for relative vertical adjustment of the spray pipe 31 and the plate 24.

A clamp nut 36, threadedly engaging a central depending boss 37 about the central bottom opening 32, cooperates with a contractible gasket or packing 38. The gasket or packing 38 may be contracted by tightening the locking nut 36. Contraction of the gasket 38 serves to provide a seal between the exterior of the pipe 31 and the container 21 and also serves to hold the pipe 31 in an adjusted vertical position.

The supply pipe 18 for the chlorinator 17 includes a hose or other flexible element 39 whereby adjustment of the position of the spray pipe 31 does not interfere with its appropriate connection with the chlorinator supply pipe 18. Optionally, the vertical position of the plate 24 can be adjusted to vary the vertical spacing between the operative end of the spray pipe 31 and the plate 24.

Since the jets are uniformly located about the pipe, the uppermost material falls uniformly as the material is consumed, whereby uniform operation is ensured.

By adding a predetermined quantity of chlorine to the system once every forty-eight hours, the desirable germicidal effects are achieved. In order to obtain the desired concentration, the length of time that the chlorinator is operative and the rate at which the pellets or pieces 28 are dissolved is controlled. For controlling the interval of operation, an electromagnetically operated valve 40 is provided for the chlorinator supply pipe 18, the electromagnetically operated valve having an energization circuit including a clock-operated switch 41. The clock-operated switch in this instance is designed to operate on a forty-eight hour basis. Since the operation of the chlorinator is dependent upon operation of the pump 11, the clock-operated switch 41 is so set as to permit operation only when the pump 11 is in operation. If desired, the energization circuit for the clock-operated switch 41 may be electrically dependent upon the closing of the clock-operated switch 16.

To minimize the quantity of chlorine used and yet obtain appropriate germicidal effects, the chlorine is added quite quickly. Accordingly, the period of operation of the chlorinator should be small, and the rate of adding the chlorine high. A high rate of adding chlorine is made possible by the present system.

When the operation of the chlorinator 17 is discontinued by closure of the valve 40, the pump 11 may continue in operation.

To ensure against uncontrolled introduction of chlorine into the system, the level of the chlorinator is so chosen that, during shut-down condition of the pump, water never rises above the plate 24. If the container 21 is vented to the atmosphere, the plate 24 would of necessity be required to be above the normal level of the pool to ensure this result. Additional allowance must be made in the arrangement shown, since the air in the container is partially exhausted.

In order to make the most efficient use of the space in the container 21 for the pellets or chunks 28, the vertical position of the plate 24 may be adjusted to the critical minimum height necessary to ensure against the uncontrolled introduction of chlorine during shut-down condition. This adjustment may be accomplished by providing supporting rods 27 of different length or, optionally, by making provisions for adjusting the vertical position of the rods 27 in the container.

The mere operation of the circulating system does not disturb the shut-down condition of the chlorinator.

Since the quantity of water in different systems may differ substantially, different quantities of chlorine must be introduced to provide the same optimum germicidal effects. Since the time required to introduce this quantity, whatever it may be, is desirably uniformly small, it is obvious that different rates of introducing chlorine for the different systems must be provided. The adjustable spray pipe 31 makes it possible to achieve materially different rates for different installations, without requiring different apparatus. A standard size chlorinator can, therefore, exactly satisfy the needs of different systems, as well as provide for adjustment of the rate of introducing chlorine for each system.

The inventor claims:

In apparatus of the character described: a container having a lower wall and side walls; a perforated plate peripherally fitting the side walls and supported above the bottom wall, and dividing the container into an upper space and a lower space; means closing the upper end of the container; conduit means for supplying liquid under pressure and projecting through the lower wall and the plate and terminating in the upper space; said conduit means having means located in said upper space providing laterally directed circularly arranged liquid outlets; said conduit being adjustable selectively to position its outlet means above the plate; means for securing the conduit means in adjusted position; and outlet forming in the lower space.

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