April 10, 1951 D. C. HARVEY 2,548,530

FILM-WINDING CONTROL AND COUNTER FOR ROLL-HOLDING CAMERAS

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FIG. 1.

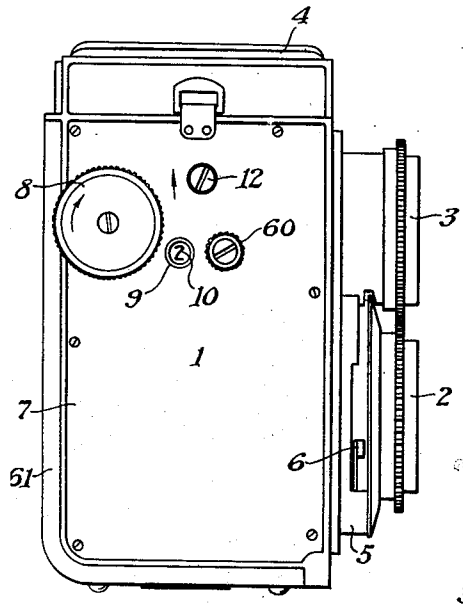

FIG. 2.

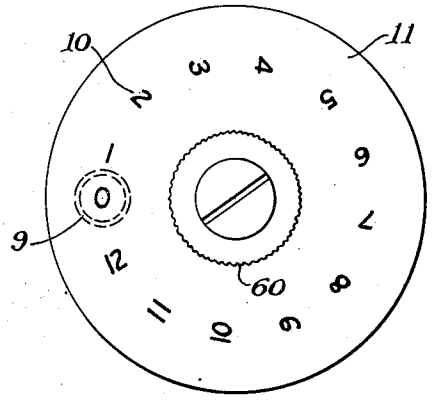

FIG. 3.

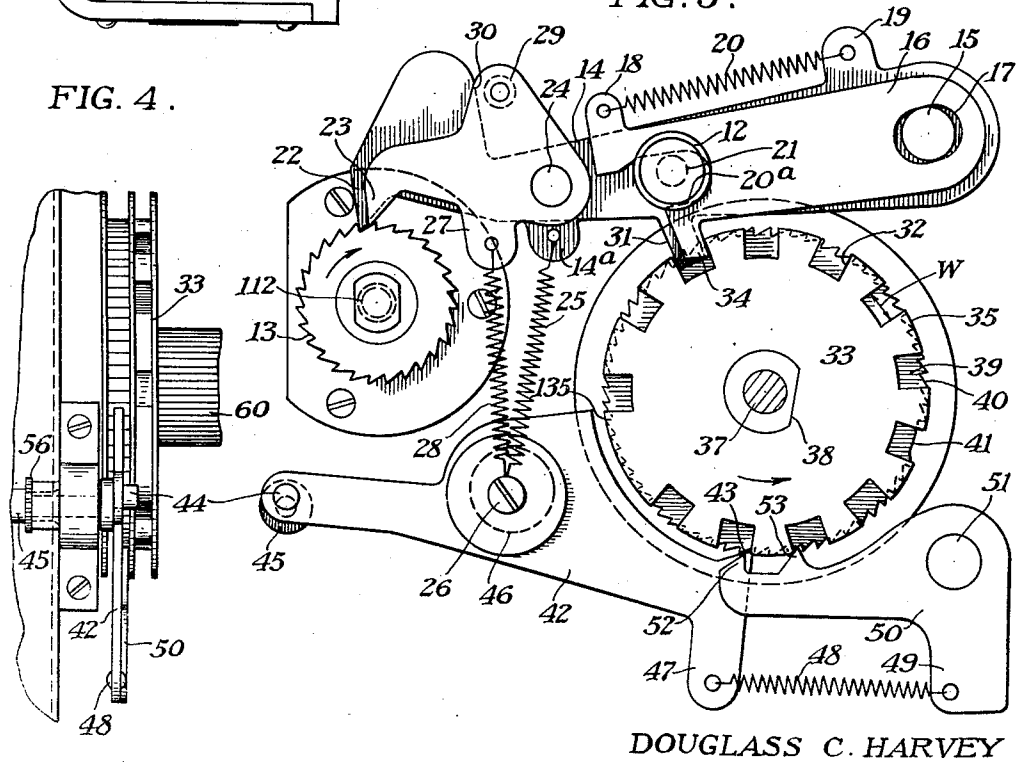

FIG. 4.

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FIG. 5.

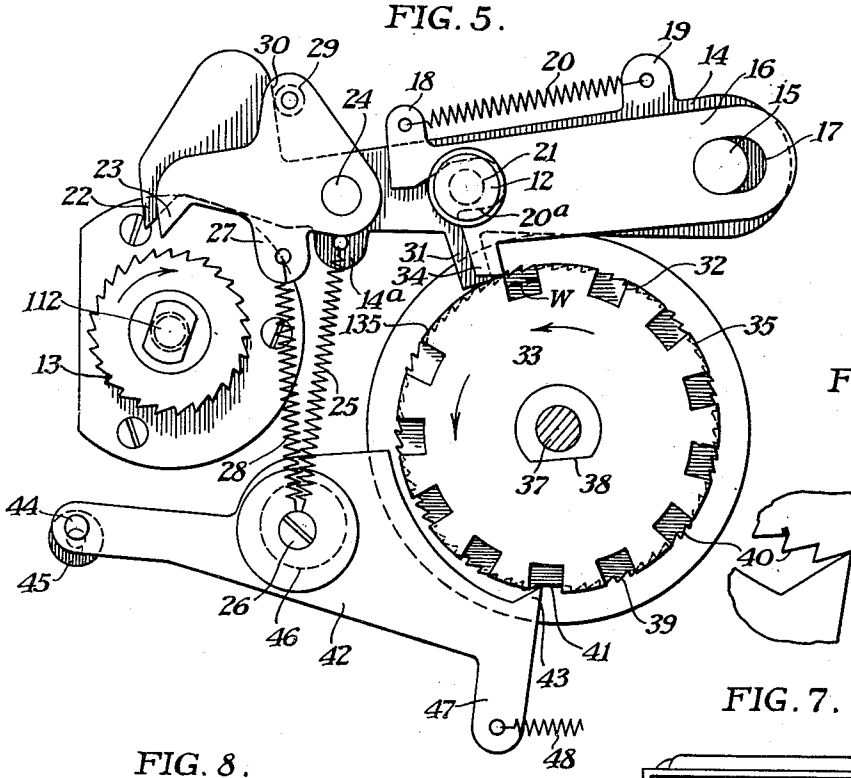


FIG. 6.

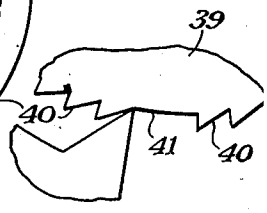


FIG. 7.

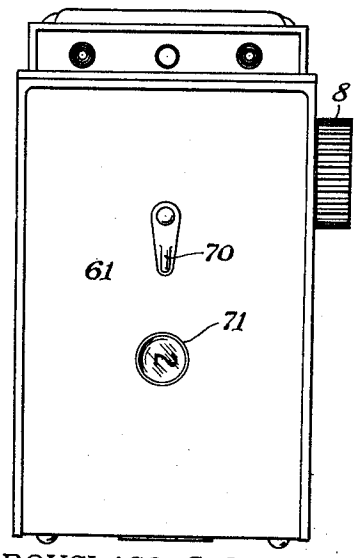
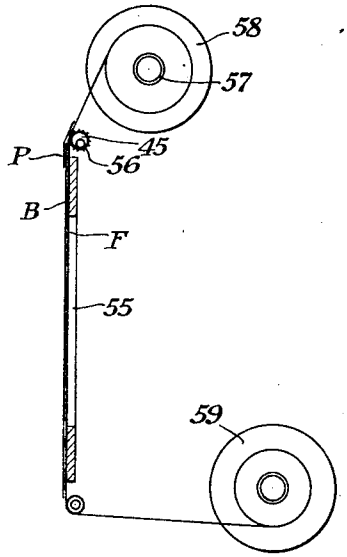


FIG. 8.



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FILM-WINDING CONTROL AND COUNTER FOR ROLL-HOLDING CAMERAS

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Application April 16, 1948, Serial No. 21,388

5 Claims. (Cl. 242—71)

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This invention relates to photography and particularly to a roll film winding control and exposure counter for roll-holding cameras. One object of my invention is to provide a film-winding control which will relieve the operator of the necessity of watching for numerals on the backing paper at a red window in winding film. Another object of my invention is to provide a relatively simple mechanism having but few parts arranged in such a manner that there is but little likelihood of the apparatus being mishandled. Another object of my invention is to provide a simple type of film-winding and counting mechanism which can be reset and moved to various positions without danger of injuring the mechanism. A still further object of my invention is to provide a simple type of film-measuring device and release which can readily be applied to roll-holding cameras with a minimum change in the parts thereof. Other objects will appear from the following specification, the novel features being particularly pointed out in the claims at the end thereof.

This mechanism may be considered as an improvement over the mechanism shown in a copending application in the names of D. C. Harvey and E. S. Marvin, Ser. No. 774,804 filed September 18, 1947, now Patent No. 2,544,879 of March 13, 1951, for Film Metering Double Exposure Prevention Camera. The mechanism has been simplified in the present application and certain disadvantages of the film-winding control shown in the copending application have been overcome in the present mechanism.

Coming now to the drawings wherein like reference characters denote like parts throughout:

Fig. 1 is a side elevation of a typical camera having a film-winding control and counter constructed in accordance with and embodying a preferred form of my invention;

Fig. 2 is an enlarged plan view of the counter dial removed from the camera;

Fig. 3 is a side elevation of the film-winding control mechanism showing the relationship of the mechanism parts after a film area has been wound into an exposure position and when the camera is ready to make a second exposure;

Fig. 4 is an enlarged end elevation showing a portion of the winding mechanism shown in Fig. 3, certain parts being omitted;

Fig. 5 is a view similar to Fig. 3 but with the parts in the starting position just after the film backing paper has been threaded to the spool and before the first film area is positioned for an exposure;

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Fig. 6 is an enlarged fragmentary detail showing a portion of the measuring ratchet and measuring pawl in position for winding the backing paper and before a film area is positioned for exposure;

Fig. 7 is a rear elevation of the camera shown in Fig. 1;

Fig. 8 is a schematic showing of the film path and exposure frame used in the camera shown in Figs. 1 and 7.

In order to illustrate a preferred embodiment of my invention I have shown my improved form of film-winding and counting control for cameras as being applied to a twin-lens reflex type of camera. As indicated in Fig. 1, the camera 1 is of a known type employing an objective in a mount 2 for taking pictures and a second objective in a mount 3 for forming an image of the picture to be taken on a ground glass which is covered by a hood 4 shown in a closed position in Fig. 1. A shutter 5 supports the lens cell 2 and a trigger 6 is used to release the shutter. The side wall 7 of the camera carries the usual type of film-winding knob 8 and is provided with a window 9 through which numbers 10 on a counting disk 11 can be successively viewed as they are brought beneath the window 9. A release handle 12 extends through a slot in the side wall 7, this release being used to move the stop pawl, to be later described, to an inoperative position after each exposure. It is obvious that my improved winding control mechanism may be applied to other types of cameras and it is to be understood that this particular form of the invention is merely an illustration of a preferred application of my invention.

My improved film-winding and counting control for cameras consists of a counter pawl and a stop pawl cooperating with the counter ratchet and a stop ratchet in such a manner that a film operator, in moving from one film to the next, manually releases the stop pawl after each exposure and then merely winds the film until the stop pawl halts the winding movement so that it is unnecessary to use the window in the camera back to determine successive exposures, although this window is necessary in initially loading and positioning the first film area in place.

As indicated in Figs. 3 and 5, a shaft 112, which carries a winding knob 8, as indicated in Fig. 1, also carries a stop ratchet 13. This ratchet is keyed to the shaft 112 and is designed to stop the movement of this shaft after a predetermined rotation thereof in positioning a film for exposure. A stop pawl 14 is used for this pur-

pose; this pawl consisting of several parts. The stop pawl may turn upon a shaft 15 on which shaft a slide 16 is also mounted for limited movement radially of the shaft through an elongated opening 17. A lug 18 on the slide is connected to a lug 19 on the pawl 14 by means of a spring 20 so that the slide is always held toward the pivot 15. The slide is also provided with an elongated opening 20a which may slide about an upstanding pin 21 terminating on the outside of the camera with the knob 12 and constituting a means for releasing the stop pawl 14. The stop pawl may be provided with a single stop ratchet engaging point 22, or it may have a second stop ratchet engaging pawl member 23 pivoted to the pawl 14 at 24. The pawl 14 includes a lug 14a connected by a spring 25 to a stud 26. The second pawl 23, if used, will include a lug 27 connected by a spring 28 to the stud 26. Thus, the point of each pawl is normally moved toward the stop ratchet 13. A pin 29 on the second pawl 23, through its engagement with the surface 30 of pawl 14, will be moved from the stop ratchet 13 when the knob 12 is raised to release the stop ratchet.

If a single pawl point 22 is used, the apparatus will work satisfactorily, but there is one difficulty and, that is, that the spacing between the exposure areas may not be the same since it will make a difference in the spacing whether the pawl initially lies at the base of a ratchet tooth, as shown in Fig. 3, or whether it lies near the top of a ratchet tooth. If more even spacing is required, the second pawl 23 may be applied which reduces the error at least by half. Another solution would be to make smaller ratchet teeth on the stop ratchet 13, but this is inadvisable because finer teeth are more difficult to make and a greater strain is placed on the fine teeth by the stop pawl.

The pawl 14 is provided with a downwardly extending lug 31 which lug is of a width less than the width W of a notch 32 in a notched disk 33. Thus, the lug 31 is normally drawn into a notch 32 by the spring 25. The lug 31 may, however, be held from a notch 32 by means of a lug 34 extending downwardly from the slide 16. This lug is of the same length, or longer, than lug 31 and may project below lug 31. The lug 34 on the slide 16 and the lug 31 on the stop pawl 14 may be made to telescope, or overlap, as in Fig. 3, in which position both lugs may pass into a notch 32. However, if the knob 12 is raised, as in Fig. 3, releasing the pawl points 22 and 23 from the stop ratchet 13, the spring 20 will move the slide 16 radially toward the pivot 15 so that instead of overlapping, as in Fig. 3, the lug 34 will move relative to the lug 31 so that the total width of the two lugs will be greater than the width W of a notch in the notched disk. Consequently, the pawl 14 will be held out of a notch when it is raised because the lug 34 will rest on the periphery 35 of the notched disk between two of the notches 32. If lug 34 projects below lug 31, it may more readily engage and be moved by a notch 32.

If the winding knob 8 is now turned, the periphery 35 will move past the two lugs until the next succeeding notch 32 strikes the lug 34, thereby moving the slide away from its expanded position with respect to lug 31 and causing the lugs to again telescope to a total width of less than a notch 32, so that when the lug 31 rides off the periphery 35, both lugs will be drawn down into a notch 32, as illustrated in Fig. 3.

The notched disk 33 is mounted on a shaft 37, this shaft having a flat 38 by which the notched disk and a measuring ratchet 39 are moved together and to which the measuring or counting disk 11 is attached to move with both the notched disk 33 and the measuring ratchet 39. This measuring ratchet has a plurality of teeth 40 around its periphery, although at one area, as indicated in Fig. 6, there is a mutilated portion 41 where several teeth are removed. In order to move the measuring ratchet 39, there is a measuring pawl 42 having a pawl point 43 engaging the teeth and being driven by an eccentric pin 44 carried by a roller 45 over which a film F passes, as shown in the diagram in Fig. 8. The pawl 42 has a clearance aperture 46 for the stud 26 and may oscillate freely about the stud without contacting with it. A lug 47 on the measuring pawl is connected by a spring 48 to one arm 49 of a bell crank lever 50 pivotally mounted on a stud 51 and held by the spring 48 so that two ratchet teeth 52 and 53, spaced apart a distance, so that when one tooth engages a measuring pawl tooth, the other tooth engages midway between two ratchet teeth. This bell crank lever merely prevents backward movement of the measuring ratchet 39. The pawl 42, driven by the eccentric 44, makes a number of short strokes each time the film roller 45 revolves. Thus 44 constitutes a crank having a measuring pawl to operate mechanism when the film is wound. A numbetr of these small impulses of the crank turn the notched disk a plurality of steps inbetween each notch 32 and, while I have shown the scale of the measuring ratchet somewhat enlarged, I prefer to have at least five revolutions of the film wheel 45 while a film area is moved past an exposure frame 55 shown in Fig. 8. By having a large number of small impulses on the measuring ratchet 42, it is possible for extremely light pressure between the film F and the film roller 45 to drive the measuring and counting mechanism very readily. This is particularly true where the roller 45 is provided with fine points 56 which may sink into the emulsion layer on a film to secure better traction.

In some instances gears have been used to connect a driving roller over which film passes to a measuring roll or notched disk, but one difficulty with such a mechanism is that a slip clutch has to be provided in order to set the mechanism for its initial exposure and if the slip mechanism does not work smoothly, the mechanism may be bent or damaged in endeavoring to set it. These difficulties are overcome with my improved form of mechanism because the stop disk and measuring ratchet may always be turned in a counter-clockwise direction when the handle 12 is moved to lift the stop pawls from the stop ratchet.

The operation of loading and exposing a film in a camera equipped with the above-described measuring mechanism is exceedingly simple. The camera back 61 may be opened for loading the film into the position shown in the diagram in Fig. 8 in the usual manner. The leader strip or backing paper may be attached to a take-up hub 57 of a film spool 58 being drawn out from a supply spool 59. The film backing paper B is attached to a film by a paster P in the usual manner and after attaching the backing paper to the take-up spool 58, the handle 12 may be raised and the knob 60 on the measuring disk may be turned to the zero position, as shown in Fig. 2. In this position, as illustrated in Fig. 5,

the notched disk is arranged with a wide projection 135 beneath the lugs 31 and 34 which are separated a width greater than the width W of a notch 32 because the holding pawl 14 is raised and the spring 20 may separate these lugs. If, now, the handle 12 is released, the parts will rest on the wide periphery section 135 and, at the same time, the mutilated portion 41, as illustrated in Fig. 5, will be brought opposite the measuring pawl 43. Therefore, as an operator turns the winding knob 8, the pawl 43 will idle back and forth in the mutilated portion 41 of the measuring ratchet and will continue to do so until the operator turns a handle 70 on the camera back moving a shutter from a red window 71 so that he can see the approach of the numeral "1" indicating the first film is in position for exposure. When "1" appears in the red window 71, the operator then merely moves the knob 60 until the numeral "1" appears beneath the window 9. In doing this, the measuring ratchet 39 is moved so that the pawl 43 may engage a tooth, the lug 34 is engaged by a notch 32 and partially telescoping over lug 31 whereupon the holding pawl 22 or 23 may engage a tooth of the holding ratchet 13 so that the film is locked against movement and the camera is ready for an exposure.

After making an exposure, handle 12 is raised, permitting the slide 16 to move lug 34 relative to lug 31 to a total width greater than the width W of a notch, thereby immediately holding the pawl 14 away from the stop ratchet 13 until film is wound. Winding film causes the pawl 42 to move a plurality of strokes, each stroke advancing the measuring ratchet 39 one tooth and until the next successive notch 32 reaches, first, the lug 34, sliding it radially of the pawl 14 and, second, the lug 31, at which time both lugs will drop into the notch immediately halting the winding movement by one or the other of the pawls 22 or 23. The camera is again ready for exposure.

It will be noted that the mechanism is simple. Most of the parts are made from stamped metal and are consequently inexpensive and there is but little mechanism which can be damaged. If the operator should try to turn the knob 60 with the pawl 14 in an operative position, this cannot be done since the notched disk 33 is definitely locked. However, by raising the handle 12 and unlocking the notched disk 33, the operator may turn the disk 33 if he turns in a counter-clockwise direction. Clockwise movement is prohibited by the bell crank lever 50. If the operator should forget to set the mechanism and has taken a number of exposures, say three, he can, by looking at the number on the film, set the counting disk 11 at any time by raising the handle 12 and turning the knob until the proper numeral appears in the window 9. Applicant believes that this mechanism is as near foolproof as any mechanism for automatically controlling and counting winding can very well be, and yet it is extremely simple to operate and reliable in use. It is not necessary to provide the pawl 14 with two separately moving pawl points 22 and 23 unless extremely even spacing is required between exposures. However, the structure with the additional pawl point 23 can be added so readily and at so little extra expense that it is a preferred construction. It is understood that the views (except those in 1, 7, and 8) are on a very much enlarged scale to better illustrate the invention and that consequently the parts which appear quite large in the drawings are actually confined to a comparatively small space.

I claim:

1. Film winding control for cameras of the type having a camera body, an exposure frame therein, a film spool support, a film winding knob for moving film across the exposure frame by turning a film spool held by the support, a roller to be turned by film moved by the winding knob each time a fresh exposure area of film passes thereover, said control comprising a stop ratchet movable with the winding knob, a stop pawl carried by the camera body, a crank carried by the roller having a measuring pawl thereon, a measuring ratchet and notched disk pivotally mounted on the camera body and movable together when the measuring pawl engages and moves the measuring ratchet, a lug carried by the stop pawl of less width than a notch of the notched disk and adapted to drop therein, a slide mounted on the stop pawl and having a lug of less width than a notch of the notched disk, spring means for holding the two lugs adjacent each other with a total width greater than a notch in the notched disk whereby said lugs may engage the outer periphery of the notched disk, said slide being movable against the spring means to overlap the two lugs when an edge of a notch in the notched disk engages and moves one lug relative to the other, permitting the lugs on the stop pawl and slide to drop into a notch in the notched disk and simultaneously permitting the stop pawl to drop into the stop ratchet after the notched disk is driven by a film to measure off an exposure length of film.

2. Film winding control for cameras as defined in claim 1 characterized in that there is a manually operable means for moving the stop pawl from the stop ratchet a distance to allow the spring means to move the slide lug longitudinally of the stop pawl lug to span a notch in the notched disk.

3. Film winding control for cameras as defined in claim 1 characterized in that the slide lug is longer than the stop pawl lug to project beneath said lug whereby said slide lug may start to engage a notch in the notched disk as the latter is moved enabling the notched disk to move the slide until the stop pawl lug may also engage a notch of the notched disk.

4. Film winding control for cameras as defined in claim 1 characterized in that there is a manually operable means for moving the stop pawl from the stop ratchet a distance to allow the spring means to move the slide lug longitudinally of the stop pawl lug to span a notch in the notched disk, said notched disk and measuring ratchet being mounted to turn with a shaft carrying a dial plate to turn therewith, graduations on the dial plate to indicate the numbers of exposures and a film-threading position, the measuring ratchet having a mutilated portion positionable opposite the measuring pawl to render the latter inoperative when the dial plate is turned to the film-threading position.

5. Film winding control for cameras as defined in claim 1 characterized in that there is a manually operable means for moving the stop pawl from the stop ratchet a distance to allow the spring means to move the slide lug longitudinally of the stop pawl lug to span a notch in the notched disk, said notched disk and measuring ratchet being mounted to turn with a shaft carrying a dial plate to turn therewith, graduations on the dial plate to indicate the numbers of

exposures and a film-threading position, the measuring ratchet having a mutilated portion positionable opposite the measuring pawl to render the latter inoperative when the dial plate is turned to the film-threading position, and the notched disk including an elongated peripheral space between notches in the notched disk, said elongated space being positioned under the slide lug and stop pawl lug when the dial plate is manually set to a starting position.

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The following references are of record in the file of this patent:

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