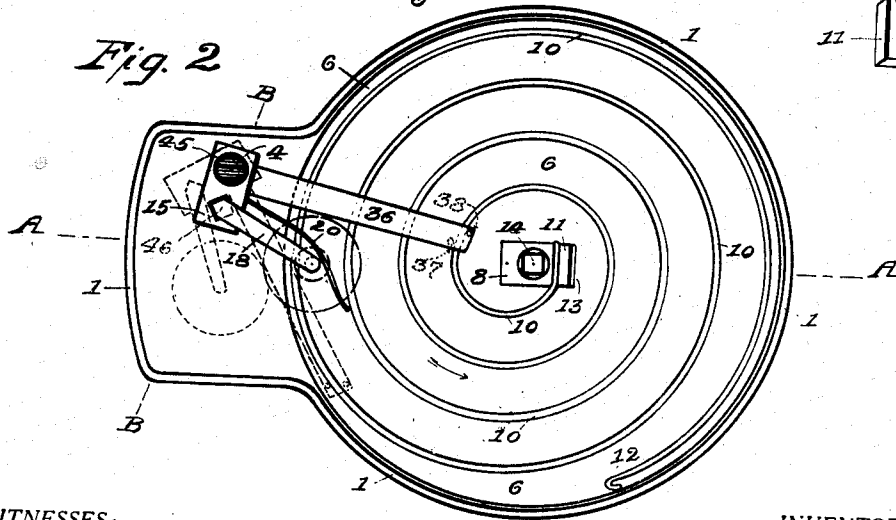
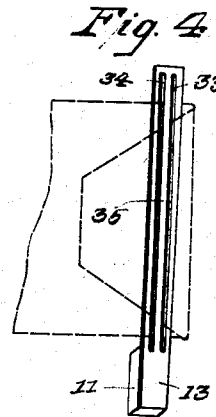
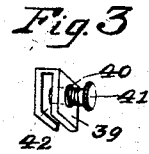
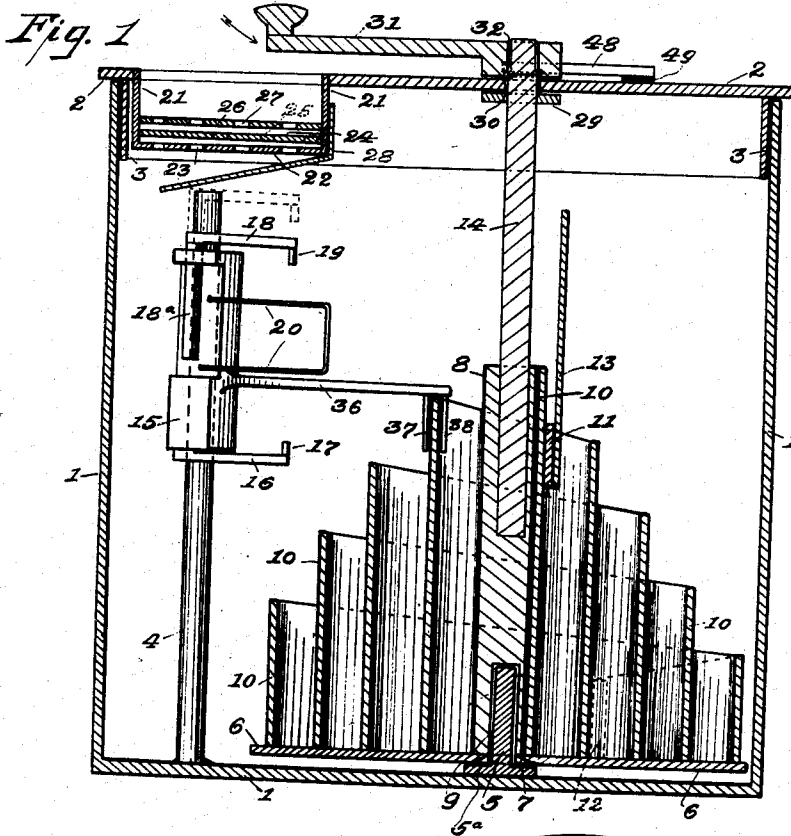


F. A. BINDER.
 PHOTOGRAPHIC DEVELOPING APPARATUS.
 APPLICATION FILED DEC. 14, 1915.

1,213,489.

Patented Jan. 23, 1917.
 2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

Fig. 5

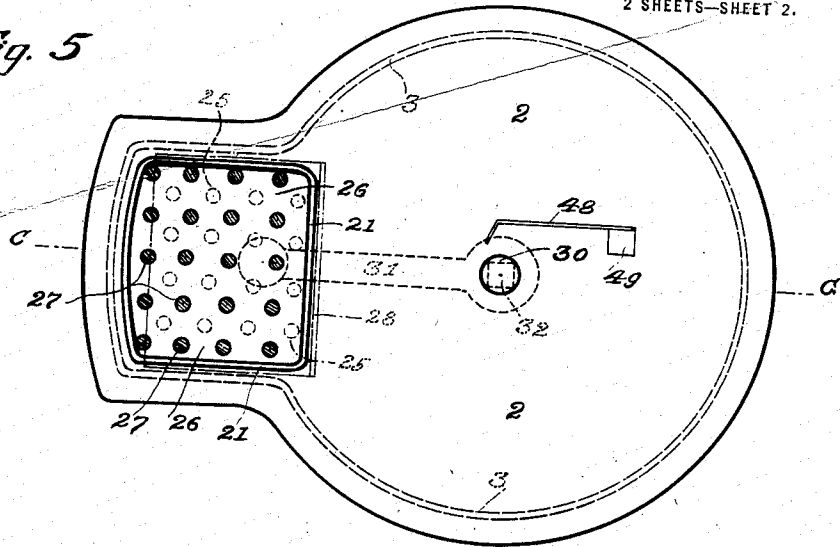


Fig. 6

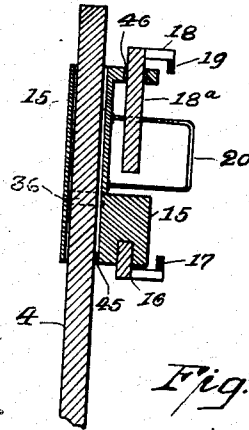
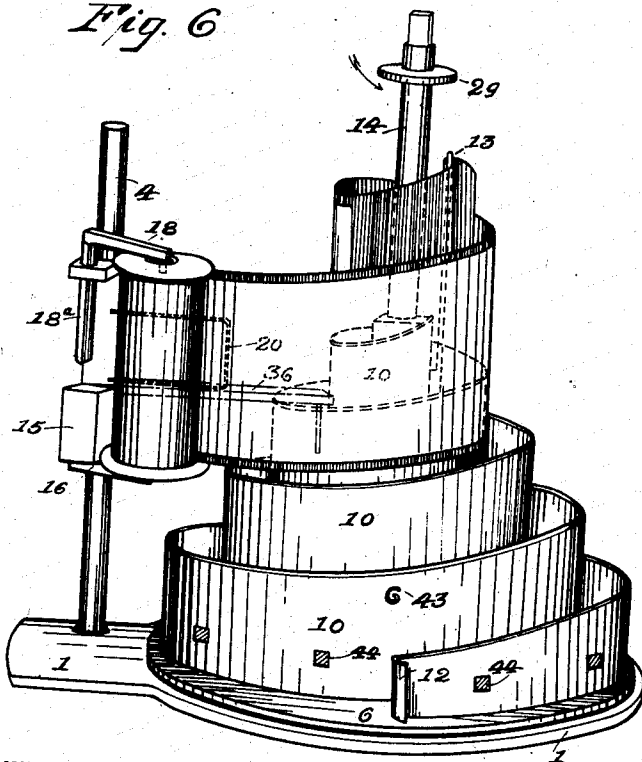
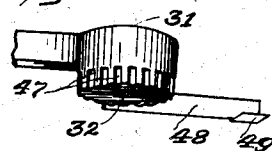


Fig. 7

Fig. 8



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PHOTOGRAPHIC DEVELOPING APPARATUS.

1,213,489.

Specification of Letters Patent.

Patented Jan. 23, 1917.

Application filed December 14, 1915. Serial No. 66,716.

To all whom it may concern:

Be it known that I, FRANK A. BINDER, a citizen of the United States, residing in the city of New York, in the county and State of New York, have invented certain new and useful Improvements in Photographic Developing Apparatus, of which the following is a specification, reference being had to the accompanying drawing, forming a part of this specification, and to the reference-numerals marked thereon.

My present invention relates to apparatus for developing photographic films, and particularly to that class of films embodying a strip of flexible sensitized film and covering of flexible opaque material such as black paper, the ends extending beyond the film to cover it when wound in a roll, or when rolled upon a spool.

The object of my invention is to provide an apparatus that is simple in both construction and operation, into which the film may be placed, and without resort to the dark room the same may be unwound and held separated of itself so as to permit the necessary fluids required in the treatment of the film to act thereon; this being attained without the use of a flexible apron or similar film separating means, as such in my opinion are inconvenient to handle.

The invention further consists in certain devices and constructions as will more fully appear, the novel features being pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a vertical sectional view of the apparatus on the line A—A of Fig. 2, and on the line C—C of Fig. 5, with the film-roll holder shown in elevation; Fig. 2 is a top plan view, the top or cover being removed; Fig. 3 is a perspective view of the stop-block adapted to fit upon the support or partition; Fig. 4 is a perspective view of the film attaching strip mounted upon the support or partition; Fig. 5 is a top plan view of the cover; Fig. 6 is a perspective view of interior parts of the casing showing the film being wound upon the support or partition; Fig. 7 is a vertical sectional view of the film-roll holder and a portion of its carrying rod on line B—B of Fig. 2; and Fig. 8 is a perspective view of the crank and the spring pawl adapted to engage the same.

Similar reference numerals indicate similar parts throughout the several views.

In the drawings 1 indicates the body or casing of the apparatus, which is preferably shaped in a general way to conform to the parts contained therein, as shown in Fig. 2. The upper portion of the casing 1 is provided with a removable cover 2 shaped to the form of the said casing but extending somewhat outward of the top edge thereof. Attached to the cover 2 I provide a downward extending strip 3 which runs completely around and forms sides therefor. This strip 3 or cover-sides, as it may be termed, is adapted to fit into and rest snugly against the sides of the casing 1 and combined with extension of the cover 2 as above mentioned serves to prevent the entrance into the apparatus of actinic light and at the same time the said cover is held firmly in place.

Within the casing 1, and attached firmly to the bottom thereof I mount a stud 5 which is preferably cylindrical in cross section and having its lower portion widened or extended outward to form a disk 5^a, as shown in Fig. 1. This stud 5 forms a pivot for an annular plate 6 which has an aperture 7 formed in or near the center of it to receive the stud 5. By reference to Fig. 1 it will be noted that a portion of the lower side of the plate 6 adjacent the aperture 7 is cut away so that the stud 5 may have free and ready entrance into the said aperture.

Secured rigidly and firmly to the plate 6, and directly over the aperture 7 therein, I supply an upright member or post 8 which in its present form is rectangular in cross section. At the lower end or base and extending upward therein a recess 9 is provided, this recess being practically a continuation of the aperture 7 in the said plate 6 being directly on a line with same and likewise adapted to form a bearing for the stud 5. Secured firmly in the upright member or post 8 and extending upward therefrom through an opening 30 in the cover 2, I provide a rod 14, the upper end of said rod being squared off above the top of the cover 2, the other portion of said rod being preferably cylindrical in cross section as shown in Fig. 6. In Fig. 1, I show the rod 14 as extending into and embedded in the upright member or post 8 but any other suitable means may be employed to secure these parts firmly together, the said rod being merely a reduced upward continuation of the said post and substantially a part thereof. At-

tached to the rod 14 so as to rest snugly against the under side of the cover 2, I furnish a disk or plate 29 as protection against the admission into the apparatus of film injurious light rays through the opening 30 in the cover 2.

For supporting the film and holding the same separated so that the developing liquids or such other fluids as may be required in treating the same may readily come in contact with all parts thereof I provide a support or partition 10. This support or partition is preferably and as shown a strip of thin metal having a width at one end of approximately the length of the post or upright member 8, and from this end it is cut lengthwise along one side on a bias or slant to a comparatively narrow opposite end, and the same is attached along its wide end to the post or upright member 8 so that the slanting side is upward. The entire length of the support or partition 10 is spirally wound around the upright member or post 8 and at the same time attached at the lower end to the plate 6, a space being left between the said post or upright member 8 and said partition 10, as well as between the various convolutions of the latter. The outer end of the partition is turned back to form a projection 12, the purpose of which will presently be made clear. It will be noted by reference to Fig. 1 and Fig. 6 that by the present arrangement of the support or partition 10 a band-like surface descending downward in a spiral is formed and it is upon this surface that the film is wound in like downward spiral form.

In the foregoing I described the support or partition 10 as being attached at its lower end to the plate 6. While it is most desirable to so attach the said partition or support as in this manner it is held firmly and rigidly to form and the various convolutions of the coil held in proper relation to each other, it will readily be understood however, that the plate 6 may be entirely dispensed with if the said partition or support is constructed of a metal or other material sufficiently rigid or firm to retain its form without the assistance of the said plate 6.

For fastening the end of the film to the partition or support 10 I provide thereon, preferably adjacent its inner end, an outward projecting block 11 which is attached to the side of the said support 10 below its upper edge and to the block 11 there is attached in turn a film fastening member 13 which is supplied with grooves or slots 33 and 34 separated by a central strip 35.

For rotating the partition or support 10 within the casing 1, I supply a removable crank 31 in which a squared recess 32 is formed to receive the correspondingly squared upper end of the rod 14. As illustrated in Fig. 1 and Fig. 5, a portion of the

said crank 31 extends outward of and around the opening 30 in the cover 2, serving to shield the said opening 30 against the passage of actinic light.

Attached firmly within the casing 1, I provide an upright rod 4, preferably cylindrical in cross section, which is secured at its lower end to the bottom of the casing, the upper end being free. A film-roll holder adapted to move up or down upon the rod 4 and to hold the film in proper relative position to the partition or support 10 so that it may be wound thereon, is employed. As illustrated in Figs. 1, 2, 6 and 7 the film-roll holder embodies a main or body portion 15 having a tubular aperture 45 running lengthwise through it and into which the rod 4 fits loosely. Extending outward of and firmly affixed to the body portion 15, a supporting bar 36 is provided which should preferably and as shown be of sufficient length to rest upon the innermost convolution of the partition or support 10. The said supporting bar 36 carries firmly attached adjacent the end two downward extending guide pins 37 and 38, sufficient space being left between these pins so that the upper end of the support or partition 10 may easily and without effort pass between them and rest against the supporting bar 36; and also that the said support 10 may freely travel between the said pins when the support is rotated, as will be noted by reference to Fig. 1 and Fig. 2. Attached at the lower end of the body or main portion 15 of the film-roll holder I furnish an outward extending arm 16 having an upturned end 17, the latter being preferably cylindrical in shape. In Fig. 7 the arm 16 is indicated as having a portion embedded in the body 15, and while this is a desirable means for attaching these parts, it will be understood that any other suitable means may be employed for this purpose, in fact they may be made of one piece. A similar arm 18 having a downturned end 19 preferably cylindrical in shape, and a downward extending stem 18^a which latter is preferably and as shown square in cross section, is fitted loosely at the stem 18^a into a correspondingly square aperture 46 formed in the top of the body 15. By this arrangement the arm 18 may be raised or lowered, thus permitting the arm ends 17 and 19 to be inserted into film-rolls of various width, the arms 16 and 18 however are held in proper alinement to each other. Between the arms 16 and 18 and extending outward in the same general direction, I provide a spring member 20 which is attached to the body or main portion 15. As best indicated in Fig. 2, this spring member 20 is somewhat curved as to conform in a general way to the surface of the film-roll carried by the arms 16 and 18. This spring member 20 serves to hold the film-roll in a firm coil and thus prevent-

ing premature unwinding especially during the preliminary preparation of attaching the end of the film-roll to the partition or support 10. The spring member 20 also provides sufficient friction by bearing against the film-roll to prevent too easy unwinding thereof that the film and its protecting covering may be evenly and smoothly spread upon the support or partition 10.

For admitting into the casing the necessary fluids required in the development of the film, I furnish a fluid box 21 in the cover 2, the same having an attached bottom 22 which is provided with a series of openings 23. Attached within the box 21 is a supplemental bottom 24 and likewise has a series of openings 25. An additional top plate 26 is fitted into the said box over the said supplemental bottom 24, the said top plate 26 being likewise supplied with a series of openings 27. This arrangement of parts is best shown by reference to Figs. 1 and 5. As there indicated, the openings 23 in the bottom 22 and the openings 27 in the top plate 26 are arranged in same relative positions to each other or in the same vertical plane; the openings 25 in the supplementary bottom however, are arranged between or out of alinement of said openings 23 and 27, and by this arrangement, as will readily be understood, a series of indirect passages are formed which will admit liquid but exclude actinic light rays. Attached to and extending under the fluid box 21, a plate 28 is provided, the purpose of which is to divert the fluid from the film during its downward flow into the casing 1, thus protecting the film against streaky or uneven development.

In the operation of the apparatus the support or partition 10 and the film-roll holder are preferably removed from the casing. This can be done simply by raising the rod 14, and as the supporting bar 36 of the film-roll holder rests upon the partition or support 10 both these parts may be withdrawn at the same time. By removing these parts the operator has free and unhampered use of both hands during the preliminary preparation of attaching the end of the film-roll to the said partition 10.

Both ends of the sensitized portion of the film-roll should be attached to the black protecting paper. In the form of film-roll now in common use one end of the sensitized film is so attached at the factory and a gummed strip is supplied for attaching the opposite end. The film-roll, with the loose end leading from the side nearest the spring member 20 so that the sensitized portion will be outward when the film-roll is wound in reversed direction upon the support or partition 10 as plainly shown in Fig. 6, is placed between the arms 16 and 18, the arm ends 17 and 19 being inserted into apertures

at the ends of the film-roll. Film-rolls of various width may be treated in the apparatus as the arm 18 may be raised or lowered at will. After the film-roll is in position between the arms 16 and 18 the same may be freely handled or carried about without danger of its unraveling as it is held quite firm by the spring member 20 which is provided upon the film-roll holder. A portion of the black protecting paper which usually extends considerably beyond the sensitized film may be removed, a sufficient length of it however should be left to fully protect the sensitized portion during the preliminary preparation.

The loose end of the film-roll is connected to the partition or support 10 by threading it into slot 34 in the film fastening member 13, and then carrying the end back through slot 33 and under and beyond the central strip 35, as shown by dotted lines in Fig. 4. By this arrangement the end of the film-roll is held securely in an upright position upon the partition or support 10. The end of the film-roll being attached, the supporting bar 36 of the film-roll holder is placed upon the inner convolution of the partition or support 10 preferably adjacent the film fastening member 13, the edge of said partition 10 resting between the guide pins 37 and 38. The portion of the film-roll which, as above described, was threaded into the film fastening member 13 should be pressed downward as far as the block 11 will permit.

The support 10 together with the film-roll holder, which is held loosely to the former by the guide pins 37 and 38, are placed in position within the casing 1, the support 10 being fitted upon the stud 5 and the film roll holder upon the rod 4 as shown in Fig. 1. The cover 2 is now placed in position upon the casing 1 and the crank 31 fitted upon the projecting end of rod 14. The support 10 is now rotated in the casing by turning the crank 31 in the direction indicated by the arrow in Figs. 1, 2 and 6, thus causing the simultaneous unwinding of the film from the spool and the rewinding of the same in reverse direction upon the support 10, as illustrated in Fig. 6. When the end of the support 10 has been reached by the supporting bar 36 further rotation of the said support 10 is prevented by the guide pin 37 coming in contact with the projection 12 at the end of the said support 10.

The manner in which the film-roll is held in proper relation to the support 10 that the film may be wound upon the various convolutions thereof, will readily be understood. As previously stated the support 10 and the film-roll holder are placed into the casing, the supporting bar 36 of the film-roll holder at this point resting upon the inner convolution of the support 10, the position of these parts being approximately

as shown in Fig. 1. The arm 16 upon which the lower end of the film-roll rests being mounted upon the body portion 15 of the film-roll holder downward of the supporting bar 36, a portion of the lower part of the film rests against the side of the inner convolution of the said support 10. As the support 10 is rotated, the supporting bar 36, actuated by the weight of the film-roll holder, moves downward with the slanting edge of the support 10, and being directed by the guide pins 37 and 38 it also swings outward with each succeeding convolution. As will of course be understood, as the supporting bar 36 moves downward, the body portion 15 of the film-roll holder, which, as previously stated is loosely fitted upon the rod 4, also moves downward and swings outward on the said rod 4, carrying the film-roll with it so that the latter is always in position to be wound upon that portion or convolution of the support 10 upon which the supporting bar 36 is resting; as clearly illustrated in Fig. 6.

In order that the film may retain its position upon the support 10 it is desirable that a portion of the black protecting paper remains wound around or connected to the spool. Usually there is a sufficient length of this black paper to permit the winding of the sensitized film upon the support 10 without entirely freeing the black paper from the spool, however as the apparatus may be required to develop comparatively short films or films provided with but a short length of black paper at the ends, I provide a stop-block 39, illustrated in Fig. 3. As shown, this stop-block is provided with an aperture 40 in one side into which a screw 41 is threaded, and extending upward from the bottom a recess 42 is formed. Suitable indicating marks such as the figure "6" at 43 Fig. 6, may be marked or stamped upon the support 10. The figure "6" in the present instance standing for "6 exposures" and the marking should be placed upon the support 10 at or near the point where the sensitized portion of a film of this variety may be expected to end. In using the stop-block 39 the same is placed upon the support over the indicating mark 43 the upper edge of said support 10 resting in the recess 42, and the screw 41 is tightened against the side of said support 10 so as to hold the stop-block firmly in place; this operation being preferably performed before the support 10 is placed into the casing 1. As the support 10 is rotated and the sensitized portion of the film is unwound from the spool the guide pins 37 and 38 come into contact with the stop-block 39 and the rotating movement of the support 10 is brought to a stop thereby preventing further unwinding of the black paper from the spool. As will be understood the stop-block may be easily removed from the

support 10 by simply loosening the screw 41. To continue with the operation of the apparatus. After the film has been wound upon the support 10 the developing liquid is poured into the casing through the fluid box 21, sufficient liquid being used to entirely cover the film. After the film has remained in the liquid a sufficient length of time the crank 31 is removed and the cover 2 lifted from the casing. A simple way to remove the film from the casing is by raising the rod 14 whereby the support 10 and the film-roll holder with the film still wound thereon, are withdrawn from the casing, and the film may then be detached from these parts and fixed in the usual manner.

While I believe it is desirable that the apparatus be equipped with the fluid box 21 for the purpose as above described, the same however is not absolutely necessary to the working of my apparatus, in fact the fluid box may be entirely dispensed with. In using the apparatus without the fluid box the developing fluid is poured into the casing before the film is wound upon the support 10, and the winding of the film upon the support 10 is performed with both the support and the film submerged in the developing fluid.

To prevent too easy actuation of the support 10 that the film may be evenly and firmly held thereon, I provide a spring pawl 48 which is attached to the top of the cover 2, the end of the pawl being adapted to fit into one of a series of shallow grooves 47 provided around the lower portion of the crank 31, as shown in Fig. 8. By the present arrangement the crank 31 is prevented from loosely swinging about which might result in dislodging the film from its position upon the support 10. For attaching the spring pawl 48 to the top of the cover 2, I provide an outward extending plate 49, as illustrated in Fig. 1 and Fig. 8, which may be attached to the top of the cover 2 in any suitable manner.

As illustrated in Fig. 6 the support 10 is provided with a series of openings 44. These extend along the entire length of the said support 10 preferably near its lower end, and are for the purpose of allowing the developing fluid to pass directly between the various convolutions of the support. While these openings 44 are not absolutely necessary as sufficient space is left between the various layers of the support 10 for the developing liquid to flow in and around all parts of the film, nevertheless these openings 44 are of some advantage and the support 10 should preferably be supplied with them.

The entire apparatus may be constructed of metal, preferably of nickel plated brass. It is especially desirable that the entire film-roll holder be constructed of solid metal and on the somewhat bulky lines shown in

Figs. 1, 2, 6, and 7 as this film-roll holder retains its position upon the support 10 by its own weight, as already described.

In Fig. 6 a film-roll having a backing of black protecting paper along the entire length of the sensitized film is illustrated this being the form of film-roll now in common use, but it will be understood that films having protecting paper only at the ends of the sensitized film may also be treated in the apparatus.

I claim as my invention:

1. In an apparatus for developing photographic films, the combination of a suitable casing closed against the admission of actinic rays; an upright member fitted within said casing; a rigid film support attached to said upright member and spirally wound around the same; and means for actuating the said upright member from without the casing so as to rotate the said film support.
2. In an apparatus for developing photographic films, the combination of a suitable casing; a cover adapted to fit upon said casing; a stud axle attached to the bottom of said casing; an upright member pivotally fitted upon said stud axle; and a film support attached to said upright member and spirally wound around the same, the said support being formed of a continuous strip of metal and held in a fixed coil.
3. In an apparatus for developing photographic films, the combination with a suitable casing and a cover adapted to fit thereon, of a stud axle attached to the bottom of said casing; an upright member having a recess formed at one end, fitted upon said stud axle; a spirally wound rigid film support with vertical sides and attached to said upright member; and means for rotating the said film support from without the apparatus.
4. In an apparatus for developing photographic films, the combination of a suitable casing, a cover adapted to fit upon said casing; a stud attached to the bottom of said casing; an upright member having a recess formed at the lower end fitted upon said stud; a rigid spirally wound film support attached to said upright member; and means for removing the said film support from the casing.
5. In an apparatus for developing photographic films, the combination of a casing; a suitable cover adapted to fit upon said casing; a stud axle attached to the bottom of said casing; an upright member 8 having a recess formed at the lower end fitted upon said stud axle; a rod 14 attached at one end to said upright member and extending upward thereof through the top of said cover; and a rigid spirally wound film support having a downward sloping top edge attached to the said upright member.
6. In an apparatus for developing photo-

graphic films, the combination of a casing; a cover adapted to fit upon said casing; a stud axle attached to the bottom of said casing; an upright member having a recess formed at one end fitted upon said stud axle; a film support attached to said upright member, the said film support being formed of a continuous strip having a downward slanting upper edge and wound in a spiral coil around the said upright member; and means for rotating the said film support within the casing.

7. In an apparatus for developing photographic films, the combination of a casing; a cover adapted to fit upon said casing; a stud mounted within said casing; an upright member having a recess formed at one end fitted upon said stud; a spirally wound film support attached to said upright member, the said film support having a spirally descending film supporting surface.

8. In an apparatus for developing photographic films, the combination of a casing; a cover adapted to fit thereon; an upright member pivotally mounted in said casing; and a rigid spirally wound film support having a series of fluid passages formed therein, attached to said upright member.

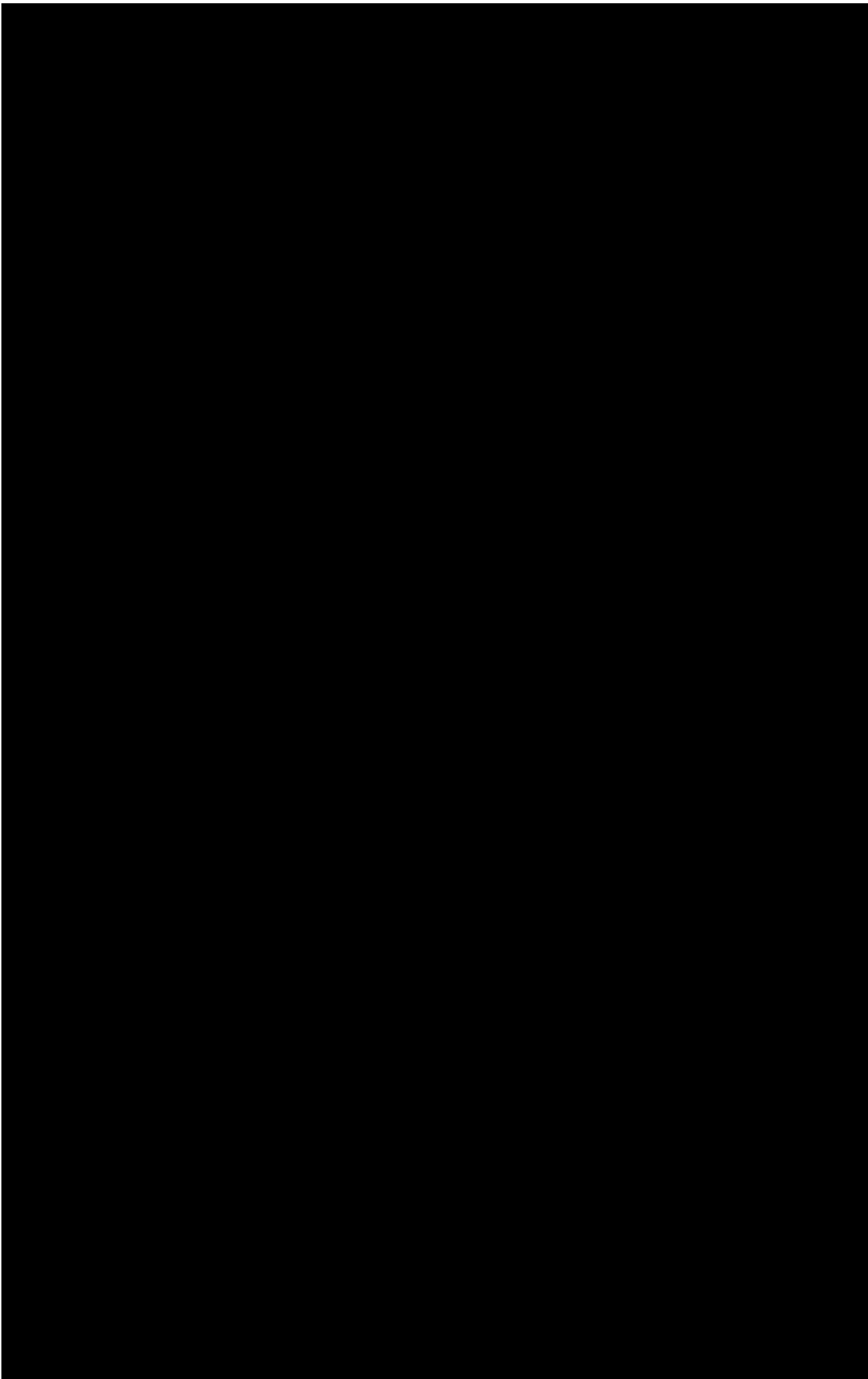
9. In an apparatus for developing photographic films, the combination of a suitable casing; a cover adapted to fit upon said casing; an upright member pivotally mounted in said casing; a spirally wound rigid film support attached to said upright member; and a film fastening member provided upon said film support.

10. In an apparatus for developing photographic films, the combination with a casing and a cover adapted to fit thereon of an upright member pivotally mounted in said casing; and a spirally wound rigid film support adapted to hold a strip of photographic film in separated layers, attached to said upright member.

11. In an apparatus for developing photographic films, the combination of a suitable casing; a cover adapted to fit thereon; a rigid spirally wound film support mounted in said casing; a suitable plate attached to the lower portion of said film support for the purpose of holding the various convolutions of same in proper relation to each other; and means for rotating the said film support within the said casing.

12. In an apparatus for developing photographic films, the combination of a suitable casing; a cover adapted to fit thereon; a stud attached to the bottom of said casing; a plate 6 having an opening formed therein fitted upon said stud; a spirally wound film support attached to said plate; and means for removing the said plate and the film support attached thereto from the casing.

13. In an apparatus for developing photographic films, the combination of a suitable



ing; a rigid spirally wound film support having a suitable film supporting surface and rotatably mounted within said casing; a film-roll holder adapted to carry a roll of photographic film also mounted in said casing; and means for supporting said film-roll holder in proper relation with the said film support so that the film may be wound upon said film support.

25. In an apparatus for developing photographic films, the combination of a suitable casing; a cover adapted to fit thereon; a film support having a spirally descending film supporting surface and rotatably mounted within said casing; a vertical rod attached within said casing; a film-roll holder adapted to carry a roll of photographic film mounted upon said rod; and means for supporting the film-roll in proper relation with the film support that the film may be wound upon said film support.

26. In an apparatus for developing pho-

tographic films, the combination of a casing; a cover adapted to fit thereon; a film support formed so as to have a spirally descending supporting surface mounted in said casing; means for rotating the said support; and means for guiding a flexible photographic film whereby the film may be wound upon the support.

27. In an apparatus for developing photographic films, the combination of a casing; a cover adapted to fit thereon; a spirally wound film support mounted in said casing; means for rotating the said support; means for guiding a flexible photographic film whereby the film may be wound upon the support; and means for limiting the rotation of the support according to the length of the film.

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Witnesses:

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