July 12, 1966 F. LOWELL 3,260,186

MINIATURE FILM PROCESSOR

Filed July 10, 1963

Fig. 1.

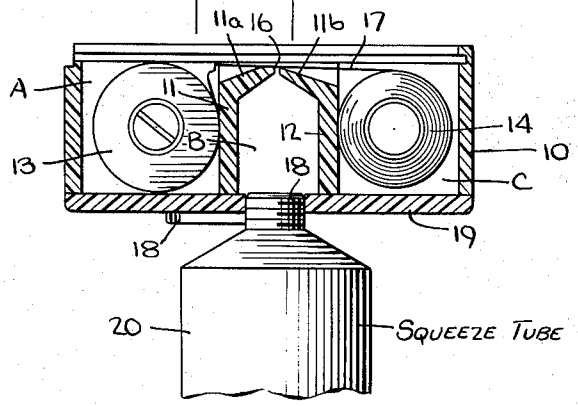


Fig. 2.

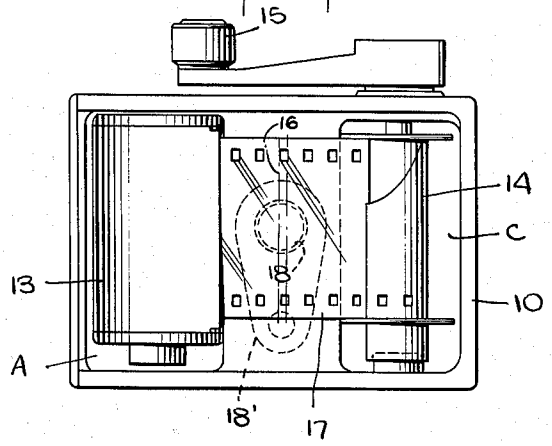
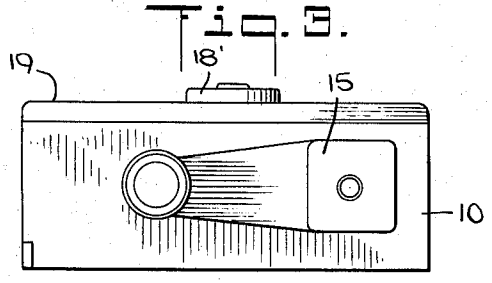


Fig. 3.



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MINIATURE FILM PROCESSOR

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This invention relates generally to devices for processing sensitive film, and more particularly to a miniature processor which in operation may be held in the hand and which is adapted to subject exposed photographic film to a monobath paste effecting rapid one-step development of the film under daylight conditions.

A number of devices have heretofore been devised to develop film under daylight rather than darkroom conditions. Such devices are useful, for example, where photographs are taken and rapid development is necessary in the field. These devices have certain inherent drawbacks and have been either excessively cumbersome, difficult to operate, or slow and unreliable in the processing of film.

For example, prior daylight processing devices usually make use of a solution in liquid form, thereby entailing liquid baths or tanks which must be placed on a stable platform. In other instances, to avoid the need for such mounting, the liquid was contained in a sealed reservoir and applied to the film through an absorbent applicator, but this resulted in a non-uniform distribution of the solution with uneven processing.

Accordingly, it is the principal object of this invention to provide a daylight processor of compact or miniature form adapted to develop black and white films of the type commercially available, quickly and uniformly.

More specifically, it is an object of the invention to provide a processor of the above type which operates in conjunction with a monobath solution in paste form contained in a separate squeeze tube which is attachable to the processor, the processor being operated in the hand of the user and not requiring a stable operating surface.

Also an object of the invention is to provide a one-step processor which functions reliably to apply a processing solution evenly to the emulsion of the film to effect uniform development thereof.

Briefly stated, these objects are attained in a film processor constituted by a housing divided into three chambers, the central chamber forming a reservoir for a monobath paste, the second and third chambers being disposed on either side thereof. The paste is fed into the reservoir by means of a squeeze tube and is extruded through a slit to engage the emulsion of a film strip drawn from the second chamber containing the film cassette, the film being wound on a take-up spool received in the third chamber.

For a better understanding of the invention, as well as other objects and further features thereof, reference is made to the following detailed description to be read in conjunction with the accompanying drawing, wherein:

FIGURE 1 is a sectional view of a miniature processor in accordance with the invention;

FIG. 2 is a plan view of the processor with the cover thereof removed; and

FIG. 3 is a side view of the processor.

Referring now to the drawing, the processor comprises a casing **10**, divided by interior walls **11** and **12** into three distinct cavities or chambers A, B and C. The casing is provided with a slidable cover (not shown) which when fully shut affords a light-proof enclosure for development purposes.

Cavity A, adjacent one end of the casing, is dimensioned to accommodate a standard film storage reel or

cassette **13**, whereas cavity C at the other end of the casing is designed to receive a take-up spool **14**. Operatively coupled to the take-up spool is a hand-crank **15** which when turned, acts to wind a film strip unreeled from the cassette onto the take-up spool, the film moving across cavity B. The intermediate cavity B is defined by the interior walls **11** and **12**, the upper portions **11***a* and **11***b* of these walls being inclined toward each other to form a slit opening **16** extending transversely with respect to the film strip **17** drawn from the cassette **13**. Cavity B constitutes a reservoir for the monobath paste.

Threadably received within a threaded opening **18**, in the face **19** of the casing, is a squeeze tube **20** containing a monobath solution in viscous or paste form. The tube may be of the conventional type in current use for example to apply printing inks to small Ditto machines, the neck of the tube being threaded and provided with a storage cap which is removed before the tube is coupled to the casing of the processor. The tube material should be a plastic or of coated metal which is non-reactive with the contents. By squeezing this tube, the monobath solution is forced into the paste reservoir B and from there is extruded through slit **16** to engage the emulsion of the film strip passing thereover. The opening is closed by a pivoted cover **18'**.

The processing solution is of the type referred to as a monobath, which combines developing and fixing components, but it is sufficiently thickened to produce the desired viscosity, whereby the monobath adheres to the film emulsion and maintains sufficient thickness so as to remain active even when the film strip is rolled up on the take-up spool. For this purpose, conventional monobath formulas may be used. Preferably the paste is of the thixotropic monobath solution type.

To operate the processor, the cover is first slid off the casing, and a cassette to be developed is inserted in cavity A. The leader of the film is drawn from the cassette and wound into the take-up spool. The cover is now pushed to the closed position to seal the casing against light. A squeeze tube containing the monobath solution is screwed into the reservoir thread, and the film processor, with the tube attached thereto, is inverted.

In operation, manual pressure is gradually applied to the tube while slowly turning the crank, thereby driving the film past the slit position and covering it with the processing material extruded therethrough.

When the crank or winding key winds all the film on the take-up spool, the developing-fixing process should be permitted to continue for the period of time appropriate for the particular film emulsion. At the end of this period the film on the take-up spool is separated from the cassette and taken out of the processor, the film being wiped to remove excess material. The processing material which still adheres to the film may be washed off in running water, and the film hung up to dry.

The reservoir B in conjunction with the slit acts to apply the processing material uniformly to the film as long as pressure is applied to the squeeze tube, the action being essentially hydraulic. A certain amount of the processing material is squeezed out when the film is wound on the take-up spool. Since the largest interval of the reaction time transpires during the period when the film is being taken up on the spool, it will be obvious that the thixotropic and adhesive properties of the processing material are as important as its processing activity.

While there has been shown what is believed to be a preferred embodiment of the miniature film processor of the invention, it will be appreciated that many changes and modifications may be made therein without departing from the essential spirit of the invention as set forth in the annexed claims.

What I claim is:

1. A hand held film processor comprising a housing divided into three chambers and having a removable cover which when closed seals the chambers against light, the chamber at one end of the housing being adapted to receive a film cassette, the chamber at the other end having a take-up spool therein, means on the exterior of said housing to wind said spool, means communicating with the central chamber to feed a monobath paste therein, said central chamber constituting a reservoir for said paste and having a slit to apply said paste to the surface of film drawn from said cassette across said reservoir onto said take-up spool, said means to feed monobath paste into said central chamber being constituted by a coupling to receive a squeeze tube containing said paste.

2. A film processor as set forth in claim 1, wherein said paste is formed by a monobath solution having thixotropic material incorporated therein.

3. A film processor, as set forth in claim 1, wherein said three chambers are formed by two partition walls within said housing, said walls having upper extensions which are inwardly directed to define said slit.

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