

Dec. 6, 1932.

G. C. BEIDLER

1,889,818

PHOTOGRAPHIC DEVELOPING APPARATUS

Filed Oct. 26, 1931

4 Sheets-Sheet 1

Fig. 1.

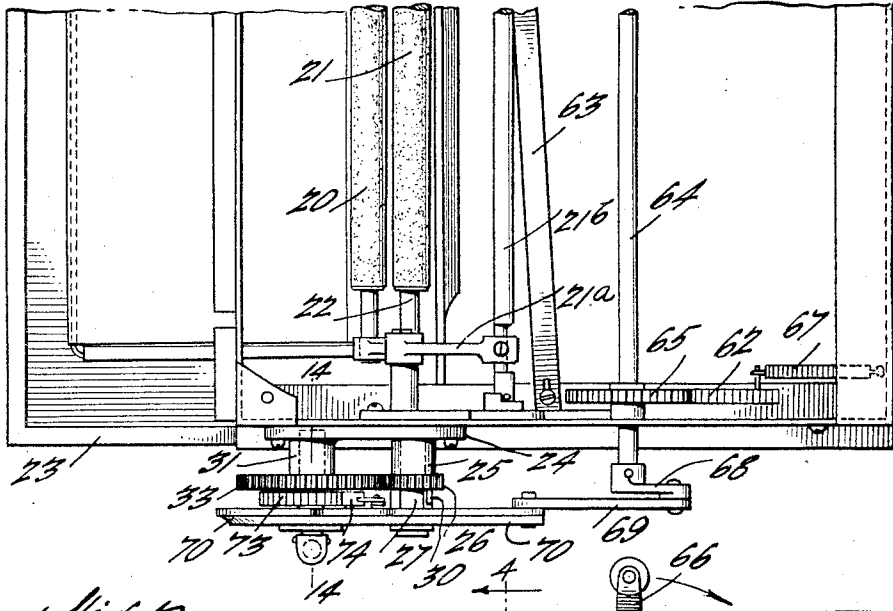
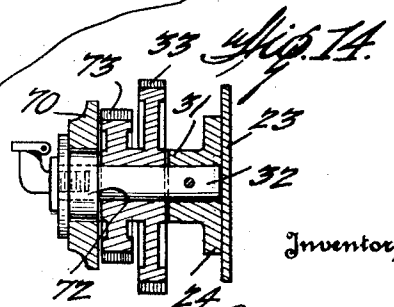
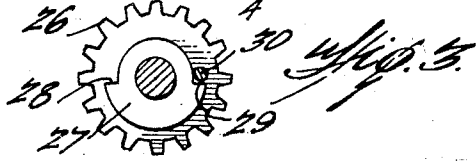
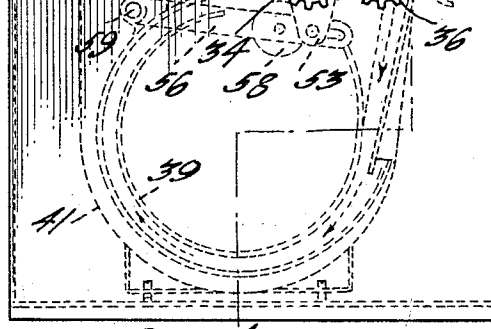
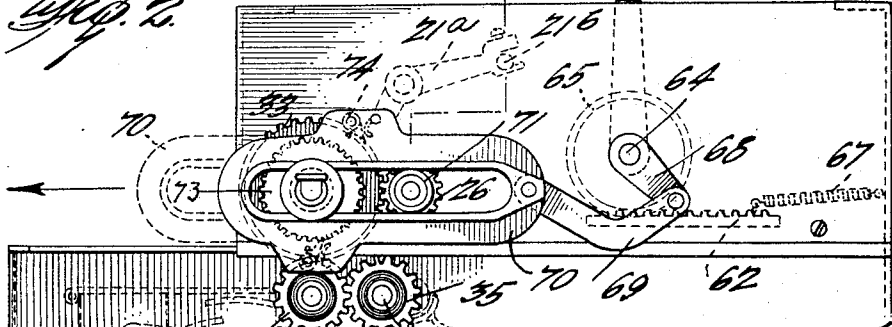


Fig. 2.



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4 Sheets-Sheet 2

Fig. 4.

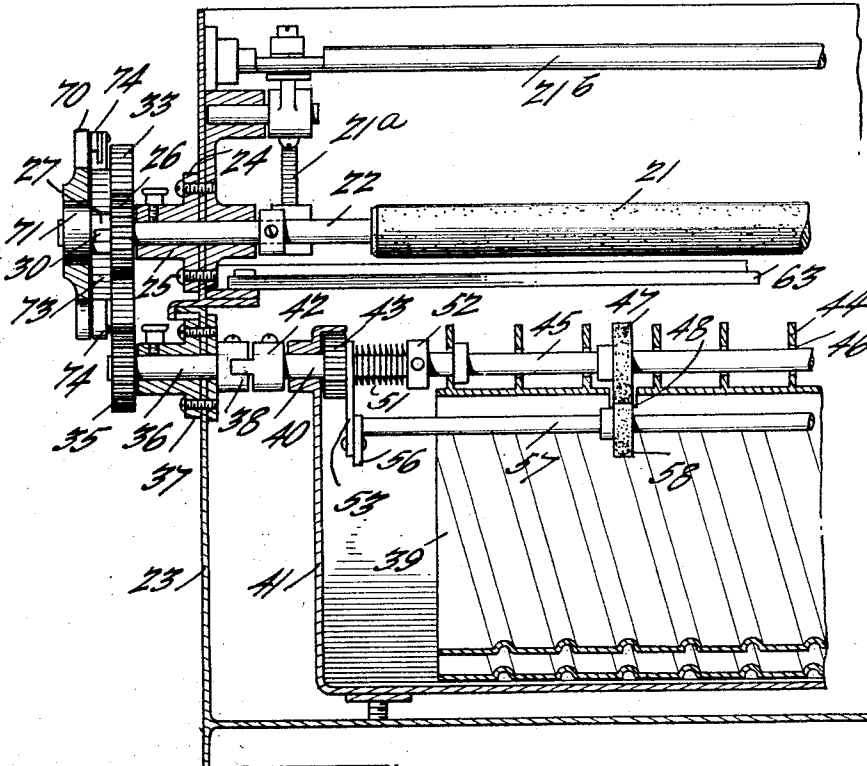


Fig. 5.

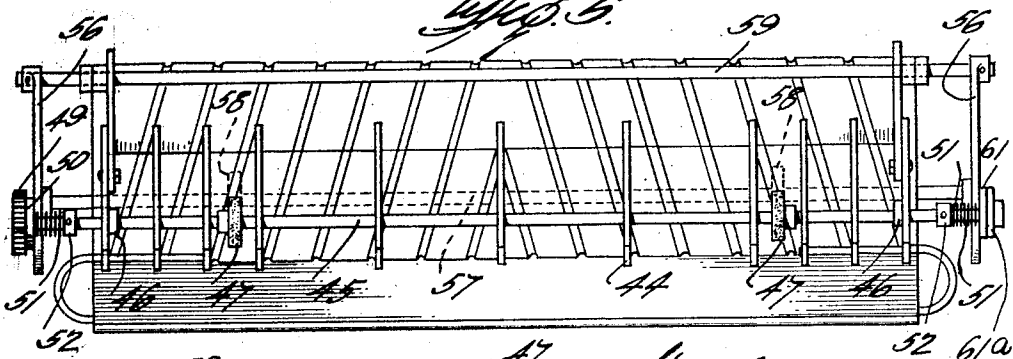
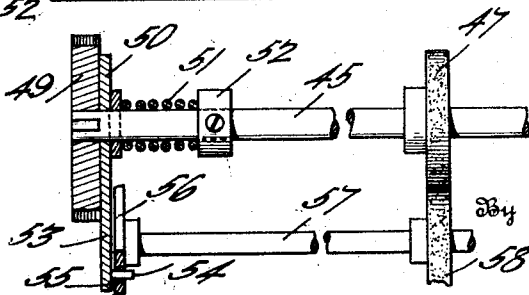


Fig. 6.



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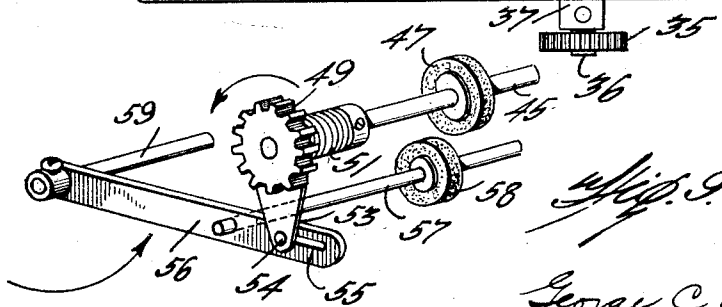
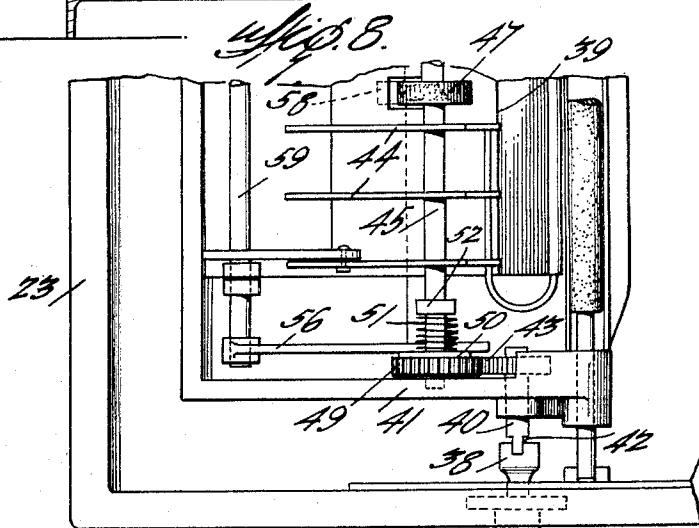
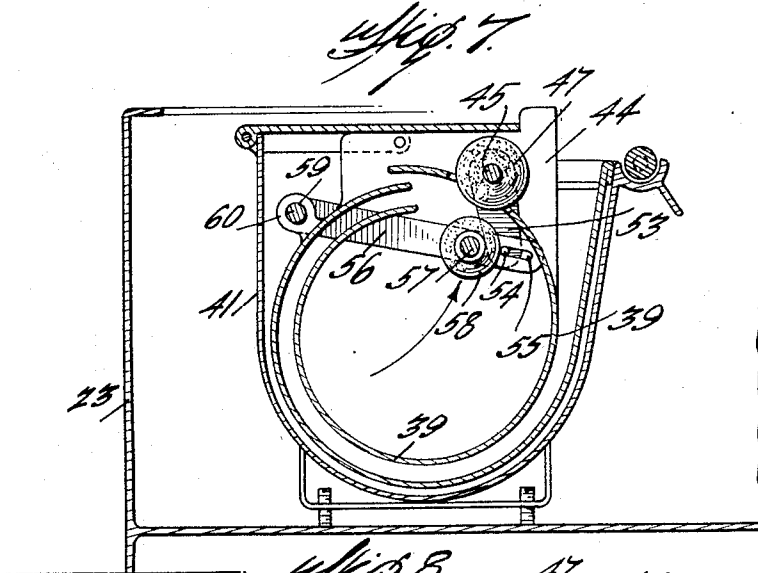
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PHOTOGRAPHIC DEVELOPING APPARATUS

Filed Oct. 26, 1931

4 Sheets-Sheet 3



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1,889,818

PHOTOGRAPHIC DEVELOPING APPARATUS

Filed Oct. 26, 1931

4 Sheets-Sheet 4

Fig. 10.

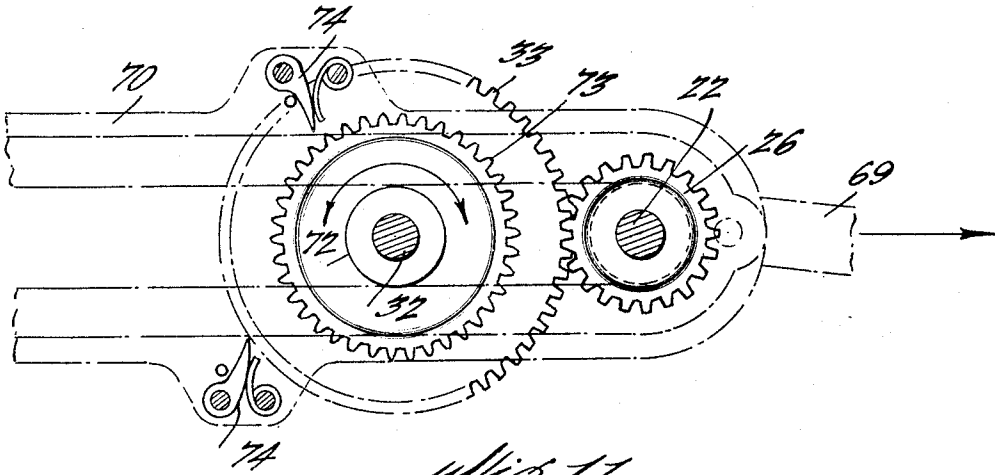


Fig. 11.

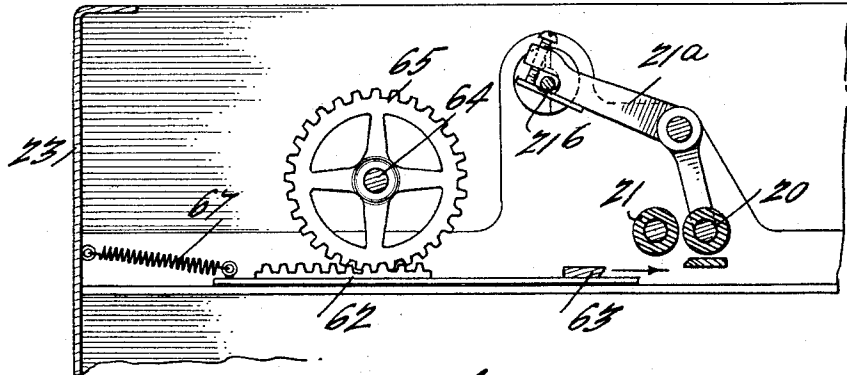


Fig. 12.

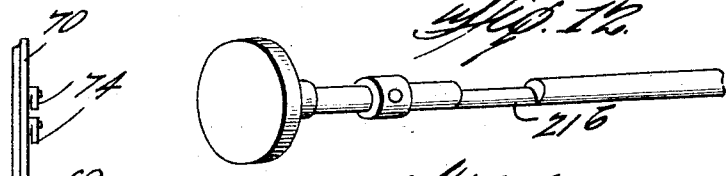
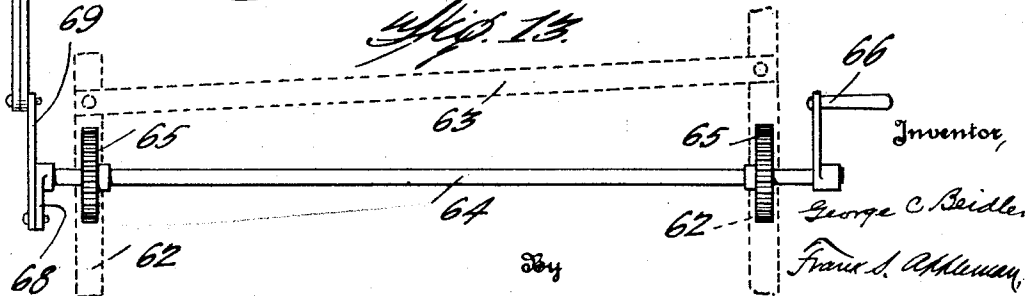


Fig. 13.



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UNITED STATES PATENT OFFICE

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PHOTOGRAPHIC DEVELOPING APPARATUS

Application filed October 26, 1931. Serial No. 571,232.

This invention relates to photographing and developing apparatus and particularly to improvements in such apparatus which are included in the patent issued to me April 3, 1928, and numbered 1,664,729 and also a patent on coil form film holders forming part of the developing apparatus characterized in patent issued to me April 3, 1928, and numbered 1,664,731.

The last mentioned patent relates to a coil film developer and a film developer of this general type is employed in the apparatus of the first mentioned patent and there is co-active relation and operation between these parts and obviously the present invention is not restricted in scope and need not necessarily be identified by the exact photographing and film transferring means of the first mentioned patent nor to the exact structural features of the coil form film holder part of the developing apparatus of the second mentioned patent.

It is an object of this invention to provide means for delivering film to be developed to a film developing receptacle and to provide film engaging means for facilitating movement of the film therein and to cause a disengagement thereof when the film is in a position to be developed. In other words, a means which engages a film to move it into the developer should disengage the film when it is in place in order that the developer may be in contact with the whole surface of the film otherwise there will be an interrupted development of those surfaces with which the feeding means are in contact.

It is a further object of this invention, therefore, to provide positively driven instrumentalities such as rollers which will engage the film as it is fed into the film holder and aid in its movement to the proper position for development. When the film is sufficiently stiff and of relatively small dimensions it may be delivered to a coil form film holder by force applied to it externally of the film holder and it may be pushed into the film holder without any pulling means being employed, but where the film stock is light or flimsy and the area of the film is extensive,

supplemental film moving means is desirable and this invention is designed to supply that function.

In the present embodiment of the invention, the film moving means within the film holder is provided with power transmitting means which utilize the movement of the film feeding means which, when in operation, draws film to an exposing chamber for exposure and thereafter discharges the exposed film therefrom and delivers it to the developing tank or receptacle. As a further step in the operation, the means for cutting the film into appropriate lengths disclosed in the first mentioned patent is utilized through suitable gearing for advancing the film in the developing tank after the first mentioned film moving means has ceased to operate and the said means for operating the film cutter is further utilized for disengaging the aforesaid film moving means from the film in order that the developer may have access to the film.

With the foregoing and other objects in view, the invention consists in the details of construction, and in the arrangement and combination of parts to be hereinafter more fully set forth and claimed.

In describing the invention in detail, reference will be had to the accompanying drawings forming part of this application, wherein like characters denote corresponding parts in the several views, and in which—

Figure 1 illustrates a plan view of a fragment of film drawing means, cutter operating mechanism and instrumentalities associated therewith for effecting movement of film in the developing receptacle;

Figure 2 illustrates a view in side elevation, partly in section, of the film developing tank and means for moving the film therein;

Figure 3 illustrates an enlarged sectional view of a shaft, a gear wheel and collar thereon;

Figure 4 illustrates a sectional view on the line 4—4 of Figure 2;

Figure 5 illustrates a detail plan view of the developing receptacle and parts associated therewith;

Figure 6 illustrates an enlarged detail view of the film moving means associated with the developing receptacle;

Figure 7 illustrates a transverse sectional view of the developing receptacle and parts associated therewith;

Figure 8 illustrates a plan view of a fragment of the developing receptacle and parts associated with it;

Figure 9 illustrates a perspective view of the mechanism associated with the developing receptacle;

Figure 10 illustrates an enlarged detail view of the film advancing means;

Figure 11 illustrates a view in elevation, partly in section, of the cutter operating mechanism and means associated with it;

Figure 12 illustrates a perspective view of a cam shaft;

Figure 13 illustrates a plan view of the cutter operating mechanism and the connection between it and the actuating means for the mechanism in the developing receptacle; and

Figure 14 illustrates a sectional view of the ratchet wheel assembly.

The invention is associated with film drawing rollers 20 and 21 that are driven in known manner from means externally of a casing, and the shaft 22 of the roller 21 projects at the side of the case 23 opposite the means for turning the rollers. A bearing plate 24 is secured on the outside of the casing and it has a journal 25 through which the shaft 22 extends. A gear wheel 26 idles on the shaft and a collar 27 is secured on the shaft to rotate with it. The collar has a circumferentially reduced portion with radially extending shoulders 28 and 29 where the reduced portion and unreduced portion merge and the gear wheel 26 has a pin 30 secured to it which moves at certain cycles of the operation around the surface of the reduced portion without coacting with the shoulders and while the collar 27 and shaft 22 are stationary.

A hollow boss 31 on the plate 24 holds a shaft 32 and an idle gear wheel 33 thereon meshes with the gear wheel 26 so that when the paper feeding rollers are moved the idle wheel turns and it is in mesh with a gear wheel 34 and the gear wheel 34 in turn is in mesh with a gear wheel 35 on a shaft 36 journaled in a bearing 37, which shaft 36 extends into the casing and has a clutch member 38 on its inner end. Within the casing, the coil form film holder 39 is located in position to receive film which is drawn from a photographing apparatus and pushed into the said film holder by the rollers 20 and 21. A shaft 40 is journaled in one end of a developing fluid receptacle 41, and the said shaft has a clutch member 42 which coacts with the clutch member 38. The inner end of the shaft 40 carries a gear wheel 43 which, through the rotation of the feed rollers 20

and 21 and the gear wheels 26, 32, 34 and 35 is driven from the source of power utilized for rotating the feed rollers 20 and 21.

The film holder 39 has vertically disposed fins or plates 44 at its top and a shaft 45 extends therethrough and is journaled in bearings 46 in the fins or plates at the ends of the film holder. The said shaft has a plurality of feed rollers 47 secured on it and they extend through slots such as 48 into the film holder near its top. The shaft 45 has a gear wheel 49 secured on it and it meshes with the gear wheel 43. A friction disk clutch 50 is secured on each end of the shaft 45 and each disk clutch is under the tension of a spring 51 held in place by a collar 52. Each friction disk clutch has an arm 53 which extends downwardly and each of said arms has a pin 54 riding in a slot 55 of an arm 56 in which a shaft 57 is journaled. The shaft 57 extends through the film holder longitudinally and it has rollers 58 coacting with the rollers 47 to aid in moving film into the film holder. The arms 56 are secured to a shaft 59 extending longitudinally of the film holder externally thereof and the shaft is journaled in bearings 60 secured to the said film holder. Since the arms 56 oscillate, they result in raising and lowering the shaft 57 to carry the rollers 58 into and out of operative relation with the rollers 47 and movement is imparted to the arms for raising and lowering them through the engagement of the friction disk clutches with the gear wheel 49 and a flange 61 of a collar 61^a respectively on the said shaft 45.

By reason of the foregoing conditions, when the mechanism is driven to draw film and deliver it to the film holder and the gear wheel 49 is rotated and the shaft 45 is turned the arms on the disk clutches are slightly oscillated or swung and this results in elevating the arms and carrying the feed rollers 58 into operative relation with the feed roller 47 and these rollers engage film coming into the film holder and aid in moving it around the convolutions of the film holder. When a certain length of film has been delivered to the film holder, the movement of the mechanism is arrested, at which time the length of film that has passed the cutting device is severed by operating the cutting mechanism.

The cutting mechanism is of a type commonly employed in machines to which reference has been made. For the purpose of an understanding of the invention, part of a mechanism of conventional type is shown and it includes slidable racks such as 62 having a cutting blade 63 which is moved as the racks are moved, it being understood that one such rack is located at each side of the machine. A shaft 64 extends through a casing of the machine and pinions 65 secured on the said shaft mesh with the racks for imparting movement to the knife 63. The shaft

has a crank handle 66 by which the said shaft is partially rotated and each rack is under the tension of a spring 67 so that the rack is retracted when the operating handle 66 is released.

The shaft 64 in this embodiment of the invention projects through the casing on the side opposite that having the operating handle 66 and a crank 68 is secured on the shaft 64. The link 69 which, in this instance, is curved is pivotally connected to the crank 68 and to a slotted plate 70, and the plate is guided by a roller 71 rotatable on the shaft 22 and a hub 72 of a ratchet wheel 73 which is rotatable on the shaft 32.

The plate 70 has dogs 74 which are pivoted on a plane, in the present embodiment of the invention, above and below the plane of the teeth of the ratchet wheel 73. The dogs are so yieldably held that the ratchet wheel is in the path of travel of their free ends as the slotted plate is reciprocated, and one dog is in advance of the other, hence one dog rotates the ratchet wheel in one direction and releases the said wheel before the other dog engages the said wheel to rotate it in opposite directions and, as the ratchet wheel is secured to the gear wheel 33, it turns the said gear wheel successively in alternate directions.

It is obvious that since the gear wheel 33 meshes with the gear wheel 34 and the gear wheel 34 meshes with the gear wheel 35, the shaft 36 will be turned in a direction first to operate the rollers 47 and 58 to feed the paper a short distance beyond that by which it was fed by the operation of the film drawing rollers 20 and 21 and that reversal of movement of the slotted plate will cause the rotation of the ratchet wheel in the opposite direction which movement turns the wheel 49 in a direction opposite to that in which it was turned when the paper was being fed, resulting in swinging the arms of the friction disk clutches in a direction to lower the arms 56 and the shaft 57 so that the rollers 47 and 58 release the film to permit the developing fluid to have access to the sensitized sides thereof.

The gear wheel 26 idles on its shaft but is positively driven in one direction by reason of the engagement of its pin with a shoulder of the collar 27. The distance between the shoulders 28 and 29 is sufficient to permit the gear wheel 26 to move under the influence of the wheel 33 to the degree that said gear wheel is moved by the action of the dogs engaging the ratchet wheel in imparting the alternate rotary motion to the wheel 33. Rotation of said wheel in one direction advances the film into the film holder after it is cut and reverse movement of the wheel 33 causes disengagement of the wheels with the film when the arms carrying the shaft 57 are moved. After the film is developed it is removed from the film holder in known manner.

The feed roller 20 is movable toward and

away from the feed roller 21 for the purpose of enabling film to be drawn between the rollers without operation of mechanism for the purpose. As a means for separating the rollers, the roller 20 has its shaft mounted on bell crank levers such as 21 and the end of each of the bell crank levers remote from the shaft is engaged by a cam shaft 21^b and when said cam shaft is turned the roller 20 is moved toward and away from the roller 21.

I claim

1. In a photographic developing apparatus, a holder of coil form for developing film, means for feeding film to the holder, suitably operated means in volutions of the coil for engaging film and advancing it in the holder, and means for operating the said engaging means to release said film when said film is located in the holder.

2. In a photographic film developing apparatus, a film holder of coil form adapted to receive film when pushed thereto endwise, suitably operated means within the holder for engaging film for advancing it in the film holder including means for disengaging the said means from the film when said film is located in the holder.

3. In a photographic developing apparatus, a coil form film holder having apertures near the top thereof, rotatably mounted rollers having their peripheries extending through the apertures, a shaft on which the said rollers are mounted, a gear wheel on said shaft, friction disks having arms on said shaft, one of which coacts with the gear wheel, a flange on said shaft engaged by the other disk, means for holding each disk in engagement with its coacting element on the shaft, oscillatively mounted arms having slots, a pin carried by each arm of a disk movable in one of the slots, a shaft carried by the oscillatable arms, rollers thereon adapted to coact with the first mentioned rollers, gearing for rotating the first mentioned shaft, a ratchet wheel connecting to move the gearing, a member mounted to reciprocate in operative relation to the ratchet wheel, dogs pivoted thereon above and below the plane of the ratchet wheel movable in the path of the teeth of the ratchet wheel whose free ends are one in advance of the other.

4. In a photographic developing apparatus, a coil form film holder into which film is delivered endwise, cooperating rollers operative within the film holder for engaging film entering the film holder and advancing the said film therein, means for causing cooperative action of the rollers on the film, and means for disengaging the rollers from the film.

5. In a photographic developing apparatus, a holder for developing film, means for feeding film to the holder, means for engaging film and advancing it in the holder,

gearing driven by the first mentioned means for driving the second mentioned means, and means for alternately rotating the gearing when the first mentioned means is at rest.

- 5 6. In a photographic developing apparatus, a coil form film holder, rollers having mountings stationary with relation to the film holder and with relation to which the rollers rotate, said rollers having their peripheries extending into the film holder, rollers in the film holder coacting with the first mentioned rollers for engaging film and advancing it in the film holder mountings for the second mentioned rollers, means for moving said mountings to carry the rollers into operative relation with the first mentioned rollers and for rotating said rollers, means for driving the means for rotating the rollers, and means independent of the driving means for rotating said rollers alternately in opposite directions after the first mentioned means for driving the rollers is at rest, including means for effecting a separation of the coacting rollers associated with the film holder.
- 10 7. In a photographic developing apparatus, a coil form film holder, suitably operated means for engaging film and exerting a pull thereon to advance the film in the holder, and means to operate said means to release the film.
- 15 8. In a photographic developing apparatus, a holder for developing film, means for feeding film to the holder, means for engaging film and advancing it in the holder, gearing for driving the second mentioned means, and means for rotating the gearing in alternate directions when the first mentioned means is at rest.
- 20 9. In a photographic developing apparatus, a coil form film holder, rotatively mounted rollers having their peripheries extending into the film holder, rollers coacting therewith for advancing film into the holder, means for moving the last mentioned rollers into and out of coactive relation with the first mentioned rollers, whereby the film is alternately engaged and disengaged and means for imparting rotary motion to said rollers.
- 25 10. In a photographic developing apparatus, a holder for developing film, means for feeding film to the holder, means for engaging film and advancing it in the holder, gearing for driving the second mentioned means, a ratchet wheel rotative with the gearing, means for rotating the ratchet wheel alternately in opposite directions, means for cutting the film, means for operating the last mentioned means, and for operating the means for rotating the ratchet wheel.
- 30 11. In a photographic developing apparatus, a coil form film holder having apertures near the top thereof, rotatably mounted rollers having their peripheries extending through the apertures, a shaft on which the said rollers are mounted, a gear wheel on

said shaft, friction disks having arms on said shaft, one of which coacts with the gear wheel, a flange on said shaft engaged by the other disk, means for holding each disk in engagement with its coacting element on the shaft, oscillatively mounted arms having slots, a pin carried by each arm of a disk movable in one of the slots, a shaft carried by the oscillatable arms, rollers thereon adapted to coact with the first mentioned rollers, means for rotating the first mentioned shaft for moving the sets of rollers into operative relation to each other and advancing film, means for cutting the film, means for operating the first mentioned shaft to advance the film in the film holder after the first mentioned means for operating the rollers is at rest, and means for moving the first mentioned shaft in the opposite direction to disengage the sets of rollers from the film.

12. In a photographic developing apparatus, a coil form film holder, a shaft journaled in stationary bearings, rollers thereon having their peripheries extending into the film holder, rollers coacting therewith for engaging film and advancing it in the film holder, a mounting for the second mentioned rollers, means for moving the said mountings toward and away from the mounting of the first mentioned rollers and effecting alternate engagement and disengagement of the rollers and the film, and means for driving the said rollers.

13. In a photographic developing apparatus, a coil form film holder having apertures near the top thereof, rotatably mounted rollers having their peripheries extending through the apertures, a shaft on which the said rollers are mounted, a gear wheel on said shaft, friction disks having arms on said shaft, one of which coacts with the gear wheel, a flange on said shaft engaged by the other disk, means for holding each disk in engagement with its coacting element on the shaft, oscillatively mounted arms having slots, a pin carried by each arm of a disk movable in one of the slots, a shaft carried by the oscillatable arms, rollers thereon adapted to coact with the first mentioned rollers, means for rotating the first mentioned shaft for moving the sets of rollers into operative relation to each other and advancing the film, and means independent of the last mentioned means for rotating the first mentioned shaft alternately in opposite directions after the said last mentioned means are at rest.

14. In a photographic developing apparatus, a holder for developing film, means for feeding film to the holder, means for engaging film and advancing it in the holder, gearing for driving the second mentioned means, a ratchet wheel rotative with the gearing, and means for rotating the ratchet wheel alternately in opposite directions.

15. In a photographic developing apparatus,

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- ratus, a coil form film holder having aper-
 tures near the top thereof, rotatably mounted
 rollers having their peripheries extending
 through the apertures, a shaft on which the
 said rollers are mounted, a gear wheel on said
 shaft, friction disks having arms on said
 shaft, one of which coacts with the gear
 wheel, a flange on said shaft engaged by the
 other disk, means for holding each disk in
 engagement with its coacting element on the
 shaft, oscillatively mounted arms having
 slots, a pin carried by each arm of a disk
 movable in one of the slots, a shaft carried
 by the oscillatable arms, rollers thereon
 adapted to coact with the first mentioned
 rollers, gearing for rotating the first men-
 tioned shaft, means for operating the gear-
 ing to advance the film in the film holder,
 and suitably operated means independent
 of the last mentioned means for successively
 rotating the gearing in opposite directions.
16. In a photographic developing appa-
 ratus, a coil form film holder, a shaft jour-
 naled in stationary bearings, rollers there-
 on having their peripheries extending into
 the film holder, rollers coacting therewith
 for engaging film and advancing it in the
 film holder, a mounting for the second men-
 tioned rollers, means for moving the mount-
 ings toward and away from the mountings
 of the first mentioned rollers whereby said
 rollers alternately engage and disengage the
 film, means for driving the said rollers, film
 cutting mechanism, means for operating said
 mechanism, and means for imparting motion
 of the said means for operating the cutting
 mechanism to the means for moving the
 mounting of the second mentioned rollers.
17. In a photographic developing appa-
 ratus, a holder for developing film, means
 for feeding film to the holder, means for en-
 gaging film and advancing it in the holder,
 gearing for driving the second mentioned
 means, a ratchet wheel rotatable with the
 gearing, a member, dogs on said member, one
 in advance of the other, below and above the
 planes of the ratchet wheel teeth respectively,
 operative to engage said ratchet teeth alter-
 nately, and means for reciprocating the mem-
 ber.
18. In a photographic developing appa-
 ratus, a coil form film holder having aper-
 tures near the top thereof, rotatably mount-
 ed rollers having their peripheries extend-
 ing through the apertures, a shaft on which
 the said rollers are mounted, a gear wheel on
 said shaft, friction disks having arms on said
 shaft, one of which coacts with the gear
 wheel, a flange on said shaft engaged by
 the other disk, means for holding each disk
 in engagement with its coacting element on
 the shaft, oscillatively mounted arms having
 slots, a pin carried by each arm of a disk
 movable in one of the slots, a shaft carried
 by the oscillatable arms, rollers mounted
- thereon adapted to coact with the first men-
 tioned rollers, gearing for rotating the first
 mentioned shaft, a ratchet wheel having
 means by which its motion is communicated
 to said gearing, and suitably operated means
 for imparting alternate rotary motion to the
 ratchet wheel.
- GEORGE C. BEIDLER.