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- (72) Inventors: Helmut Ettischer Wolfgang Ort
 Horst Simon Kurt Steisslinger

(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 use with filmstrip perforated at predetermined metering intervals.

It is an object of the present invention to reduce or obviate the possibility of film movement during the exposure period by eliminating the force of a film sensing pawl on the trailing edge of the film perforation during a picture taking operation when the camera vibrations can suddenly relieve frictional restraints.

In accordance with the present invention there is provided a photographic camera comprising supply and take-up chambers for receiving respectively supply and take-up rolls of a filmstrip perforated at predetermined metering intervals, transport means operable to advance a received filmstrip along a camera exposure plane from the supply chamber to the take-up chamber, an exposure mechanism operable to effect the exposure of received filmstrip at the exposure plane, a film sensing member movable from a first position in which it is spaced from a received filmstrip disposed in the exposure plane, to a second position in which it bears against the filmstrip to engage a perforation during the advance of the filmstrip and, by the trailing edge of the engaged perforation as the filmstrip is advanced, in the general direction of filmstrip advancement to a third position, means associated with the sensing member for disabling the transport means upon movement of the sensing member to its third position, means for applying a resilient force to the sensing member in a direction urging the sensing member from its third position toward

its second position and means associated with the force applying means for disabling the force applying means at least during operation of the exposure mechanism, whereby such force is not transmitted by the sensing member to a received filmstrip during exposure.

In the accompanying drawings:—

Fig. 1 is a view of a portion of a camera constructed with the present invention and showing a cartridge containing a film strip loaded in the camera, the camera elements being shown in their positions immediately following an exposure;

Fig. 2 is a view similar to Fig. 1 showing the camera elements in their position after the shutter has been cocked;

Fig. 3 is a view similar to Fig. 1 showing the camera elements preparatory to film advancement; and

Fig. 4 is a view similar to Fig. 1 showing the camera elements in their positions when the camera is ready to be operated 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 to the drawings, a camera having a housing 10 has a film cartridge 12 received therein. The film cartridge has supply and take-up chambers 14 and 16, respectively, which enter corresponding supply and take-up compartments in the camera housing. A filmstrip 18 is carried by the cartridge and is perforated along one edge at predetermined metering intervals. The cartridge may contain opaque backing paper, and may be of the type shown in U.S. Patent No. 3,138,081.

A film advance slide 20 is mounted in camera housing 10 so as to be movable from the position shown in Fig. 1 in the direction of arrow

22. Slide 20 has an opening 24 with a cam surface 26 formed thereby, a plurality of ratchet teeth 28 and a lug 30. A spring 32 urges the slide 20 to the right-hand side as viewed in Fig. 1.

A shutter drive member 34 is rotatably carried on a stud 36 in housing 10 and is biased in a clockwise direction, as viewed in Fig. 1, by means of a spring 38. An arm 40 on the drive member 34 actuates a shutter, not shown, during clockwise rotation of the drive member to effect an exposure. A second arm 42 of the drive member has a cam follower 44 extending into the opening 24 of slide 20 to follow the cam surface 26 during leftward movement of the slide 20, thereby rotating the drive member 34 in a counterclockwise direction against the force of spring 38. The function of two other arms 46 and 48 on drive member 34 will be explained hereinafter.

A rack 50, having a plurality of gear teeth 53, is slidably mounted in housing 10 and is urged by means of a spring 54 into contact with a stud 56 on the drive member 34. Teeth 52 mesh with corresponding gear teeth on a gear sector 58 which, through gears 60 and 62, advances film from supply compartment 14 to take-up compartment 16 when the rack 50 is moved towards the left-hand side. Gear sector 58 is connected to the gear 60 through a one-way clutch (not shown) so that gears 60 and 62 do not turn when the rack 50 is moved towards the right-hand side.

A latch member 64 is pivotally mounted in housing 10 on a stud 66 for movement between a latch position retaining drive member 34 in its cocked position, Figs. 2, 3 and 4, and a release position (permitting spring 38 to move the drive member rapidly 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 means of a spring 74. Member 70 has three arms 76, 77 and 78 and three tabs 80, 81 and 92, respectively, on the end of those arms.

A film sensing member 84 is rotatably and slidably carried by a pin 86 which extends into a slot 88 in the sensing member. A film sensing pawl 100 on the sensing member 84 extends toward film 18 at the camera's exposure plane. A leaf spring 102 tends to rotate the sensing member 84 in a clockwise direction to urge the sensing pawl 100 to a film engaging position as shown in Fig. 1. A cam surface 104 and a tab 106 are provided on the other end of the sensing member 84, and the functions of these elements will be explained hereinafter.

A control member 108 is rotatably carried by a stud 110 and is urged in a counterclockwise direction by means of a spring 112 against a stop 114 on the camera housing. The upper portion of control lever 109 is disposed in the region of cam surface 104 of sensing member 84, while the lower portion of the control lever

has tab 116 which lies in the path of a claw 118 which is rotatably carried by a stud 120 on the slide 20 and is urged in a clockwise direction about the stud 120 by means of a spring 122 until a leg 124 of the claw engages the cam follower 44 of shutter drive member 34. A wire spring 126 is aligned with a pin 128 on the sensing member 84.

Fig. 1 shows the camera elements positioned after an exposure has been made. The camera is now ready for the operator to advance the film to the next picture frame. Referring to Fig. 2, the operator manually moves slide 20 towards the left-hand side as viewed in that figure against the force of spring 32. During this movement, the cam follower 44 engages cam surface 26 causing the shutter drive member 34 to rotate in a counterclockwise direction against the force of the spring 38 until arm 48 thereon snaps behind the latch member 64. At the same time, the claw 118 engages tab 116 on the control member 108 to rotate the control member in a clockwise direction, whereby the upper portion of the control member 108 engages the cam surface 104 of film sensing member 84 to rotate the film sensing member in a counterclockwise direction, thereby withdrawing sensing pawl 100 from the film perforation. As control member 108 continues to rotate, the spring 126 engages the pin 128 to move the sensing member 84 to the right until the tab 106 thereon is located beneath the tab 82 on the intermediate member 70.

During the first stroke of slide 20, lug 30 misses the rack 50 because the rack has been held in its lower Fig. 1 position by the pin 56 on the drive member 34. Therefore, during the first movement of the slide, there is no film advancement. The camera elements are now positioned as shown in Fig. 2, and as the operator allows spring 32 to return slide 20 to the right, rack 50 is raised by the spring 54 into alignment with lug 30 on the slide 20. The camera elements are now in their respective positions shown in Fig. 3. Note that arm 42 and its cam follower 44 has released claw 118 so that the claw may be pivoted in a clockwise direction by the spring 122 until it is no longer aligned with the tab 116 of control member 108.

Now, on the second operational stroke of slide 20 in the direction of arrow 22, the lug 30 on the slide moves the rack 50 to the left so as to advance film from the supply compartment 14 to the take-up compartment 16 of the cartridge 12. As the film advances, when a perforation reaches the position of film sensing pawl 100, the pawl is moved into the perforation by the spring 102 so that the sensing member is moved to the left by the advancing film. Note that at this time there is no force opposing such movement of the sensing member since spring 126 has been removed from pin 128 by the spring 112.

At the moment that the next succeeding frame of film reaches the camera's exposure

station, tab 106 on the sensing member 84 is moved clear of tab 82 of the intermediate member 70, enabling spring 74 to rotate the intermediate member in a clockwise direction until tab 81 on arm 77 engages ratchet teeth 28 on slide 20, it is returned to the right by spring 32. The camera elements are now positioned as shown in Fig. 4 and the camera is ready to be operated to make an exposure. Note that the spring 126 is spaced from the pin 128 so that there is no force on the sensing member 84 tending to move the sensing member to the right. Thus, when the shutter is tripped and camera vibrations are set up, there is no load on the film sensing pawl which might cause film movement forward the camera's supply chamber due to the loss of frictional resistance mentioned above.

To make an exposure, latch 64 is rotated in a clockwise direction (by means of the camera's release lever, not shown), releasing drive member 34 to run down in a clockwise direction from its Fig. 1 position to operate the shutter mechanism by its arm 40. During such running down movement of the drive member 34, its arm 46 engages the tab 80 on the arm 76 of the intermediate member 70 to rotate the intermediate member in a counterclockwise direction, thereby disengaging the tab 81 from the ratchet teeth 28 of the slide 20. At the same time, arm 42 of the drive member pivots claw 118 in a counterclockwise direction to align the right-hand end of the claw with the tab 116 of the control lever 108, and the pin 56 on the drive member 34 moves the rack 50 out of alignment with the abutment 30 on the slide 20. Spring 102 retains sensing pawl 100 in the film perforation. The camera elements are now in their respective positions shown in Fig. 1, and the camera is ready to be operated to advance the next succeeding film frame to the exposure station as hereinbefore described.

WHAT WE CLAIM IS:-

1. A photographic camera comprising supply and take-up chambers for receiving respectively supply and take-up rolls of a filmstrip perforated at predetermined metering intervals, transport means operable to advance a received filmstrip along a camera exposure plane from the supply chamber to the take-up chamber, an exposure mechanism operable to effect the exposure of received filmstrip at the exposure plane, a film sensing member movable from a first position in which it is spaced from a received filmstrip disposed in the exposure plane, to a second position in which it bears against the filmstrip to engage a perforation during the advance of the filmstrip and, by the trailing edge of the engaged perforation as the filmstrip is advanced, in the general direction of filmstrip advancement to a third position, means associated with the sensing member for disabling the transport means upon movement of the sensing member to its third position, means for applying a resilient force to the sensing

member in a direction urging the sensing member in a direction urging the sensing member from its third position toward its second position and means associated with the force applying means for disabling the force applying means at least during operation of the exposure mechanism, whereby such force is not transmitted by the sensing member to a received filmstrip during exposure.

2. A photographic camera according to Claim 1, wherein the means for disabling the resilient force applying means comprises a control member movable toward and away from a predetermined position and the resilient force applying means comprises spring means associated with the control member in a manner to be operatively coupled to the sensing member for urging the sensing member in a direction along the exposure plane opposed to the direction of film advancement when the control member is moved away from its predetermined position and to be operatively uncoupled from the sensing member when the control member is in its predetermined position.

3. A photographic camera according to Claim 2, further comprising means associated with the sensing member and the control member for moving the sensing member from its third position to its first position upon movement of the control member from its predetermined position.

4. A photographic camera according to Claim 3, wherein the means associated with the sensing member and control member includes a cam surface on the sensing member contactable by the control member.

5. A photographic camera according to Claim 2, 3 or 4, comprising means associated with the control member and the transport means for moving the control member from its predetermined position upon initial operation of the transport means.

6. A photographic camera according to Claim 2, 3, 4 or 5, further comprising a shutter mechanism movable from a cocked position to a run-down position to effect the exposure of received filmstrip at the exposure plane, and cocking means operable to move the shutter mechanism to its cocked position, and wherein the control member is moved to its predetermined position at least during run-down movement of the shutter mechanism and is moved from its predetermined position upon operation of the cocking means.

7. A photographic camera according to any one of the preceding claims, further comprising spring means for urging the sensing member from its first position toward its second position.

8. A photographic camera according to Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

L. A. TRANGMAR, B.Sc., C.P.A.



station, tab 106 on the sensing member 84 is moved clear of tab 82 of the intermediate member 70, enabling spring 74 to rotate the intermediate member in a clockwise direction until tab 81 on arm 77 engages ratchet teeth 28 on slide 20, it is returned to the right by spring 32. The camera elements are now positioned as shown in Fig. 4 and the camera is ready to be operated to make an exposure. Note that the spring 126 is spaced from the pin 128 so that there is no force on the sensing member 84 tending to move the sensing member to the right. Thus, when the shutter is tripped and camera vibrations are set up, there is no load on the film sensing pawl which might cause film movement forward the camera's supply chamber due to the loss of frictional resistance mentioned above.

To make an exposure, latch 64 is rotated in a clockwise direction (by means of the camera's release lever, not shown), releasing drive member 34 to run down in a clockwise direction from its Fig. 1 position to operate the shutter mechanism by its arm 40. During such running down movement of the drive member 34, its arm 46 engages the tab 80 on the arm 76 of the intermediate member 70 to rotate the intermediate member in a counterclockwise direction, thereby disengaging the tab 81 from the ratchet teeth 28 of the slide 20. At the same time, arm 42 of the drive member pivots claw 118 in a counterclockwise direction to align the right-hand end of the claw with the tab 116 of the control lever 108, and the pin 56 on the drive member 34 moves the rack 50 out of alignment with the abutment 30 on the slide 20. Spring 102 retains sensing pawl 100 in the film perforation. The camera elements are now in their respective positions shown in Fig. 1, and the camera is ready to be operated to advance the next succeeding film frame to the exposure station as hereinbefore described.

WHAT WE CLAIM IS:-

1. A photographic camera comprising supply and take-up chambers for receiving respectively supply and take-up rolls of a filmstrip perforated at predetermined metering intervals, transport means operable to advance a received filmstrip along a camera exposure plane from the supply chamber to the take-up chamber, an exposure mechanism operable to effect the exposure of received filmstrip at the exposure plane, a film sensing member movable from a first position in which it is spaced from a received filmstrip disposed in the exposure plane, to a second position in which it bears against the filmstrip to engage a perforation during the advance of the filmstrip and, by the trailing edge of the engaged perforation as the filmstrip is advanced, in the general direction of filmstrip advancement to a third position, means associated with the sensing member for disabling the transport means upon movement of the sensing member to its third position, means for applying a resilient force to the sensing

member in a direction urging the sensing member in a direction urging the sensing member from its third position toward its second position and means associated with the force applying means for disabling the force applying means at least during operation of the exposure mechanism, whereby such force is not transmitted by the sensing member to a received filmstrip during exposure.

2. A photographic camera according to Claim 1, wherein the means for disabling the resilient force applying means comprises a control member movable toward and away from a predetermined position and the resilient force applying means comprises spring means associated with the control member in a manner to be operatively coupled to the sensing member for urging the sensing member in a direction along the exposure plane opposed to the direction of film advancement when the control member is moved away from its predetermined position and to be operatively uncoupled from the sensing member when the control member is in its predetermined position.

3. A photographic camera according to Claim 2, further comprising means associated with the sensing member and the control member for moving the sensing member from its third position to its first position upon movement of the control member from its predetermined position.

4. A photographic camera according to Claim 3, wherein the means associated with the sensing member and control member includes a cam surface on the sensing member contactable by the control member.

5. A photographic camera according to Claim 2, 3 or 4, comprising means associated with the control member and the transport means for moving the control member from its predetermined position upon initial operation of the transport means.

6. A photographic camera according to Claim 2, 3, 4 or 5, further comprising a shutter mechanism movable from a cocked position to a run-down position to effect the exposure of received filmstrip at the exposure plane, and cocking means operable to move the shutter mechanism to its cocked position, and wherein the control member is moved to its predetermined position at least during run-down movement of the shutter mechanism and is moved from its predetermined position upon operation of the cocking means.

7. A photographic camera according to any one of the preceding claims, further comprising spring means for urging the sensing member from its first position toward its second position.

8. A photographic camera according to Claim 1, constructed substantially as hereinbefore described with reference to, and as shown in the accompanying drawings.

L. A. TRANGMAR, B.Sc., C.P.A.