

PATENT SPECIFICATION

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(54) PHOTOGRAPHIC CAMERAS

(71) We, EASTMAN KODAK COMPANY, a Company organized under the Laws of the State of New Jersey, United States of America of 343 State Street, Rochester, New York 14650, United States of America 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:—

The present invention relates to devices for metering film in roll film cameras, and more particularly relates to such devices used in connection with roll film that is perforated at predetermined metering intervals.

Devices for metering successive roll film exposures by arresting the film winding mechanism in response to the sensing of perforations or notches precut in the film at specific chosen intervals are old and well known in the art. Coassigned U.S. Patent No. 3,148,605, which issued September 15, 1964 in the names of D. M. Peterson et al, shows a camera film metering mechanism which utilizes a sensing member which is held against a surface of the film. When the sensing member has (1) engaged a film perforation or notch and (2) been moved along in the direction of film travel by the film, it releases an independently biased locking pawl which moves at high velocity to engage and lock a ratchet wheel which is integral with the camera's film drive. Movement of the locking pawl also frees the camera's shutter release lever, permitting the exposure of the film by the operator.

In commercial applications, mechanisms such as disclosed in the Peterson et al patent have proven to be highly successful and reliable. However, in such mechanisms it is necessary to attach the leading end portion of the film to a take-up core, and

to advance the film past the camera's exposure area by turning the core. Metering is often accomplished by preventing core rotation when a perforation in the film has been sensed. Thus, if the film is loaded into the camera with a loose leading end portion, the operator must attach the leading end portion to the take-up core. In most commercial applications of this type of metering mechanism, the film is supplied to the camera in a double-chamber cartridge, such as for instance the commonly known 126 cartridge. The cartridge includes a take-up core to which the leading end portion of the film has been attached at the factory.

In accordance with the present invention there is provided a photographic camera including means for receiving a roll film having a leader portion perforated at metering intervals less than a predetermined value and an exposure portion perforated at second metering intervals greater than said predetermined value, means defining an exposure area at a film plane, a shutter mechanism, and a film metering mechanism comprising film drive means for advancing film across the film plane, detection means for sensing the interval between metering perforations in the portion of film at the exposure area, the detection means having a first state upon sensing a film portion perforated at intervals less than said predetermined value and a second state upon sensing a film portion perforated at intervals greater than said predetermined value, means for preventing actuation of the shutter mechanism when the detection means is in its first state, means responsive to the detection means for releasably disabling the drive means when the detection means is in its second state, and means responsive to actuation of the shutter mechanism for releasing the disabling means until the next

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portion of film perforated at intervals greater than said predetermined value is sensed at said exposure area by the detection means.

5 In the accompanying drawings:

Fig. 1 is a view of a filmstrip perforated at various intervals for use in the camera of the present invention;

10 Fig. 2 is a top schematic view of a camera incorporating the film metering mechanism of the present invention;

Fig. 3 is a perspective view of a portion of the film metering mechanism of the present invention with the elements in their respective positions when film perforated at less than the predetermined interval is at the camera's exposure area;

20 Fig. 4 is a perspective view similar to Fig. 3 with the elements in their respective positions when film perforated at intervals greater than the predetermined distance is at the camera's exposure area;

Fig. 5 is a perspective view of the camera's double exposure prevention mechanism in its active position;

25 Fig. 6 is a view similar to Fig. 5 showing the apparatus for moving the camera's double exposure prevention mechanism to its inactive position; and

30 Fig. 7 is a view similar to Fig. 3 with the camera elements in their respective positions after the film trailer has been run off.

35 Because cameras are well known, the present description will be directed in particular to elements forming part of, or cooperating more directly with, apparatus in accordance with the present invention. It is to be understood that camera elements 40 not specifically shown or described may take various forms well known to those skilled in the art.

In Fig. 1, there is shown a filmstrip 10 having a leader portion 12, an exposure portion 14 and a trailer portion 16. The film is perforated along one edge. The perforations in the leader and trailer portions are spaced apart less than a predetermined distance, while the perforations in the exposure portion are spaced apart greater than the predetermined distance. At the very end of trailer portion 16, a long perforation 18 is provided, the distance between the leading edge of the long perforation and the trailing edge of its adjacent perforation being less than the distance between the perforations in the leader portion.

Referring to Fig. 2, a camera includes a 60 housing member or base 20 with a supply chamber 22 and a take-up chamber 24. Filmstrip 10 is threaded past an exposure area from the supply chamber to the take-up chamber. The film may be backed by 65 opaque paper 26. The film roll may be

supplied to the camera in any of several known forms such as for example on a supply spool, in a supply magazine or in a double-chamber cartridge. A coiled leaf spring 28 is provided in the take-up chamber 70 to guide the film and prevent its cinching as the filmstrip is pushed into the take-up chamber in the manner to be described in detail hereinafter. An anti-backup spring 30 contacts one edge of the film surface to 75 keep the film from slipping backward toward the supply chamber. Other types of anti-backup devices, such as for example a ball travelling in a wedge-shaped slot, will readily occur to those skilled in the art. 80

Referring now to Fig. 3 as well as Fig. 2, a film advancing member or slide 32 is manually movable by a handle 34 to the left as viewed in Fig. 2 against the bias of a spring 36 which is attached to a lug 38 85 on the slide and a post 40 on base 20. The slide has a disabling or locking member 42 with three notches *a*, *b*, and *c* along one surface, each notch having a peculiar configuration, the purpose of which will be 90 later described. Slide 32 has a tab 46 and is notched at 48.

A film sensing lever 50 is pivotally mounted on slide 32 at 52 and is urged for rotation in a clockwise direction about 52, 95 as viewed in Fig. 2, by a torsion spring 54 having legs which abut the lug 38 on slide 32 and a post 56 on lever 50. Lever 50 carries a pawl 58 which is urged into contact with the film surface by spring 54. 100 The end of pawl 58 is bevelled at 60. A leg 62 on lever 50 extends generally perpendicular to pawl 58.

A combination double exposure preventing means and stop member 64 105 is pivotally mounted on a pin 66 which extends from base 20. Stop member 64 has a pair of tabs 68 and 70 extending downwardly therefrom and a pair of legs 72 and 74 extend to the left as 110 viewed in Fig. 2. One end of a spring 76 is attached to a post 78 on stop member 64 and the other end of the spring is attached to a lug 80 on base 20. The function of this spring will be described hereinafter. 115 Stop member 64 is pivotable about pin 66 between the position shown in Figs. 2-4 and 7 and the position shown in Figs. 5 and 6. Since spring 76 assumes a position on one or the other side of pin 66 120 depending on the position of stop member 64, the spring is effective to hold the stop member in whichever position it assumes.

Not shown, but readily within the understanding of those skilled in the art, a shutter 125 release mechanism is provided for normally capping the camera's picture-taking aperture and is actuatable for selectively and momentarily uncapping the aperture to expose film at the film plane. The shutter 130

release mechanism is operated by a shutter release lever 82 pivoted to camera base 20. Shutter release lever 82 has a protruding tab portion 84 which is aligned with slot 48 in slide 32 when the slide is in its extreme rightward position as shown in Figs. 4 and 5. When slide 32 is in order than this position, the slot is not aligned with shutter release lever tab portion 84 so that a picture may not be taken. Further, leg 72 of stop member 64 aligns with tab portion 84 when member 64 is in the position shown in Figs. 5 and 6 so that shutter release member 82 may not be depressed. Tab portion 84 has a cam surface 86 which cooperates with leg 74 of stop member 64 upon depression of shutter release lever 82 to move member 64 from its active position shown in Figs. 2-4 and 7 to an intermediate position. Overcentre spring 76 moves stop member 64 from its intermediate position to its inactive position shown in Figs. 5 and 6 when shutter release lever 82 is released. Upon loading a roll of film into supply chamber 22, the leading end portion of the filmstrip is threaded past the camera's exposure area and into take-up chamber 24 inside of coil leaf spring 28. Of course, if the camera is adapted to receive double-cavity cartridges, the leading end portion of the film will already be in the take-up chamber and the leaf spring will be carried by the cartridge. At this time, leader portion 12 of filmstrip 10 is at the exposure area of the camera, and metering pawl 58 may or may not be in its extended position in a film perforation. To advance the leader portion through the exposure area, handle 34 is pulled to the left to move slide 32 therewith against the force of spring 36. Locking member 42 on the slide moves with the slide member past tab 68 on stop member 64, the stop member being in its inactive position shown in Figs. 5 and 6.

As metering pawl 58 finds a perforation as it travels across the film surface, the film (and backing paper, if any) will be moved therewith toward the take-up chamber. Handle 34 is continued to be pulled to the left until pawl 58 reaches a stop position whereat the handle may not be further advanced to the left. During its travel to the left, and after locking member 42 has passed stopped member tab 68, tab 46 on slide 32 rotates stop member 64 in a counterclockwise direction until tab 70 rests on leg 62 of lever 50. Upon the release of the handle, spring 36 returns slide 32 to the right, pawl 58 being cammed out of the perforation by bevelled surface 60. This rotates lever 50 in a counterclockwise direction about pivot 52 so that leg 62 of that lever pushes against tab 70 to keep

tab 68 from falling into one of the notches in locking member 42.

During its return movement, metering pawl 58 rides along the surface of the film which is held stationary by spring 30. As long as the leader portion of the film is in the exposure area, the metering pawl will fall into the next succeeding perforation after it has travelled a distance from its stop position sufficient to align tab 68 and the centre notch *b* in locking member 42. As the metering pawl moves to its extended position through the perforation, the stop member 64 pivots in a counterclockwise direction so that tab 68 falls into notch *b* in locking member 42 as shown in Figs. 2 and 3. Cooperation of this tab and the abutment surface of the notch will prevent metering pawl 58 and slide 32 from travelling further to the right.

As can be seen in Figs. 2 and 3, slide 32 has not returned to its original position and notch 48 has not aligned with tab portion 84 of shutter release lever 82 so that the shutter release lever may not be depressed to take a picture. Since a picture may not be taken, cam member 86 cannot be actuated to rotate lever 64 in a clockwise direction. Thus, the only thing that an operator can do is to again pull handle 34 thereby advancing more of the leader portion into the take-up chamber, the tab 68 being carried out of the notch *b* by a levelled surface of the notch lying opposite to the abutment surface thereof.

As the first film frame of the exposure portion 14 of filmstrip 10 is aligned with the exposure area of the camera, the metering pawl, upon returning from its stop position after advancing the last frame of the leader portion of the film past the exposure area, will have advanced to the right a distance sufficient to align tab 68 with notch *a* in locking member 42 before falling into a perforation (Fig. 4). Now the abutment surface of notch *a* cooperates with tab 68 to prevent the operator from pulling slide member 32 to the left. Slot 48 in slide 32 is aligned with tab portion 84 of shutter release lever 82 so that a picture may be taken. As lever 82 is depressed, cam surface 86 pushes on leg 74 to rotate stop member 64 in a clockwise direction from its full line position to its phantom line position in Fig. 4. This removes tab 68 from notch *a*. The travel of lever 82 is limited by an abutment surface 85 thereof engaging leg 72. Upon release of lever 82, overcentre spring 76 causes stop member 64 to rotate further in a clockwise direction until leg 72 is below and in the path of tab portion 84 (Fig. 5) to prevent the operator from operating the shutter mechanism.

Now the operator can again pull handle

34 of slide member 32 to the left, causing pawl 58 to move therewith to advance film into take-up chamber 24. This operation may be repeated until all of the frames in the exposure portion of the film have been exposed.

Now upon return of slide 2 and pawl 58, the pawl will fall into the first perforation in trailer portion 16 of filmstrip 10 after moving a distance from the pawl's stop position sufficient to align tab 68 with the notch *b* in locking member 42. As the metering pawl moves to its extended position through the film perforation lever 64 pivots in a counterclockwise direction so that tab 68 falls into the notch *b* in locking member 42 to prevent actuation of the shutter release mechanism and to allow only further advancement of the film by movement of slide 32 to the left. Repeated operation of slide handle 34 runs off the remaining portion of the film trailer. At the end of the trailer, the metering pawl will fall into elongated perforation 18 in the film upon its return from its stop position. This will happen before tab 68 reaches locking member 42. As slide 32 continues to move to the right, tab 68 contacts a bevelled portion of the locking member and is cammed thereby to ride over the locking member and to fall into notch *c* therein (Fig. 7). Now, the shutter release mechanism cannot be operated because notch 48 is not aligned with tab portion 84 and slide 32 can no longer be moved in either direction. Therefore, the film advance mechanism is completely "locked up". At this time, the operator can remove the roll of film for processing, and can reload the camera in the manner described above with a roll of fresh film.

WHAT WE CLAIM IS:—

1. A photographic camera including means for receiving a roll film having a leader portion perforated at metering intervals less than a predetermined value and an exposure portion perforated at second metering intervals greater than said predetermined value, means defining an exposure area at a film plane, a shutter mechanism, and a film metering mechanism comprising film drive means for advancing film across the film plane, detection means for sensing the interval between metering perforations in the portion of film at the exposure area, the detection means having a first state upon sensing a film portion perforated at intervals less than said predetermined value and a second state upon sensing a film portion perforated at intervals greater than said predetermined value, means for preventing actuation of the shutter mechanism when

the detection means is in its first state, means responsive to the detection means for releasably disabling the drive means when the detection means is in its second state, and means responsive to actuation of the shutter mechanism for releasing the disabling means until the next portion of film perforated at intervals greater than said predetermined value is sensed at said exposure area by the detection means.

2. A photographic camera according to Claim 1, wherein the film drive means includes a slide movable from a first position toward a second position to advance film across the film plane, said slide having an abutment facing toward the second position, and the disabling means comprises a stop member movable between an inactive position spaced from the path of movement of the abutment and an active position in the path of movement of the abutment to prevent movement of the slide from its first position, and means for moving the stop member to its active position when a film portion perforated at intervals greater than said predetermined value is sensed at the exposure area by the detection means.

3. A photographic camera according to Claim 2, wherein the means for releasing the disabling means comprises a cam actuable upon operation of the shutter mechanism to move the stop member from its active position to its inactive position.

4. A photographic camera according to Claim 2 or 3, further comprising means for disabling the shutter mechanism to prevent actuation thereof when the stop member is in its inactive position.

5. A photographic camera according to Claim 2, 3 or 4, further comprising means for disabling the shutter mechanism to prevent actuation thereof when the slide is in other than its first position.

6. A photographic camera according to any one of the preceding Claims 2 to 5, wherein the detection means forms part of the film drive means and comprises a pawl mounted for movement with the slide along a path extending parallel to the film plane and for movement, under the action of a spring, relative to the slide to an extended position to engage a film perforation and to a retracted position in which it is disengaged from the film perforation, the film being advanced by the pawl during the movement of the slide from the first to the second position and the pawl being cammed out of an engaged



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the detection means is in its first state, means responsive to the detection means for releasably disabling the drive means when the detection means is in its second state, and means responsive to actuation of the shutter mechanism for releasing the disabling means until the next portion of film perforated at intervals greater than said predetermined value is sensed at said exposure area by the detection means.

2. A photographic camera according to Claim 1, wherein the film drive means includes a slide movable from a first position toward a second position to advance film across the film plane, said slide having an abutment facing toward the second position, and the disabling means comprises a stop member movable between an inactive position spaced from the path of movement of the abutment and an active position in the path of movement of the abutment to prevent movement of the slide from its first position, and means for moving the stop member to its active position when a film portion perforated at intervals greater than said predetermined value is sensed at the exposure area by the detection means.

3. A photographic camera according to Claim 2, wherein the means for releasing the disabling means comprises a cam actuable upon operation of the shutter mechanism to move the stop member from its active position to its inactive position.

4. A photographic camera according to Claim 2 or 3, further comprising means for disabling the shutter mechanism to prevent actuation thereof when the stop member is in its inactive position.

5. A photographic camera according to Claim 2, 3 or 4, further comprising means for disabling the shutter mechanism to prevent actuation thereof when the slide is in other than its first position.

6. A photographic camera according to any one of the preceding Claims 2 to 5, wherein the detection means forms part of the film drive means and comprises a pawl mounted for movement with the slide along a path extending parallel to the film plane and for movement, under the action of a spring, relative to the slide to an extended position to engage a film perforation and to a retracted position in which it is disengaged from the film perforation, the film being advanced by the pawl during the movement of the slide from the first to the second position and the pawl being cammed out of an engaged



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film perforation during the return movement of the slide from the second to the first position.

substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

5 7. A photographic camera constructed

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