Feb. 1, 1927. 1,615,880

F. F. LUCAS

DEVELOPING CONTAINER

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Fig. 1.

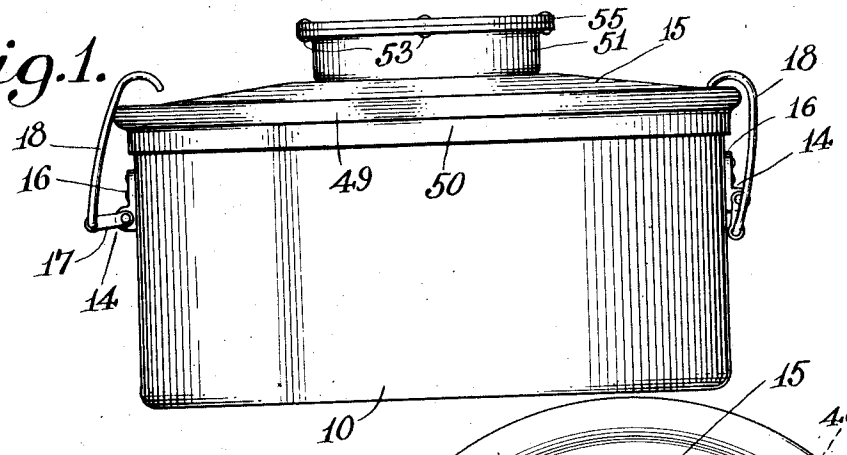


Fig. 2.

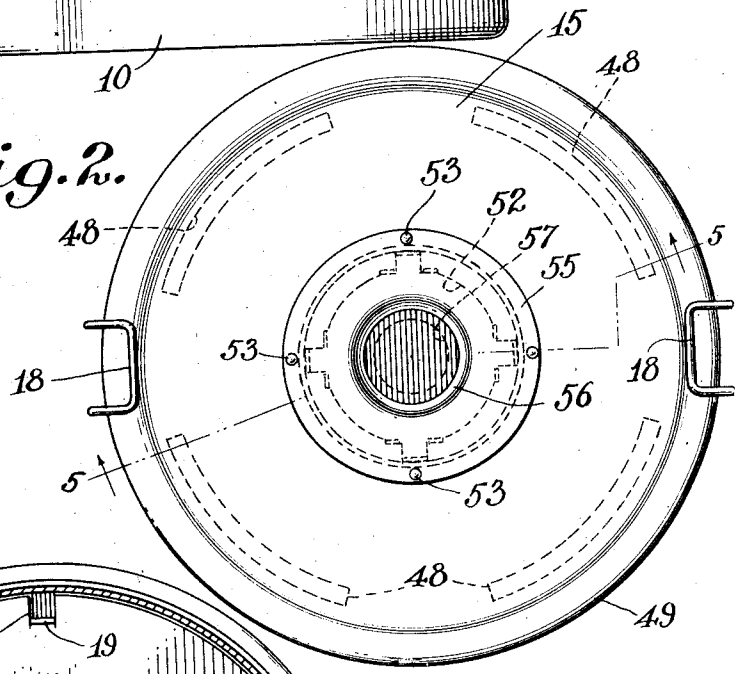
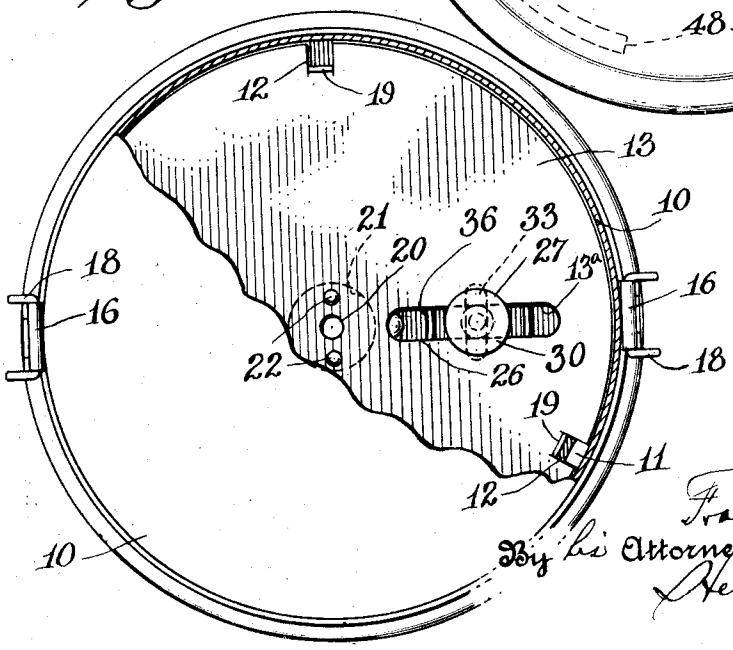


Fig. 3.



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Fig. 4.

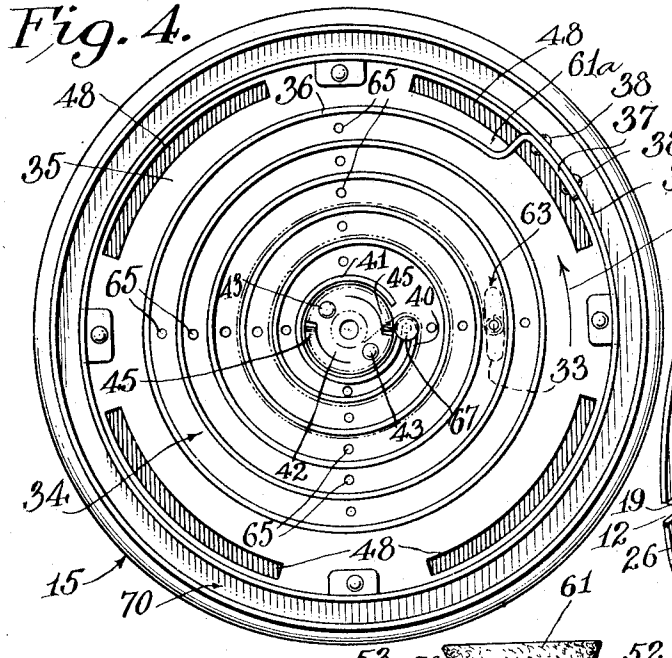


Fig. 6.

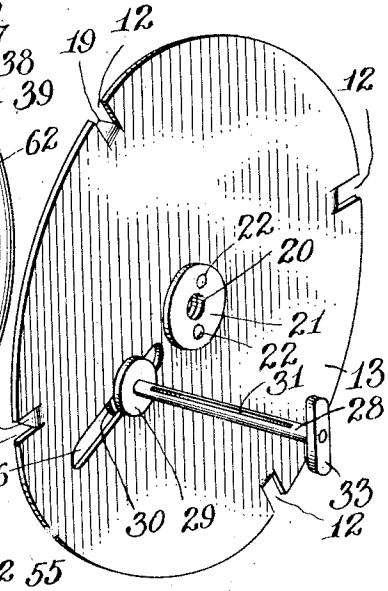


Fig. 5.

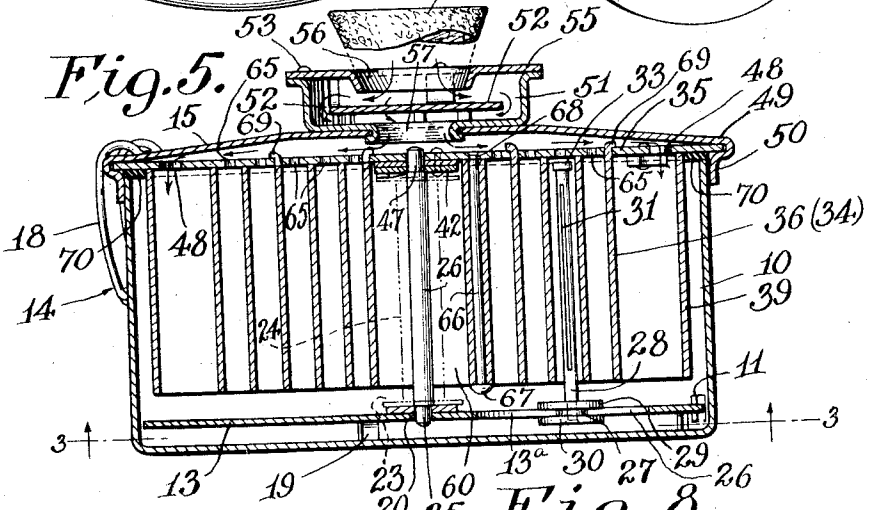


Fig. 7.

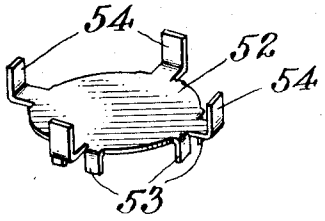
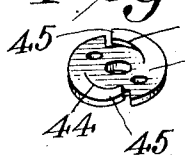


Fig. 8.



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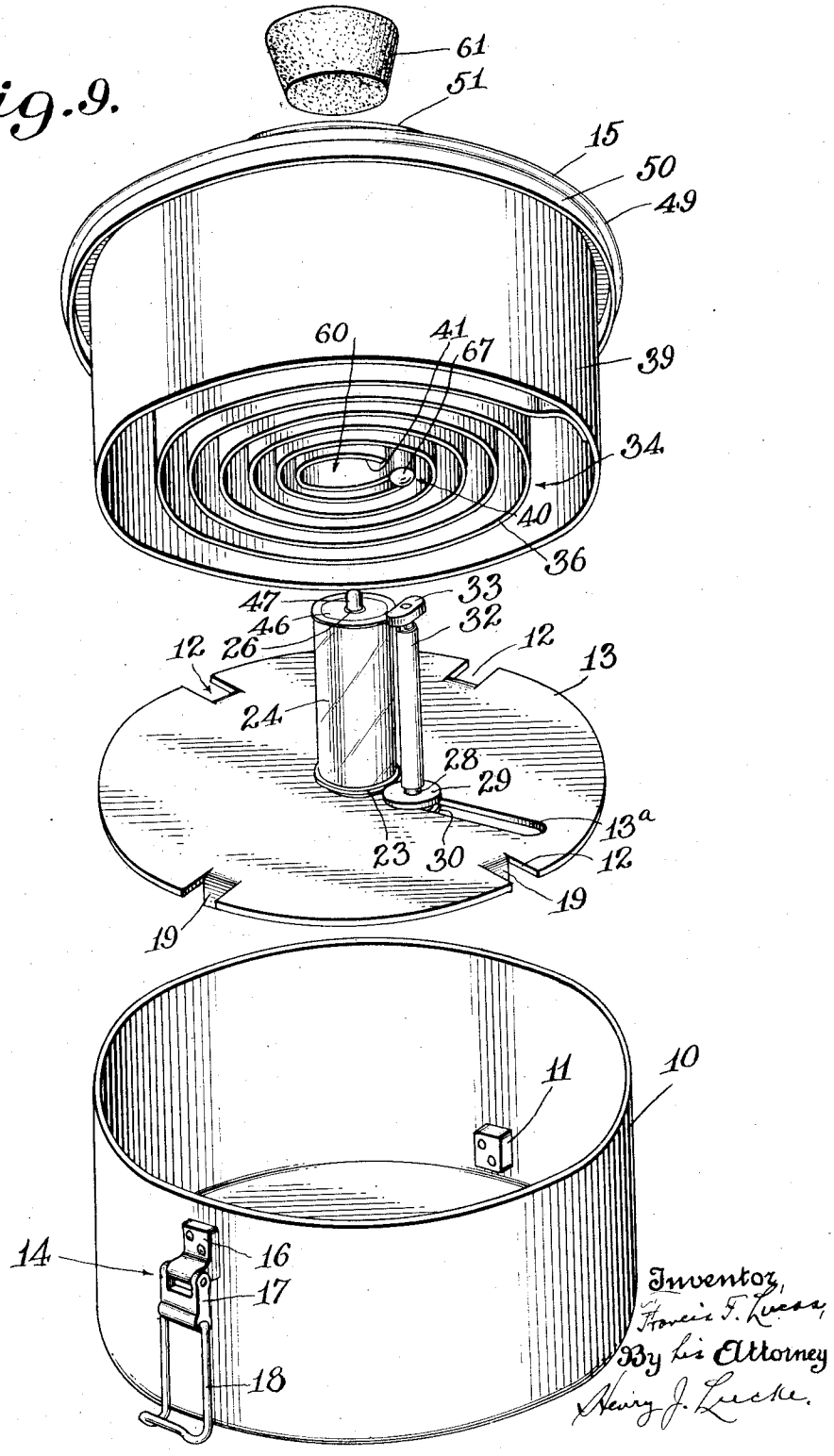
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DEVELOPING CONTAINER

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Fig. 9.



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Fig. 10.

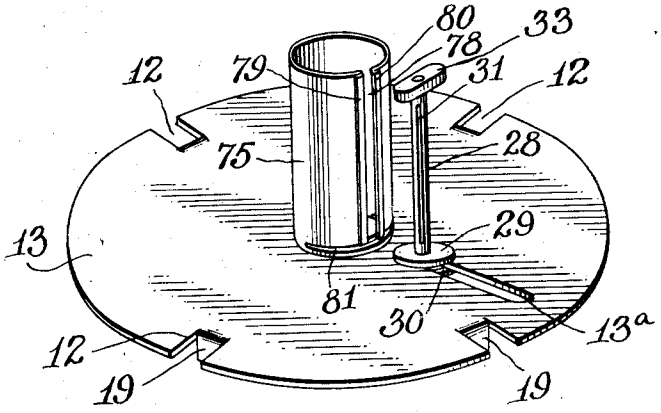


Fig. 12.

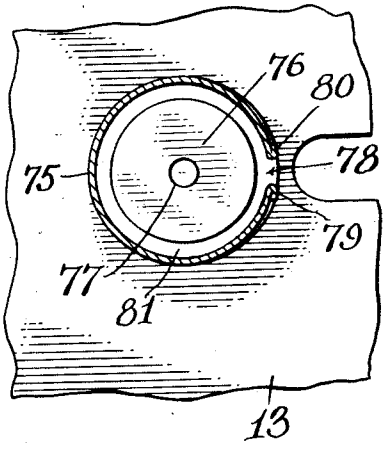
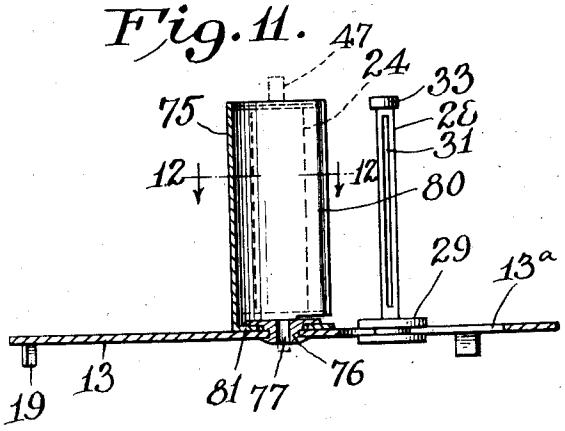


Fig. 11.



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Patented Feb. 1, 1927. 1,615,880

UNITED STATES PATENT OFFICE.

FRANCIS F. LUCAS, OF EAST ORANGE, NEW JERSEY.

DEVELOPING CONTAINER.

Application filed February 23, 1922. Serial No. 538,535.

This invention relates to receptacles for developing photographic films and like articles.

An object of this invention is to provide improved means in compact form for developing photographic films and like articles of relatively long length, whereby the manipulation and developing of the film are more effectually carried out.

A further object of the invention is to provide means for conveniently and readily receiving a film in rolled condition and improved means for separating the convolutions of the roll to afford access by the developing fluid to the entire sensitized surface of the film.

A further object of the invention is to provide a device, all parts of which subjected to chemicals are of non-corrosive metal or like inert material; a further object is to arrange the movable parts of my device in a manner to safeguard against dislocation when in use or when assembling or disassembling.

With the above and other objects in view, a preferred form of my invention comprises a rotary container, a removable support therein for receiving the rolled film, a member for holding the free end of the film, and a guide member cooperating with such holding element and provided with spirally extending means for guiding the convolutions of the film upon being unwound and for holding the convolutions apart and a cover provided for means for admitting the developing fluid through its inlet and capable of rotation relative to the container while protecting the enclosed film from the light, which rotative movement in coaction with the holding member and the guiding means causes the film to be unwound.

Further features and objects of the invention will be more fully understood from the following detail description and the accompanying drawings, in which—

Fig. 1 is a side elevation of the developer, showing the cover assembled and one locking hook in locked position and the other locking hook in unlocked position;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is a bottom plan view of the developer, and partially broken away on section line 3—3 of Fig. 5;

Fig. 4 is a detail bottom plan view of the cover and attached spiral guide member;

Fig. 5 is a vertical sectional elevation viewed on section line 5—5 of Fig. 2;

Fig. 6 is a perspective view of the false bottom and of the member for holding the free end of the film;

Fig. 7 is a detail perspective view of the trap in the inlet of the cover;

Fig. 8 is a detail perspective view of a collet;

Fig. 9 is an exploded view showing, bottom to top, firstly, the container; secondly, the false bottom, with a film roll positioned on its supporting member, and its free end secured to the holding member, both carried by the false bottom, and thirdly, the guide member and cover;

Fig. 10 is a perspective view showing a modified form of the invention in which the film roll is held within a resilient housing during the stage of assembling the developing device, to safeguard against self-unrolling of the film;

Fig. 11 is a vertical central section of Fig. 10; and

Fig. 12 is a detail sectional view, on an enlarged scale, on line 12—12 of Fig. 11.

Referring to the drawings, and particularly Fig. 9, the developer comprises the container 10 shown in the form of a round vessel having on its inner face the stop 11 adapted to receive any one of the notches 12 of the false bottom 13, and serving to preclude rotation of the false bottom 13 as will be understood more fully hereinafter.

The container 10 is also provided with the oppositely disposed cam locks 14, see also Fig. 1, for locking the cover 15. Each cam lock comprises a base 16 riveted or otherwise secured to the exterior of the can, a link 17 and a hook member 18 pivoted at one end to the free end of the link 17 and looped at its free end for engagement with the cover when the lock 14 is moved to its self-locking position. The false bottom 13 may be provided with four notches 12, see Figs. 6 and 9, preferably formed by partially slitting radially at the circular edge of the

plate 13 and bending down the material between the slits to form the depending lugs 19 serving as feet of the false bottom to rest on the bottom of the container 10, as is indicated in Fig. 5.

At the center of the false bottom 13 is provided an opening 20 about which is secured the centrally recessed disk 21 riveted at 22, 22, to the false bottom 13 and serving as the support for one of the end disks 23, see Fig. 9, of the spool 24 of the film roll. The downward end 25, see Fig. 5, of the rod 26 passing through the spool 24 is received within the recess of the disk 21 and the opening 20 of the false bottom 13. Upon placing the false bottom 13 with one of its notches 12 about the stop 11, see Figs. 5 and 9, the false bottom is prevented from rotation relative to the container 10.

Extending radially from the central opening 20 of the false bottom 13, I provide the slot 26 through which extends the bottom end 27, see Fig. 5, of the member 28 for holding and pulling the protecting paper to which the film is attached as will be understood, to unroll the same.

The lower end 27 of the holder member 28 is slidably retained in the slot by means of the upper washer 29 and the lower washer 30 secured by swaging or otherwise to the end 27 of the holder 28. The holder 28 is provided with the longitudinally extending slot 31 through which is threaded the free end 32 of the protecting paper to which film is attached. At the upper end of the holder 28 I swage or otherwise secure the block 33.

The guide member 34, see Figs. 9, 5 and 4, comprises an upper plate 35 on whose lower face depends the spirally arranged strip 36, as is indicated in Fig. 4, or equivalent; the outer end 37 of the spiral strip 36 may be secured by rivets 38, 38, to the outer circular side 39 of the guide member 34. The spiral strip 36 at its inner end is bent at 40 curvedly back on itself to form a substantially circular opening, and again bent at 41 in the reversed substantially circular curve to form the opening 60 within which is received the film roll 24 and its aligning rod 26.

At the top of the circular opening 60 is secured the friction collet 42, see Fig. 4, secured by rivets 43, 43, to the end face of the upper plate 35 of the guide member 34, which friction disk 42, shown in perspective in Fig. 8, is slitted, as is indicated at 44, 44, to provide for the resilient tongues 45, 45, adapted as is indicated in Fig. 5, to resiliently engage and brake the upper disk 46 of the roll spool 24 when unrolled. The upper end 47 of the spool rod 26, is received within the central opening of the disk 42.

The upper plate 35 of the guide member 34 is provided with spaced slots 48, see Fig. 4, to afford passage for the developing fluid.

The cover 15 of the container 10 is preferably formed at its circular periphery with the fold 49 and the downward, inwardly resilient flange 50 serves as an apron when the cover is positioned on the container 10, as is indicated in Fig. 5. When assembled, the guide member 34 including the upper plate 35 and the spiral 36 may be held within the fold 49 of the cover 15.

The cover 15 is provided with the receiver 51, see Fig. 5, in which is located the trap 52, formed, as is indicated in Fig. 7, of metal having the spaced, downwardly turned extensions 53 serving as feet, and the spaced, upwardly turned extensions 54 for engagement with the top 55 of the receiver 51 to hold the trap 52 in approximately central position. The top 55 of the receiver 51 is riveted as is indicated at 53, see Figs. 2 and 5, to the upper flange of the receiver 51 to bind the trap 52 in its central position. The top 55 is provided with the inlet 56 and the bottom of the receiver 51 is provided with an outlet 57, see Fig. 5; in forming such outlet 57, the material of the bottom of the receiver 51 is preferably turned and swaged to bind the receiver 51 to the cover 15, as a unit.

When using my developing device, the cover 15 is removed, while the false bottom 13 may be left in position within the container 10; upon removing the cover the guide member 34 is removed therewith. The roll film 24 is positioned upon the centering rod 26 and the free end 32, of the protecting paper is threaded through the slot 31 of the holding member 28. Upon replacing the cover 15 and the guide member 34, the block 33 of the holding member 28 is received within the spiral slot, see Fig. 9, and the spool of roll film 24 is passed within the circular opening 60. The developing fluid is now poured through the inlet 56 of the receiver 51, from whence, as is indicated by the arrows in Fig. 5, it passes by gravity about the trap 52, thence through the outlet 57, thence over the upper plate 35, through the slots 48 and thence into the container 10. The amount of developer is added to bring the level of the developer to the proper height, as will be understood. The stopper 61 of cork or similar material is then positioned in the opening 56. The cam locks 14 are now closed to partial locking position. While holding the cover 15, say with the left hand, or otherwise, the container 10 is rotated by the other hand in clockwise direction, as is indicated by the arrow 62 in Fig. 4, thereby rotating the false bottom 13 and therewith the holding member 28 is actuated through the passage between the spiral convolutions 36 of the guide 34 and progresses the film and protecting paper within the passages of the spiral convolutions 36, until the holder 28 is brought to a final position, say at the terminal location 61ª, see

Fig. 4. At 63, in Fig. 4, the holder 28, is indicated at an intermediate position. In such movement of the holder 28 it is guided at its lower end by the slot 26 to move outwardly radially relatively to the false bottom 13 and the false bottom 13 is prevented by the stop 11 from rotation relative to the container 10. The block 33 at the upper end of the holder 28 is held from unwinding by engagement with the opposite faces of the spiral passage, thereby preventing the end of the protecting paper of the film from being pulled out of the slot 31 of the holder 28; the friction disk 42 brakes the spool as the film is thus unwound.

In the operation of pulling the film through the spiral convolutions, the clamps 14, 14 hold the cover 15 from springing from the upper edge of the circular side of the container 10 while permitting rotation of the container 10 relative to its cover 15, and accordingly the downwardly extending flange 50 with the outer periphery of the plate 35 of the guide member 34 located within the fold 49, protects the film from leakage of light.

After the film has been fully developed, the cork 61 is removed, and the container 10 is then inverted to pour out the developing fluid; the fluid at this stage takes the paths reversed to those indicated by the arrows in Fig. 5. The film may be washed thoroughly while still in the container 10 by pouring in fresh water into the container 10, pouring the same out and rewashing as often as desired. The container may then be opened and the film taken out and at once fixed in the usual manner. Or, the film may be taken out of the container and washed in a suitable bath and thereafter fixed.

It may be also desirable to fix the film while still in the container and after rewashing as above described, the fixing liquid is poured into the container 10, the precaution being taken that the fixing liquid be thoroughly washed from the container before another film is developed.

When it is desired to develop another film the holding member 28 is pushed from its outer position in the slot 26 to its inner end and the operations hereinabove described are repeated.

From the above, it will be seen that I have provided in most compact form, a developer for roll films, in which all the parts may be made of metal or other non-corrosive or inert material, and the movable parts of which are arranged to obviate dislocation. My invention secures effectual access to the emulsified face of the film by the developer and the various convolutions of the film are positively precluded from contacting one another at all stages.

It will also be noted that the film when unrolled is positioned with its sensitized face in a vertical plane and that all portions throughout the length of the film are exposed to the chemical fluid. The length of the spiral may be selected for the particular lengths of the usual dimensions of films now on the market; it will be apparent that the length of the spiral may be chosen to accommodate more than one film length, the holder for the lesser film lengths attaining a position between the intermediate convolutions of the spiral.

For the purpose of expediting the flow of the fluid within the convolutions of the spiral, I may provide the vents 65, see Figs. 4 and 5 in the upper plate 35 of the spiral holder 36, affording egress of the air and entry of the fluid therethrough.

The spiral 36 may be supported in any suitable manner, and in the drawings I have indicated as one preferred form, the pin 66 passing through the slot formed at the portion 40 of the spiral which is bent back on itself, its head 67, see Fig. 9, engaging the lower edge of the spiral 36 and its upper end 68 soldered or swaged or otherwise secured in a suitable opening in the top plate 35. The spiral 36 may be supported from the upper plate 35 at points intermediate its terminal portions by means of the teats 69 integral with the spiral 36, passing through suitable openings in the top plate 35 and bent into engagement with the upper face of the plate 35.

Preferably, means are provided for preventing unrolling of the film when positioned on the false bottom 13 preparatory to insertion with the spiral 36. I have shown in Figs. 10, 11 and 12 the resilient, enclosing clip 75, loosely mounted on the circular plate 76, secured by rivets 77 or the like to the false bottom 13, such clip 75 extending about the film roll when located therein, the clearance 78 between the free ends 79, 80 of the clip 75 affording a path for the free end of the protecting paper to be secured in the slot 31 of the holder pin 28 and to permit the film to be paid out when the film has been positioned within the opening 60. It will be noted that the enclosing clip 75 upon receiving the film roll 24, as is indicated in Fig. 11, is of a dimension to be readily received within the opening 60. The clip 75 may be stamped from metal, to have the lower, reentering flat portion 81, to loosely engage under and about the circular stud 76 to provide for free movement of the clip 75 thereon.

The gasket 70 is provided for sealing the joint between the upper edge of the container 10 and the cover 15.

If desired, the container, with the cork 61 positioned in the inlet 56, may be inverted intermittently during the process of developing to cause a circulation of the developing fluid and dislodge any air bubbles.

It will also be noted that the spacing between the spiral convolutions are of relatively large magnitude whereby to afford ample clearance for the film and its supporting paper and is of sufficient magnitude to react against the tendency of air bubbles to form between the sensitized surface of the film and the surface of the adjacent spiral convolutions.

Whereas I have described my invention by reference to specific forms thereof it will be understood that many changes and modifications may be made without departing from the spirit of the invention.

I claim:

1. Apparatus for developing or fixing roll films comprising a container, a cover for said container, means for supporting a film roll within said container, a guide member having relatively fixed passage portions and carried by said cover, movable means for connecting with the free end of the film and for moving the free end of the film through said guide member and means connecting said cover with said movable means for actuating said movable means.

2. Apparatus for developing or fixing roll films comprising a container, a support therein for a film roll, a cover for said container, means for holding said support in non-rotative relation to said container, a holding member for the free end of the film, a guide member carried by said cover and having a curvedly extending passage and movable means for connecting with the free end of the film for movement of the free end of the film through said guide member.

3. The combination of a circular container, a circular cover for said container, a guide member carried by said circular cover and having an opening for the reception of a film roll and further having a passage communicating with such opening and for receiving the film when unrolled and means disposed within said container for connecting with the free end of the film and directing the free end of the film through said passage.

4. The combination of a container, a cover therefor, a guide member having an opening for the reception of a film roll and further having a passage communicating with such opening for receiving the film when unrolled, means for attaching said guide member to said cover and means disposed within said container for unrolling the film and directing the unrolled portion of the film through said passage.

5. The combination of a container, a cover therefor, a guide member having an opening for the reception of a film roll and further having a passage communicating with such opening for receiving the film when unrolled, means for attaching said guide member to said cover operated upon relative rotation between said container and said cover, and means disposed within said container for unrolling the film and directing the unrolled portions of the film through said passage.

6. The combination of a container of substantially symmetrical cross-section, a cover therefor of substantially similar symmetrical cross-section, a guide member having an opening for the reception of roll film in rolled condition and further comprising spirally arranged convolutions providing a spiral passage communicating with said opening, an arm for holding the free end of a roll film and means operative from the exterior of said casing for moving said arm through said spiral passage, to thereby unroll said film roll and pull the same through said spiral passage, said exterior operative means including a false bottom for said container and provided with a slot for movably locating said arm.

7. The combination of a container, a cover therefor, a guide member having an opening for the reception of a roll film in rolled condition and further comprising spirally arranged convolutions providing a spiral passage communicating with said opening, an arm for holding the free end of a roll film and means operative from the exterior of said casing for moving said arm through said spiral passage, to thereby unroll said film roll and pull the same through said spiral passage, said exterior operative means including a false bottom for said container and provided with a radially extending slot for movably locating said arm and means for pivoting the spool of the roll film on said false bottom.

8. The combination of a container, a cover therefor, a guide member having an opening for the reception of a roll film in rolled condition and further comprising a spirally arranged guiding wall providing a spiral passage communicating with said opening, an arm for holding the free end of the protecting paper of a roll film and means operative from the exterior of said casing for moving said arms through said spiral passage, to thereby unroll said film roll and pull the same through said spiral passage, said exterior operative means including a false bottom of said container and provided with a slot for movably locating said arm and means for precluding rotation of said false bottom relative to said container.

9. The combination of a container, a cover therefor, a guide member having an opening for the reception of a roll film in rolled condition and further comprising a spirally arranged guiding wall providing a spiral passage communicating with said opening, an arm for holding the free end of a roll film, and means operative from the exterior of said casing for moving said arm through said spiral passage, to thereby unroll said film roll and pull the same through said

spiral passage, said exterior operative means including a false bottom for said container and provided with a radially extending slot for movably locating said arm, a stop carried by said container for restricting rotation of said false bottom relative to said container and means for pivoting the spool of the roll film to said false bottom.

10. The combination of a container of substantially circular cross-section, a cover therefor of substantially circular cross-section, a guide member having an opening for the reception of a roll-film in rolled condition and further comprising a spirally arranged guiding wall providing a spiral passage communicating with said opening, a slotted arm for attachment for the free end of a roll film and means operative from the exterior of said casing for moving said arm through said spiral passage, to thereby unroll said film roll and pull the same through said spiral passage.

11. The combination of a container of circular cross-section, a cover therefor of substantially circular cross-section, a guide member having an opening for the reception of a roll film in rolled condition, and further comprising a spirally arranged guiding wall providing a spiral passage communicating with said opening, a slotted arm for holding the free end of the protecting paper of a roll film, and means operative from the exterior of said casing for moving said arm through said spiral passage, to thereby unroll said film roll and pull the same through said spiral passage, said exterior operative means including a false bottom for said container and provided with a radially extending slot for movably locating said arm, means for pivoting the spool of the roll film to said false bottom, and a stop carried by said container for restricting rotation of said false bottom relative to said container.

12. The combination of a container, a cover therefor, a guide member having an opening for the reception of a film roll and further having a passage communicating with such opening for receiving the film when unrolled, means for attaching said guide member to said cover and light-excluding fluid inlet means for said container.

13. The combination of a container, a cover therefor, a guide member having an opening for the reception of a film roll and further having a passage communicating with such opening for receiving the film when unrolled, means for attaching said guide member to said cover operated upon relative rotation between said container and said cover, and light-excluding fluid inlet means for said container.

In testimony whereof I have signed this specification this 20th day of February 1922.

FRANCIS F. LUCAS.