Aug. 20, 1940. J. E. VANDERWALKER 2,212,357

APPARATUS FOR DEVELOPING AND OTHERWISE TREATING PHOTOGRAPHIC FILM

Filed April 6, 1939 2 Sheets-Sheet 1

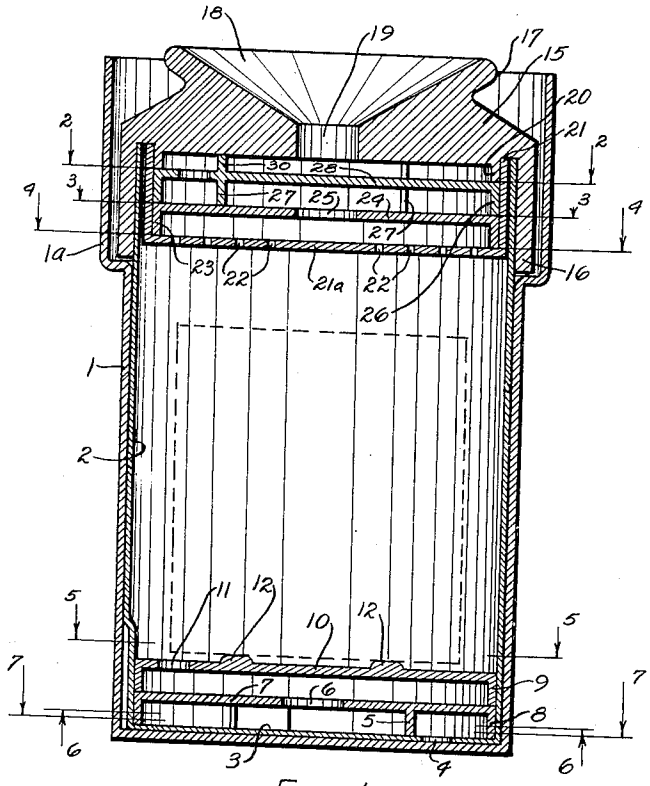

FIG. 1

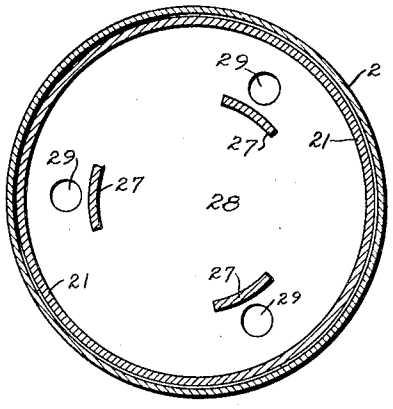

FIG. 2

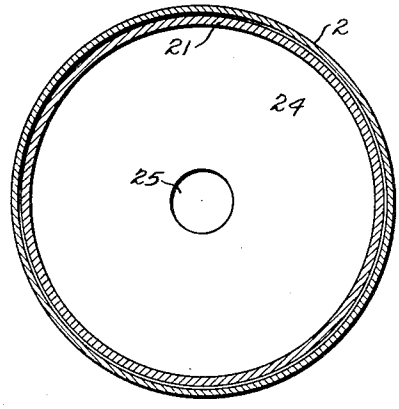

FIG. 3

Inventor:
Joseph E. Vanderwalker
Per Whitehead & Vogl
Per Earle B. Whitehead
Attorneys

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APPARATUS FOR DEVELOPING AND OTHERWISE TREATING PHOTOGRAPHIC FILM

Filed April 6, 1939 2 Sheets-Sheet 2

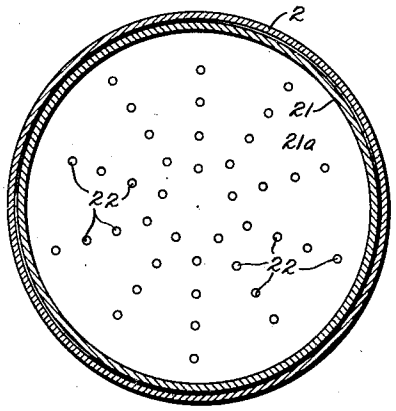

FIG. 4

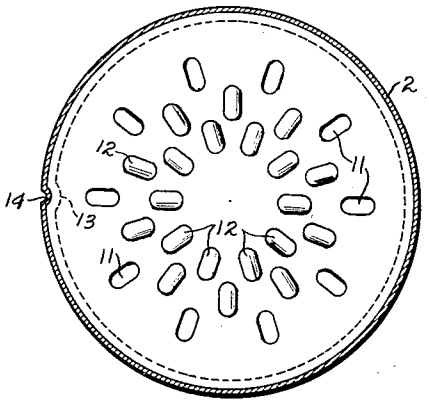

FIG. 5

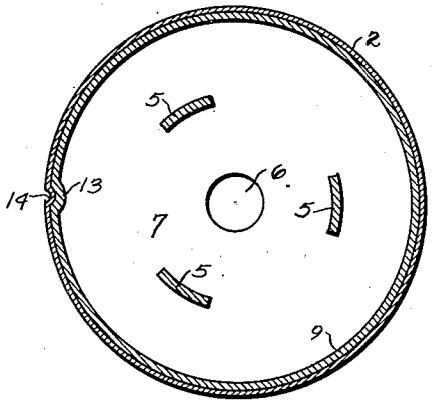

FIG. 6

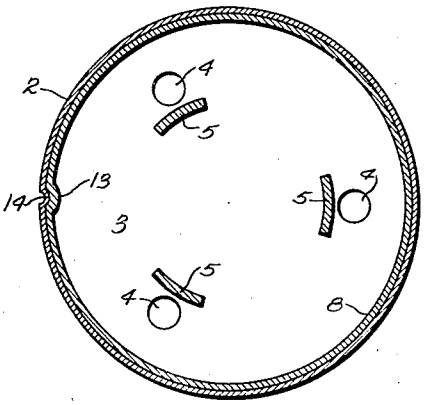

FIG. 7

Inventor:
Joseph E. Vanderwalker
By Whitehead & Vogl
Per Earle Whitehead
Attorneys

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APPARATUS FOR DEVELOPING AND OTHERWISE TREATING PHOTOGRAPHIC FILM

Joseph E. Vanderwalker, Victor, Colo.

Application April 6, 1939, Serial No. 266,294

11 Claims. (Cl. 95—90.5)

This invention relates to apparatus for developing and otherwise treating photographic film.

Objects of the invention are to provide apparatus of the class described which has within itself means for excluding light while admitting liquid and/or air, so that the apparatus may be operated without the necessity of a dark room, and in such apparatus to provide (*a*) for a high degree of compactness, simplicity, economy, efficiency, and facility for cleaning; (*b*) for admission of liquid under pressure, whereby to effectively eject air and prevent spotting of the film; (*c*) for construction of the apparatus by the assembling of parts, each one of which is simple and economical in construction and which give extreme efficiency for the purpose indicated when assembled, but which may be readily disassembled into separate parts, of construction most easily cleaned; (*d*) for ease of assembly and disassembly of parts and for a structure composed of parts so arranged as to practically eliminate wear, deterioration or wrong adjustment of the parts; (*e*) for the utmost facility and speed in filling and emptying the apparatus in using the same.

The novel features of my apparatus are defined in the appended claims. The structure, assembly and operation, as well as additional objects and advantages, will, however, be fully described in the following description of a preferred embodiment of the invention, which embodiment is illustrated in the accompanying drawings in which

Fig. 1 is a vertical, central section of the apparatus completely assembled.

Figs. 2 to 7, inclusive, are, respectively, sections of the central portion of the apparatus taken on lines 2—2, 3—3, 4—4, 5—5, 6—6, 7—7, in each case looking in the direction of the arrows on the respective lines in Fig. 1.

The apparatus comprises a cylindrical tank 1, having its upper portion enlarged as at 1*a* for the double purpose of accommodating the flange of the cover and providing space for excess liquid, all as hereinafter described. The balance of the apparatus, when assembled, is adapted to be seated within tank 1.

Within tank 1, and preferably having a loose, sliding fit therein, I provide tank 2, preferably somewhat shorter than tank 1, as illustrated at Fig. 1, and adapted to nest within tank 1 substantially as illustrated.

The bottom of tank 2 is illustrated at Fig. 7, and is indicated generally by 3 and is provided with a plurality of orifices 4, to permit the ingress and egress of liquid. Each orifice is provided with a baffle 5 to intercept the passage of light from the orifices 4 to the orifices 6 in false bottom 7, which false bottom is supported on the bottom 3 by annular ring 8. The baffles 5 may be affixed to the bottom 3, projecting upwardly therefrom, or may depend from the false bottom 7, as desired.

Resting on the false bottom 7, as by annular ring 9, is a secondary false bottom 10 provided with orifices 11 for the admission and emission of liquid, and also provided with projections or lugs 12 for supporting a spool or roll of film and preventing the end of such spool closing the orifices 11, and providing for free circulation of liquid between the secondary false bottom 10 and the end of the spool.

The false bottoms 7 and 10 and their depending rings 8 and 9 are indented as at 13, and the lower portion of tank 2 is correspondingly indented as at 14, whereby the comating of these indentations will assure the seating of the false bottoms 7 and 10 in predetermined position relative to each other and relative to the orifices 4 and the baffles 5.

The construction just described obviously provides for the admission into the interior of tank 2 of liquid through orifices 4, 6 and 11, and for the emission of liquid therethrough, while excluding from the interior of tank 2 any light which might enter through orifices 4.

The top of tank 2 is provided with a cover indicated generally at 15, having a flange 16 adapted to enclose the top of tank 2 and to have an engagement with tank 2 by sufficient friction or other suitable means to permit the lifting of tank 2 (when full of liquid) by the cover 15, for which purpose the cover 15 is provided with an overhanging rim 17 serving as a handle which may be gripped by the fingers for conveniently lifting the cover and therewith, tank 2.

Cover 15 is funneled, as at 18, the funnel terminating in a down spout 19, communicating with the interior of tank 2, whereby liquid may be easily poured into tank 2, if desired, the spout 19 serving for the admission and emission of liquid and/or air.

It will be noted that enlarged portion 1*a* of tank 1 provides not only for the seating of flange 16 but also additional space outside said flange for the accommodation of any liquid which may be forced upwardly within tank 1 by the insertion of tank 2 therein, as hereinafter described.

The cover 15 has a depending annular flange

20 spaced from the flange 16 sufficiently to accommodate both the upper rim of tank 2 and the upper rim of inverted cup 21, which rim of cup 21 is adapted to tightly fit the flange 20, whereby to support cup 21 and the enclosed parts later described, by such friction grip of the cup 21 with the flange 20.

The bottom 21*a* of cup 20 is provided with a large number of small orifices 22 scattered throughout the bottom 21*a* for the purpose hereinafter described.

Suitably supported on the bottom 21*a* of the cup, as by annular flange 23, I provide a partition 24 having a central orifice 25, and suitably supported on partition 24, as by annular flange 26 and/or baffles 27, I provide an upper partition 28 having orifices 29 outside the baffles 27, the partition 28 carrying upwardly projecting baffles 30 positioned between the orifices 29 and the spout 19 in the cover 15.

From the foregoing description it will be obvious that either liquid or air may enter the interior of tank 2 through the cover or be ejected from the interior of tank 2 through the cover, while light entering through spout 19 will be excluded from that portion of the interior of tank 2 which is below partition 24.

It will be noted that the entire apparatus is of the utmost compactness, the tank 2 with cover 15 being of substantially the same length as the enclosing tank 1 and substantially enclosed therein.

In operation, the tank 2 is removed from tank 1, and the cover 15, carrying with it cup 21 and its contained parts, is removed from tank 2 and the rack or spool of film is seated upon the projections or lugs 12 and cover 15 with cup 21 and its contained parts is replaced upon tank 2 in the position indicated in Fig. 1. The desired liquid is then placed in tank 1 and the operator, using overhanging flange 17 as a handle, inserts tank 2 with its contained parts in tank 1, and as tank 2 is pressed down into the liquid, the liquid will be forced upwardly through orifices 4, 6 and 11 and into the interior of tank 2, enveloping the film in the tank, it being understood that sufficient of the liquid will be placed in tank 1 so as to fully cover the film in tank 2 when that tank has been seated on the bottom of tank 1, as illustrated in Fig. 1.

It will be obvious that the exertion of downward pressure on cover 15, forcing tank 2 down into the liquid, will result in forcing the liquid under pressure into the interior of tank 2 and will cause a circulation of the liquid within the tank and the pressure will result in the almost instantaneous filling of tank 2 and enveloping the film, whereby all parts of the film will be enveloped in the liquid at substantially the same instant, thus eliminating variation in development of different portions of the film. The same forcing of the liquid into tank 2, as above described, insures the complete expulsion of air from the interior of tank 2, the forcible injection of liquid resulting in a circulation and agitation thereof within tank 2, in turn resulting in the complete elimination of air spots or pockets. This forcible and sudden immersion of the film in the liquid is important, not only to insure uniform development of the film from top to bottom, but also for the elimination of spots which would result in the film if minute particles or bubbles were permitted to adhere to the film.

It is to accomplish the above described results that tank 2 has a loose sliding fit in tank 1, a practically imperceptible space being provided between the two, so that the liquid in tank 1 is forced through the orifices 4 and into tank 2.

However, if downward pressure be exerted to an excessive degree, some of the liquid will rise between the walls of tank 1 and tank 2, and any such liquid will be accommodated in the space outside flange 16 within enlarged portion 1*a* of tank 1. Flange 16, projecting beyond the inner wall of the smaller part of tank 1, prevents any upward squirting of the liquid.

While the liquid is entering tank 2 from the bottom, the air, obviously, will be expelled from tank 2 through orifices 22, 25 and 29 and spout 19.

When the film has remained in the liquid for the desired time, tank 2 is lifted out of tank 1, the operator using the overhanging flange 17 as a handle for this purpose. By reason of the free inlet of air through spout 19 and orifices 29, 25 and 22, the liquid will flow out of tank 2 through orifices 11, 6 and 4 almost as rapidly as tank 2 is lifted, and the advantage of this is obvious, in that the film is all removed from the liquid at substantially the same instant, thus avoiding variations in the action of the liquid on different portions of the film and insuring a uniform result.

By the time the bottom of tank 2 has reached the top of tank 1 the liquid will all have left tank 2 and rinse water may be poured into tank 2 through funnel 18, entering the interior of tank 2 through the orifices 29, 25 and 22 and rinsing the film. In this operation the multiplicity of small orifices 22 results in the spraying of the rinsing water, thus accomplishing a quick and complete rinsing of the contained film.

Assuming that the foregoing operation has been conducted with a developing liquid, the tank 2 will now be inserted in another tank 1 containing the fixing liquid, and after the fixing of the film the rinsing operation may be repeated as above described.

While a second tank 1 is mentioned above, it will, of course, be obvious that a single tank 1 may be used, the developing liquid being poured into a suitable receptacle and replaced by fixing liquid.

While the various parts which engage tank 2 normally retain the positions as illustrated in Fig. 1, it is obvious that they may be readily separated so that each part may be easily and thoroughly cleansed. It is apparent from the illustration that each part by itself is of very simple construction, so that it is inexpensive in manufacture, as well as easy to clean. Moreover, the parts are so constructed and arranged, as above described and as illustrated in the drawings, that improper assembling is difficult if not impossible, so that the structure is substantially "fool-proof."

Again it will be noted that each part of the device is of such simple and rugged construction that there is practically nothing to wear and nothing to break in the course of use, including assembling and disassembling of the parts.

I have hereinabove described, and in the drawings illustrated, many details of construction. Modifications and equivalent alternatives for such details will be obvious to those skilled in the art, and the invention is not confined or limited to such details.

I claim:

1. In photographic processing apparatus, a container adapted to receive within itself a light-proof-packed set of exposed films and having

series of staggered orifices at opposite ends thereof but being otherwise closed, a tank adapted to receive said container with a loose, sliding fit, whereby, when said container is inserted in said tank, liquid in the tank will be forced into said container through one of said series of orifices.

2. In apparatus as defined in claim 1, said tank having an annular reservoir surrounding the top of the container for any liquid forced upwardly around the container.

3. In apparatus as defined in claim 1, a container cover having a flange enclosing the top of the container, the upper portion of the tank being annularly enlarged to receive said container cover flange and to form a reservoir therearound for any liquid forced upwardly around the container.

4. In photographic processing apparatus, having a negative container and an inverted cup-like member within the top of the container, a cover for said container having a pair of interrelatively spaced flanges adapted to respectively engage the open ends of the container and of the cup-like member.

5. In apparatus as defined in claim 4, an orifice in the cover, orifices in the bottom of the cup-like member and partitions within said member having interrelatively staggered orifices whereby to prevent passage of light but permit passage of fluid in either direction between the interior of the container and the exterior of the cover.

6. In apparatus as defined in claim 4, a plurality of spaced, freely separable, partitions, having staggered masked orifices, within and retained by said cup-like member.

7. In apparatus as defined in claim 4, an orifice in the cover, members within and retained by said cup-like member adapted to prevent passage of light but permit passage of fluid in either direction between the interior of the container and the exterior of the cover, said cup-like member having a perforated bottom adapted to spray into the interior of the container any liquid passing from the cover orifice toward said interior.

8. In photographic processing apparatus, a container adapted to receive within itself a light-proof-packed set of exposed films and having orifices at each end thereof but being otherwise closed and, at each end of the interior thereof, a plurality of spaced, freely separable members having masked and interrelatively staggered orifices whereby, at each end of the container, to prevent passage of light but permit passage of fluid in either direction between the interior and exterior of said container.

9. In apparatus as defined in claim 8, said members in one end of said container being held in predetermined interrelative position by a comating tongue and groove formed in the container wall and in the edges of said separable members.

10. In apparatus as defined in claim 8, said members in one end of said container being contained within and retained by a cup-like member engaged and supported by an orificed cover, said cover forming an end of said container when closed.

11. In apparatus as defined in claim 1, an inwardly funneled and orificed cover in engagement with the container and having an upwardly projecting and overhanging annular rim adapted to be manually gripped whereby to lift said container.

JOSEPH E. VANDERWALKER.