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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 a photographic camera with a film transport and shutter cocking mechanism.

In accordance with the present invention there is provided a photographic camera with a film transport mechanism and shutter cocking mechanism, a firing means for percussion ignitable flashlamps, a firing lever controlling the firing percussion, a release member and a shutter driver for driving the shutter, wherein the firing lever and the shutter driver are multi-armed and are provided on respectively one arm with projections at which the driver bears on the lever, the shutter driver bearing under the action of its driving spring in overlapping manner on the projection of the firing lever and the firing lever being held under the action of its driving spring by a release lever co-operating with the release member, and one arm of the shutter driver co-operates with a control cam of the film transport and shutter cocking means for the purpose of cocking the shutter driver, the firing lever being freed for running-down movement with the actuation of the release member, while the shutter driver initially cannot run down without obstruction, until as a result of the pivoting movement of the firing lever and the shutter driver, the overlap determining the instant of firing is cancelled out and both levers run down while being independently driven to effect synchronous operation of the shutter and a flashlamp, the instant of firing being after the overlap is cancelled.

In the accompanying drawings:—

[Price 33p]

Figure 1 is a section through a part of a camera constructed in accordance with the present invention showing the mechanism in the tensioned state after the locking of the film transport movement has occurred; 50

Figure 2 is a view similar to Fig. 1, but with the mechanism in the run-down condition, with the film transport lock released. 55

The arrangement is first of all described by reference to Figure 1. Mounted for sliding movement on a camera housing 17 is an actuating member 1, which co-operates through its control cam 1a with a shutter driver 2, 2d and through a control cam 1b with a firing lever 4, 4b. The shutter driver 2 is mounted for rotation about a bearing 18 and is acted upon by a spring 9 in a counter-clockwise direction, the same spring 9 at its other end holding a rack 19 bearing against the side wall 17a of the housing. A lug 2e of the shutter driver 2 lies in a recess 19b of the rack 19 and co-operates with an edge 19a thereof. An arm 2c of the shutter driver 2 co-operates with a shutter blade 7 mounted to be rotatable about a bearing 16 and with a lug 11a of an intermediate lever 11. 60 65 70

The shutter driver 2 also comprises two lugs 2a, 2b, of which one lug 2a co-operates with an arm 15a of an actuating lever 15 and the other lug 2b co-operates with a bent-over portion 4a of the firing lever 4. The actuating lever 15, mounted to be rotatable about a shaft 20, is under the action of a spring 31, which engages an arm 15b and urges the actuating lever 15 in a clockwise direction. The arm 15b of the actuating lever 15 co-operates with a dog 3a of a flashlamp holder 3 (indicated in broken lines). The actuating lever 15 is arranged to be springy axially, and it becomes operative in the advancing direction of the flashlamp holder 3, 3a, but during its return movement is resiliently deflected by inclined surfaces (not shown) on the dogs 3a. 75 80 85 90

The firing lever 4 is mounted for rotation about the shaft 20 and has a lug 4d which

Price 75p

is acted upon by a spring 8 to urge the firing lever 4 in a clockwise direction. The firing lever 4 is provided with an inclined surface 4c, which co-operates with a pin 21a of a percussion firing lever 21 which is mounted to rotate about a bearing 22. Co-operating with the percussion firing lever 21 in a known manner (which is not shown in detail) is a control lever 23 which projects into the region of the flash cube holder 3 (indicated in broken lines), in order to move the percussion firing lever 21 into its "ready" position when a flash cube is inserted in the holder. The firing lever 4 includes a bent-over portion 4b, at which it is held by a projection 5a of a release lever 5 in the tensioning position.

The release lever 5 is arranged to be pivotable about a bearing 24 and is acted upon in a counter-clockwise direction by a spring 25. That end of the release lever 5 opposite the holding projection 5a comprises a bent-over lug 5b, which co-operates with locking teeth 1c of the actuating member 1. In addition, this end of the release lever 5 is provided with an inclined surface 5c, which co-operates with a cone 6a of a release member 6. The release member 6 co-operates with a recess (not shown) in a locking bar 1d of the actuating member 1, and in the position of the actuating member 1 as shown in Figure 1, the recess takes up a position beneath the release member 6, so that the said member can engage in the recess, but during the movement of the actuating member the release member is prevented from being actuated by the locking bar 1d. A locking recess 6b in the release member 6 co-operates with a bent-over lug 10a of a locking lever 10. The locking lever 10 is mounted to be rotatable about a bearing 26 and is acted upon by a spring 27 in the clockwise direction, the locking lever 10 bearing against an intermediate lever 11. The intermediate lever 11, which is acted upon in a counter-clockwise direction by a spring 37, co-operates by means of its arm 11c with a sensing member 12.

The sensing member 12 has a slot 12a engaging a pin 28 about which it is pivoted in a clockwise direction by means of a spring 29 acting on a lug 12b. A sensing pin 12c of the sensing member 12 co-operates with a perforated film 30 in a cassette 13.

The rack 19 is provided on its underside with teeth 19c, which co-operate with a gear of the film-winding mechanism (not shown in detail) co-operating with a winding spool 13a of the cassette 13. Likewise arranged on the underside of the rack 19 is a nose 19d, which co-operates with a projection 1e on the actuating member 1.

The mechanism operates as follows:

The mechanism according to Figure 1 is in the tensioned or cocked condition. If now

the release member 6 is actuated, the release lever 5 is pivoted in a clockwise direction by means of the cone 6a of the member 6 and the inclined surface 5c. As a result, the projection 5a of the release lever 5 frees the bent-over lug 4b, so that the firing lever 4 can run down in a clockwise direction. Since the lug 2b of the shutter driver 2 bears against the bent-over portion 4a of the firing lever 4, the release thereof is simultaneously effected. However, initially the shutter driver 2 cannot run down without obstruction. It is only when the lug 2b of the shutter driver 2 and the bent-over lug 4a of the firing lever 4 slide away from one another that there is a complete release of the firing lever 2. The time delay between the freeing of the running-down movement of the firing lever 4 and the shutter driver 2 serves for establishing the instant of firing of the flashlamp relatively to the opening of the shutter. During its running-down movement, the firing lever 4, through the inclined surface 4c, operates the percussion firing lever 21, 21a, which in known manner initiates the percussion firing of the flashlamp (not shown).

During its running-down movement from the position "D" towards "C", the shutter driver 2 carries out several functions (see Figure 2). Its arm 2c actuates the shutter blade 7, whereby the film is exposed. Thereafter, the arm 2c runs against the lug 11a of the intermediate lever 11 and pivots the latter in a clockwise direction, the spring-loaded locking lever 10 also carrying out this movement and the lug 10a of the locking lever 10 is swung out of the locking teeth 1c of the actuating member 1. By this means, the film transport is released. Should the release member 6 still be pressed down, the cancellation of the film transport lock only occurs when the release member is freed, since until then the recess 6b of the release member 6 prevents the lug 10a of the locking lever 10 from swinging back. A repeated actuation of the release member 6 is prevented by the recess 6b of the release member 6 lying above the lug 10a of the locking lever 10. The lug 2e of the shutter driver 2 leaves the edge 19a of the rack 19, so that the rack 19 is able to travel under the action of the spring 9 towards the side wall 17a of the camera housing 17. The lug 2a of the shutter driver 2 allows the actuating lever 15 to carry out its return movement. Simultaneously, the lug 2d comes into abutment with the control cam 1a of the actuating member 1.

After letting go the release member 6, the bent-over lug 5b of the release lever 5 is moved into engagement with the locking teeth 1c of the actuating member 1, whereby the return lock 1c, 5b, becomes operative (Figure 2). The shutter blade 7 is moved

under the action of a return spring (not shown), after making an exposure, back to its closed position.

To prepare the camera in readiness for making an exposure, the actuating member 1 is moved in the direction of the arrow "B". The projection 1e moves past the nose 19d of the rack 19. The cocking of the shutter driver 2 is thus obtained by the control cam 1a of the actuating member 1, the shutter driver 2 being moved from the position "C" towards position "D" (Figure 1). Through the lug 4b, the control cam 1b of the actuating member 1 moves the firing lever 4 into its cocked position (Figure 1), until the lug 4b runs over the nose 5a of the release lever 5 and the firing lever 4 is held by the release lever 5. The shutter driver 2 is retained in its cocked position by the bent-over portion 4a of the firing lever 4 bearing on its lug 2b. During the cocking of the shutter driver 2, the actuating lever 15 is swung by means of the lug 2a in a counter-clockwise direction, whereby the flashlamp holder 3 is turned through 90° by means of the dogs 3a. As soon as the release lever 5 has assumed its holding function, its lug 5b swings out of engagement with the locking teeth 1c of the actuating member 1, whereby the return lock 1c, 5b is disabled. During the cocking of the shutter driver 2, lug 2e thereof strikes against the edge 19a of the rack 19 and pulls the rack into the position according to Figure 1. As soon as the shutter driver 2 is moved towards its cocked position, the intermediate lever 11 follows this movement under the action of its spring 37. This causes the arm 11c of the intermediate lever 11 to move the sensing member 12 into the sensing position (not shown), where the sensing pin 12c of the sensing member 12 bears on the film 30. After the cocking operations have been completed, the actuating member 1 is moved back under the action of the spring 32 into its initial position "A", the inclined surfaces on the projection 1e and on the nose 19d allowing a resilient deflection of the rack 19.

The transport of the film takes place with a subsequent actuating movement. If for this purpose the actuating member 1 is again moved in the direction of the arrow "B", its projection 1e strikes against the nose 19d of the rack 19 and carries the rack 19 with it, the advance of the film taking place in the direction of the arrow "F". As soon as a perforation comes into the region of the sensing pin 12c, the latter moves into said perforation under the action of the spring 37 which is stronger than the spring 29. The sensing member 12, 12c is now driven by the film 30 until the projection 12d on the sensing member 12 slides off the arm 11c of the intermediate lever 11. The spring 29

of the sensing member 12 can now become effective, this spring pivoting the sensing member 12 in a clockwise direction and withdrawing the sensing pin 12c from the perforation. As a result of the sensing member projection 12d sliding off the arm 11c, the intermediate lever 11 and, with it, the locking lever 10, are able to pivot further in a counter-clockwise direction under the action of the spring 37 until the bent-over lug 10a of the locking lever 10 drops into the locking teeth 1c of the actuating member 1, whereby movement of the actuating member 1 in the direction of the arrow "B" and thus the film advance are blocked. The withdrawal of the sensing member 12, 12c and the engagement of the locking lever 10, 10a take place immediately one after the other, so that the film advance is very quickly blocked and a uniform frame interval is obtained. After the actuating member 1 has again returned under the action of its spring 32 into the position "A", the mechanism once again assumes the position which is shown in Figure 1. The lug 10a of the locking lever 10, in this position, is once again pivoted away from the recess 6b of the release member 6, so that the release member 6 is free for another operation.

If there is no cassette 13 in the camera, an unlocking lever 14 becomes effective, and this lever, under the action of its spring 33, is moved into cassette chamber 17b. As a result, through an arm 14a, of lever 14, the intermediate lever 11 is pivoted in a clockwise direction until the lug 10a of the locking lever 10 is moved out of the locking teeth 1c of the actuating member 1 and assumes a position outside the recess 6b of the release member 6. In this way, the release member 6 becomes free for operation and the mechanism can, for example, be actuated for demonstration purposes.

With the mechanism as described, the firing mechanism and the shutter mechanism are caused to become independently effective, whereby a constant firing force and constant shutter speeds are obtained. In addition, the establishment of the instant of firing is achieved by simple and possibly adjustable means. Moreover, the shutter release is not additionally loaded, so that a soft release is obtained.

WHAT WE CLAIM IS:—

1. A photographic camera with a film transport mechanism and shutter cocking mechanism, a firing means for percussion ignitable flashlamps, a firing lever controlling the firing percussion, a release member and a shutter driver for driving the shutter, wherein the firing lever and the shutter driver and multi-armed and are provided on respectively one arm with projections at which 130

under the action of a return spring (not shown), after making an exposure, back to its closed position.

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the driver bears on the lever, the shutter driver bearing under the action of its driving spring in overlapping manner on the projection of the firing lever and the firing lever being held under the action of its driving spring by a release lever co-operating with the release member, and one arm of the shutter driver co-operates with a control cam of the film transport and shutter cocking means for the purpose of cocking the shutter driver, the firing lever being freed for running-down movement with the actuation of the release member, while the shutter driver initially cannot run down without obstruction, until as a result of the pivoting movement of the firing lever and the shutter driver, the overlap determining the instant of firing is cancelled out and both levers run down while being independently driven to effect synchronous operation of the shutter and a flashlamp, the instant of firing being after the overlap is cancelled.

2. A photographic camera according to Claim 1, wherein the release lever is pivotally mounted and carries on one end a projection for holding the firing lever, while the other end of the release lever has a bent-over lug which, in conjunction with locking teeth on an actuating member, prevents return movement of the actuating member.

3. A photographic camera according to Claim 2, wherein the firing lever has a

bent-over lug, which co-operates with a control cam on the actuating member for cocking the firing lever.

4. A photographic camera according to Claim 1, 2 or 3, wherein the actuating member includes a lug which co-operates with an actuating lever mounted for axial displacement and engaging on a flash cube holder, and the actuating lever and also the firing lever are arranged to be rotatable about a common shaft, the actuating lever causing the indexing of the flash cube holder during the cocking of the shutter driver and, during its return travel, resiliently yielding to the flash cube holder.

5. A photographic camera according to any one of the preceding claims, wherein the firing lever includes an inclined surface which co-operates with a percussion firing lever of the flashlamp firing mechanism, the percussion firing lever being lifted by the inclined surface, during the running down of the firing lever, to release the torsion spring of a flashlamp for percussion firing.

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

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