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APPARATUS FOR RAPID DEVELOPMENT OF PHOTOGRAPHIC FILM

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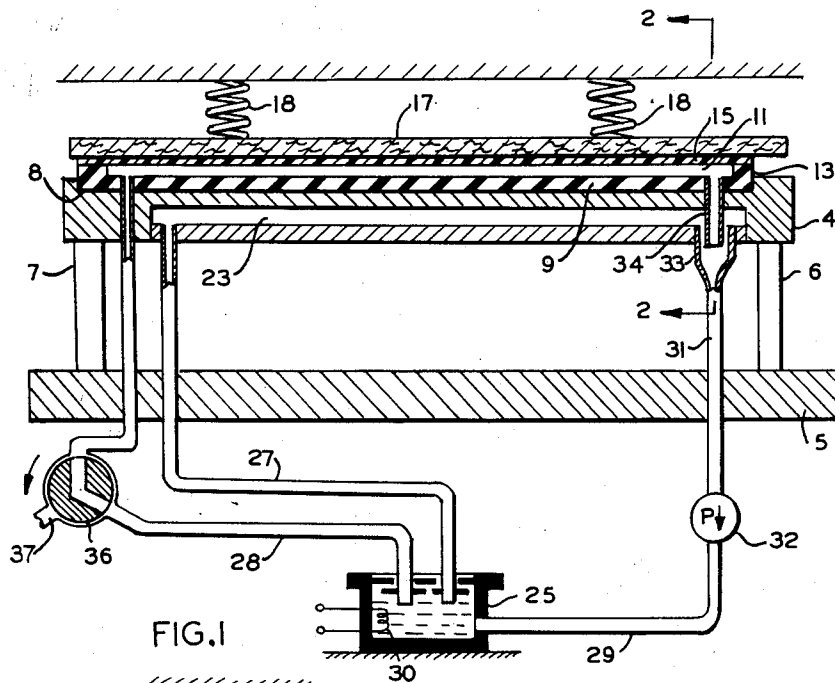


FIG.1

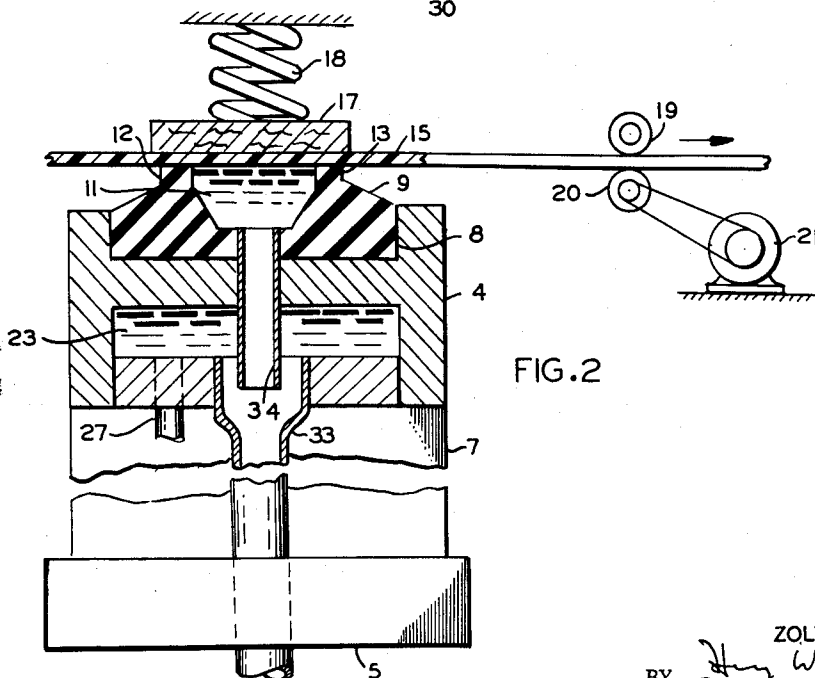


FIG.2

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APPARATUS FOR RAPID DEVELOPMENT OF
PHOTOGRAPHIC FILMZoltan Takats, Vestal, N.Y., assignor to General Aniline
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3 Claims. (Cl. 95—89)

This invention relates to photographic processing apparatus and, more particularly, to an apparatus for rapid development of photographic film or similar material.

In certain photographic applications it is of great importance that the exposed sensitized material be rapidly developed so that the result may be inspected without delay.

It is the primary object of this invention to provide an apparatus which, while of extremely simple construction, will permit continuous, even development of a moving photographic film without creating streaks or other blemishes.

It is a particular feature of the invention that the apparatus constructed in accordance therewith circulates developing solution in a narrow confine and applies this to the emulsion side of a moving film web, at the same time removing excess developer from the surface of the film so that further development is arrested.

The processing technique for "arrested development" is disclosed in my application S.N. 735,128 concurrently filed, and the present apparatus is primarily intended to accomplish the result outlined therein.

Other objects and features will be apparent from the following description of the invention, pointed out in particularity in the appended claims and taken in connection with the accompanying drawing, in which:

FIG. 1 is an elevational view in cross section of the apparatus, illustrated in schematic form; and

FIG. 2 is a sectional view taken along lines 2—2 of FIG. 1.

Referring to the drawing, it is seen that the apparatus consists of an elongated support 4 which may be mounted on a base 5 by means of legs 6 and 7. The support has a longitudinal channel 8 in which is imbedded an insert 9 of resilient material such as plastic or rubber. In practice, the latter has proved particularly useful for this purpose. The insert 9 is so constructed as to form a trough 11 having vertically extending edges or lips 12 and 13. The film 15 travels transversely over the insert 9. A pressure pad 17, biased by springs 18, presses the film 15 firmly against the lips 12 and 13 so as to seal the area overlying the trough 11.

The film 15 may be moved in any suitable manner across the trough 11, for example, between a pair of rollers 19 and 20 as diagrammatically shown in FIG. 2, the roller 20 being driven by a suitable motor 21.

The support 4 is preferably of stainless steel or similar material and also has a cavity 23 which runs parallel with the trough 11. The purpose of this is to permit circulation of liquid in the body of the support 4 so as to maintain it at a certain temperature.

In the preferred embodiment, the same liquid, namely, the solution used for the development of the film circulating in the trough 11, is also employed for conveying heat to the support 4 by circulating it in the cavity 23. The circulatory system consists essentially of a liquid storage tank 25 having two outlet conduits 27 and 28 and a return conduit 29. A heating element, shown diagrammatically as a coil 30, is located in the tank 25. The current to the coil 30 would normally be controlled by a thermostatic switch, not shown here, since such an arrangement is conventional and is not part of the present invention.

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The solution in the tank, being controlled as to temperature, will also effectively maintain a predetermined temperature in the cavity 23 so that variations in temperature of the developing liquid in the trough be thereby minimized.

The conduit 27 connects to the inlet opening of the cavity 23, the outlet of which is serviced by the conduit 31 which terminates in the suction end of the pump 32, the pressure end of which connects to the return conduit 29. In this manner, a direct circulation is established between the tank 25 and the cavity 23.

It is to be noted that the conduit 31 has a funnel-shaped portion 33 of larger diameter where it enters the cavity 23. The outlet pipe 34 of the trough 11 extends into the portion 33 so that this assembly will function as an aspirator. The suction produced by the flow of liquid in the cavity 23 and the conduit 31 is thus utilized to create a flow of developing liquid in the trough 11 from the tank 25 through the outlet conduit 28, pipe 34, conduit 31 and the pump 32.

The aspirator-type liquid displacement in the trough 11 has the particular advantage that circulation is ancillary to the main liquid flow in the cavity 33 and may be stopped at any time without disturbing the operation of the pump or the flow in the cavity 33 and that the suction created enhances the adherence of the film to the lips of the trough 11.

For the purpose of stopping circulation in the trough 11, there is provided an air valve 36 in the conduit 28. When this valve is opened, air may enter through the opening 37 into the trough 11 and the suction produced in the aspirator will remove all residual liquid. By this arrangement, the trough can easily be cleaned at any time desired while the liquid flow is maintained in the body of the support 4 to maintain the necessary temperature.

Referring to the operation of the system, the tank 25 is filled with suitable developing solution, for example, the type described in the aforementioned co-pending application, and the pump started to circulate the liquid in the cavity 23 until the required temperature is established. Circulation may now be started in the trough 11 by simply closing the air valve 36. The film 15 is passed across the trough 11, firmly contacting the lips 12 and 13, whereby the area over the trough 11 is completely sealed by the film.

The developing liquid in the trough 11 contacts the emulsion side of the film 15, development taking place as the film 15 is moved between the rollers 19 and 20 by the motor 21. It is to be understood that the speed of film travel may be regulated by the motor 21 by suitable gearings or electrical controls, not shown here, so that sufficient time is assured for the developing liquid to be absorbed by the emulsion for proper development.

The intimate contact between the lip 13 and the emulsion side of the film acts as a squeegee to remove all excess developer from the surface of the film 15. In this manner, any further development is arrested and, as pointed out in application S.N. 735,128, the image may be viewed in bright light without further fogging.

I claim:

1. Apparatus for applying developing liquid to a moving photographic film or the like comprising an elongated solid support having an insert of resilient material, said insert having walls defining a trough, said support enclosing a cavity below said trough and running substantially parallel therewith, a container for developing liquid, conduits interconnecting said container with said cavity including a pump for circulating the liquid between said container and said cavity, inlet and outlet openings in said trough, a conduit interconnecting said inlet opening with said container and aspirator means in the conduit interconnecting said cavity and said container for producing a

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circulation of developing liquid in said trough, said trough having vertically extending lips adapted to contact said film and seal the area overlying said trough, means for pressing said film thereagainst while it moves in the direction transverse to said trough.

2. Apparatus for applying developing liquid to a moving photographic film or the like comprising an elongated, solid support having an insert of resilient material, said insert having walls defining a trough with vertically raised edges, said support enclosing a cavity below said trough and running substantially parallel therewith, a container for developing liquid, a heating element in said container, a circulating system including conduits interconnecting said container with said cavity and a pump for circulating the liquid between said container and said cavity, inlet and outlet openings in said trough, a conduit interconnecting said inlet opening with said container and aspirator means connected to said system for producing a circulation of developing liquid in said trough, said raised edges being adapted to contact said film and seal the area overlying said trough, and means for pressing said film thereagainst while it passes across said trough in the direction transverse to said edges.

3. Apparatus for applying developing liquid to a moving photographic film or the like comprising an elongated

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solid support having an insert of resilient material, said insert having walls defining a trough with vertically raised edges, said support enclosing a cavity below said trough and running substantially parallel therewith, a container for developing liquid, a heating element in said container, conduits interconnecting said container with said cavity including a pump for circulating the liquid between said container and said cavity, inlet and outlet openings in said trough, a conduit interconnecting said inlet opening with said container and said outlet opening provided with aspirator means located in the conduit interconnecting said cavity and said container for producing a circulation of developing liquid in said trough, said raised edges being adapted to contact said film and seal the area overlying said trough, and means for pressing said film thereagainst while it passes across said trough in the direction transverse to said edges.

References Cited in the file of this patent

UNITED STATES PATENTS

2,631,511	Tuttle	Mar. 17, 1953
2,780,974	Fairbank	Feb. 12, 1957
2,856,829	Orlando	Oct. 21, 1958