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RAPID DEVELOPER TRAP

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Fig. 1.

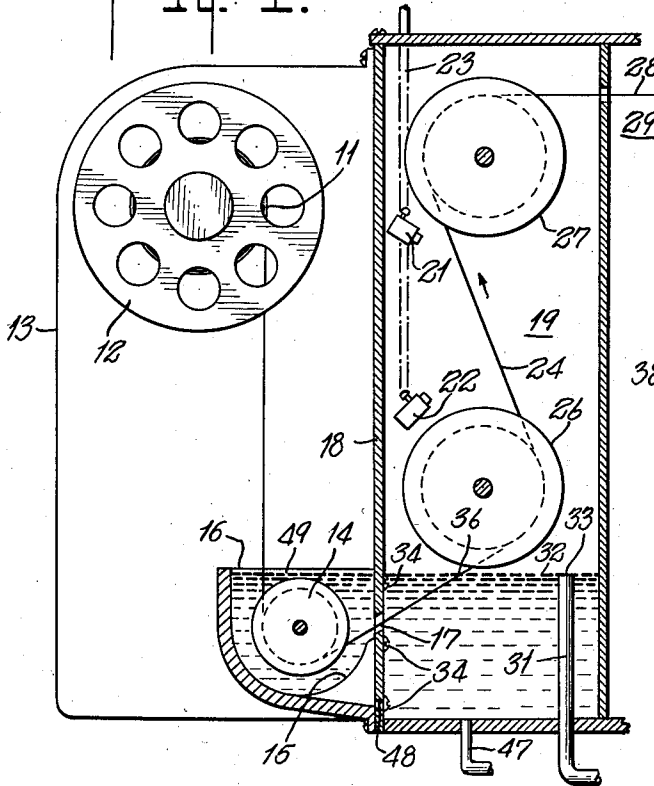


Fig. 2.

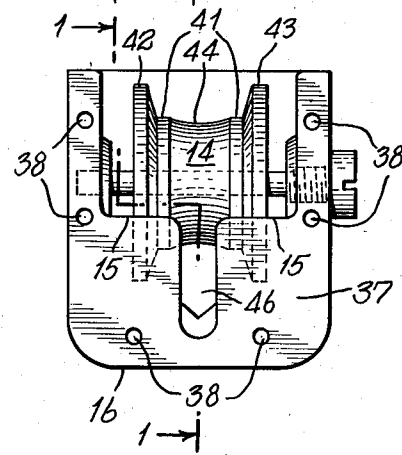
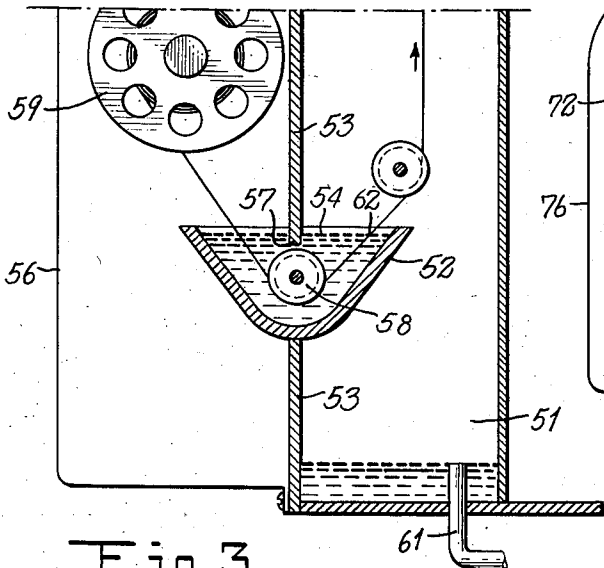


Fig. 3.

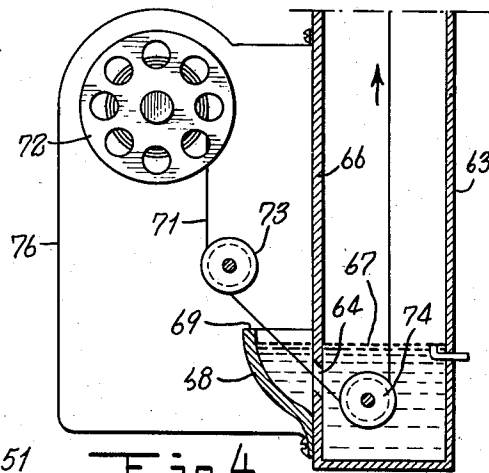


Fig. 4.

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RAPID DEVELOPER TRAP

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4 Claims. (Cl. 95—94)

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This invention pertains to traps for photographic rapid developing apparatus, and particularly to a liquid trap for use in a processor for rapidly developing motion picture film.

Quick developing processes find increasing use in recording television, facsimile and microfilm images so that a film record may be obtained in the shortest possible space of time either for immediate reprojection or record purposes. The mechanism for accomplishing such a process usually consists of a light-tight cabinet having in succession separate chambers for developing, fixing, washing and drying the exposed film. The exposed film itself is fed from a supply reel or directly from the device used for recording the images thereon and is threaded over a series of rollers which continuously pass the film successively through developing, fixing, washing and drying chambers so that the whole process is completed in a fraction of a minute.

Such extreme rapidity of development requires the use of a strong developing solution applied to the film in the form of a highly atomized spray, the spray being confined in a closed developing chamber through which the film is passed rapidly and continuously. As a result of the atomization of the developing solution and of the high velocity with which it is applied to the film, a fine mist or vapor is generated which fills the entire interior of the developing chamber. Moreover, it has been found to be exceedingly desirable to maintain the temperature of the developing solution spray at the highest practicable point which, for instance, is in order of 120° F. As a result of such a high temperature, the vapor pressure of the developing solution is greatly increased, enhancing its tendency to vaporize and to form mist. If this mist is permitted to escape from the developing chamber through any opening so that it comes in contact with the exposed film before it enters the developing chamber, two serious difficulties ensue: predevelopment occurs, making the total length of developing time indefinite and resulting in over-developed or under-developed portions of film, and developing solution reaches the film ahead of the developing chamber irregularly and at localized spots, resulting in small over-developed spots on the finished film.

The instant invention eliminates any possibility of spray or mist from the developing chamber reaching the film prior to the entrance of the film into the chamber, while at the same time preventing escape of the developing solution and interposing no appreciable additional mechanical resistance to the movement of the

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film. The invention achieves this result by providing a liquid trap at the entrance to the developing chamber, so that the moving film strip enters the chamber upward from the surface of the liquid. This liquid pool from which the entering film emerges thus completely prevents in a thoroughly positive manner any possibility of the entrance of either spray or mist into the chamber from which the film is fed to the developing chamber.

The purpose of this invention, therefore, is to provide a trap for a quick developing apparatus for motion picture film such that the spray and mist produced in a developing compartment is prevented from making contact with a film prior to its entrance into that compartment.

Another purpose of this invention is to provide a liquid ingress seal for moving film at the entrance to a developing chamber which permits ingress of the film but prevents egress of liquid or vapor from the chamber.

Still another purpose is to provide a trap for developing solution at the entrance of a quick developing chamber, the trap being filled with liquid from the surface of which exposed film is introduced to the chamber.

Further information concerning the invention can be secured from the detailed description and the accompanying drawings, in which:

Fig. 1 is an elevation and partial section on the line 1—1, Fig. 2, of the developing chamber portion of a quick developing apparatus and of the exposed film reel box, the side plates of the chamber and reel box being removed to reveal the interiors.

Fig. 2 is a view of a cup and roller comprising one form of the liquid trap of the invention.

Fig. 3 depicts a form of the invention employing a liquid trap at the entrance to a chamber separated from the developing liquid therein, the sides of the developing compartment and exposed film reel box being removed to reveal the interiors.

Fig. 4 is a vertical section depicting another form of developing chamber trap.

Referring now to Fig. 1, an exposed motion picture film 11 is wound on a reel 12 housed in a light-tight exposed film box 13. The film 11 is drawn from the reel 12 and passed around an idle roller 14 contained in a cup 16. The cup 16 is filled with liquid forming an entrance seal as will be described later in greater detail. After passing the roller 14 the film is passed over the guide shoulders 15 and through a slot 17 cut in the side wall 18 which forms a partition between a developing compartment 19 and the exposed

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film box 13, the guide shoulders 15 guiding the film toward the slot 17 during this film threading operation. The slot 17 is made considerably wider than the thickness of the film and longer than the width of the film so that in operation the film does not touch the sides or ends of the slot 17. The film thus enters the compartment 19 through the slot 17 and is therein exposed to spray of developing solution applied from several spray nozzles represented by the two nozzles 21 and 22. These nozzles are supplied with developing solution under pressure from a pipe system 23, so that the solution is atomized into fine spray by the nozzles and is forcefully sprayed upon the emulsion side 24 of the strip of motion picture film. The film is led around rollers 26 and 27 within the developing compartment 19 and then, at a point indicated by the reference numeral 28, is led into the following compartment 29 which may contain wash water, stop solution, fixing solution or the like. The remaining portions of the quick developing apparatus following the developing compartment are not depicted in detail and their operations are not described because they are outside of the scope of this embodiment and because in a general way they follow conventional procedures of fixing and drying motion picture film.

The developing solution applied by the nozzles 21 and 22 to the film 24 is held at a uniform temperature of 120° F. by thermostatic controls in the solution supply system, this temperature being the highest permissible in developing film employing one preferred type of base. Because of this elevated temperature, the degree of atomization, and the force with which the developing spray impinges upon the film, a thick mist is created which fills the developing compartment 19. Condensed mist and spent spray fall into the bottom of the compartment, where it collects as liquid and is drawn off by an overflow pipe 31. The level of the surface 32 of the liquid is determined by the level of the entrance end 33 of the overflow pipe 31.

The cup 16 is fastened by means of screws 34 to the partition 18, a gasket being inserted between the cup and partition to render the joint liquid tight. The cup is positioned so that the film running off the roller 14 within the cup and extending in a taut line to the roller 26 passes through the slot 17 without touching its sides or ends. The slot 17 is so positioned with relation to the overflow pipe entrance 33 that the slot is well below the surface 32 of the liquid, and the slot is at all times completely immersed, forming a liquid-sealed trap for preventing any gaseous or vaporous communication between the atmosphere of the compartment 19 and the atmosphere of the exposed film box 13. The film therefore, enters the vapor-filled space of the developing compartment 19 at the point 36 where it leaves the surface 32 of the condensed and spent developing solution in a generally upward direction.

The cup 16 and its associated roller are more clearly shown in Fig. 2. The face 37 of the cup abuts against the outer surface of the partition 18, Fig. 1, and is fastened thereto by means of six screws secured in the threaded holes 38, Fig. 2. The roller 14 consists of a central hub portion having a reduced diameter at its center 44 so that at either side thereof cylindrical rims 41 are formed which support the film strip only at the portions thereof adjacent its edges, thereby protecting the emulsion of the film from abrasion.

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Two flanges 42 and 43 located on each side of the central hub portion act as means for laterally guiding and positioning the film strip as it passes over the roller. The center portion of the cup 16 is provided with a recess 46 between the guide shoulders 15. This recess permits all developing solution to be drained from the cup when the developing compartment 19, Fig. 1, is drained through a drain pipe 47, a hole 48 being drilled in the partition 18 in line with the bottom of the cut-away part 46, Fig. 2, of the cup 16 for this purpose. When the cup 16 is in position it will of course be filled with developing solution to the level indicated by the line 49, Fig. 1, level with the surface 32 inside the compartment and controlled thereby. The roller 14 is therefore normally completely submerged.

It has been found that the amount of pre-development that occurs in the cup 16 is negligible, the period of time spent by the film in the cup being short compared to the length of time spent within the developing compartment. In any case, the period of time spent in the cup is a definite quantity and the concentration of the developer therein can be controlled, so that the use of this liquid trap introduces no uncertainty of its own in the degree of development of the film while it eliminates other uncertainties as before stated.

Under certain conditions where extremely hot developing solutions are used it may be that the developing solution contained within the cup or trap may have a tendency to "steam," producing a certain amount of developing solution vapor concentration in the exposed film box 13. In such instances, it is preferable to use water instead of developing solution in the liquid trap.

One form of apparatus utilizing such an inert liquid is shown in Fig. 3, in which a developing compartment 51 has a film entrance port protected by a liquid trap contained in a cup 52, which is made integral with or otherwise affixed to one wall 53 of the compartment 51. The cup is nearly filled with water or other inert liquid to the level of the surface 54, and the wall or partition 53 between the compartment 51 and the preceding exposed film box 56 is extended downward into the liquid as indicated by the reference numeral 57 forming a film inlet aperture which is completely submerged and hence is sealed as far as the transmission of vapor there-through is concerned. The cup 52 contains an idle roller 58, acting as guide and support for the motion picture film in its passage from an exposed film reel 59 into the developing compartment 51 and the cup 52 and roller 58 are positioned well above the liquid level of the developing solution. The spent spray and mist of the developing solution collects in the bottom of the developing compartment and is drawn off by the pipe 61.

The film thus enters the developing compartment 51 upward through an inert liquid surface 54 at the point 62; therefore, although this liquid may attain the temperature of the developing solution and may "steam" from that portion of its surface that is in the exposed film box 56, the vapor produced thereby in that box has no effect in developing or spotting the exposed film, which is exposed to the development process only after emerging at point 62 from the surface 54 of the liquid in the cup, after which it is exposed to the vapor and mist in the developing compartment atmosphere as well as to the spray from the spray

nozzles therein. True the inert liquid of the trap may become slightly contaminated by the developing solution mist but the solution so formed is so weak as to have no effect on the film.

In Fig. 4, there is illustrated a further embodiment of the invention characterized by a downward direction of motion of the film strip as it passes into a compartment of the quick developer machine, and also characterized by the omission of a guiding roller from the liquid trap cup.

A developing compartment 63 has a slot 64 in one wall 66 for the entrance of film strip. The developing compartment 63 is filled to a level indicated by the reference numeral 67 with liquid developing solution whence solution is pumped to appropriate spray nozzles, and this level is above the slot 64, which is therefore completely covered by the liquid developing solution. Surrounding the slot 64 in such a manner as to contain the developing solution is a cup 68 having an edge 69 at a level higher than that of the liquid surface 67.

The exposed film 71 is carried on a reel 72, from which it is drawn over a roller 73, through liquid in the cup 68, through the slot 64 and around a roller 74. From the roller 74 the film strip is drawn upward in the developing compartment the remainder of which including the spray nozzles is omitted from the description and drawing, being similar to that previously described. The exposed film reel 72 and the cup 68 are contained in a light-tight housing 76.

In operation, the exposed film strip is drawn from the roller 73 in a downward direction and proceeds in a straight line into and through the surface of the developing solution in the cup 68, through the slot 64 and to the roller 74, which is submerged in developing solution. This roller 74 changes the motion of the film strip to an upward direction, so that it merges within the compartment 63 into the atmosphere therein out of and upward through the surface 67 of the developing solution. This effectually prevents the escape of any vapor or spray from the atmosphere of the compartment 63 to the space within the box 76.

It is obvious that the liquid trap of this invention can also be applied to the entrance or exit opening of any of the other tanks and compartments of a quick developing apparatus where it is desirable to prevent the passage of spray, mist and vapor through the opening while offering no impediment to the passage of the film.

What is claimed is:

1. A trap for rapid developing apparatus comprising, a film treating compartment through which a film strip is adapted to be passed for rapid processing by the application of fluid sprays of processing fluid, said compartment containing a reserve supply of processing fluid partially filling the lower portion thereof, an aperture in a wall of said compartment located below the liquid level of said reserve supply fluid, a member extending exteriorly of said compartment adjacent said aperture, an orifice in said member communicating with said aperture for liquid communication with the interior of said compartment through said aperture, said member having upstanding wall portions extending above the level of the reserve supply fluid in said compartment whereby said member is partially filled by the reserve supply fluid in said compartment and means for guiding said film strip through said

member and said aperture into said compartment.

2. A trap for rapid developing apparatus comprising, a film treating compartment through which a film strip is adapted to be passed for rapid processing by the application of fluid sprays of processing fluid, said compartment containing a reserve supply of processing fluid partially filling the lower portion thereof, a film admitting aperture in a wall of said compartment located below the liquid level of said reserve supply fluid, a cup-shaped member secured to and extending exteriorly of the wall of said compartment at said film admitting aperture, an orifice in said cup member communicating with said aperture whereby the interior of said cup-shaped member is in liquid communication with the interior of said compartment through said film admitting aperture, said cup-shaped member being provided with wall portions extending above the level of the reserve supply fluid in said compartment, and means located in said cup-shaped member for guiding a film strip through said cup-shaped member and said film admitting aperture into the interior of said compartment.

3. A trap for rapid developing apparatus comprising, a film treating compartment through which a film strip is adapted to be passed for rapid processing by the application of fluid sprays of processing fluid, said compartment containing a reserve supply of processing fluid partially filling the lower portion thereof, a film admitting aperture in a wall of said compartment located below the liquid level of said reserve supply fluid, a cup-shaped member secured to and extending exteriorly of the wall of said compartment at said film admitting aperture, an orifice in said cup member communicating with said aperture whereby the interior of said cup-shaped member is in liquid communication with the interior of said compartment through said film admitting aperture, said cup-shaped member having wall portions extending above the level of the reserve supply fluid in said compartment, and an idle roller mounted in said cup-shaped member for engaging a film strip and for directing its passage through said cup-shaped member and said film admitting aperture into the interior of said compartment.

4. A trap as defined in claim 3 in which the interior bottom surface of said cup-shaped member is provided with a drain channel inclined downwardly towards said compartment, and said compartment wall is provided with a drain port positioned in juxtaposition to the lowest level of said drain channel.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,595,473	Minton	Aug. 10, 1926
1,852,662	Lord et al	Apr. 5, 1932
1,890,026	Barkelew	Dec. 6, 1932
2,111,759	Douden	Mar. 22, 1938
2,251,232	Houston	July 29, 1941
2,458,394	Luboshez	Jan. 4, 1949
2,475,658	Briechele	July 12, 1949

FOREIGN PATENTS

Number	Country	Date
940,618	France	May 31, 1948