

PATENT SPECIFICATION

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(72) Inventors HELMUT ETTISCHER,
WOLFGANG ORT, HORST SIMON and
KURT STEISSLINGER



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(54) PHOTOGRAPHIC CAMERA

(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 cameras for receiving roll film perforated at predetermined metering intervals, particularly to means for eliminating or reducing the risk of film movement after the film has been advanced.

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 intervals are old and well known in the art. In many such devices, the perforation sensing member remains in the perforation after the film has been advanced and is removed from the perforation during the exposure operation of the camera. It has been found that devices of this type may cause camera movement during exposure due to the requirement of sufficient force on the shutter release lever to withdraw the sensing member from the perforation. In other camera metering devices, the sensing member remains in the perforation during exposure and is spring biased against the trailing edge of the film perforation and film movement along the camera's exposure plane can occur during the exposure operation if camera vibrations cause momentary relaxation of frictional forces between the camera and the film.

It has been found that if the film sensing pawl is withdrawn from the perforation after the film has been advanced, there is a possibility that the film may move along the exposure plane toward the camera's take-up chamber because of torsional forces on the take-up film roll. Normally, the static frictional forces on the film from the camera and

cartridge parts is sufficient to prevent such movement. However, if the camera is vibrated or jarred, such as for example by normal road vibrations in an automobile, the static friction may be overcome and the film may move or creep toward the take-up chamber.

When a camera in which the film has moved in this manner is used to take a picture, the exposure may slightly overlap the next succeeding exposure, producing a less satisfactory result. Further, since processors normally cut roll film at positions determined by the perforations in the film, and since the exposure frame of film which has crept will be misaligned with the corresponding perforation, a portion of that frame will be cut away and will appear in the next frame.

In accordance with the present invention there is provided a photographic camera comprising a housing having a space for receiving roll film perforated at predetermined metering intervals, transport means operable for advancing received film along an exposure plane, metering means including a sensing pawl for detecting the presence of a film perforation at a predetermined position along said exposure plane, a film holding member mounted in the camera for movement between an active position extending through said exposure plane and a perforation in received film and an inactive position on one side of said exposure plane, means for moving the holding member to its inactive position upon initial operation of the transport means and means for moving the holding member toward its active position upon completion of a film transporting operation.

In the accompanying drawings:—

Fig. 1 is a view of a portion of a camera constructed in accordance with the present invention wherein the camera elements are arranged after an exposure has been made;

Fig. 2 is a view similar to that shown in Fig. 1, but showing the positions of the camera elements during initial film advance; and

Fig. 3 is also a view similar to that shown in Fig. 1, but showing the positions of the camera

elements after the film has been advanced and the camera is ready to make an exposure.

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.

Referring now to Fig. 1, the camera illustrated therein includes a housing 10 into which a film cartridge 12 containing perforated roll film 14 has been loaded. The film may be backed by opaque paper and the cartridge may be of the type shown in U.S. Patent No. 3,138,081 and includes take-up and supply chambers 18 and 20, respectively.

A film advance slide 22 is mounted in camera 10 by means of 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 an opening 26, a plurality of ratchet teeth 28, an abutment 30 and a recess 32 in the underneath surface thereof. A spring 34 urges the slide 22 to the right-hand side as viewed in Fig. 1.

A shutter drive member 36 is rotatably carried on a stud 38 mounted on the housing 10 and is biased in a clockwise direction as viewed in Fig. 1 by means of a spring 40. An arm 42 on the drive member 36 actuates a shutter, not shown during rotation of the drive member 36 in a clockwise direction to effect an exposure. A second arm 44 of the drive member 36 carries a stud 46 which extends into the opening 26 of slide 22 to follow, during movement of the slide in the direction of arrow 24, the cam surface which defines the lower boundary of the opening 26, thereby rotating the drive member 36 in a counter-clockwise direction against the force of spring 40. The function of two other arms 48 and 50 on drive member 36 will be explained hereinafter.

A rack 52 having a plurality of gear teeth 54 is slidably mounted on housing 10 and is urged by means of a spring 56 to the right-hand side as viewed in Fig. 1. Teeth 54 mesh with corresponding teeth on a gear sector 60 which, through bears 62 and 64, advances film from the supply compartment 20 to the take-up compartment 18 when the rack 52 is moved towards the left-hand side. Gear sector 60 is connected to gear 62 by means of a one-way clutch (not shown) so that gears 62 and 64 do not turn when rack 52 is moved to the right-hand side.

A latch member 66 is pivotally mounted in the housing 10 on a stud 68 for movement between a latch position (retaining drive member 36 in its cocked position shown in Fig. 3) and a release position (permitting spring 40 to move the drive member rapidly to its uncocked position 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 means of a spring 74.

A film sensing member 90 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 extends towards film 14 and the camera's exposure plane. A spring 98 urges the sensing pawl 96 away from the film and the sensing member 90 to the right-hand side. A tab 100 is provided on the right-hand end of the sensing member 90 to engage a tab 102 on an arm 76 of intermediate member 70.

A film holding member 104 is slidably mounted in housing 10 on a pair of pins 106 and 108 which extend into a pair of slots in the holding member. A spring 110 urges holding member 104 toward the film and a pin 112 extends into recess 32 of slide 22.

Fig. 1 shows the camera elements positioned after an exposure has been made. The camera is now ready to be operated to cock the shutter mechanism and advance film to the next picture frame. The operator manually moves the slide 22 in the direction of arrow 24 against the force of spring 34. As the slide begins to move, pin 46 engages the cam surface of opening 26, causing the shutter drive member 36 to rotate in a counter-clockwise direction against the force of spring 40 until the arm 48 thereon snaps behind the latch member 66. As drive member 36 rotates, its arm 50 moves away from an arm 77 of the intermediate member 70 to permit intermediate member 70 to rotate in a clockwise direction by the force of spring 74 thereby causing its tab 102 to engage and rotate the sensing member 90 in a clockwise direction until sensing pawl 96 rests on the film surface.

During initial movement of the slide 22 in the direction of arrow 24, the pin 112 on film holding member 104 engages an inclined edge of recess 32 in the slide to cause movement of the holding member against the force of spring 110, thereby withdrawing the holding member from the film perforation. After the film holding member 104 has cleared the perforation, abutment 30 on slide 22 engages the rack 52 so that continued movement of the slide will cause rotation of gears 60, 62 and 64 to advance film 14 in the direction of arrow 111 along the camera's exposure plane. Fig. 2 shows the positions of the camera elements as the film is being advanced.

As the next succeeding perforation reaches the position of film sensing pawl 96, the pawl will drop into the perforation so that sensing member 90 is carried by the advancing film towards the left-hand side. When sensing pawl 96 reaches the position of film holding member 104 tab 100 is clear of tab 102 on inter-

mediate member 70 so that spring 74 rotates the intermediate member 70 in a clockwise direction until the end of an arm 78 thereof engages ratchet teeth 28 to prevent further movement of the slide 22 in the direction of arrow 24. Tab 100, having moved clear of tab 102, no longer holds the sensing member 90 against the force of spring 98 and that now rotates the sensing member 90 in a counterclockwise direction to withdraw the sensing pawl 96 from the film perforation, with which it was engaged leaving the sensing member 90 free to move to the right-hand side. When the operator releases slide 22, spring 34 moves the slide to the right-hand side and film holding member 104 is moved into the perforation by means of the spring 110 to secure the film and to prevent further film movement until withdrawn during the next frame advance operation. The camera elements are now positioned as shown in Fig. 3, and the camera is ready to be operated to make an exposure.

In order to make an exposure, the latch 66 is rotated in a counterclockwise direction (by the camera's body release member, not shown) releasing drive member 36 to run down in a clockwise direction from its Fig. 3 position to operate the shutter mechanism by means of the arm 42. During such running down movement of the drive member 36, its arm 50 engages the tab on arm 77 of intermediate member 70 to rotate the intermediate member in a counterclockwise direction, thereby removing the end of arm 78 from ratchet teeth 28 of slide 22. The camera elements are now in their respective positions shown in Fig. 1, and the camera is ready to be operated to recock the shutter and advance the next succeeding film frame to the exposure station as hereinbefore described.

In cameras wherein more than one film perforation is available, the holding member may be arranged to enter a different perforation than the sensing pawl.

WHAT WE CLAIM IS:—

1. A photographic camera comprising a housing having a space for receiving roll film perforated at predetermined metering intervals, transport means operable for advancing received film along an exposure plane, metering means including a sensing pawl for detecting the presence of a film perforation at a predetermined position along said exposure plane, a film holding member mounted in the camera for movement between an active

position extending through said exposure plane and a perforation in received film and an inactive position on one side of said exposure plane, means for moving the holding member to its inactive position upon initial operation of the transport means and means for moving the holding member toward its active position upon completion of a film transporting operation.

2. A photographic camera according to Claim 1, wherein the film holding member is spring urged toward its active position and is coupled to the transport means for movement to its inactive position during the initial operation of the transport means.

3. A photographic camera according to Claim 2, wherein the transport means includes a manually operable film advance slide to which the film holding member is coupled by means of a cam and cam follower which, upon initial actuation of the film advance slide move the film holding member to the inactive position and, upon return movement of the slide to its initial position, allow the spring to move the film holding member to the active position.

4. A photographic camera according to Claim 3, wherein the sensing pawl is mounted for pivotal movement into engagement with a film perforation located at said predetermined position and for sliding movement during continued advance of the film, and the metering means also includes an intermediate member which, during the sliding movement of the sensing pawl, is spring urged into latching engagement with the film advance slide to prevent further actuation thereof in a film advancing direction.

5. A photographic camera according to Claim 4, wherein the sensing pawl is pivoted into engagement with a received film by means of the intermediate member and, during its sliding movement is disengaged from the intermediate member for pivotal movement under spring action away from the film.

6. A photographic camera according to Claim 5, wherein the holding member engages the film perforation from which the sensing pawl is disengaged.

7. A photographic camera having a film holding member constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

L. A. TRANGMAR, B.Sc., C.P.A.
Agent for the Applicants.

mediate member 70 so that spring 74 rotates the intermediate member 70 in a clockwise direction until the end of an arm 78 thereof engages ratchet teeth 28 to prevent further movement of the slide 22 in the direction of arrow 24. Tab 100, having moved clear of tab 102, no longer holds the sensing member 90 against the force of spring 98 and that now rotates the sensing member 90 in a counterclockwise direction to withdraw the sensing pawl 96 from the film perforation, with which it was engaged leaving the sensing member 90 free to move to the right-hand side. When the operator releases slide 22, spring 34 moves the slide to the right-hand side and film holding member 104 is moved into the perforation by means of the spring 110 to secure the film and to prevent further film movement until withdrawn during the next frame advance operation. The camera elements are now positioned as shown in Fig. 3, and the camera is ready to be operated to make an exposure.

In order to make an exposure, the latch 66 is rotated in a counterclockwise direction (by the camera's body release member, not shown) releasing drive member 36 to run down in a clockwise direction from its Fig. 3 position to operate the shutter mechanism by means of the arm 42. During such running down movement of the drive member 36, its arm 50 engages the tab on arm 77 of intermediate member 70 to rotate the intermediate member in a counterclockwise direction, thereby removing the end of arm 78 from ratchet teeth 28 of slide 22. The camera elements are now in their respective positions shown in Fig. 1, and the camera is ready to be operated to cock the shutter and advance the next succeeding film frame to the exposure station as hereinbefore described.

In cameras wherein more than one film perforation is available, the holding member may be arranged to enter a different perforation than the sensing pawl.

WHAT WE CLAIM IS:—

1. A photographic camera comprising a housing having a space for receiving roll film perforated at predetermined metering intervals, transport means operable for advancing received film along an exposure plane, metering means including a sensing pawl for detecting the presence of a film perforation at a predetermined position along said exposure plane, a film holding member mounted in the camera for movement between an active

position extending through said exposure plane and a perforation in received film and an inactive position on one side of said exposure plane, means for moving the holding member to its inactive position upon initial operation of the transport means and means for moving the holding member toward its active position upon completion of a film transporting operation.

2. A photographic camera according to Claim 1, wherein the film holding member is spring urged toward its active position and is coupled to the transport means for movement to its inactive position during the initial operation of the transport means.

3. A photographic camera according to Claim 2, wherein the transport means includes a manually operable film advance slide to which the film holding member is coupled by means of a cam and cam follower which, upon initial actuation of the film advance slide move the film holding member to the inactive position and, upon return movement of the slide to its initial position, allow the spring to move the film holding member to the active position.

4. A photographic camera according to Claim 3, wherein the sensing pawl is mounted for pivotal movement into engagement with a film perforation located at said predetermined position and for sliding movement during continued advance of the film, and the metering means also includes an intermediate member which, during the sliding movement of the sensing pawl, is spring urged into latching engagement with the film advance slide to prevent further actuation thereof in a film advancing direction.

5. A photographic camera according to Claim 4, wherein the sensing pawl is pivoted into engagement with a received film by means of the intermediate member and, during its sliding movement is disengaged from the intermediate member for pivotal movement under spring action away from the film.

6. A photographic camera according to Claim 5, wherein the holding member engages the film perforation from which the sensing pawl is disengaged.

7. A photographic camera having a film holding member constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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