

March 18, 1930.

L. CAUTE

1,750,704

APPARATUS FOR THE PREPARATION OF CINEMATOGRAPHIC FILMS

Filed April 26, 1928

2 Sheets-Sheet 1

Fig. 1

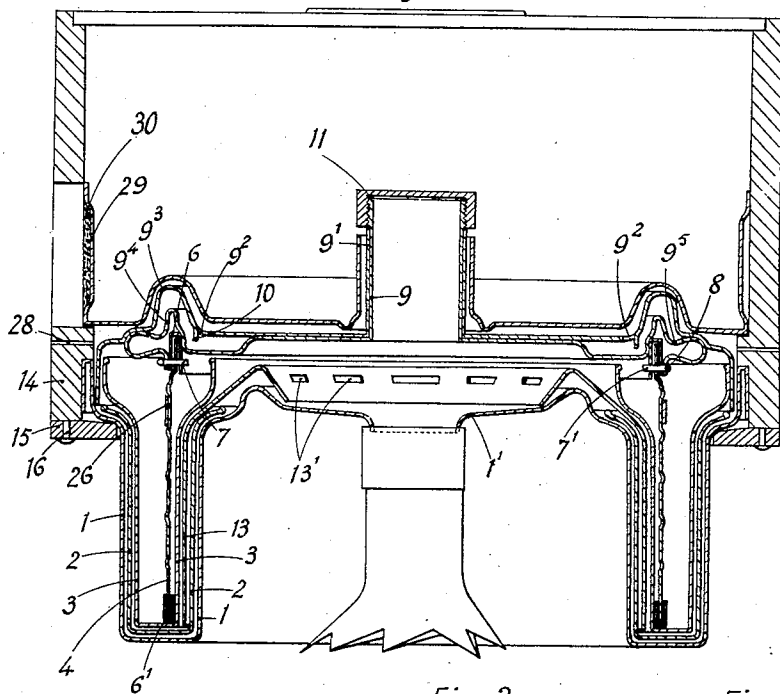


Fig. 2

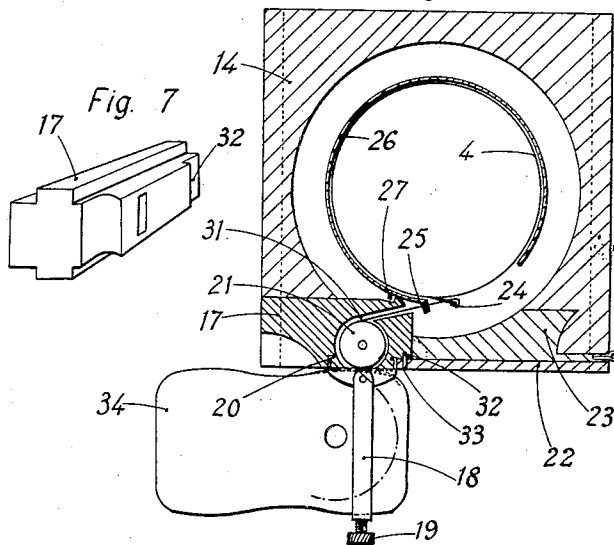
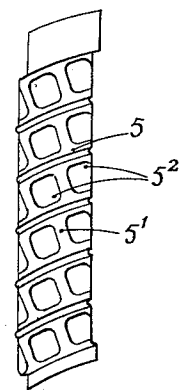


Fig. 3



L. Caute
INVENTOR

By: Marks & Clark
Phys.

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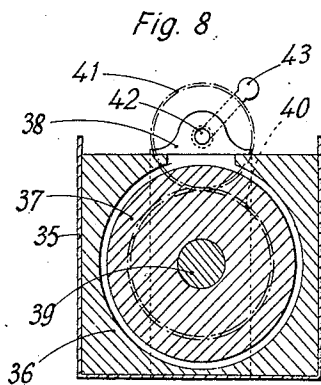
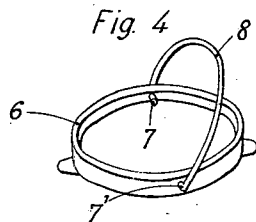
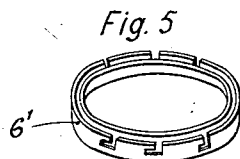
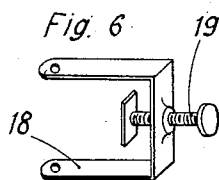
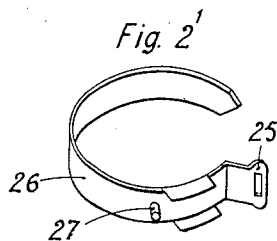
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2 Sheets-Sheet 2



L. Caute
INVENTOR

By: Mark & Clark
ATTYS.

UNITED STATES PATENT OFFICE

LOUIS CAUTE, OF EZANVILLE, FRANCE, ASSIGNOR TO LOUIS HENRY, OF CHANGAI, CHINA

APPARATUS FOR THE PREPARATION OF CINEMATOGRAPHIC FILMS

Application filed April 26, 1928, Serial No. 273,132, and in France May 3, 1927.

The present invention has for its object improvements in the construction and arrangement of recipients for the preparation of cinematographic films, and relates to a new arrangement whereby such films can be handled in absolute darkness during the whole series of operations which are required, such as winding, developing, washing, fixing, or reversal, for the obtainment of a negative or a direct positive.

By my said arrangement of the vessels, I am enabled to obtain a considerable economy of chemical products by reducing the capacity of the said vessels, thus affording a reduction in the amount of the necessary bath and also of the washing water.

The following description with reference to the appended drawings shows an embodiment of the said invention.

Fig. 1 is a view showing a vertical cross section of a recipient according to the invention.

Fig. 2 shows a horizontal section of the device for winding the film upon the drum.

Fig. 2' is a view of the helical guide assuring the regular winding of the film upon the drum.

Fig. 3 is a view of the sections forming the said drum.

Figs. 4 and 5 show the rings used to assemble the said sections.

Fig. 6 shows the strap maintaining the film holder upon the block serving to assure the winding of the film upon the drum.

Fig. 7 is a perspective view of the film block.

Fig. 8 is a modified form of the said recipient.

My said apparatus comprises a set of three vessels 1, 2 and 3 which have an annular cross section and are engaged in one another. Due to the annular arrangement thus offered, I am enabled to reduce to the minimum the amount of the bath or the washing water required to treat the cinematographic films.

In the recipient thus formed is engaged a drum 4 consisting of a set of separate sections 5 (Fig. 3) which are fitted together by their overlapping edges and are maintained in the cylindrical form by two U-shaped rings 6—6'

(Figs. 4 and 5). The drum 4 serves to support the film under treatment. In the ring 6 are engaged two tenons 7, 7' connected together by a bent rod 8 forming a spring as well as a handle for manipulating the drum 4, and also a catch for securing the sections 5 to the ring 6. At the same time, the said tenons serve to connect a cover 9—whose function will be further explained—with the drum 4 and hence with the upper ring 6.

The cover 9 allows the film to be washed while the recipient is placed in the light, but without allowing the light to enter the said recipient, and for this purpose the cover consists of two principal parts 9, 9¹ (Fig. 1). The part 9¹ of the cover is pierced with the apertures 9² for the circulation of the washing water, and it comprises a beaded or flanged edge 9³ which prevents this water from flowing to any part except into the interior of the recipient. Into the said flanged part is fitted a like flanged part 9⁴ formed on the part 9 of the cover which is apertured in 9⁵.

This affords an assembled device which provides for the circulation of the water while providing for a light-tight operation, and in order to prevent all reflection of the light, I employ the screens 10 which are formed by bending the metal while perforating the part 9² of the cover to form the apertures 9¹ serving for the circulation of the wash water which is supplied by a suitable inlet.

The parts 9 and 9¹ of the cover are held together by a control knob 11 mounted on the part 9 of the cover. A sleeve 13 is engaged in the washing vessel 2, and it serves as a vertical partition so as to oblige the wash water to flow in a well-determined manner towards the centre at which the apertures 13¹ are provided for the purpose. This circulation of the water will remove from the gelatin the substances it has absorbed during the different operations, and will constantly renew the water used with the film. The sleeve 13 forms a partition and obliges the water supplied by the top part of the cover (in two parts 9 and 9¹) to descend along the film which is wound on the drum 4 and with which it is always in contact, and the water

then rises and flows in the interior through the orifices 13¹ without making further contact with the film or with the fresh water, and due to this arrangement this water will not be contaminated by the products of the washing.

By my said construction, I further obtain a great economy of wash water due to its improved use, and can also wash the films with running water simply by means of a bottle affording an automatic supply. This can be done in virtue of the disposition of the recipient which will not become entirely emptied by itself and always holds sufficient water. Should the water feed be stopped, in order to protect the film still in the water, the funnel shape of the inner flange 1¹ of the washing recipient allows the water to be discharged into a bottle and I may thus dispense with a sink or other complicated outfit.

The arrangement of the recipients and other parts is such that the whole is contained in a single box and forms a compact apparatus for traveling, for storage or the like.

As above stated, the said apparatus offers an economy of the baths employed, and it is for this reason that I adopt the annular form for the different vessels in use.

The drum 4 consists of removable sections in order that a certain number of such sections may be disposed in a chamber situated above the recipient. In the construction herein specified, the said chamber may contain the proper number of such sections to form eight drums, so that the operation may treat as many as eight films without being obliged to wait until the first one is dry in order to have the use of the drum. The films will remain upon the drum during the drying, and they can be dried more quickly from the fact that the drum may be rapidly rotated so as to expel the water.

My said device offers a great advantage from the fact that it exposes the whole surface of the film during the developing and the other operations, and these operations can be better observed. This arrangement is particularly valuable for the blackening of reversed films, since they can be exposed to the light upon the whole surface.

The film can be wound upon the drum 4, without needing to observe it, in a portable chamber 14 which is secured to the washing recipient 1 by a collar 15 which can be removed by simply turning it through a few degrees, thus releasing it from the studs 16 which are provided below the lower faces of the sides of the chamber 14.

The film need not be removed from its holder in order to be treated; the holder 34 is used as it is, after removing it from the view-taking camera. It is placed upon a support 17 to which it is secured by a strap 18, Fig. 6, and a screw 19; the two branches of

said strap are secured at their ends to a plate 20 provided with thick cloth or felt in such manner as to form a light-tight joint. A roller 21 mounted in the block 17—as shown in Fig. 2—serves to guide the film so that it will issue from its holder without scratching, and will be brought into the proper position, with the gelatin side out, so that it may be wound upon the drum 4. An exit channel 31, tangential to the roller 21, is formed in the block 17 to prevent the light from entering the dark chamber when the holder 34 is removed after the film has been wound upon the drum 4.

The block 17 is so shaped that it will be slidable on one of the sides of the chamber 14, as shown in Fig. 7. The hole 32 is provided for the insertion of a pin 33 secured to the slidable strip 22 mounted on a door 23; by sliding the said door to the left, the end of the film may be attached to the drum 4 to start the winding. Before attaching it to the stud 24 provided upon one of the sections 5 of the drum 4 and at its lower part, the end of the film is inserted into a slot 25 of a helical segment 26 disposed on the drum 4 in the helical channel formed by the slots 5' of the sections 5 when these are put together. The said guide is shown in Fig. 2', and it assures the regular winding of the film upon the drum 4. The sections 5 of the drum are pierced with the punched apertures 5² so disposed that when the film is wound upon the said drum, the image parts will coincide with the apertures 5² so that the film can be examined by transparency. The drum 4 can obviously consist of celluloid, glass or like material not requiring such apertures.

The segment 26 also serves to guide the drum 4 during the winding of the film. For this purpose a stud 27 may make contact with the block 17 and prevent the segment 26 from turning with the drum 4 in the given direction of rotation. When the drum is turned in the other direction, the end of the sector provided with the slot 25 will form a projection. The sector 26 is held upon the block 17 by two flanges so as to secure it in the vertical direction.

The sector 26 may be released by displacing the block 17 to the left so that the drum may be rotated during the different developing or other operations; said block may be moved without danger of admitting the light into the recipient, since it draws with it the sliding plate 22 which closes the opening. A closing member 28 is provided in order to cover the drum 4 provided with undeveloped film when changing the vessels or the like.

The dark chamber 14 is provided with a movable cover 29 of suitable shape which is faced with cloth 30 to make it lighttight. The said cover, which is movable in the dark chamber 14, may receive the drum 4 and its

covers 9, 9¹, the whole being secured by the knob 11. The drum 4 is operated for the winding of the film by means of the knob 11 which is turned in the proper direction. The drum 4 is screwed upon the segment 26 and descends in the recipient 1 which contains no liquid. During the descent, the top part 29 follows the drum 4 in such manner as to form a closing device.

Since the end of the film is attached to the stud 24 secured to the drum 4, when the film is entirely wound, the other end is still in the holder. Since it has been already acted upon by the light (or at all events cannot be used, since it has not been exposed) it can be exposed to the light by opening the holder, thus releasing the end attached to the stud of the holder, and securing it to the drum 4. For this purpose, I may use a movable attaching member formed of a piece of bent metal which is secured to one of the vertical sides of the apertures 5² of the drum 4.

Fig. 8 shows a modification providing for the developing in a dark chamber, while observing the film during the whole series of operations. For this purpose, the recipient is horizontal as shown at 35, and it may contain a block 36 for economizing the bath; the cylinder 37 serves to support the drum and is made imperforate in order to economize the bath. Two cheeks 38 support the shaft 39 of the cylinder 37, and serve to control the latter. One of the ends of the cylinder 37 may be provided with a gear wheel 40 coacting with a like wheel 41 keyed to the shaft 42 secured to one of the cheeks 38 adapted for control by a handle. A discharge cock may be placed at one end of the vessel 35 for the exit of the wash water.

The cheeks 38 are so placed that they may serve to support the drum 4 for the winding, the water removal, and the unwinding of the film. Herein, the filling block 36 is removed from the vessel 35.

The use of this vessel 35, while enabling the work to be carried out with a much reduced quantity of bath, and also enabling the operator to heat or cool the bath if required (in this case the block 36 may consist of a vessel of the proper shape provided with an orifice for the supply of hot or iced water), will further enable the operator to follow all the operations of developing and fixing, without exposing the film to the air, since it is always immersed. The whole surface of the film may be exposed to the operator's view or to the light for the operations of reversal or blackening.

The film may also be wound upon the drum and developed in full light, by placing it in a vessel analogous to the one shown in Fig. 8, which is closed by a cover provided with guides receiving the block 17 upon which is mounted the holder containing the exposed

film. The sector is (as before) engaged upon the drum 4. The said block, when moving upon the cover, is displaced due to its entraining by the sector, and it makes the vessel fluidtight.

In like manner, by the use of recipients of suitable size, I may employ several drums in order to develop a determined number of films.

I may further employ an electric lamp disposed in front of a window formed on one side for examining the film by transparency or by direct observation of the surface.

The said lamp may be provided with a non-actinic glass plate which is placed in the drum 4.

Obviously, the said invention is subject to all suitable modifications in detail. The invention consists essentially in a novel arrangement of vessels facilitating the different operations required for the obtainment of direct positive or negative films, whereby the manipulation of the film in the dark room will be avoided as much as possible.

Claims:

1. An apparatus utilizable in full light for the preparation of cinematographic films, comprising in combination a set of vessels having an annular form and fitting into one another, the outer vessel being disposed as to form near its centre a discharge outlet, a sleeve forming a partition placed between the inner vessel and the vessel immediately next the said inner vessel, an upper downturned flange on the said partition leading to the discharge outlet of the outer vessel, a drum upon which is wound the film to be treated removably disposed inside the inner vessel, a light-proof cover fitting with a light-tight joint over the said vessels, means connecting the film-drum to the cover, means for rotating the said drum about its axis exteriorly to the said cover, a dark chamber removably disposed upon the set of vessels, and in which the film drum may be removed from the set of vessels, a device exteriorly disposed on the side of the said chamber and allowing the film to be treated to be wound in the dark chamber on the film-drum.

2. An apparatus as claimed in claim 1, in which the drum consists of a plurality of sections assembled with their edges arranged in overlapping engagement, rings for holding said edges in position, and said sections having grooves so as to form in the drum a helical channel in which the film is located.

3. An apparatus as claimed in claim 1, in which the device exteriorly disposed on the side of the chamber and allowing the film to be treated to be wound in the dark chamber includes a block of suitable form slidable on one side of the said dark chamber and on which may be clamped the film holder, a roller arranged inside the block, a channel formed in the block tangentially to the said

roller and permitting without penetration of
light the film of the holder to be inserted in-
side the dark chamber and attached to the
film drum, and a guiding device coacting with
5 the drum and allowing the drum to be ro-
tated about its axis so as to wind the film and
simultaneously descending the drum from the
dark chamber inside the inner vessel, the said
chamber being provided with a slidable bot-
10 tom moving along with the drum.

In testimony whereof I affix my signature.

LOUIS CAUTE.

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