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(54) PHOTOGRAPHIC ROLL FILM 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 photographic roll film cameras (hereinafter referred to as "of the kind defined") for use with film having perforations spaced along the film at a pitch equivalent to the spacing of exposure areas on the film.

Our Letters Patent No. 1,050,232 discloses camera mechanism wherein a sensing pawl remains in a film perforation during exposure and is cammed out of the perforation by the trailing edge of the film perforation as the film is advanced to the next succeeding film frame. By removing the sensing pawl from the perforation in this manner, camera steadiness during the exposure period is improved.

In accordance with the present invention there is provided a photographic roll film camera of the kind defined, comprising actuating means for sequentially cocking a shutter drive means and actuating a film transport means, a movably mounted film sensing pawl engageable with a film perforation advanced into alignment therewith, latching means which is operable in response to movement of the sensing pawl in engagement with a film perforation to latch the actuating means against further actuation in a film advancing direction and, upon movement of the shutter drive means to an uncocked position for effecting an exposure, is actuated to unlatch the actuating means, and retracting means which, after the movement of the shutter drive means to its uncocked position and upon operation of the actuating means to cock the shutter drive means, disengages the sensing pawl [Price 33p]

from an engaged perforation.

In the accompanying drawings:—

Fig. 1 is a horizontal section through part of a camera constructed in accordance with the present invention, showing the position of the camera elements after an exposure has been made;

Fig. 2 is a similar view to Fig. 1 showing the position of the camera elements after the shutter has been cocked and prior to advancing the film;

Fig. 3 is a similar view to Fig. 1 showing the position of the camera elements after the film has been advanced and the camera is ready for an exposure;

Fig. 4 is a horizontal section through part of a camera constructed in accordance with a second embodiment of the present invention, showing the position of the camera elements after the shutter has been cocked and prior to advancing the film; and

Fig. 5 is a horizontal section through part of a camera constructed in accordance with a third embodiment of the present invention showing the position of the camera elements after an exposure has been made.

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 not specifically shown or described may take various forms well known to those skilled in the art.

The camera illustrated in Fig. 1 has a housing 10 into which a film cartridge 12 containing perforated roll film 14 and opaque backing paper 16 has been loaded. The film cartridge may be of the type shown in our Letters Patents Nos. 1,034,904 and 1,034,905 and includes take-up and supply chambers 18 and 20, respectively.

A film advance slide 22 is mounted in camera housing 10 by a pin-and-slot arrangement so as to be movable from the position shown in Fig. 1 in the direction of arrow 24. Slide 22, has a cam recess 26, a

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plurality of ratchet teeth 28, and lugs 30 and 32 thereon. A spring 34 urges slide 22 to the right as viewed in Fig. 1.

A shutter drive member 36 is rotatably carried on a stud 38 in housing 10 and is biased in a clockwise direction as viewed in Fig. 1 by means of a spring 40. An arm 42 on drive member 36 actuates a shutter (not shown), during clockwise rotation of the drive member to effect an exposure. A second arm 44 of the drive member has a cam follower 46 extending into the cam recess 26 of slide 22 to follow, during movement of the slide in the direction of arrow 24, the lower angled cam surface of the cam recess 26, thereby rotating drive member 36 in a counterclockwise direction against the force of spring 40. The function of arms 40 and 50 on drive member 36 will be explained hereinafter.

A rack 52, having a plurality of gear teeth 54, is slidably and pivotally mounted on housing 10 and is urged by a spring 56 into contact with a stud 58 on drive member 36. Teeth 54 mesh with corresponding gear teeth on a gear sector 60, which, through gears 62 and 64, advance film from supply compartment 20 to take-up compartment 18 when rack 52 is moved to the left against the force of a spring 65. Gear sector 60 is connected to gear 62 through a one-way clutch (not shown) so that gears 62 and 64 do not turn when rack 52 is moved to the right.

A latch member 66 is pivotally mounted in housing 10 on a stud 68 for movement between a latch position (retaining drive member 36 in its cocked position; Figs. 2 and 3) and a release position (permitting spring 40 to move the drive member to its uncocked position as shown in Fig. 1).

An intermediate member 70 is rotatably carried in housing 10 on a stud 72 and is biased in a clockwise direction by a spring 74. Intermediate member 70 has three arms, 76-78, arm 76 having a pair of tabs 80 and 82, arm 77 having a tab 84 and arm 78 having a pair of tabs 86 and 88.

A film sensing member 90, having a tab 100 at the right hand end, is rotatably and slidably carried by a pin 92 which extends into a slot 94 in the sensing member. A film sensing pawl 96 on the sensing member 90 extends toward film 14 and the camera's exposure plane. A spring 98 urges the sensing pawl 96 towards the right hand side and also against the film 14, so as to pass through a film perforation 108 which is brought into alignment therewith.

A control member 102 is pivotally mounted on housing 10 by a stud 104, having a tab 106 engageable with tab 88 on intermediate member 70. The lower portion of the control member lies in the path of lug 30 on slide 22.

Fig. 1 shows the camera elements positioned after an exposure had been made. The camera is now ready to be operated to cock the shutter mechanism and advance the film to the next picture frame. The operator manually moves slide 22 in the direction of arrow 24 against the force of the spring 34. As the slide moves, follower 46 engages the lower angled cam surface of the cam recess 26, causing shutter drive member 36 to rotate in a counterclockwise direction against the force of spring 40 until arm 48 is retained by latch member 66. At the same time, lug 30 engages the lower portion of control member 102 to rotate the control member in a clockwise direction so that tab 106 on the control member engages tab 88 on intermediate member 70 and rotates the intermediate member in a counterclockwise direction so that tab 82 engages tab 100 of sensing member 90 to rotate the sensing member in a counterclockwise direction to withdraw sensing pawl 96 from the film perforation 108. One pawl 96 is withdrawn from the perforation, spring 98 moves sensing member 90 to the right until tab 100 thereon falls beneath tab 80 on the intermediate member. Tab 106 on control member 102 passes beneath tab 88 on the intermediate member so that the lower portion of the control member remains out of the path of lug 30 on slide 22; see Fig. 2.

During the first stroke of slide 22, lug 32 does not engage rack 52 the rack having been held in its lower, Fig. 1 position by pin 58 on drive member 36. Therefore, during the first movement of the slide, there is no film advancement. When released, the slide is returned to the right by spring 34 and the camera elements are positioned as shown in Fig. 2, rack 52 having been raised by spring 56 into alignment with lug 32 on the slide.

On the second operation stroke of slide 22, lug 32 on the slide moves rack 52 to the left to advance film from supply compartment 20 to take-up compartment 18 of the cartridge. As the film advances, when a perforation 108 reaches the position of film sensing pawl 96, the pawl is moved into the perforation by spring 98 so that the sensing member is moved to the left by the advancing film.

When the next succeeding frame of film reaches the camera's exposure station, tab 100 on sensing member 90 becomes disengaged from tab 80 of intermediate member 70, enabling spring 74 to rotate the intermediate member in a clockwise direction until tab 86 on arm 78 engages ratchet teeth 28 on slide 22 to prevent further film advancement. When the operator releases slide 22, it is returned to the right by spring 34. The camera elements are now positioned as shown in Fig. 3, and the camera is

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ready to make an exposure.

To make an exposure, latch 66 is rotated in a clockwise direction (by the camera's body release member, not shown) releasing drive lever 36 to move in a clockwise direction from its Fig. 3 position to operate the shutter mechanism (not shown) by arm 42. During the movement of drive member 36, arm 50 engages tab 84 on arm 77 of intermediate member 70 rotating the intermediate member in a counterclockwise direction, thereby removing tab 86 from ratchet teeth 28 of slide 22, stud 58 on the drive member moving rack 52 out of alignment with tab 32 on slide 22. Spring 98 retains sensing pawl 96 in the film perforation 108. The camera elements are now again in their respective positions shown in Fig. 1, and the sequence of operations may be repeated.

In the embodiment of Figs. 1—3, film sensing pawl 96 of sensing member 90 rests on the surface of film 14 immediately after withdrawal from the perforation. The second preferred embodiment, shown in Fig. 4, includes means for holding the sensing member after withdrawal from the perforation until commencement of the film transport. The same reference numerals as were used in the first embodiment have been used in Fig. 4 to point out identical structure.

A catch 110 is rotatably mounted about a stud 112, and is urged in a counterclockwise direction by a spring 114, and a leg 116 on the catch rests against a pin 118 on gear sector 60. A hook 120 on the catch cooperates with a tab 122 on sensing member 90.

The sequence of operation of the camera shown in Fig. 4 is the same as that of the camera shown in Figs. 1—3, differing only in that after withdrawal from a perforation of sensing pawl 96, sensing member tab 122 is hooked by catch 110 so that sensing pawl 96 is held away from the film. On the second operating stroke of slide 22, pin 118 moves downwardly in contact with the lug 116 and cams the catch 110 in a clockwise direction, whereby hook 120 of the catch releases tab 122 of sensing member 90 and the sensing member is free to rotate until sensing pawl 96 engages the film surface.

Fig. 5 shows a further embodiment of the present invention in which film sensing member 90 is formed of two parts 130 and 132 which are pivotally connected by a pin 134. Portion 130 of the sensing member is slidably mounted on housing 10 by a pin-and-slot arrangement and is biased by a spring 136 to the right. Portion 132 is acted upon by a spring 138 in a clockwise direction about pin 134. A slot tab 140 on portion 130 limits the travel in a clockwise direction of portion 132. A leg 142 cooperates with a pin 144 on an arm 146 of intermediate

member 70 to remove sensing pawl 96 from a film perforation upon counterclockwise rotation of the intermediate member.

The functions of the elements of the embodiment shown in Fig. 5 are the same as those of the embodiment of Figs. 1—3 except that on the first operation stroke of slide 22, leg 142 of portion 132 is engaged by pin 144 of the intermediate member so that sensing pawl 96 is withdrawn from the perforation 108. Sensing member portions 130 and 132 then move to the right under the influence of spring 136.

WHAT WE CLAIM IS:—

1. A photographic roll film camera of the kind defined, comprising actuating means for sequentially cocking a shutter drive means and actuating a film transport means, a movably mounted film sensing pawl engageable with a film perforation advanced into alignment therewith, latching means which is operable in response to movement of the sensing pawl in engagement with a film perforation to latch the actuating means against further actuation in a film advancing direction and, upon movement of the shutter drive means to an uncocked position for effecting an exposure, is actuated to unlatch the actuating means, and retracting means which, after the movement of the shutter drive means to its uncocked position and upon operation of the actuating means to cock the shutter drive means, disengages the sensing pawl from an engaged perforation.

2. A photographic roll film camera according to Claim 1, wherein the shutter drive means comprises a rotatable member which is spring biased to the uncocked position and is latched in the cocked position by means of a spring latch which is disengaged therefrom upon actuation of a shutter release member.

3. A photographic roll film camera according to Claim 2, wherein the rotatable member is moved to its cocked position by means of a cam surface engaging a projection of the rotatable member.

4. A photographic roll film camera according to Claim 1, 2 or 3, wherein the film transport means includes a pivotally mounted rack which, upon movement of the actuating means to cock the shutter drive means, is pivoted out of the path of movement of the actuating means and, after the shutter drive means has been cocked, is spring urged into the path of movement of the actuating means to advance the film.

5. A photographic roll film camera according to Claim 4 as appendent to Claim 2 or 3, wherein the rotatable member is provided with a second projection which, upon movement of the rotatable member to the uncocked position, engages and pivots the

ready to make an exposure.

To make an exposure, latch 66 is rotated in a clockwise direction (by the camera's body release member, not shown) releasing drive lever 36 to move in a clockwise direction from its Fig. 3 position to operate the shutter mechanism (not shown) by arm 42. During the movement of drive member 36, arm 50 engages tab 84 on arm 77 of intermediate member 70 rotating the intermediate member in a counterclockwise direction, thereby removing tab 86 from ratchet teeth 28 of slide 22, stud 58 on the drive member moving rack 52 out of alignment with tab 32 on slide 22. Spring 98 retains sensing pawl 96 in the film perforation 108. The camera elements are now again in their respective positions shown in Fig. 1, and the sequence of operations may be repeated.

In the embodiment of Figs. 1—3, film sensing pawl 96 of sensing member 90 rests on the surface of film 14 immediately after withdrawal from the perforation. The second preferred embodiment, shown in Fig. 4, includes means for holding the sensing member after withdrawal from the perforation until commencement of the film transport. The same reference numerals as were used in the first embodiment have been used in Fig. 4 to point out identical structure.

A catch 110 is rotatably mounted about a stud 112, and is urged in a counterclockwise direction by a spring 114, and a leg 116 on the catch rests against a pin 118 on gear sector 60. A hook 120 on the catch cooperates with a tab 122 on sensing member 90.

The sequence of operation of the camera shown in Fig. 4 is the same as that of the camera shown in Figs. 1—3, differing only in that after withdrawal from a perforation of sensing pawl 96, sensing member tab 122 is hooked by catch 110 so that sensing pawl 96 is held away from the film. On the second operating stroke of slide 22, pin 118 moves downwardly in contact with the lug 116 and cams the catch 110 in a clockwise direction, whereby hook 120 of the catch releases tab 122 of sensing member 90 and the sensing member is free to rotate until sensing pawl 96 engages the film surface.

Fig. 5 shows a further embodiment of the present invention in which film sensing member 90 is formed of two parts 130 and 132 which are pivotally connected by a pin 134. Portion 130 of the sensing member is slidably mounted on housing 10 by a pin-and-slot arrangement and is biased by a spring 136 to the right. Portion 132 is acted upon by a spring 138 in a clockwise direction about pin 134. A slot tab 140 on portion 130 limits the travel in a clockwise direction of portion 132. A leg 142 cooperates with a pin 144 on an arm 146 of intermediate

member 70 to remove sensing pawl 96 from a film perforation upon counterclockwise rotation of the intermediate member.

The functions of the elements of the embodiment shown in Fig. 5 are the same as those of the embodiment of Figs. 1—3 except that on the first operation stroke of slide 22, leg 142 of portion 132 is engaged by pin 144 of the intermediate member so that sensing pawl 96 is withdrawn from the perforation 108. Sensing member portions 130 and 132 then move to the right under the influence of spring 136.

WHAT WE CLAIM IS:—

1. A photographic roll film camera of the kind defined, comprising actuating means for sequentially cocking a shutter drive means and actuating a film transport means, a movably mounted film sensing pawl engageable with a film perforation advanced into alignment therewith, latching means which is operable in response to movement of the sensing pawl in engagement with a film perforation to latch the actuating means against further actuation in a film advancing direction and, upon movement of the shutter drive means to an uncocked position for effecting an exposure, is actuated to unlatch the actuating means, and retracting means which, after the movement of the shutter drive means to its uncocked position and upon operation of the actuating means to cock the shutter drive means, disengages the sensing pawl from an engaged perforation.

2. A photographic roll film camera according to Claim 1, wherein the shutter drive means comprises a rotatable member which is spring biased to the uncocked position and is latched in the cocked position by means of a spring latch which is disengaged therefrom upon actuation of a shutter release member.

3. A photographic roll film camera according to Claim 2, wherein the rotatable member is moved to its cocked position by means of a cam surface engaging a projection of the rotatable member.

4. A photographic roll film camera according to Claim 1, 2 or 3, wherein the film transport means includes a pivotally mounted rack which, upon movement of the actuating means to cock the shutter drive means, is pivoted out of the path of movement of the actuating means and, after the shutter drive means has been cocked, is spring urged into the path of movement of the actuating means to advance the film.

5. A photographic roll film camera according to Claim 4 as appendent to Claim 2 or 3, wherein the rotatable member is provided with a second projection which, upon movement of the rotatable member to the uncocked position, engages and pivots the



rack out of the path of movement of the actuating means.

5 6. A photographic roll film camera according to any one of the preceding claims, wherein the sensing pawl is mounted for pivotal and sliding movement and is pivotally urged towards the film plane and slidably urged in a direction opposed to the direction of film advance by means of a spring.

10 7. A photographic roll film camera according to any one of the preceding claims, wherein the latching means comprises a tab which is carried by one arm of a pivotally mounted intermediate member and is engageable with ratchet teeth carried by the actuating means.

15 8. A photographic roll film camera according to Claim 7, wherein the intermediate member is spring urged in a direction to bring the tab into engagement with the ratchet teeth and is disengaged from the ratchet teeth upon cocking the shutter drive means.

20 9. A photographic roll film camera according to Claims 6, 7 and 8, wherein the actuating means comprises a slidably mounted

member carrying an abutment which, upon movement of the slidably mounted member to cock the shutter drive means, engages and rotates a control member to turn the intermediate member about its pivot so that a second tab carried by the intermediate member engages and causes retraction of the sensing pawl from an engaged perforation.

30 10. A photographic roll film camera according to Claim 9, wherein the intermediate member is retained in a position in which the first mentioned tab is held out of engagement with the ratchet teeth on the slidably mounted member by means of the sensing pawl until the latter engages a film perforation and is slidably moved by the movement of the film.

35 40 45 11. A photographic roll film camera according to Claim 1 constructed substantially as hereinbefore described with reference to, and as shown in, Figs. 1 to 3, or Fig. 4, or Fig. 5 of the accompanying drawings.

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