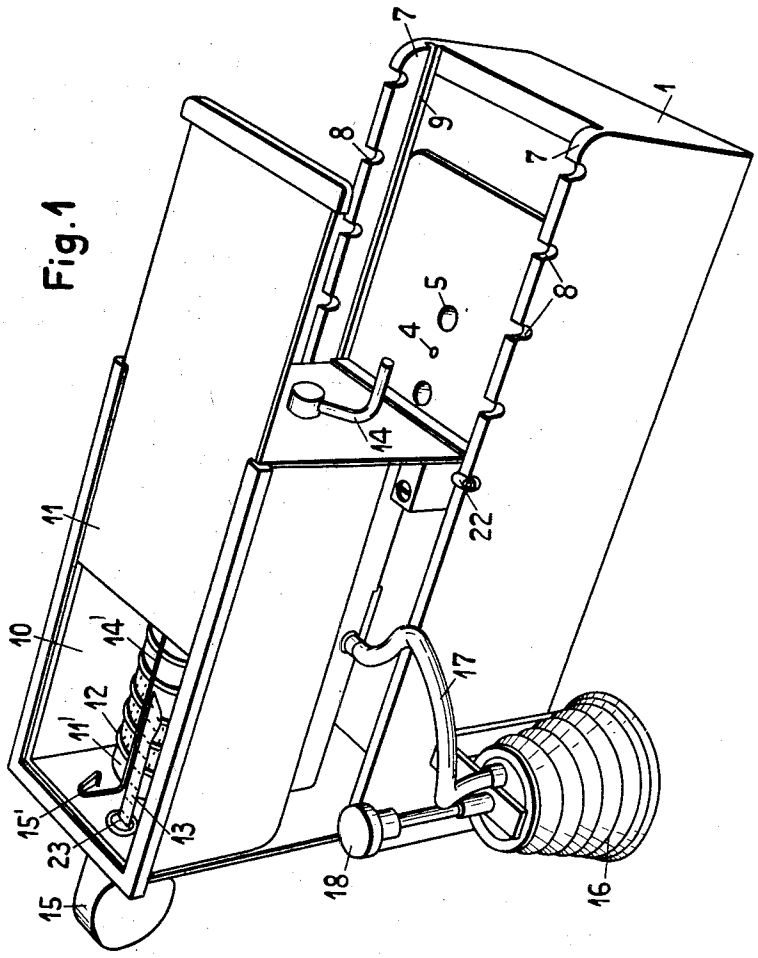
March 4, 1958 P. E. MÄDER 2,825,272

DEVICE FOR THE DEVELOPING, FIXING AND WASHING OF CINEMATOGRAPH FILMS IN DAYLIGHT

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Fig. 1



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Fig. 2

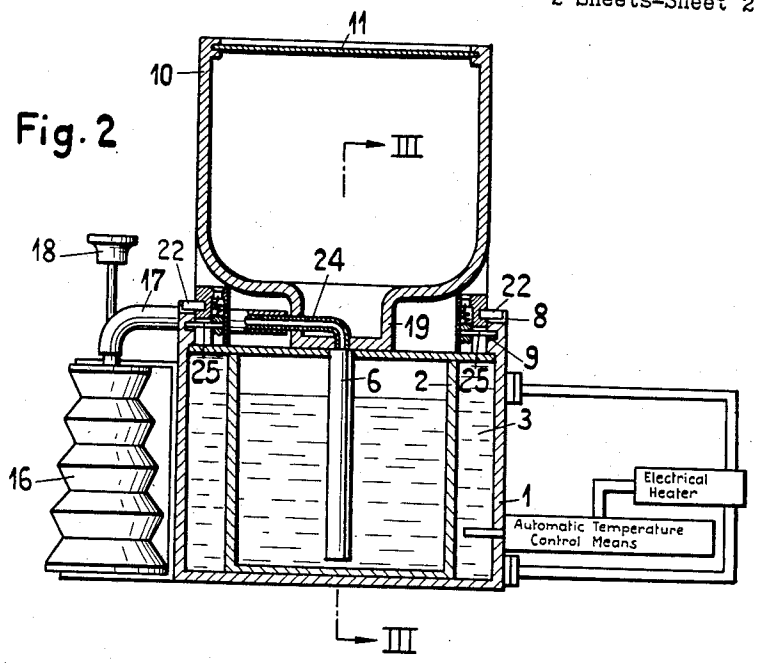
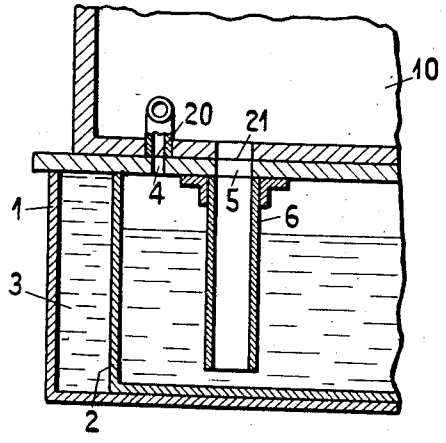


Fig. 3



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DEVICE FOR THE DEVELOPING, FIXING AND WASHING OF CINEMATOGRAPH FILMS IN DAYLIGHT

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14 Claims. (Cl. 95—90)

The present invention relates to a device for the developing, fixing and washing of cinematographic films, and has the main object of providing a device of the kind referred to which can be operated in daylight without the need for a dark room.

It is another object of the invention to provide a device of the kind referred to which is particularly suitable for the developing of target films or the like, where it is essential to perform all the operations as quickly as possible.

With these and other objects in view I provide a device for the developing, fixing and washing of cinematograph films in daylight, comprising in combination: a tank having several compartments each for one of the photographic baths, a container receiving the film to be treated, adjustable relative to the said tank into operative position with respect to a selected compartment thereof, guide means guiding the film through the said container, a riser tube mounted in each of the said compartments issuing at the top thereof and adapted to contact in a liquid- and air-tight manner an aperture provided at the bottom of the said container, a source of compressed air having a discharge pipe movable in conjunction with the said container and adapted to contact with its discharge opening in an air tight manner an aperture provided in the top of each compartment.

For example a bellows is provided as the said source of compressed air.

Preferably the said tank is subdivided into five compartments, the first one receiving a first developer, the second one a second developer, the third one a stop bath, the fourth one a fixing bath, and the fifth one washing water.

The device according to the invention may comprise in addition: resilient means operatively engaging the said container and keeping the openings of the said container in tightly sealed contact with the corresponding openings of that tank compartment upon which the said container is actually adjusted, and also a rotatable drum having a helical guide rib on its circumference mounted in the said container, the said guide rib engaging the edge of the film to be treated in the said device. A hand crank may be coupled to the said drum, rotating the same in operation.

Moreover the said device may comprise in addition: a hooked stationary guide rod arranged in the said container alongside the said drum at a distance therefrom, the said guide rod guiding a film introduced into the said container in the axial direction of the said drum helically around the said drum. Preferably the said guide rod is tiltably pivoted to the said container.

A preferred form of the device for the developing, fixing and washing of cinematograph films in daylight comprises in combination: a tank having several compartments each for one of the photographic baths, a container receiving the film to be treated, adjustable relative to the said tank into operative position with respect to a selected compartment thereof, projections provided on the said container, a tub surrounding the said tank, guides arranged on top of the said tank shiftably guiding the said container, rests provided on the said tub adapted to be engaged by the said projections of the said container and locating the latter in its position adjusted, guide means guiding the film through the said container, a riser tube mounted in each of the said compartments issuing at the top thereof and adapted to contact in a liquid- and air-tight manner an aperture provided at the bottom of the said container, a source of compressed air having a discharge pipe movable in conjunction with the said container and adapted to contact with its discharge opening in an air-tight manner an aperture provided in the top of each compartment.

Preferably the said tub surrounding the said tank forms a water bath, and provisions are made for an electric heating means for the said water bath arranged in the said tub, and for automatic temperature regulating means responsive to the temperature of the said water-bath and operatively connected to the said heating means, controlling the current supply thereto.

These and other features and objects of the invention will be clearly understood from the following description of an embodiment thereof given by way of example with reference to the accompanying drawings, in which:

Fig. 1 shows a perspective view of the device.

Fig. 2 a transverse section thereof, and

Fig. 3 a part-section along the line 3—3 of Fig. 2.

The device illustrated for the developing, fixing and watering of cinematograph films in daylight comprises a tank **2**, which contains the various photographic baths in that it is subdivided in the longitudinal direction, for example into five compartments.

In a first compartment is contained a developer, in a second compartment a second developer, in a third compartment a stop bath, in a fourth compartment a fixing bath, and in a fifth compartment water for washing the finished exposed and developed film. As will be seen from Fig. 2, the tank **2** is accommodated in a tub **1** in such a manner that it is surrounded by a water bath **3**. This bath is adapted to be heated by for example electrical heating means and can be provided with an automatic temperature control means.

Each of the five compartments of the tank **2** has on its top a small aperture **4** and a hole **5**. These holes are arranged in the longitudinal centre line of the tank. In continuation of each hole **5** a riser pipe **6** is provided which extends into the tank compartment concerned.

On the tub **1** on both sides rails **7** are provided which have rests **8** and are provided at its juxtaposed faces with guides **9**.

Over the tank **2** and the tub **1**, respectively, the developing container **10** is slidable on the guides **9**.

This container is adapted to be closed by a lid **11** tightly against light, and contains a drum **11'** on which there is a rib **12**, the helical pitch of which is chosen in such a manner that the axial distance of the turns corresponds to the width of the film **13** to be developed. The drum **11'** is rotatable by hand by means of a crank **14**. Above the drum **11'** a film guiding rod **14'** is provided, the cranked ends **15'** (Fig. 1) of which are pivotally journalled in a side wall of the container **10**. The rod **14'**, owing to its weight and to its eccentrical arrangement, rests on the ribs **12**, and causes the film **13** entering in the axial direction of the drum **11'** to be deflected and to place itself, as illustrated, between the turns **12**. The film emerging from the casing **15** is then directed with its sensitive side downward in its portion running in the axial direction of the drum. Owing to the deflection by the rod **14'**, the sensitive layer comes to lie outwardly on the drum **11'**.

The tub 1 carries an air bellows 16, which is in communication with the container 10 through a hose connection 17. The operation of the bellows is effected by a pusher 18.

In the casing 10 a drainage gutter 19 is provided, and as will be seen from Fig. 2, the pipe 17 leads to a bend 24 built into the container 10, which has an orifice 20 directed downwardly. Moreover in the bottom of the container 10 an aperture 21 is provided, the diameter of which corresponds to that of the riser tubes 6. The openings 20, 21 are arranged in such a manner that they correspond with the apertures 4, 5 of one of the tank compartments, any time the pins 22 of the casing 10 engage in certain rests 8. For the guidance of the container 10 in the tub 1 there is provided, in addition to the pins 22, a further pair of rigid pins on the left end (Fig. 1) of the container 10, which slide in the guides 9. Moreover, resilient pins 25 are provided, which are arranged side by side with the pins 22 and secure the container 10 on the tub 1.

The film magazine 15 with the exposed film is attached to the container 10 in a manner not shown, for example by means of a bayonet joint. The exit opening of the magazine comes then to lie on the entrance opening 23 of the container 10.

The manner of operation of the device described is as follows:

At the beginning of the treatment of a film the container 10 engages with its pins 22 in the first rests 8, i. e. the container is in the position illustrated in Fig. 1. The apertures 20, 21 are then positioned over the holes 4, 5 of the first tank compartment. The resilient pins 25 arranged side by side with the pins 22 take care that the container 10 is pressed on to the tank 2. Between the container 10 and tank 2 conveniently a packing is provided so that these two components of the device rest upon one another in an air- and liquid-tight manner. When now the knob or pusher 18 is pressed downward and the bellows 16 is thereby compressed, air is pressed through the bend 24 and the apertures 20, 4 into the first tank compartment, which has the consequence that part of the liquid contained therein rises into the container 10. At the same time the drum 11' is turned by means of the crank 14, and thereby the film 13 is wetted on all sides by the first bath. When the knob 18 is released, the bellows 16 rises, whereby a vacuum is generated and the liquid is sucked again from the container 10 back into the first tank compartment. By pressing down the knob 18 for a longer or shorter time, the period of development in the individual baths can be dosed at will.

When the film has been subject to treatment by the first bath and the liquid has returned from the container 10 into the first tank compartment, the container is shifted in the longitudinal direction on the tub 1, until the pins 22 drop into the next rests 8. Thereupon the whole process is repeated. The film, after treatment by the five baths, is developed, fixed and washed to a finish. All these operations can be carried out in daylight very well and quickly, owing to which the construction illustrated is particularly suitable for the developing of target films.

While I have described herein and illustrated in the accompanying drawings what may be considered a typical and particularly useful embodiment of my said invention, I wish it to be understood that I do not limit myself to the particular details and dimensions described and illustrated, for obvious modifications will occur to a person skilled in the art.

What I claim as my invention and desire to secure by Letters Patent, is:

1. A device for the developing, fixing and washing of cinematograph films in daylight, comprising in combination: a tank having several compartments each for one of the photographic baths, a container receiving the film to be treated, adjustable relative to said tank into operative position with respect to a selected compartment thereof,

projections provided on said container, a tub surrounding said tank, guides arranged on the top of said tank displaceably guiding the said container, rests provided on said tub adapted to be engaged by said projections of said container and locating the latter in its position as adjusted, guide means guiding the film through said container, a riser tube mounted in each of said compartments issuing at the top thereof and adapted to contact in a liquid- and air-tight manner an aperture provided at the bottom of said container when the latter is adjusted in position above the respective compartment, a source of compressed air having a discharge pipe movable in conjunction with said container and adapted to contact with its discharge opening in an air tight manner an aperture provided in the top of each compartment when said container is adjusted in position above the latter, and air pressure means adapted for pressing air through said inlet pipe into said compartment so as to exert pressure on the liquid therein and cause the same to rise through said riser tube into said container and act upon said cinematographic film therein.

2. A device as claimed in claim 1, wherein said tub surrounding said tank forms a water bath.

3. A device as claimed in claim 2, comprising in addition: electric heating means for said water bath arranged in said tub, and automatic temperature regulating means responsive to the temperature of said water bath and operatively connected to said heating means controlling the current supply thereto.

4. An apparatus for developing, fixing and washing photographic materials, such as cinematographic films and the like, in daylight, comprising an elongated tank, closed at the top and consisting of several compartments each destined for receiving a different liquid for the treatment of said photographic material, a developing container for receiving undeveloped photographic material therein, said container being mounted on top of said tank means for displacement by sliding said container on said tank and causing said container to register successively with each of said compartments, there being an opening in the bottom of said container, means for adjusting said container in position above each of said compartments, means for introducing air under pressure through said container into the one of said compartments with which said container is caused to register so as to exert pressure on the liquid therein, riser means in each of said compartments in registration with said container opening when said container is adjusted into position above each of said compartments for the liquid to rise from the compartment registering with said container into the latter and act upon the photographic material therein when said liquid is under air pressure.

5. A device as claimed in claim 4, wherein the said source of air under pressure is a bellows.

6. A device as claimed in claim 4, comprising in addition: a film magazine detachably connected to the said container in a light-tight manner.

7. A device as claimed in claim 4, wherein the said tank is subdivided into five compartments, the first one receiving a first developer, the second one a second developer, the third one a stop bath, the fourth one a fixing bath, and the fifth one washing water.

8. A device as claimed in claim 4, comprising in addition: a rotatable drum having a helical guide rib on its circumference mounted in said container, said guide rib engaging the edge of the photographic material such as cinematographic film and the like to be treated in the said device.

9. A device as claimed in claim 8, comprising in addition: a hand crank coupled to said drum and rotating the same in operation.

10. A device as claimed in claim 8, comprising in addition: a hooked stationary guide rod arranged in said container along-side said drum at a distance therefrom, said guide rod guiding a film introduced into said con-

tainer in the axial direction of said drum helically around said drum.

11. A device according to claim 10, wherein said guide rod is tiltably pivoted to the said container.

12. An apparatus for developing, fixing and washing photographic materials such as cinematographic films and the like, in daylight, comprising an elongated tank closed at the top and consisting of several compartments each destined for receiving a different liquid for the treatment of said photographic material, a developing container for receiving undeveloped photographic material therein, said container being mounted on top of said tank means for displacement by sliding said container on said tank and causing said container to register successively with each of said compartments, a bottom portion of said container being provided with an opening, an inlet pipe leading from the outside through said container to an orifice in said bottom portion adjacent said opening, a riser tube mounted in each compartment and having an orifice in the top thereof, each compartment having an opening at the top adjacent said riser tube orifice, said opening in each of said compartments being spaced from said riser tube orifice therein by the same distance as said inlet pipe orifice from said opening in said container bottom portion, means for adjusting said container in position above each of said compartments in successive order and causing said orifice and opening of said bottom portion to register with said opening and orifice respectively in said compartment, air pressure means being connected to said inlet pipe outside said container and being adapted for pressing air through said inlet pipe into said compartment so as to exert pressure on the liquid therein and cause the same to rise through said riser tube into said container and act upon said photographic material therein.

13. A device as claimed in claim 12, comprising in addition: resilient means operatively engaging the said container and keeping the opening and inlet pipe orifice of said container in tightly sealed contact with the corresponding riser tube orifice and opening respectively of that tank compartment upon which the said container is actually adjusted.

14. An apparatus for developing, fixing and washing photographic materials such as cinematographic films and the like, in daylight, comprising an elongated tank, having a closed top wall, a plurality of compartments disposed in said tank successively in longitudinal direction, for receiving liquids for treating the photographic material therein, each compartment being provided with a first and second opening in said top wall, said first opening being spaced from said second opening at the same distance for each compartment, a riser pipe in each of said compartments attached to and registering with said first opening, guiding means on top of said tank extending in the direction of said successive compartments, a developing container mounted on said guide means and adapted displaceably for successive registration with said compartments, for receiving undeveloped photographic material therein, means for sealing said container hermetically against daylight, a bottom portion for said container having a first and second aperture being disposed therein for registration with said first and second opening respectively in one of said compartments, an inlet pipe leading from the outside through said container to said second aperture, air pressure means connected to said inlet pipe outside said container, and means for adjusting said container in position above one of said compartments for registration of said first and second aperture of said container with said first and second opening of said compartment respectively, said air pressure means being adapted for pressing air through said inlet pipe into said compartment so as to exert pressure on the liquid therein and cause the same to rise through said riser tube into said container and act upon said photographic material therein.

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