

PATENT SPECIFICATION

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- (21) Application No. 12450/73 (22) Filed 15 March 1973
 (31) Convention Application No. 235 143 (32) Filed 16 March 1972 in
 (33) United States of America (US)
 (44) Complete Specification published 21 Jan. 1976
 (51) INT. CL.² G03B 1/62
 (52) Index at acceptance
 G2A 401 403 631 678 MD
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(54) METERING MECHANISM FOR A 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 a metering mechanism including a device for sensing the presence of a film perforation selectively to lock and release the film transport mechanism of a camera, and more particularly to such a mechanism for minimizing any surge of force on the film during the exposure interval.

The present invention is an improvement over the mechanism disclosed in our copending Application No. 55571/72 (Serial No. 1,418,296) the relevant parts of which mechanism are described hereinafter with reference to Figs. 1 to 4 of the accompanying drawings.

It is an object of the present invention to provide an improved metering mechanism which reduces or eliminates the possibility of film movement during the exposure period by reducing any surge of force by the film metering mechanism on the film when camera vibrations suddenly relieve frictional restraints.

According to the present invention, there is provided a metering mechanism for a photographic camera arranged to receive roll film perforated at predetermined metering intervals, and having a transport mechanism for advancing received film along a camera exposure plane, the mechanism comprising a metering lever movable between an active position disabling the transport mechanism and an inactive position, a film sensing member movable from a re-

tracted position on one side of an exposure plane, to a first extended position extending through the exposure plane when intercepting one of the film perforations, and to a second extended position by the trailing edge of the film perforation as the film is advanced along the exposure plane, a latch member mounted for movement between a blocking position and a non-blocking position, an abutment on the latch member for blocking movement of the metering lever to its active position when the latch member is in its blocking position, an abutment on the latch member contactable by the film sensing member for moving the latch member from its blocking position to its non-blocking position during movement of the sensing pawl from its first extended position to its second extended position, and spring means for urging the latch member toward its blocking position wherein the spring means is mounted to apply a resilient force to the latch member substantially in same plane as the plane of contact between the sensing member and latch member so as to minimize, during movement of the latch member to its non-blocking position, any force moment on the latch member caused by forces applied thereto by the spring means and the sensing lever.

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

Figs. 1-4 are views of a portion of a camera metering mechanism known to the Applicants and forming the subject matter of the aforesaid copending patent application;

Figs. 5 and 6 are perspective sectional views of a portion of a camera metering mechanism in accordance with an embodiment of the present invention; and

Fig. 7 is a top sectional view of the mechanism shown in Figs. 5 and 6.

Because cameras are well known, the 90

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present description will be directed in particular to elements forming part of, or co-operating more directly with, the mechanism in accordance with the present invention.

5 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.

10 Figs. 1-4 show a portion of the camera described in our above-mentioned Application No. 55571/72 (Serial No. 1,418,296), the disclosure of which is hereby specifically incorporated herein. A portion of a filmstrip 10 and backing paper 12 is shown
15 in an exposure plane which lies perpendicular the surface of a mechanism plate 14 in the camera. A portion 16 of a metering lever includes a tab 18. The metering lever is urged in the direction shown by a spring
20 20 for movement from an inactive position to an active position for disabling a film transport mechanism, not shown. A film sensing pawl 22 has a slot 24 through
25 which a post 26 extends so that sensing pawl 22 may move rotatably about the post and longitudinally relative thereto. A spring 27 urges the sensing pawl downwardly as viewed in Figs. 1-3 into engagement with
the surface of film 10.

30 A latch member 28 is rotatably carried by post 26 adjacent to the surface of mechanism plate 14. The latch member has a tab 30 and an abutment portion 32 which extends in a direction generally perpendicular
35 to the mechanism plate through slot 24 in sensing pawl 22. A wire torsion spring 34 is wrapped about an annular groove 36 in post 26 and has a first leg 38 which abuts a stud 40 extending from the
40 mechanism plate and a second leg 42 which contacts abutment portion 32 of latch member 28, tending to rotate the latch member in a counterclockwise direction as shown in Figs. 1-3. The force of spring 34 is
45 transmitted along abutment portion 32 of the latch member to sensing pawl 22 to tend to rotate the sensing pawl in a counterclockwise direction also. Two other annular grooves 44 and 46 have been provided for
50 rotatably supporting camera elements which are not shown and which do not form a part of the present invention.

Referring to Fig. 1, the camera elements are shown positioned after an exposure has
55 been made and as film 10 is being advanced in the direction of arrow 48 to the next exposure area. Sensing pawl 22 has been withdrawn to a retracted position on one side of the exposure plane and is urged by
60 spring 27 into engagement with the film surface. Spring 34 has rotated latch member 28 to a position wherein tab 30 blocks movement of metering lever 16 to its active position. As the film is advanced, friction
65 between the film surface and sensing pawl

22 tends to rotate the sensing pawl in a clockwise direction. However, this tendency is opposed by the force of spring 34 acting through abutment portion 32 of
latching member 28.

70 As the next succeeding perforation reaches the end of sensing pawl 22, spring 27 moves the sensing pawl downwardly until the nose 50 of the sensing pawl enters the perforation as shown in Fig. 2. As the
75 film continues to be advanced, the trailing edge of the perforation exerts a force on nose 50 of sensing pawl 22 to rotate the sensing pawl in a clockwise direction. As the pawl rotates, it exerts a force F (Fig. 4) 80
on abutment portion 32 of latch member 28 to rotate the latch member in a clockwise direction until tab 18 of metering lever 16 falls off of tab 30 of the latch member so that the metering lever may be
85 moved by spring 20 to its active position, disabling the film transport mechanism (see Fig. 3).

When an exposure is made, metering lever 16 is raised so that tab 18 clears tab 90
30 and is held in this position until initial film advancement takes place. As the film moves, sensing pawl 22 is further rotated in a clockwise direction until its cam surface
52 engages a tab 54 extending from mechanism plate 14 to lift the sensing pawl out
95 of the film perforation. Spring 34 now rotates latch member 32 in a counterclockwise direction to align tab 30 thereon with tab 18 of metering lever 16 and to rotate
100 sensing pawl 22 to its position shown in Fig. 1.

Referring to Fig. 4, the forces acting on latch member 28 will now be considered. Spring 34 exerts a force f_s on abutment
105 portion 32. Force f_s is opposed by frictional forces between the latch member and the surface of the mechanism plate, frictional forces between the latch member and post 26 and force F of sensing pawl 22
110 on abutment portion 32. As the force of spring 34 on abutment portion 32 acts in a plane spaced from the plane of force F , a force moment is set up tending to rotate the latch member about an axis generally
115 parallel to mechanism plate 14. This tends to move the latch member to the phantom line position shown in Fig. 4, increasing the frictional force on the latch member from the surface of the mechanism
120 plate. This movement has been shown exaggerated in Fig. 4 more clearly to illustrate this phenomenon. Thus, when the camera is cocked and ready for an exposure, force f_s is opposed by force F and the sum
125 of certain frictional forces in the camera including the frictional force between mechanism plate 14 and latch member 28.

As mentioned hereinbefore, as the shutter is tripped, minor vibrations travel through 130

the camera suddenly to relieve static friction. If the friction between latching member 28 and the surface of mechanism plate 14 is relieved as the shutter trips, the force of spring 34 on pawl 22 is momentarily increased, tending to move the film. This problem is compounded by the simultaneous reduction in friction between the film and the film gate caused by exposure vibrations of the camera.

As a feature of the present invention, a mechanism has been devised in which the forces on latching member 28 do not tend to urge the latching member into frictional engagement with the surface of mechanism plate 14. Referring to Figs. 5-7, there is shown a preferred embodiment of the present invention wherein camera elements which are the same as those shown in Figs. 1-4 have been referred to by the same reference numerals. Some of the camera elements have been modified, and these modified elements are referred to by the same reference numerals with a prime mark. Latching member 28 has been modified so that its abutment portion 32' has a notch 56 on the end facing away from mechanism plate 14. Spring 34' has been modified so that leg 42' is turned at 58 and extends generally along abutment portion 32' to rest within notch 56 so that the force f_s' of spring 34' against the abutment portion is generally in the plane of force F from sensing pawl 22.

Now, as the sensing pawl is moved from its extended position as shown in Fig. 5 to its metered position, Fig. 6, by the trailing edge of the perforation as a frame of film is advanced, force F of sensing pawl 22 against abutment portion 32' of latching member 28 is opposed by force f_s' from spring 34' generally in the same plane. Thus, there is no force moment acting on the latching member to force the member into engagement with the mechanism plate. This is illustrated in Fig. 7. As such, when the shutter is tripped, camera vibrations do not cause a loss of frictional resistance between latch member 28 and plate 14 as is the case in the known embodiment shown in Figs. 1-4. Accordingly, there is less force surge on the pawl tending to move the film during exposure, and therefore less risk of blurred pictures.

As can be seen from the above, a mechanism has been provided for eliminating one cause of film movement by reducing the amount of force surge on the film sensing pawl during exposure. The invention has been described in detail with particular reference to a preferred embodiment thereof, but it will be understood that variations and modifications can be effected within the scope of the invention as defined in the appended claims.

WHAT WE CLAIM IS:—

1. A metering mechanism for a photographic camera arranged to receive roll film perforated at predetermined metering intervals, and having a transport mechanism for advancing received film along a camera exposure plane, the mechanism comprising a metering lever movable between an active position disabling the transport mechanism and an inactive position, a film sensing member movable from a retracted position on one side of an exposure plane, to a first extended position extending through the exposure plane when intercepting one of the film perforations, and to a second extended position by the trailing edge of the film perforation as the film is advanced along the exposure plane, a latch member mounted for movement between a blocking position and a non-blocking position, an abutment on the latch member for blocking movement of the metering lever to its active position when the latch member is in its blocking position, an abutment on the latch member contactable by the film sensing member for moving the latch member from its blocking position to its non-blocking position during movement of the sensing pawl from its first extended position to its second extended position, and spring means for urging the latch member toward its blocking position wherein the spring means is mounted to apply a resilient force to the latch member substantially in same plane as the plane of contact between the sensing member and latch member so as to minimize, during movement of the latch member to its non-blocking position, any force moment on the latch member caused by forces applied thereto by the spring means and the sensing lever.

2. A mechanism as claimed in Claim 1 wherein the latch member is rotatably movable about an axis perpendicular to the said plane.

3. A mechanism as claimed in Claim 2 wherein the spring means comprises a wire torsion spring having a portion looped about the axis; a first leg engaging an abutment on a mechanism plate remote from the said plane and a second leg extending laterally towards the said plane to engage the latch member substantially in the said plane.

4. A mechanism as claimed in Claim 3 wherein the axis is defined by a post projecting from the mechanism plate, the latch member is pivotally mounted on the post so as to be adjacent and parallel to the plate, the torsion spring is wound about the post, the sensing pawl is mounted on the post for its pivotal and longitudinal movement, and the latch member includes an abutment portion extending substantially perpendicularly away from the mechanism plate to



the camera suddenly to relieve static friction. If the friction between latching member 28 and the surface of mechanism plate 14 is relieved as the shutter trips, the force of spring 34 on pawl 22 is momentarily increased, tending to move the film. This problem is compounded by the simultaneous reduction in friction between the film and the film gate caused by exposure vibrations of the camera.

As a feature of the present invention, a mechanism has been devised in which the forces on latching member 28 do not tend to urge the latching member into frictional engagement with the surface of mechanism plate 14. Referring to Figs. 5-7, there is shown a preferred embodiment of the present invention wherein camera elements which are the same as those shown in Figs. 1-4 have been referred to by the same reference numerals. Some of the camera elements have been modified, and these modified elements are referred to by the same reference numerals with a prime mark. Latching member 28 has been modified so that its abutment portion 32' has a notch 56 on the end facing away from mechanism plate 14. Spring 34' has been modified so that leg 42' is turned at 58 and extends generally along abutment portion 32' to rest within notch 56 so that the force f_s' of spring 34' against the abutment portion is generally in the plane of force F from sensing pawl 22.

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2. A mechanism as claimed in Claim 1 wherein the latch member is rotatably movable about an axis perpendicular to the said plane.

3. A mechanism as claimed in Claim 2 wherein the spring means comprises a wire torsion spring having a portion looped about the axis; a first leg engaging an abutment on a mechanism plate remote from the said plane and a second leg extending laterally towards the said plane to engage the latch member substantially in the said plane.

4. A mechanism as claimed in Claim 3 wherein the axis is defined by a post projecting from the mechanism plate, the latch member is pivotally mounted on the post so as to be adjacent and parallel to the plate, the torsion spring is wound about the post, the sensing pawl is mounted on the post for its pivotal and longitudinal movement, and the latch member includes an abutment portion extending substantially perpendicularly away from the mechanism plate to

wards the sensing pawl, the abutment portion being engaged on one surface by the sensing pawl and on an opposite surface by the second leg of the spring in a plane parallel to the mechanism plate but spaced therefrom.

5 A metering mechanism for a photographic camera substantially as hereinbefore described with reference to and as illustrated in Figs. 5, 6 and 7 of the accompanying drawings.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1975.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

