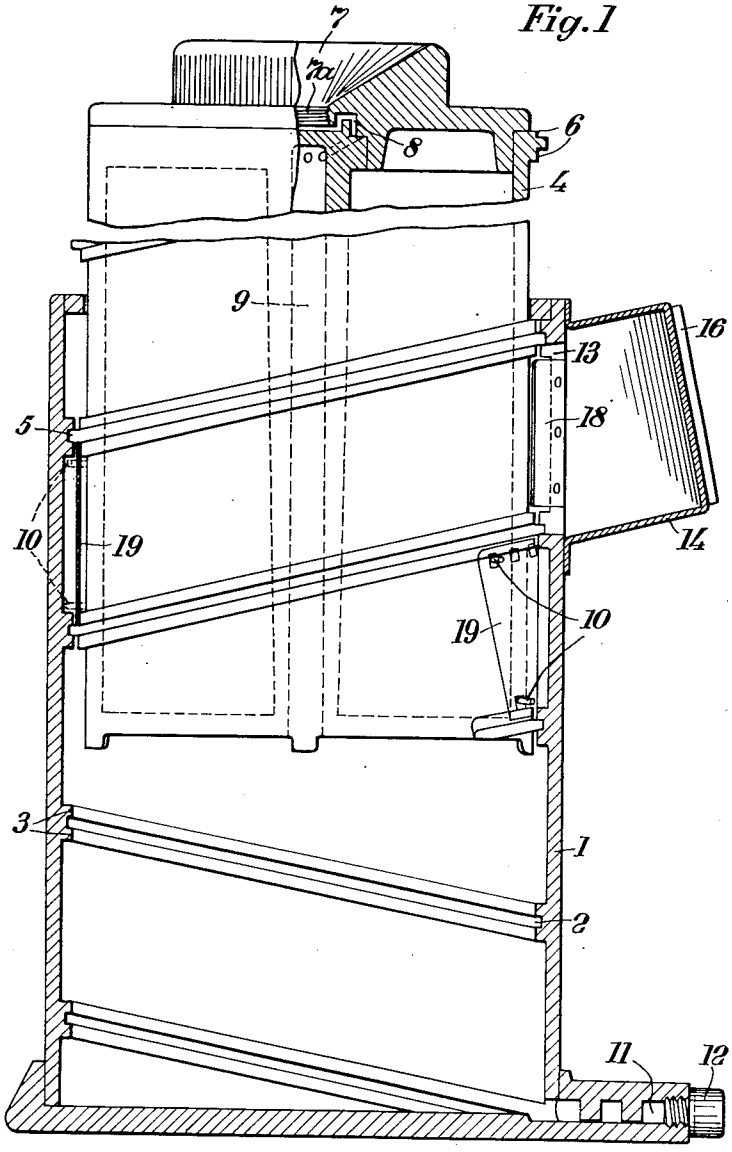
March 26, 1940. A. LINGG ET AL 2,194,603

DAYLIGHT PHOTOGRAPHIC DEVELOPING APPARATUS

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Fig. 1



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Fig. 2

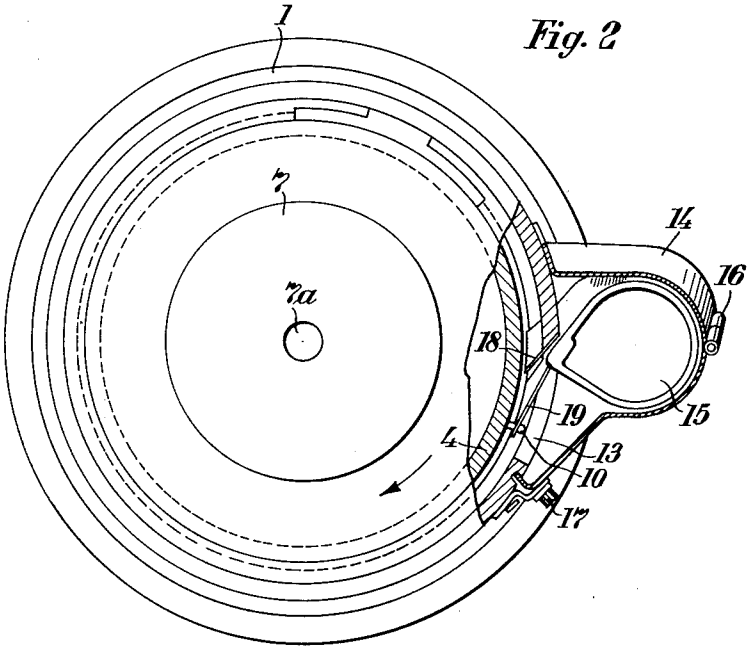
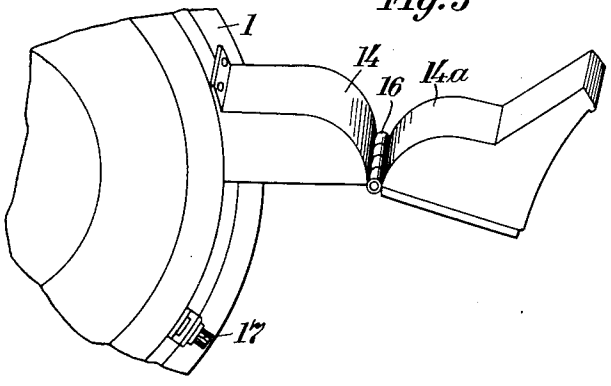


Fig. 3



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DAYLIGHT PHOTOGRAPHIC DEVELOPING APPARATUS

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Application August 9, 1938, Serial No. 223,900
In Germany August 10, 1937

6 Claims. (Cl. 95—90.5)

This invention relates to an apparatus by which it is possible to develop films, without paper protective strips and without a leader- and trailer-strip, in daylight.

In known apparatus of this kind there is either no possibility of introducing films without a leader- and trailer-strip in daylight into developing solutions or it is necessary to use for the purpose complicated light-excluding devices.

It has also been proposed to fix the film to a long traction band and to draw it with the aid of this band into the guide grooves of the developing apparatus.

Again, it has been proposed to push the film into the developing solution without the aid of such a traction device. This mode of introducing the film, however, is disadvantageous because of the tendency of the film to jam, and it is wholly impossible to introduce the film if the guide grooves are not quite dry.

This invention avoids all these disadvantages by the use of a rigid body which serves both for introducing the film and as its carrier. The rigid body is preferably a core provided with a screw thread and adapted to be screwed into a similarly threaded cylindrical vessel. During the introduction the film is held at the edges only by the helical grooves on the core and in the vessel. The core has two pins engaging in the perforations of the film for fixing the film on the core. These pins extend closely to the inner surface of the cylindrical vessel so that the film cannot rise above the pins or teeth even if subjected to excess tension or pressure. The developing and fixing solutions are introduced through an opening in the hollow core and the solutions flow away through a labyrinthine opening in the bottom of the cylindrical vessel.

The apparatus has many advantages as compared with the known daylight developing apparatus. It is simple to handle, necessitates very little developing solution, the film carrier can be cleaned easily and the film can be moved in the developing vessel so that the development is uniform and complete. The film is satisfactorily guided on both sides in the cylindrical vessel, while it is being positively drawn into its guides, without the necessity for a traction band or a leader- and trailer-strip of the film or a guide piece or traction device, such as is known by the registered trade-mark "Correx"-band.

The invention is illustrated in the accompanying drawings.

While we are aware that many modifications and changes in the apparatus as shown in the drawings will suggest themselves to one skilled in the art, we do not wish to limit the scope of the invention further than indicated in the appended claims.

Figure 1 is an axial cross sectional view through the cylindrical vessel having the helical groove and showing in sectional elevation the film carrier partially screwed into the vessel.

Figure 2 is a plan view of the developing apparatus, the part of the apparatus which is above the place where the film is introduced having been broken away,

Figure 3 shows the place where the film is introduced, the cover being open.

The apparatus consists of a cylindrical vessel 1 on the inner surface of which there are helical ribs 3 for forming a female thread 2. The core 4 is provided externally with a helical male thread 5 corresponding with the female thread 2. In addition to the thread 5 there are also helical guide ribs 6 for the film. At the top of the core is a funnel-shaped cavity 7 for receiving the necessary solutions. The narrow end of this funnel is screw-threaded for receiving the corresponding screw-thread of a pipe for connection with the water main. The exit of the funnel is connected by a labyrinthine passage 8 with the pipe 9 which extends to the bottom of the core and there opens. Between the two lowest spires of the thread on the core 4 there are pins or teeth 10 for engagement in the perforations at the entering end of the film. The pins 10 extend close to the inner face of the cylindrical vessel. At the bottom of the vessel 1 there is an outflow opening 11 closed by a screw stopper 12. The opening 11 is also labyrinthine in order to prevent entry of light through the opening into the vessel. In the upper part of the vessel 1 there is an opening 13 for introduction of the film 19 and fixing it to the core 4. This opening is covered by a hinged cap 14, 14a. This cap is to receive the film cassette 15. For this purpose the cover 14a of the cap is turned on its hinge 16. In the closed position the cover 14a is held by a fastening 17. A flange 18 of steel or the like serves on the one hand as a light excluder and on the other hand as a stripper for the film when withdrawing the latter.

The procedure of developing the film in daylight with the aid of this apparatus is as follows:

The core 4 for receiving the film is screwed into the cylindrical vessel until the teeth 10 stand before the opening 13 in the cylinder 1. The cover 14a of cap 14 is then opened, the film cassette 15 is inserted into the cap and the end

of the film 19 which projects from the cassette is fixed to the core by introducing the pins 10 into the perforations of the film. The cover 14a is then closed and held by the fastening 17 in the closed light-tight position. By screwing the core 4 into the cylinder 1 the film is drawn into the latter until it is completely wound on to the core. The film is now held only at its edges by the helical guide ribs 3 on the one hand and by the helical ribs 6 on the core 4 on the other hand. The teeth 10 extend to the inner surface of the cylinder as indicated in Figure 1 on the left hand side by dotted lines. The film cannot move in space owing to the mode of guiding which has been described, so that even the end of the film 19 does not need to be fastened. The film is lowered in the vessel so far that its upper end is below the cassette 15. The developing solution is now poured into the funnel 7 and passes through the passage 8 and the tube 9 to flow from below upwards through the helical grooves to the uppermost spire of the film. Since the space surrounding the film 19 is very small, very little developing solution is necessary. In order to remove any air bubbles and to allow the developing solution to come into intimate contact with the film, it is advantageous that the core 4 may be moved up and down on its axis so as to move the solution or the film in the solution. When development is complete, the solution is allowed to flow away by unscrewing the stopper 12. The stopper is then again screwed in place and the fixing solution is run-in in like manner and after fixing is finished is removed, in the same manner as the developing solution. Washing is preferably performed by screwing the pipe which is in connection with the water main into the thread 7a of the opening. During the washing the cap 14, 14a and the empty cassette 15 may be removed so that the water may flow from the opening 13. The film is removed from the vessel by unscrewing the core 4. In this operation the film is stripped by the stripper 18 from the core, and, having been fixed to a developing clamp, is stretched for drying.

We claim:

1. Apparatus for developing a film having perforations at its both sides and having neither a protective strip, a leader-strip nor a trailer-strip, comprising in combination a light-tight cylindrical container, the inner surface of said container being provided with helical ribs forming a female thread, a cylindrical core externally carrying a helical male thread corresponding with said female thread, said core being adapted to be screwed into said container and provided with helical ribs forming a helical groove serving to hold the film to be developed at its edges, an opening in the upper part of said container for introduction of the film, light-tight means for supporting a film mounted outside the container in a position contiguous to said opening and means arranged on said core in the lower portion of the groove for engagement with the perforations of film at the entering end of the film.

2. Apparatus as claimed in claim 1 wherein the means for engagement with the perforations of film at the entering end of the film consist of pins mounted in positions substantially perpendicular to the surface of the cylindrical core.

3. Apparatus as claimed in claim 1 wherein a flange is mounted at the opening in the upper part of the container for introduction of the film which serves to aid the exclusion of light from the interior of the developing apparatus and to strip the film from the core when the film is withdrawn from the apparatus.

4. Apparatus as claimed in claim 1 wherein the means for supporting the film outside the container consists of a cap for receiving a film cassette, said cap being removable and capable of being closed.

5. A day-light loading developing tank for film contained in a cartridge, comprising a cylindrical container, a cylindrical core member, a receptacle for the film cartridge having a light tight connection with said container, spiral interengaging means on said container and on said core for simultaneously screwing said core into said container and winding the film from said cartridge and receptacle spirally onto said core, and cooperating means on said container and on said core for maintaining the film in spaced relation from both said container and said core.

6. A day-light loading developing tank for film contained in a cartridge, comprising a cylindrical container provided with an internal spiral thread, a cylindrical core member provided with a corresponding external thread for engagement with said container thread whereby said core member may be screwed into said container in a light tight manner, an external receptacle for the film cartridge, light tight means for introducing the film from said receptacle into said container, means for fastening said film to said core for winding thereon, and cooperating means on said container and on said core for maintaining the film in spaced relation from both said container and said core.

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