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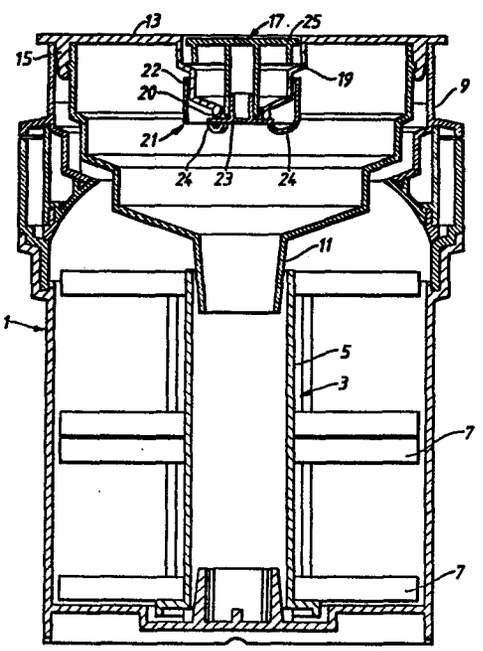
(54) Photographic processing tanks.

(57) A photographic film developing tank having a valve means in the lid which acts to release pressure inside the tank. The valve may include a manually operable plunger (25) which lifts a valve member (23) from its seat (20) when depressed by the operator.



"Photographic Processing Tanks"

Photographic processing tanks for processing lengths of exposed photographic film are well known and they consist essentially of a light-tight tank in which the film, arranged in a spiral coil, is supported on a holder. The film is loaded onto the holder under darkroom conditions, such as safelight illumination or in total darkness. The holder is then placed in the tank and the tank is made light-tight. Thereafter, the processing can be accomplished with the tank in normal lighting conditions.

The processing solutions are introduced in turn into the tank and they must move freely over the film surface so that solutions which have been exhausted in certain areas of the film emulsion may be moved to other areas of the film. Similarly, solutions which have not been involved in a great deal of activity, and are, therefore, not exhausted, must be moved to those areas of the film where interaction with the film emulsion is greater. This periodic movement of the processing solution is conveniently brought about by completely inverting the processing tank at regular intervals. To prevent processing solution from pouring out of the tank when it is inverted, it is usual to provide an outer seal cap which is arranged to cover the opening in the top of the tank through which the processing solutions enter and leave the tank and it is sealed around its periphery to the top of the tank.

During the processing of the film emulsion, gas is evolved and, as it cannot escape from the tank, the pressure in the tank increases.

It has been found in practice that, when the outer seal cap is eventually removed from the tank so that the processing solution can be poured from the tank, there is a tendency for the processing liquid to spurt. The solutions which are employed in film

processing may be toxic and/or a skin irritant and it is undesirable that these solutions should spurt on to the operator's hands or clothes. It is even more important that the solutions should not be allowed to spurt into the operator's face as this may necessitate medical treatment.

According to the present invention, a film developing tank is provided with valve means for lowering the pressure in the tank.

The valve means may be manually operated or it may be arranged to operate automatically to lower the pressure when the pressure builds up to a predetermined level.

In order that the invention may be more readily understood, it will now be described by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a sectional side elevation of a film processing tank;

Figure 1a is an underneath plan view of part of the lid of the tank of Figure 1;

Figures 2 and 3 are a sectional side elevation and a plan, respectively, of part of the outer seal cap in accordance with an embodiment of the invention;

Figures 2a and 3a show a modified form of the embodiment of Figures 2 and 3; and

Figures 4 to 7 are sectional side elevations of alternative forms of the invention.

Referring to Figure 1, a film processing tank comprises a generally cylindrical open-topped container 1 containing a film holder 3. This holder has a central hollow tube 5 and at least one pair of annular support plates 7 removably mounted on the tube. The plates have spiral wound ribs thereon and the lateral edges of a strip of film to be processed (not shown) are located in the spaces between adjacent turns of the ribs. A lid structure 9 is removably mounted on the top end of the container 1 and, when it is so fitted, the lower end of a funnel portion 11 of the lid structure projects into the upper end of the hollow tube 5. The solutions required to bring about the various processing operations are poured in turn

into the upper end of the lid structure and they flow down the hollow tube into the tank. Similarly, spent processing solution is removed by inverting the tank.

An outer seal cap 13 of resilient material has an annular, downwardly extending, rib 15 which fits tightly into an annular channel extending around the upper surface of the lid structure. A valve means 17 is located in the seal cap to enable pressure in the tank to be reduced before the cap is removed from the lid structure. In the arrangement shown in Figure 1, the cap has a central downwardly extending portion 19 with an aperture forming an annular valve seat 20 at its lower end. A valve assembly 21 has an annular threaded portion 22 which screws on to the portion 19 to cause a valve member 23 to engage with the valve seat on the underside of the aperture 20. The valve member is attached to the portion 22 by radially extending, resilient spider arms 24 (see Figure 1a) which form a biassing spring. A plunger 25 extends into the aperture 20 close to the valve member 23. Any build up of pressure in the tank urges the valve member 23 against the valve seat of the portion 19 to close off the aperture. To release the pressure, the plunger 25 is manually pressed downwardly from outside the tank to displace the valve member from the underside of the aperture.

In the arrangement shown in Figures 2 and 3, the cap 13 has a small aperture 26 therethrough and a rotatable plate 27 is arranged to lie on the upper surface of the cap so as to overlie and cover the aperture 26. A spring 29 urges the plate into a position where it covers the aperture 26. On the underside of the plate 27 there may be an enlarged recess 30 as shown in Figures 2a and 3a respectively, so as to provide a buffer reservoir which reduces spurting and an opening 31 leads to the upper surface of the plate. The plate can be rotated manually against the action of the spring until the recess 30 overlies the aperture 26 in the cover and the interior of the tank is in communication with the outside of the tank.

Figure 4 shows a similar arrangement to that shown in Figures 2 and 3 where a plate 35 is slidable in a guide 37 provided

on the upper surface of the cap 13. A spring 39 urges the plate 35 to a position where it overlies and covers the aperture 26 in the cap. An enlarged recess 41 may be incorporated in the underside of guide 37 above the aperture 26 as shown in Figure 4a, and an aperture 42 leads to the upper surface of the guide. The plate 35 has an opening 43 therethrough and it can be manually displaced to a position where the opening 43 in the plate is in alignment with the aperture 26 and the recess 41.

Figure 5 shows a valve means which operates when the internal pressure in the tank reaches a predetermined value. A hollow boss 45 in the cap 13 contains a spring loaded plunger 49. The plunger bears against a valve seat 51 to close it off but, when the internal pressure rises sufficiently to lift the plunger away from the valve seat, the interior of the tank is in communication with the exterior of the tank through an aperture 53 in the boss.

In the arrangement shown in Figures 6 and 7, a boss 57 is formed on the underside of the cap 13 and a spring loaded plunger 59, 61, respectively, is located in the boss. In the Figure 6 embodiment, the plunger bears against a valve seat 63 surrounding an aperture in the cap 13 and, in the Figure 7 embodiment, the plunger is a tight fit in the aperture in the cap. In both cases, the boss is in communication with the interior of the tank and, by manually depressing the plunger, gas in the tank can escape through the boss to the exterior of the tank. In the plunger 61, there is a passage 65 which is normally closed off by the cap 13 but, when the plunger is depressed, one end of the passage comes into communication with the interior of the boss while the other end is in communication with the exterior of the tank.

In the arrangements shown in Figures 2, 3 and 4, the provision of the enlarged recess 30, 41 causes any liquid mixed with the gas to be trapped and, thus, undesirable spurting of the solution is avoided.

CLAIMS

1. A photographic film developing tank including valve means for lowering the pressure in the tank.

2. A photographic film developing tank according to claim 1 in which the valve means is arranged to be operated manually.

3. A photographic film developing tank according to claim 1 in which the valve means is arranged to be operated automatically when the pressure in the tank builds up to a predetermined level.

4. A photographic film developing tank according to claim 2 in which the valve means comprises a closure member which is resiliently biassed to the closed position and is arranged to be manually movable to the open position.

5. A photographic film developing tank according to claim 4 in which the closure member comprises a movable plate (27; 35) having an aperture which registers with an aperture in a part of the tank when the valve is open.

6. A photographic film developing tank according to claim 5 in which the plate (35) is linearly slidable between the open and closed positions.

7. A photograhic film developing tank according to claim 5 in which the plate (27) is rotatable between the open and closed positions.

8. A photographic film developing tank according to claim 4 in which the closure member includes a plunger (25).

9. A photographic film developing tank according to claim 8 in which the valve means comprieses an inwardly facing valve seat (20)

formed in a lid (13) of the tank, a movable valve member (23) mounted inside the lid and resiliently biassed into engagement with the valve seat, and a manually operable plunger (25) mounted on the outside of the lid and extending through the valve seat to engage with the valve member.

10. A photographic film developing tank according to claim 9 in which the valve seat is formed on an inwardly extending threaded annular neck (19) of the lid, and the valve member is mounted on the said neck by means of a threaded annular collar (22).

11. A photographic film developing tank according to claim 10 in which the valve member is connected to the said collar by means of a plurality of radially extending resilient spider arms (24).

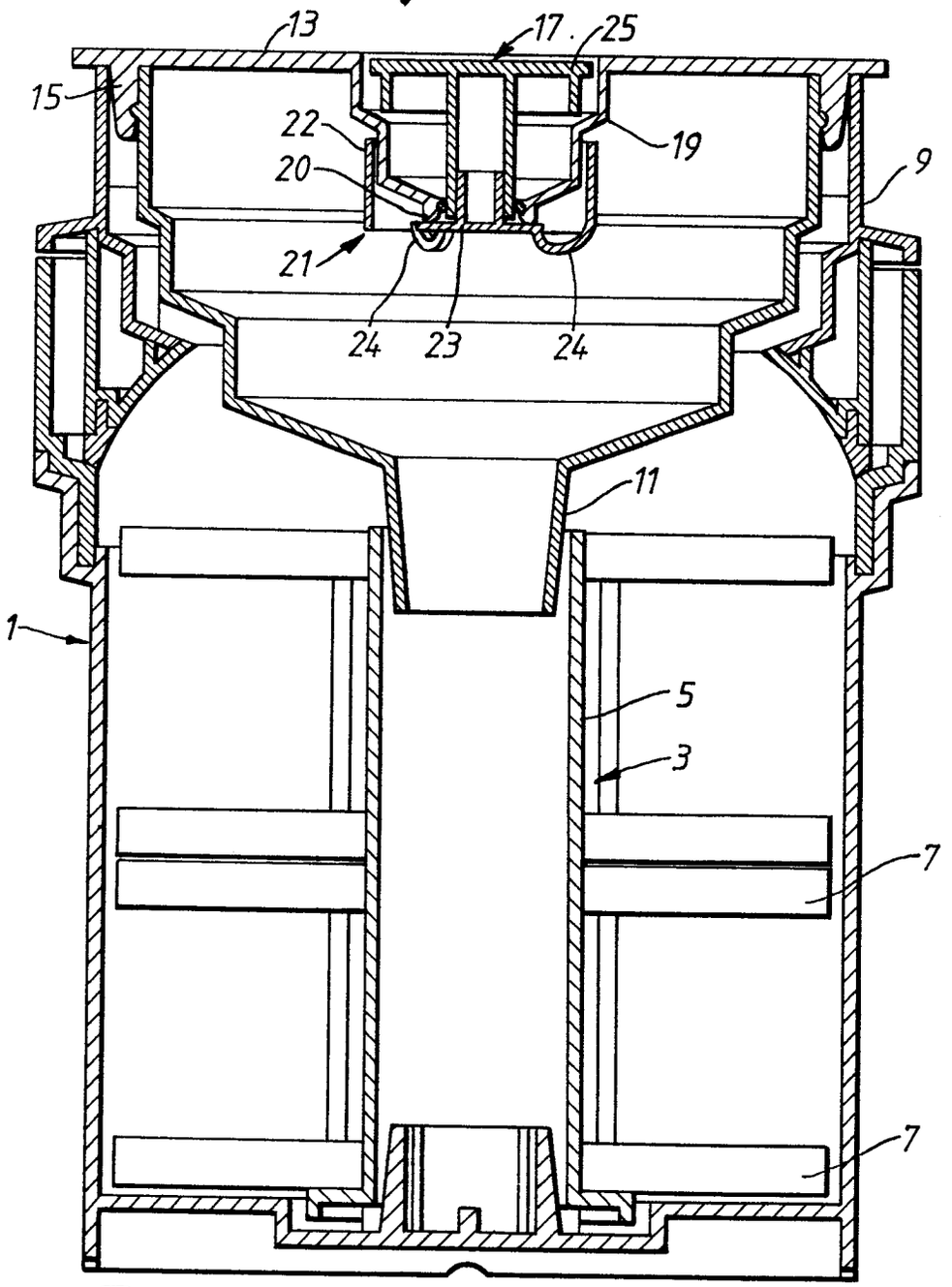


FIG. 1.

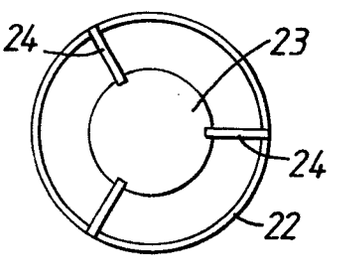


FIG. 1a.

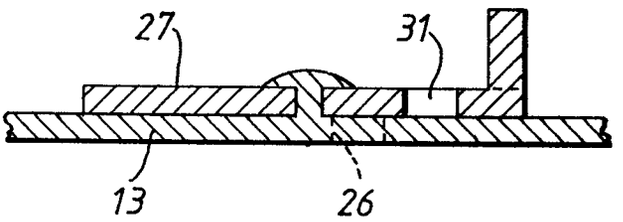


FIG. 2.

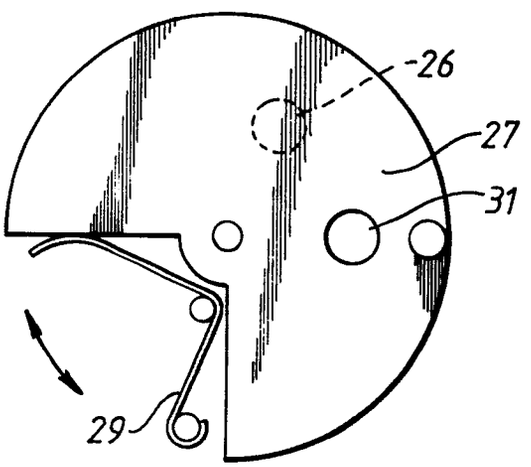


FIG. 3.

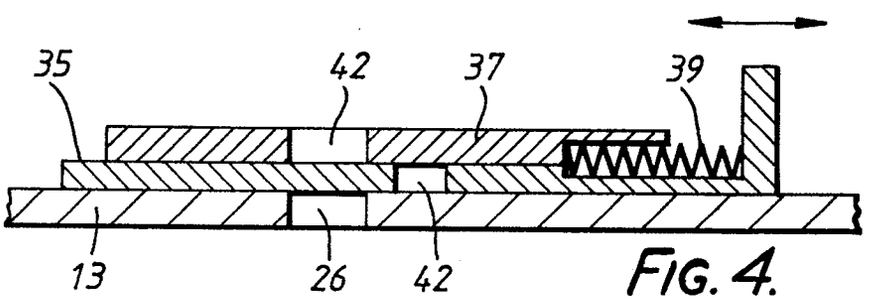


FIG. 4.

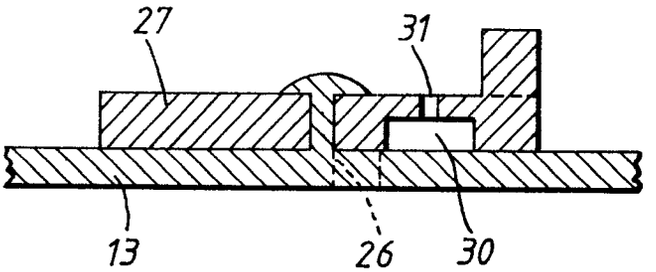


FIG. 2a.

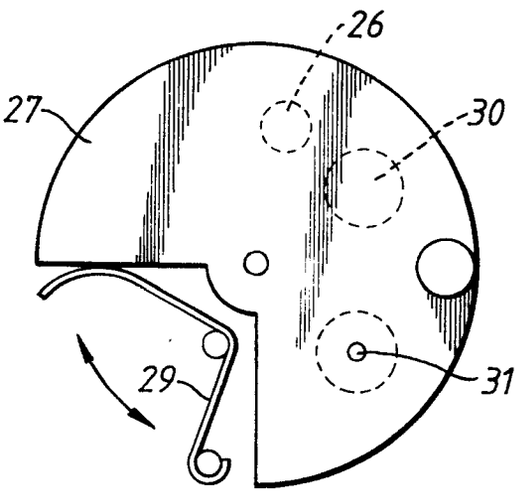


FIG. 3a.

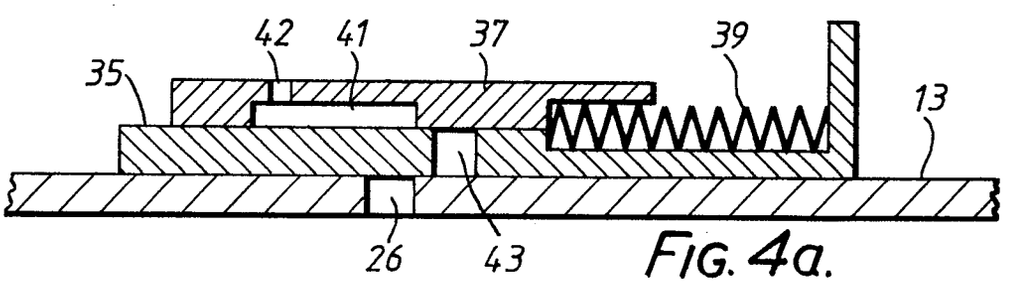


FIG. 4a.

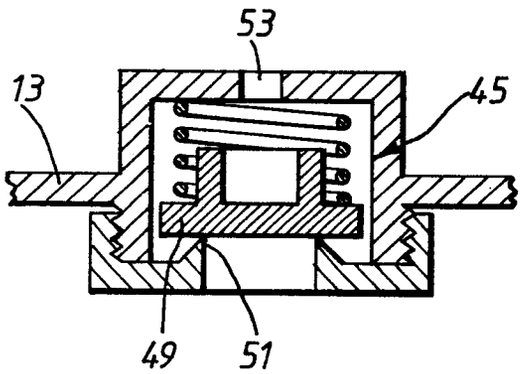


FIG. 5.

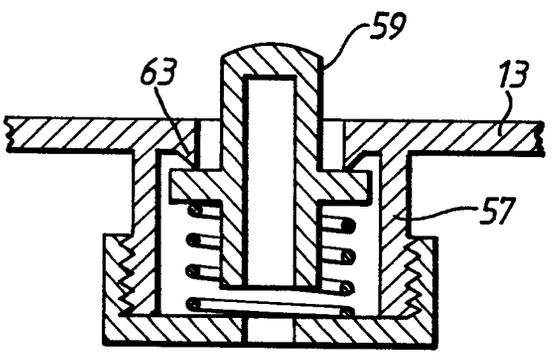


FIG. 6.

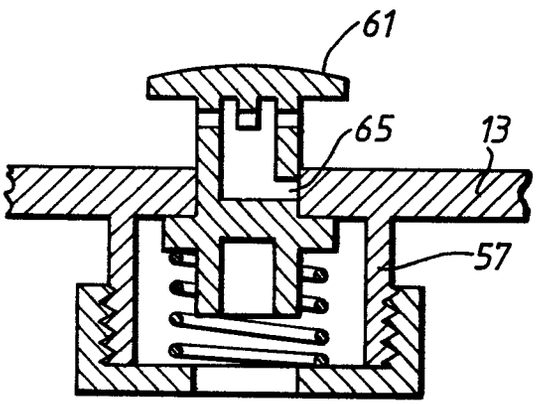


FIG. 7.

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EUROPEAN SEARCH REPORT

Application number
EP 85 30 7216

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	GB-A-2 004 849 (J. BOCKEMÜHL) * Pages 1,2; figures 1-7 *	1	G 03 D 13/04
A	CH-A- 95 899 (A. BUYSSENS) * Page 1; figures 1-3 *	1-4,8, 9	
A	US-A-2 790 570 (F.A. HODGES et al.) * Claims 2-6; figures 1-16 *	1,3	

TECHNICAL FIELDS SEARCHED (Int. Cl.4)

G 03 D 13/04
G 03 D 13/06
B 65 D 51/16

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16-01-1986	BOEYKENS J.W.

CATEGORY OF CITED DOCUMENTS

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