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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 photographic cameras for use with film strip perforated at predetermined metering intervals. In accordance with the present invention there is provided a photographic camera adapted to receive a filmstrip perforated at predetermined metering intervals, comprising transport means for advancing a received filmstrip along the camera's exposure plane, a metering member having an inactive position and an active position disabling the transport means, 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 film strip 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 and the metering member for placing the metering member in its active position upon movement of the sensing member to the 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 for clamping the sensing member against movement by the force applying means at least while the metering member is in its active position.

In the accompanying drawings:

Fig. 1 is a view of a portion of a camera constructed in accordance with the present invention and showing a cartridge containing a filmstrip loaded in the camera, the camera

elements being shown in their position immediately preceding an exposure;

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

Fig. 3 is a view similar to Fig. 1 showing the camera elements as film is being advanced;

Figs. 4—6 are views of a second embodiment of a camera in accordance with the present invention showing the camera elements in three sequential positions as film is advanced; and

Fig. 7 is a view of a third embodiment of a camera in accordance with the present invention.

Because cameras are well known, the present description will be directed in particular to elements forming part of, or co-operating 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 been shown with a film cartridge 12 received therein. The film cartridge has supply and take-up chambers 14 and 16, respectively, which enter correspondingly 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 19, 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 a recessed area 24 with a cam surface 26 formed thereby, a plurality of ratchet teeth 28 and a lug 30. A spring 32 urges slide 20 to the right 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 a spring 38. An arm 40 on 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 recess 24 of slide 20. The function of two other arms 46 and 48 on drive member 34 will be explained herein-after.

A rack 50, having a plurality of gear teeth 52, is slidably mounted in housing 10 and is urged by a spring 54 into contact with a stud 56 on 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 rack 50 is moved to the left. Gear sector 58 is connected to gear 60 through a one-way clutch, not shown, so that gears 60 and 62 do not turn when rack 50 is moved to the right.

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; Fig. 1) and a release position (permitting spring 38 to rapidly move the drive member to its uncocked position as shown in Fig. 2).

A metering member comprises a lever 70 rotatably carried in housing 10 on a stud 72 and biased in a clockwise direction by a spring 74. Lever 70 has three arms and three tabs 80-82 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 extends toward film 18 at the camera's exposure plane. A spring 102 tends to rotate the sensing member in a clockwise direction to urge sensing pawl 100 to a film engaging position as shown in Fig. 1. The sensing member has a projection 106 on one end and a pair of bent tabs 107 and 108, the functions of these elements to be explained hereinafter.

A blocking member 110 is rotatably carried by stud 72 and is urged in a clockwise direction by a spring 112 against bent tab 107 on the sensing member. The lower portion of the blocking member has tab 116 which lies in the path of one arm of lever 70.

Fig. 1 shows the camera elements positioned after the film has been advanced and before an exposure is made. To make an exposure, latch 64 is rotated in a clockwise direction (by the camera's body release lever, not shown), releasing drive member 34 to run down in a clockwise direction from its Fig. 1 position and to thereby operate the shutter mechanism by its arm 40. During such running down movement of drive member 34, its arm 46 engages tab 80 on lever 70 to rotate the lever in a counterclockwise

direction, thereby removing tab 81 from ratchet teeth 28 of slide 20. At the same time, pin 56 on the drive member moves rack 50 out of alignment with abutment 30 on the slide. Spring 102 retains sensing pawl 100 in the film perforation. The camera elements are now in their respective positions shown in Fig. 2, and the camera is ready to be operated to advance the next succeeding film frame to the exposure station.

Referring to Fig. 2, the operator manually moves slide 20 in the direction of arrow 22, and, as the slide moves, follower 44 rides along the bottom surface of recess 24 and falls off a step 120 to the beginning of surface 26. To ensure that this step is not missed, a projection 122 is provided. As follower 44 falls off the step, drive member 34 rotates slightly in a clockwise direction causing further counterclockwise rotation of lever 70. Blocking member 110 is rotated further in a counterclockwise direction to engage bent tab 108 and to thereby rotate sensing member 84 counterclockwise. As soon as sensing pawl 100 clears the perforation, spring 102 moves the sensing member to the right.

As slide 22 continues to move to the left, follower 44 moves up surface 26, causing shutter drive member 34 to rotate in a counterclockwise direction against the force of spring 38 until arm 48 thereon snaps behind latch member 64.

During the first stroke of slide 20, lug 30 misses rack 50 because the rack has been held in its lower, Fig. 2, position by pin 56 on drive member 34. Therefore, during the first movement of the slide, there is no film advancement, and, as the operator allows spring 32 to return slide 20 to the right, rack 50 is raised by spring 54 into alignment with abutment 30 on the slide. The camera elements are now in their respective positions shown in Fig. 3.

Now, on the second operational stroke of slide 20 in the direction of arrow 22, lug 30 on the slide moves rack 50 to the left to advance film from supply compartment 14 to take-up compartment 16 of the cartridge. As the film advances, when a perforation reaches the position of film sensing pawl 100, the pawl is moved into the perforation by spring 102 so that the sensing member is moved to the left by the advancing film.

At the moment that the next succeeding frame of film reaches the camera's exposure station, tab 106 on sensing member 84 falls off of tab 82 of lever 70, enabling spring 74 to rotate the intermediate member in a clockwise direction until tab 81 engages ratchet teeth 28 on slide 20 to prevent further film advancement. When the operator releases slide 20, it is returned to the right by spring 32. During such rotation of lever 70, blocking member 110 clamps sensing member 84

by cooperation with an abutment surface 130 on housing 10. The camera elements are now positioned as shown in Fig. 1 and the camera is ready to be operated to make an exposure.

5 Note that the clamping of sensing member 84 between member 110 and surface 130 prevents rightward movement of the sensing member. Thus, when the shutter is tripped and camera vibrations are set up, there is
10 no movement of the film sensing pawl which might cause film movement toward the camera's supply chamber due to the loss of frictional resistance mentioned above.

In Figs. 4 and 5, we have shown a second
15 embodiment of the present invention wherein blocking member 110¹ is held out of engagement with tab 107 of sensing member 84 until metering lever 70 has been released from tab 106 of the sensing member. Fig. 4,
20 which corresponds in sequence to Fig. 3 of the first embodiment, shows that after an exposure has been made and the shutter cocked, clamping member 110¹ is held out of contact with tab 107 by engagement of
25 lever 70 and tab 116¹. In Fig. 5, a perforation has reached sensing pawl 100, but clamp member 110¹ has still not contacted tab 107. Only when metering lever 70 has been released, as in Fig. 6, can spring 112 move
30 clamp member 110¹ into engagement with bent tab 107, thus preventing additional drag during the final stage of film advance.

In accordance with the embodiments of Figs. 1—6, the surface of clamp members
35 110 and 110¹ which cooperate with tab 107 is flat. In order to increase the holding action between the clamp member and sensing member 84, this surface may be provided with teeth 132 as in the embodiment of Fig.
40 7. In this case, tab 107¹¹ is inclined so that one of its edges engages with teeth 132 of blocking member 110¹¹.

WHAT WE CLAIM IS:—

45 1. A photographic camera adapted to receive a filmstrip perforated at predetermined metering intervals, comprising transport means for advancing a received filmstrip along the camera's exposure plane, a metering
50 member having an inactive position and an active position disabling the transport means, a film sensing member movable from a first position in which it is spaced from a received filmstrip disposed in the exposure
55 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
60 direction of filmstrip advancement to a third position, means associated with the sensing member and the metering member for placing the metering member in its active posi-

tion upon movement of the sensing member to the 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 for clamping the sensing member against movement by the force applying
70 means at least while the metering member is in its active position.

2. A photographic camera according to Claim 1, wherein the clamping means includes a blocking lever, spring means for urging the blocking lever toward clamping engagement with the sensing member and means associated with the blocking lever and the metering member for moving the blocking lever out of engagement with the sensing member when the metering member is in its inactive position.

3. A photographic camera according to claim 2, further comprising means associated with the blocking lever and the transport means for moving the blocking lever out of clamping engagement with the sensing member upon operation of the transport means.

4. A photographic camera according to claim 3, further comprising means associated with the sensing member and the blocking lever for moving the sensing member to its retracted position upon movement of the blocking lever out of clamping engagement with the sensing member upon operation of
95 the transport means.

5. A photographic camera according to claim 4, wherein the means associated with the sensing member and blocking lever includes a cam surface on the sensing member
100 contactable by the blocking lever.

6. A photographic camera according to claim 5, further comprising means associated with the blocking lever and the transport means for moving the blocking lever away
105 from its clamping position upon initial operation of the transport means.

7. A photographic camera according to claim 6, further comprising a shutter mechanism movable from a cocked position to a
110 run-down position to effect the exposure of received filmstrip at the exposure plane, cocking means operable during the initial actuation of the transport means to move the shutter mechanism to its cocked position
115 and means associated with the cocking means for moving the blocking member from its clamping position upon operation of the cocking means.

8. Photographic cameras according to claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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by cooperation with an abutment surface 130 on housing 10. The camera elements are now positioned as shown in Fig. 1 and the camera is ready to be operated to make an exposure.

5 Note that the clamping of sensing member 84 between member 110 and surface 130 prevents rightward movement of the sensing member. Thus, when the shutter is tripped and camera vibrations are set up, there is
10 no movement of the film sensing pawl which might cause film movement toward the camera's supply chamber due to the loss of frictional resistance mentioned above.

In Figs. 4 and 5, we have shown a second
15 embodiment of the present invention wherein blocking member 110¹ is held out of engagement with tab 107 of sensing member 84 until metering lever 70 has been released from tab 106 of the sensing member. Fig. 4,
20 which corresponds in sequence to Fig. 3 of the first embodiment, shows that after an exposure has been made and the shutter cocked, clamping member 110¹ is held out of contact with tab 107 by engagement of
25 lever 70 and tab 116¹. In Fig. 5, a perforation has reached sensing pawl 100, but clamp member 110¹ has still not contacted tab 107. Only when metering lever 70 has been released, as in Fig. 6, can spring 112 move
30 clamp member 110¹ into engagement with bent tab 107, thus preventing additional drag during the final stage of film advance.

In accordance with the embodiments of
35 Figs. 1—6, the surface of clamp members 110 and 110¹ which cooperate with tab 107 is flat. In order to increase the holding action between the clamp member and sensing member 84, this surface may be provided with teeth 132 as in the embodiment of Fig.
40 7. In this case, tab 107¹¹ is inclined so that one of its edges engages with teeth 132 of blocking member 110¹¹.

WHAT WE CLAIM IS:—

45 1. A photographic camera adapted to receive a filmstrip perforated at predetermined metering intervals, comprising transport means for advancing a received filmstrip
50 along the camera's exposure plane, a metering member having an inactive position and an active position disabling the transport means, a film sensing member movable from a first position in which it is spaced from a received filmstrip disposed in the exposure
55 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
60 direction of filmstrip advancement to a third position, means associated with the sensing member and the metering member for placing the metering member in its active posi-

tion upon movement of the sensing member to the third position, means for applying a
65 resilient force to the sensing member in a direction urging the sensing member from its third position toward its second position, and means for clamping the sensing member against movement by the force applying
70 means at least while the metering member is in its active position.

2. A photographic camera according to Claim 1, wherein the clamping means includes a blocking lever, spring means for
75 urging the blocking lever toward clamping engagement with the sensing member and means associated with the blocking lever and the metering member for moving the blocking lever out of engagement with the sensing
80 member when the metering member is in its inactive position.

3. A photographic camera according to claim 2, further comprising means associated with the blocking lever and the transport
85 means for moving the blocking lever out of clamping engagement with the sensing member upon operation of the transport means.

4. A photographic camera according to claim 3, further comprising means associated with the sensing member and the blocking
90 lever for moving the sensing member to its retracted position upon movement of the blocking lever out of clamping engagement with the sensing member upon operation of
95 the transport means.

5. A photographic camera according to claim 4, wherein the means associated with the sensing member and blocking lever includes a cam surface on the sensing member
100 contactable by the blocking lever.

6. A photographic camera according to claim 5, further comprising means associated with the blocking lever and the transport
105 means for moving the blocking lever away from its clamping position upon initial operation of the transport means.

7. A photographic camera according to claim 6, further comprising a shutter mechanism movable from a cocked position to a
110 run-down position to effect the exposure of received filmstrip at the exposure plane, cocking means operable during the initial actuation of the transport means to move the shutter mechanism to its cocked position
115 and means associated with the cocking means for moving the blocking member from its clamping position upon operation of the cocking means.

8. Photographic cameras according to
120 claim 1, constructed substantially as hereinbefore described with reference to, and as shown in, the accompanying drawings.

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