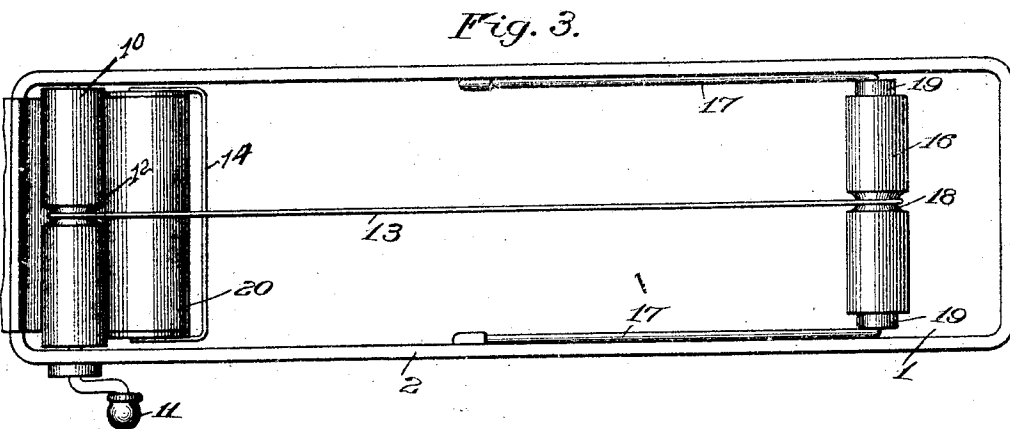
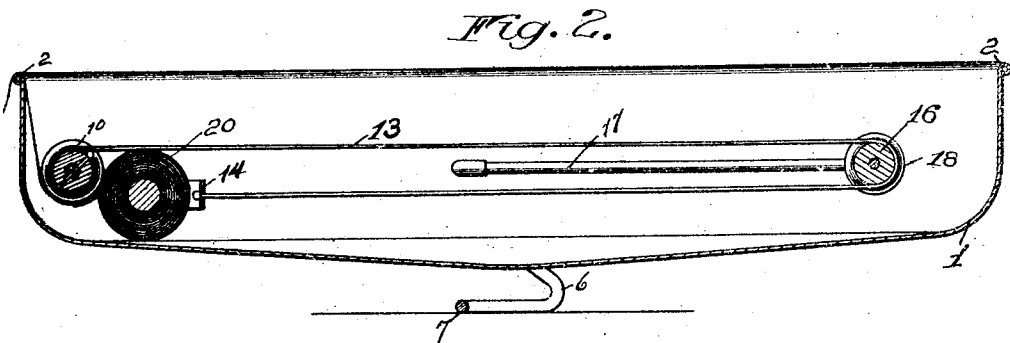
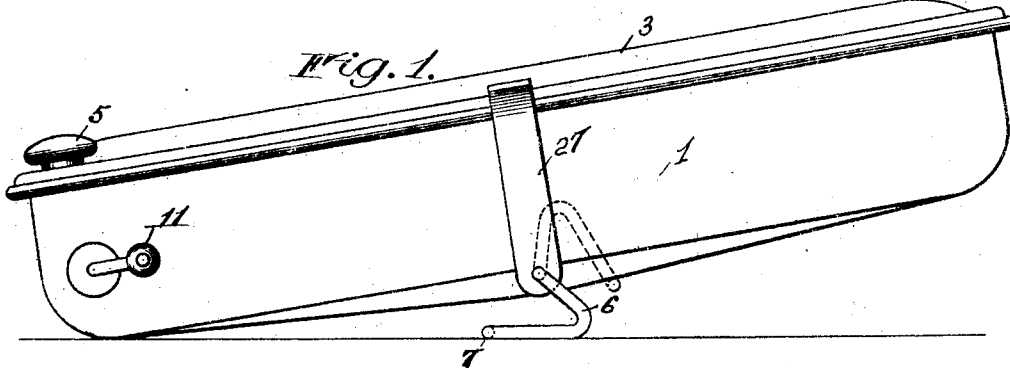


R. KROEDEL.
 PHOTOGRAPHIC FILM DEVELOPING APPARATUS.
 APPLICATION FILED NOV. 3, 1908.

917,078.

Patented Apr. 6, 1909.

2 SHEETS—SHEET 1.



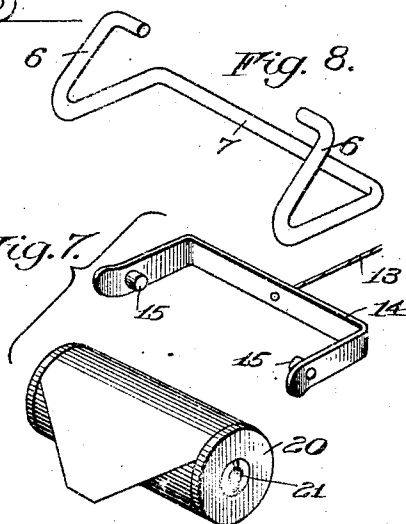
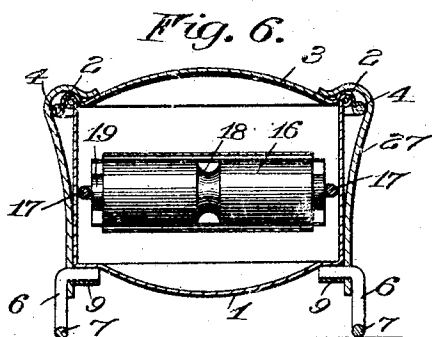
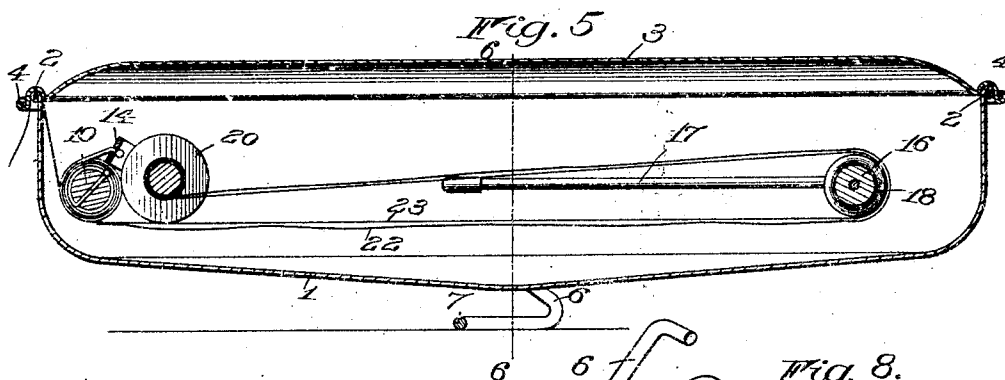
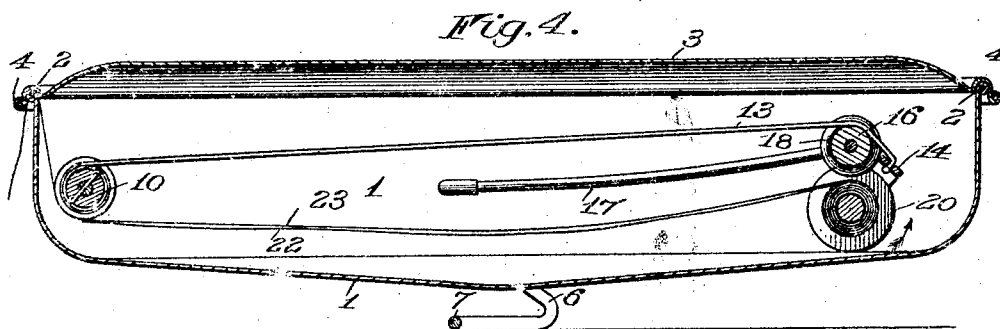
Witnesses
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 Attorneys.

R. KROEDEL.
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 2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

ROBERT KROEDEL, OF ROCHESTER, NEW YORK, ASSIGNOR TO EASTMAN KODAK COMPANY,
OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

PHOTOGRAPHIC-FILM-DEVELOPING APPARATUS.

No. 917,078.

Specification of Letters Patent.

Patented April 6, 1909.

Application filed November 3, 1906. Serial No. 341,900.

To all whom it may concern:

Be it known that I, ROBERT KROEDEL, of Rochester, in the county of Monroe and State of New York, have invented certain
5 new and useful Improvements in Photographic-Film-Developing Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of the specification, and
10 to the reference-numerals marked thereon.

My present invention relates to apparatus for developing or otherwise treating strips of sensitized photographic film, the entire process
15 taking place within a container from which light, or the actinic rays thereof, is excluded, whereby the use of a dark room becomes unnecessary, and it has for its object to provide a simple, cheap and convenient
20 device of this nature by the use of which, film wound upon a spool or other contrivance may be unrolled without danger of injury and exposed to the developing washing or fixing solutions or other liquids.

To these and other ends the invention consists in certain improvements and combinations of parts all as will be hereinafter more fully explained, the novel features being pointed out in the claims at the end of the
30 specification.

In the drawings: Figure 1 is a side elevation of a developing machine constructed in accordance with my invention. Fig. 2 is a central, longitudinal, vertical section thereof
35 with the cover removed showing a film roll or cartridge inserted ready to be unrolled and developed. Fig. 3 is top plan view of the interior of the container with the parts in the same position as in Fig. 2. Fig. 4 is a central, longitudinal, vertical section with the
40 cartridge inserted and partially unrolled. Fig. 5 is a similar view with the cartridge entirely unrolled. Fig. 6 is a transverse vertical section on the line 6--6 of Fig. 5. Fig. 7 is a
45 collective view showing the manner of attaching the cartridge to the unwinding device, and Fig. 8 is a perspective view of the support upon which the container is pivoted.

Similar reference numerals in the several
50 figures indicate similar parts.

In a developing machine of the present type, it is desirable that, in unrolling the film, it be laid upon its supports instead of being drawn across them as in the latter case

the moistened surfaces retard the move- 55
ments of the parts and the increased friction is apt to result in injury to the delicate structure of the film. To accomplish this operation and at the same time dispense with such
paraphernalia as the spacing apron which is
60 usually employed to separate the convolutions of film when the latter is wound upon a reel as a support whereby I materially lessen the cost of production, I provide a containing
vessel having separated transverse supports 65
between which the film is extended through suitable means by fastening the free end thereof and drawing the spool or roll over the
supports and between them, whereby it is
70 thoroughly exposed to the liquid in the container, aided preferably by oscillation of the latter.

Referring now to the drawings which illustrate an embodiment of the invention, 1
75 indicates the containing vessel or tray which is usually oblong in shape, being of a width slightly greater than that of the cartridge for the development of which the machine is adapted and of a length equal, preferably, to
80 about half that of the strip of film when unrolled. The edges of the tray are preferably rolled as at 2 to offer a firm engagement for the cooperating portion of the
cover 3, the rim or bead 4 of which, when in
85 place, extends well over the said edges as shown in section in Figs. 4 and 5, in order to insure a light tight joint. The cover is provided with an aperture near one end fitted
90 with a plug 5 through which the liquids are poured. For the purposes of rocking the receptacle it is pivotally mounted at or near
its center, and I provide a convenient support preferably constructed of a single piece
95 of wire bent as shown in Fig. 8, to form the two side standards 6 connected by the portion 7, and having their upper ends bent inwardly to engage sockets 9 on the lower side
of the receptacle on which the latter may be
100 tilted. The connecting portion 7 of the support being located nearer one end of the receptacle than the other, and the side portions or legs being arranged at the sides of
the receptacle and extended horizontally to
105 rest on the table, the base may be folded up against the bottom for shipping purposes where desired, as shown in dotted lines in
Fig. 1.

At one end the receptacle is provided with.

a reel or other winding device formed in the present instance by the drum or roller 10 journaled to extend transversely thereof and operated by a crank 11 on the exterior.

5 A circumferential groove 12 forms a central reduced portion to which is attached one end of a flexible connector or cord 13, the groove being preferably of sufficient depth to allow the entire length of cord to be wound

10 thereon without permitting the outer convolutions to extend above the plane of the surface of the roller for reasons that will later appear. The outer end of the cord is connected to a carrier for a coil or cartridge

15 of film consisting in the present instance of a yoke 14 having arms provided with trunnions or pins 15 (Fig. 7) between which the film cartridge is adapted to be held, said pins being adapted to enter the apertures formed

20 in the ends of the spool on which the film or the film and backing are wound. At the opposite end of the container is an idle roller or support 16 loosely mounted upon a pair of vertically movable arms 17 preferably

25 of resilient material fastened to the sides of the receptacle at a point removed from the axis of the roller whereby the latter is permitted a limited movement in a vertical direction. This roller is also provided with

30 a central groove 18 while the ends are reduced as at 19 to accommodate the flanges of the film spool when the latter passes over it.

The ordinary film cartridge or roll usually embodies a flanged spool 20, (Fig. 7) having

35 axial apertures 21 in the ends thereof by means of which it is mounted for rotation in the camera, or roll holder, and upon this spool is wound the strip of film 22 together with an opaque backing or covering 23 of

40 slightly greater length, attached thereto in such manner that in unrolling, the film will appear on the inside or beneath the paper. I have, in the present instance, illustrated the film in this form and my device as

45 adapted thereto but the film could be readily accommodated when otherwise put up as, for instance, the trunnions 15 could be simply inserted in the ends of a roll into which it might be wound without a core.

50 The operation is as follows: Referring now to Figs. 2 and 3, the cord 13 is passed from the roller 10, over roller 16, thence back beneath the rollers and the yoke on its end secured to the coil of film or cartridge spool by

55 means of the trunnions 15, the cartridge being free to rotate and in the position shown being arranged against roller 10 with a portion of the paper backing unrolled and extending beneath the latter and over the edge of the

60 container. The container is then tilted to elevate the end at which the film is positioned and a quantity of the developing or other solution poured in at the opposite or lower end where the capacity of the vessel is greater

65 by reason of the presence of the roller 16

only. The cover is applied and secured by means of the clips 27 and so much of the backing drawn out by hand as will start the unwinding, within the receptacle, of the film itself, suitable indicia being preferably placed 70 at such a point on the backing as will show when the outer convolution or protecting covering of paper has been unwound. While the cover is, in the present instance, utilized to secure the free end of the paper during the 75 operation of the machine, it is also made loose enough to permit slight movement of the paper as just described though without allowing the entrance of light, or other means could be employed to hold the end of 80 the paper, or it could be held by the operator if desired. The crank 11 is then turned, whereupon the cord 13 traveling over the roller 16 draws the film spool with it unrolling the film as it goes. When the spool reaches 85 the roller 16 the latter yields upwardly (as shown in Fig. 4) through the pressure of the flanges against the shoulder or reduced portion 19, until it has passed upon the upper side, whereupon the roller drops back again 90 to its former position. By mounting the roller in this way it is made to support the layers of film lower in the containing vessel than would otherwise be possible in handling a cartridge of any size, and the amount of 95 solution necessary to saturate it thoroughly is thereby reduced. Continued motion of the crank completes the unwinding until the binding of the yoke 14 upon the reel warns the operator that the circuit has been com- 100 pleted (Fig. 5), and the film withdrawn and laid in the receptacle in position to be subjected to the action of the fluid. The vessel is then oscillated upon the support as shown in Fig. 1 whereat the solution or liquid flows 105 from end to end washing thoroughly over the horizontal layers of film until the desired effect thereon has been produced, after which the cover is removed, the yoke disengaged from the spool and the latter together 110 with the film withdrawn or else the liquid is drained out and replaced with other solutions.

By the means described, the strips are held in a substantially extended position 115 throughout, the film being upon the outside and free from contact with any portion of the apparatus by which the delicate substances upon its surface could be disturbed, while the cost of manufacturing such a machine is 120 comparatively slight and the amount of solution necessary reduced to a minimum, inasmuch as the latter, by the movement imparted to it, washes freely on both layers, though its level, when in a state of rest, be 125 slightly below the upper one. It will be seen that in treating spools of film wherein the relative position of the film strip and backing are reversed, or in other instances, the operation may be reversed or the spool 130

turned end for end, when inserted, to bring the film upon the outside and the paper on the inside against the rollers.

The feature of moving the spool carrying the film instead of merely withdrawing the film and paper or film only from a stationary spool is advantageous, as by this means the film is, as before stated, laid on the support or supports which maintain the layers separated and any desired length of film, whether in the form of cartridges or mere rolls of naked film can be laid around a number of supports without liability of damage. I prefer, however, to make the tray or container of such length that only two layers are exposed as this reduces liability of having the sensitized surface of the film contact with any hard substance.

I claim as my invention:

1. In a developing apparatus, the combination with a receptacle, of a support therein and means operable from the exterior of the receptacle for carrying a roll of film around the support.

2. In a developing apparatus, the combination with a receptacle, of a support therein, a roll carrier and means operable from the exterior of the receptacle for moving the carrier around the support.

3. In a developing apparatus, the combination with a receptacle, of a support at one end thereof, a roll carrier and means operable from the exterior of the receptacle for carrying the roll from one end of the casing around the support and back to the first mentioned end.

4. In a developing apparatus, the combination with a receptacle, of a support arranged at one end thereof, a roll carrier, and a flexible connector attached to the said carrier and extending around said support.

5. In a developing apparatus, the combination with a receptacle, of a support arranged at one end thereof, a roll carrier, a flexible connector attached to said carrier and extending around said support and a winding drum arranged opposite the support to which the connector is attached.

6. In a developing apparatus, the combination with a receptacle, a support at one end movable transversely of the length of the latter, a winding drum arranged at the opposite end of the receptacle, a flexible connector attached at one end to the drum and extending around the support and a roll carrier attached to one end of the connector.

7. In a developing apparatus, the combination with a receptacle, a support at one end thereof, a winding drum at the opposite end, means for operating said drum from the exterior of the receptacle, and a flexible connector attached to the drum and extending around said support.

8. In a developing apparatus, the combination with an elongated receptacle, of a

yielding support at one end, a winding device at the opposite end, a flexible connector attached to the winding drum and extending around the support and a roll carrier secured to the connector.

9. In a developing apparatus, the combination with an elongated receptacle, and a base upon which it is pivoted for rocking, of means arranged within the receptacle and operable from the exterior for extending film in two substantially horizontal stretches.

10. In a developing apparatus, the combination with a receptacle and film-supporting devices mounted therein, of means for holding one end of the film against movement and a traveling member adapted to be connected with the roll for unwinding the film and extending it in a substantially flat position on the supporting devices.

11. In a developing apparatus, the combination with a receptacle, of a winding device mounted therein operable from the exterior of the receptacle, a film support, means for securing one end of the film against movement and a flexible connecting member on the winding device extending around the support and adapted to be attached to the other end of the film strip.

12. In a developing apparatus, the combination with a receptacle, of a winding drum having a reduced portion mounted therein and operable from the exterior of the receptacle, a film support, means for securing one end of the film against movement and a flexible member on the drum adapted to be wound upon the reduced portion thereof and extending around the support and means for connecting said member with the other end of the film.

13. In a developing apparatus, the combination with a receptacle, of a film support and a winding device mounted therein, the latter having a flexible connecting member attached thereto and extending around the support, means for securing the free end of the film and a yoke on the flexible member adapted to engage the ends of a film roll.

14. In a developing apparatus, the combination with a receptacle and means for holding the end of a film against movement, of a film supporting roller mounted in the receptacle and provided with reduced portions at either end and means for drawing a film spool around the latter to unwind the film therefrom.

15. In a developing apparatus, the combination with a receptacle and means for holding one end of a film against movement, of a resiliently-mounted film support, and means for drawing a film roll around the latter to unwind the film therefrom.

16. In a developing apparatus, the combination with a receptacle and means for holding one end of a film against movement, of resilient arms, a revoluble film support

thereon, and means for drawing a film roll around the latter to unwind the film therefrom.

17. In a developing apparatus, the combination with a receptacle, of means for holding the free end of the film against movement and means for advancing the spool to unwind the film and expose it to liquid in the receptacle.

18. In a developing apparatus, the combination with a receptacle provided with a film support, of means for holding the free end of the film against movement and means for advancing a roll of film over the support to unwind the film and lay it thereon.

19. In a developing apparatus, the combination with a receptacle, of means for holding the free end of a film against movement and means pivotally connected to a film for advancing the latter to unwind the film and expose it to the liquid.

20. The combination with a rocking developing receptacle, of a support embodying

side standards pivoted at their upper ends to the receptacle and having portions extending lengthwise of the latter upon both sides of the pivotal center to form an extended base and a connection between corresponding ends of said portions permitting the standards to fold against the sides of the receptacle.

21. The combination with a rocking developing receptacle provided with sockets at opposite sides of a support composed of a single piece of material embodying side standards having inwardly extending ends pivoted in sockets, the horizontal base portions extending lengthwise of the latter upon both sides of the pivot and a connecting portion between corresponding ends of the base portions permitting the standards to fold against the sides of the receptacle.

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