

PATENT SPECIFICATION

DRAWINGS ATTACHED

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COMPLETE SPECIFICATION**Roll Film Photographic Camera**

We, FRANKE & HEIDECKE G.M.B.H., a German Body Corporate trading as ROLLEI-WERKE FRANKE & HEIDECKE of 196 Salzdah-lumerstrasse, Braunschweig, Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a film winding mechanism in a roll film photographic camera of the kind having a counter mechanism, a winding member for advancing said counter mechanism and a film from an initial position through the medium of a metering roll against the tension of a return spring, and locking means operative to arrest the winding member upon advance of the film through each film frame and further operative to release the winding member upon completion of a normal number of exposures. The term "normal" is used herein to define the number of exposures, for example twelve, provided by a conventional paper-backed film, and the purpose of releasing the winding member on completion of the film is to allow unobstructed winding on of the trailing end of the protective paper strip.

In cameras of the kind referred to it is known to provide a feeler mechanism for sensing the leading point of connection between the film and the protective paper strip which mechanism is brought into the operative position by closing the camera back. The film winding handle can then be continuously actuated until the said point of connection of the paper to the film runs through the feeler mechanism and engages the metering mechanism and locks the film winding handle after the first image frame has entered the gate. After the film has been exposed and on reaching said normal number of exposures, the counting mechanism becomes inoperative, so that the paper trailer strip can then be continuously wound on.

In another camera construction, the paper leader strip is wound forward until an index mark on the protective paper coincides with an index mark in the camera, this taking place with the camera back open, and then the limiting and counting mechanism is engaged by closing the camera back, thereby locking the winding lever when the first image frame enters the gate.

Both such camera constructions require no backing paper for the film, apart from light-tight leader and trailer strips, so that it is possible to provide on the standard roll film spool approximately twice the length of film that is possible when the film is paper-backed over the full length.

In order that cameras which are fitted with a counter mechanism for the conventional roll film with a full length protective paper may also be used for such substantially double-length films, or used at will with the conventional film and the double-length film, it is necessary to allow the counter, after the normal number of exposures, to return to the initial value, possibly by uncoupling of the counter by means operable from the outside, and to start the counting afresh for the second half of the film.

However, such a procedure is not fool-proof, for the following reasons:

1. It is not possible to decide whether a conventional roll film or a double-length film has been loaded into the camera.

2. In the latter case, it is not possible to decide whether it is a frame of the first or the second half of the film which is in the gate.

3. Return of the counter to the zero position after the twelfth exposure could be forgotten or overlooked.

4. Between the first and second series of exposures, there will be an unused piece of film, because the metering mechanism is adjusted for an advance of the film corresponding to

the distance between the point of connection of the film to the leader strip and the end of the image gate.

It is an object of the invention to avoid these disadvantages and to this end the invention provides a film-winding mechanism in a roll film photographic camera of the kind referred to, comprising a stop member movable, by the actuation of a manually displaceable control member, into the path of a projection on said counter mechanism so as to temporarily uncouple the counter mechanism from the winding member on reaching the normal number of exposures and to lock said winding member while permitting said counter mechanism to return towards its zero position, and an abutment member also movable by the actuation of said control member to prevent complete return of the counter mechanism to its zero position so that said mechanism remains conditioned to permit the first winding-on step for the exposure of a further length of the film. From the position of the control member, it can be seen from outside whether the winding mechanism is set for the passage of the first or the second half of the film; and if the camera is set in its basic position for films with twelve exposure frames, it is only necessary to engage the stop and abutment members when using the longer film.

The invention will now be described by means of one constructional example in respect of a camera in which, as shown in the accompanying drawings, the film wind is produced by a reciprocable winding crank and in which the film-metering mechanism is set in operation by the point of connection of the film with the leading protective paper strip. However, it will be readily apparent that the invention can also be used in cameras of the kind in which the limiting of the film winding movement and the counter mechanism are determined by a metering cylinder or roll which is driven by the film, an initial winding on to a predetermined leader index taking place when the film is loaded.

In the drawings, in which only those parts of the winding mechanism which are necessary for understanding the invention are shown,

Fig. 1a is a side elevational view showing the winding mechanism while the film leader strip is being wound on;

Fig. 1b is a detail view showing the position of the manually operable disengaging device before the counter changing operation;

Fig. 2 is a fragmentary side elevation showing the position of the parts of the winding mechanism after the twelfth exposure;

Figure 3 is a view similar to Figure 2 showing the position of the parts of the winding mechanism after engagement of the winding lock with continued winding on after the twelfth exposure;

Fig 4 is a detail view similar to Figure 1b showing the position of the manually operable

disengaging device during the changing operation;

Fig. 5 is a view similar to Figure 4 showing the position of the manually operable disengaging device after the changing operation; and

Fig. 6 is a view similar to Figures 2 and 3 showing the position of the parts of the winding mechanism on starting the advance of the second half of the film.

The film F with its backing paper F¹¹ runs from the supply spool 1 (Figure 1a) between two rolls 2 and 3 and over a guide roller 4 to the take-up spool 5. This take-up spool 5 is driven through gearing 6, 7 from a gear wheel 8 driven by a reciprocable film-winding crank handle 9. The roller 3 is mounted on one arm of a bell crank lever 10 pivotable about a pin 11 and the other arm 12 of which co-operates with one end 13 of a lever 14 pivotable about a pin 16. The other end of the lever 14 is formed as a pawl 15. The pivot pin 16 is mounted in one arm 17 of a two-armed lever pivoted on a pin 18, and the other arm 19 of said lever is disposed in the range of movement of a projection 20 on the camera back. The lever 17, 19 is pivoted in the counter-clockwise direction on closing the camera back, a bent end 21 thereof then striking against a fixed stop 22. By this means, the pin 16 is established as a pivot point. With the counter-clockwise pivoting movement of the lever 17, 19, the pawl 15 engages a lug 23 on a connecting link 24 and pulls the latter towards the left, and through a pin-and-slot connection 25, 26 said link rocks the lever 10 in the counter-clockwise direction until, at the end of the movement, the end 13 of lever 14 snaps behind the arm 12 of lever 10 and latches it, under the action of a spring 27, with the roll 3 in contact with the film. At the same time the link 24 through a pin 27 pivots a lever 28 clockwise about a fixed pin 29 and thereby pulls a slide member 31 downwardly through a connecting pin 30. The upper end of the slide member 31 is coupled by means of a pin-and-slot connection 32, 33 to a lever 34, which is held tensioned in the counter-clockwise direction by a hairpin spring 35. Mounted on a pin 37 on a projecting arm 36 of the lever 34 is gear wheel 38, which is driven through a pin 39 from a film-metering wheel (not shown) resiliently engaging the periphery of the film spool 5. By the downward movement of the slide member 31, the lever 34 is pivoted in the clockwise direction, whereby a pinion 40 which is rigid with the gear wheel 38 is disengaged from the teeth 41 of a counter wheel 42. The counter mechanism is thereby freed, so that it can move back to the zero position under the influence of a return spring. Connected to the counter wheel 42 is a cam disc 43 which co-operates with a lever 44 pivoted on a pin 66, one end of which lever carries a locking tooth 46 engage-

able with a toothed disc 47 secured to the winding crank 9.

When, with the parts in the position shown in Figure 1a, the connection point F^{11} of the film F to the backing paper F^1 comes between the rolls 2 and 3 by actuation of the film-winding crank handle 9, the lever 10 is rocked in the clockwise direction, whereby its arm 12 slides under the end 13 of the lever 14 and the latter is swung in the clockwise direction. As a consequence the pawl 15 releases the lug 23, so that the slide member 31 is now pulled upwardly by lever 34 under the action of the spring 35 and the link 24 is moved towards the right. Due to the rocking of the lever 34, the pinion 40 comes into mesh with the teeth 41 of the counter wheel 42. Upon further advance of the film, the counter wheel 42 is also driven; after reaching the first image frame, a pawl 45 on lever 44 drops into the first of a series of notches in the disc 43 and said lever, through the tooth 46, locks the gear wheel 8 on the shaft of the crank handle 9. At the same time, a projecting end 48 on the lever 44 lifts a tail 49 of a latch 50 pivoted at 53, thereby releasing a main locking pawl 51 for engagement with toothed disc 47 under the action of a spring 52. Upon return movement of the crank 9, the pawl 45 is disengaged in known manner from the cam disc 43 and the pawl 46 from the toothed disc 47. With each release operation of the shutter, the main locking pawl 51 is withdrawn from toothed disc 47 so that the film-winding crank 9 can be turned until pawl 45 enters the next notch in the cam disc 43 and locks the film winding mechanism. When the normal number of exposures of a conventional film is reached, for example twelve exposures, a gap in the teeth 41 registers with the pinion 40, so that there is no further driving of the counter mechanism. In this position, the locking pawl 45 and tooth 46 are held in their inoperative positions so that the paper trailer strip can be wound on without obstruction.

In order to be able to prevent the film-winding lock from becoming ineffective after the twelfth exposure when the camera is loaded with a substantially double-length film having only leader and trailer paper strips, a stop lever 54, also pivoted at 53 and having a pointed end 55 facing the circumference of the cam disc 43, can be swung to engage said end 55 with the cam disc and thereby lock the film-winding mechanism after the twelfth exposure. For this purpose, a driver member 56 is provided on the lever 54, said member being bent up from the lever and being of such length that it projects into the path of movement of the latch tail 49 and is engageable by a control cam disc 57 (see Figures 1b, 4 and 5). When the lever 54 is swung in the clockwise direction, it carries the latch 50 with it, so that said latch is disengaged from the main locking pawl 51 and the latter can consequently engage

the teeth of the winding crank disc 47. The cam disc 57 has a hook-like projection 58 by means of which it holds the lever 54 in the immediate vicinity of the cam disc 43 in the position of said cam disc shown in Figure 1b. The cam disc 57 carries the pin 59, on which is pivoted a link 60 formed with a slot 61 engaging the pin 30, so that when the cam disc 57 is rotated clockwise through 180° from the position of Figure 1b into the position according to Figure 5, the link 60 carries out first a downward movement to force the pin 30 downwardly and then an equivalent upward movement.

Provided on the notched cam disc 43 is a radially projecting tooth 62. When the first half of the film has been exposed and the image frame "12" has been reached (Fig. 2), the tooth 62 engages the end 55 of the lever 54 and drives said lever in the clockwise direction to the position according to Figure 3, in which the driver member 56 disengages the latch 50 from the film wind locking pawl 51 and thus locks the crank against further turning movement. Since the movement of the lever 54 is limited by the positioning of the driver member 56 on the cam disc 57, the counter mechanism is also locked. For preparing the counter mechanism for running through the second half of the film, the cam disc 57 is rotated manually in the clockwise direction through 180° . In an intermediate position (Fig. 4), the pins 59 and 30 have reached the lowermost position, in which the slide member 31 is pulled downwardly to such an extent that the driving pinion 40 has disengaged from the teeth 41 of the counter wheel 42. A tooth 64 on a lever 65 is engageable by a bevelled surface 63 of the slide member 31, said lever 65 being pivotable about the pin 66. During the previously described downward movement of the slide member 31, the bevelled surface 63 displaces the tooth 64 outwardly, but it still lies in the path of the tooth 62 on the notched disc 43. The freed notched disc 43 and the counter wheel 42 can consequently not spring back completely into the zero position, but remain in an intermediate position between "0" and "1" when the tooth 62 strikes against the tooth 64, and this position can be marked for example by a dot 67 on the counter scale. With further rotation of the cam disc 57 (Fig. 5), the link 60 permits the slide member 31 to move upwardly again so that the driving wheel 40 can re-engage with the counter wheel teeth 41. The cam disc 57 has then also forced the driver member 56 downwardly, whereby the latch 50 swings downwardly under the influence of its spring 52 and thus drives the lever 54 in the counter clockwise direction and pivots it out of the range of the tooth 62. The pawl 51 is now disengaged from disc 47 in known manner by the release of the shutter for the last normal exposure and thereafter the film winding crank

9 is actuated so that the film can initially be advanced up to the counter position "1," which corresponds to the thirteenth exposure. The further winding then takes place in the usual way. After the double-length film has been run through, the rotation of the notched disc 43 is not prevented by the pointed end 55 of the lever 54, so that when the double number of pictures has been reached and the film winding crank 9 then be again actuated the gap in the teeth 41 makes the driving wheel 40 inoperative, whereby unobstructed winding on of the paper trailer strip is made possible in known manner.

When the camera back is opened after the film has been run through and a new film is loaded, then upon again closing the camera, the slide member 31 is pulled downwardly by the action of the projection 20 on the lever 19 and as result the counter wheel 42 and the notched disc 43 are uncoupled from the driving gear wheel 40, so that the counter mechanism springs back to the zero position, because the displacement of the slide 31 caused by the member 20 takes place in the downward direction with such a long stroke that also the tooth 64 is moved out of the range of the tooth 62. The operations already described are now repeated with the winding on of the leader strip, the engagement of the counter mechanism and the automatic limitation of the film winding movement at frame "1" and also after exposure "12."

The two operative positions of the cam disc 57 can be indicated, for example, by the numbers "24" and "12." In this case, according to the constructional example, the marking "24" indicates that a film of double length is loaded and that arresting of the winding movement will be effected after the twelfth exposure, whereas with the cam disc in position "12," such an arresting operation does not occur at the image frame or counter position "12." It is naturally possible when running through the second half of the film, to choose this position "24" (Fig. 1b) of the cam disc 57, so that at exposure number "24," there is an automatic locking of the film winding mechanism. In this way a number of exposures greater than 24 can be made if the length of film is sufficient for this purpose. Disengagement of the metering and counting mechanism for the purpose of continuous winding of the film can be effected from any position of the metering and counting mechanism by turning the cam disc 57 through 90° (Fig. 4).

The invention is not restricted to cameras

in which the winding mechanism is actuated by a crank, or in which the film winding and shutter tensioning are effected by forward and rearward swinging of the crank, but it can also be used on those cameras with which the film winding is effected by continuous rotation of a crank or a knob.

WHAT WE CLAIM IS:—

1. A film-winding mechanism in a roll film photographic camera of the kind referred to, comprising a stop member movable, by the actuation of a manually displaceable control member, into the path of a projection on said counter mechanism so as to temporarily uncouple the counter mechanism from the winding member on reaching the normal number of exposures and to lock said winding member while permitting said counter mechanism to return towards its zero position, and an abutment member also movable by the actuation of said control member to prevent complete return of the counter mechanism to its zero position so that said mechanism remains conditioned to permit the first winding-on step for the exposure of a further length of the film.

2. A film-winding mechanism in a roll film camera according to claim 1, comprising means operable by closing the camera back to move said abutment member to a position permitting complete return of the counter mechanism to its zero position.

3. Film-winding mechanism in a roll film camera according to claim 1 or 2, wherein said stop member consists of a locking device adapted to be moved into the path of a projection of the counter mechanism and provided with a driver member for a release means of a winding locking means.

4. Film-winding mechanism in a roll film camera, according to any one of the preceding claims, wherein the abutment member for the counter mechanism is held by spring force in its operative position and is so disposed in the path of movement of a slide that it is inoperative in the leader strip winding position of said slide, but remains operative upon actuation of the slide by changing over the counter mechanism.

5. A film-winding mechanism in a roll film camera according to claim 1 substantially as described with reference to and as illustrated in the accompanying drawings.

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