

## DRAWINGS ATTACHED



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(54) CAMERA WITH A FOCAL PLANE SHUTTER AND A  
 FLASHLIGHT ACTUATION MECHANISM

(71) We, ERNST LEITZ GmbH., of 633 Wetzlar, Federal Republic of Germany, a joint stock company organised under the laws of the Federal Republic of Germany, 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:—

10 The present invention relates to a camera having a focal plane shutter and a flashlight actuation mechanism.

For the synchronisation of flash apparatus an electric contact is often provided in such cameras, which contact works together with the shutter and is closed by a component directly or indirectly moved during the shutter release exactly at the moment when a first shutter blind or slider has completely exposed the image aperture. The contact is either thereby momentarily closed by the first blind, for example by means of a wiping contact, or opened again by a subsequently following second blind. In each case the synchronising contact is opened again when the shutter has run down.

With some cameras a second contact is provided, the safety contact, in series with the synchronising contact, and works together with the shutter winding means in such a way that it is opened directly upon commencement of shutter winding and closed again only upon return of the shutter winding means into their starting out position.

With these cameras such a safety contact is necessary because during shutter winding the first and second shutter blinds are moved back in common into their starting out position (the tensioned position) and during this movement close again temporarily the synchronising contact. Were the safety contact not provided, and not opened at this stage by the shutter winding means, the flash would be released upon the return move-

ment of the shutter blinds, which naturally is not desired.

The safety contact represents, however, a burdening of the camera, both because of its price and also because of the space necessitated by it and by the operating means necessitated for it.

According to the present invention, there is provided a camera comprising a focal plane shutter which comprises a first shutter member movable from a first position to a second position to uncover an image aperture and a second shutter member movable from a first position to a second position to cover the image aperture, and a flashlight actuation mechanism which comprises an electrical switch means maintained in a first electrical state when the shutter members are both in their respective first positions or both in their respective second positions, means actuable by movement of the first shutter member from its first position to its second position to bring the electrical switch means into a second electrical state and means actuable by movement of the second shutter member from its first position to its second position to return the electrical switch means to the first electrical state, the flashlight actuation mechanism being so arranged that throughout the return movement of each of the two shutter members from its respective second position to its respective first position the electrical switch means is constrained to remain in the first electrical state.

Conveniently, the shutter members comprise blinds arranged to move from respective supply rollers to respective take-up rollers in moving from their respective first positions to their respective second positions.

In a preferred embodiment, the electrical switch means comprises a pair of movable contact elements so operable by respective actuation members associated with the

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shutter members that during movement of the first shutter member from its first position to its second position the other actuation member moves said other contact element out of contact with said one contact element, and the actuation members during the return movement permit the respective contact elements to move back to their positions occupied when the shutter members were in their respective first positions without permitting the contact elements to touch one another.

Suitably, the actuation members comprise cams carried on the respective supply rollers.

15 An embodiment of the invention will now be more particularly described with reference to the accompanying drawing, in which Figs. 1a to 1d show schematically a focal plane shutter with a first shutter blind and a second shutter blind, and the blind rollers belonging thereto.

20 In the drawing a supply roller of a first shutter member, in the form of a first blind 1, is designated by reference numeral 3, on which roller in the first (tensioned) condition of the shutter the upper portions of the bands 1a of this blind are wound up. This represents the first position of the first blind. At its lower end the first blind 1 is secured on a take-up roller 4, which is acted upon by a take-up spring. The first blind 1 is wound up on the take-up roller 4 when the shutter runs down into its second (tension-released) position.

25 Similarly, a second shutter member in the form of a second blind is designated by numeral 2, which blind in its first position (when the shutter is tensioned) is wound up on a supply roller 5, while its bands 2a are made fast on a take-up roller 6. At the position at which the slot-forming edges of the two blinds overlap one another the second blind 2 is provided with a light trap 7 into which the first blind 1 fits.

30 Above the supply rollers 3 and 5 an electrical contact 8 is disposed, which represents the synchronising contact of a camera not further shown. The synchronising contact 8 consists of two contact elements in the form of tongues 8a, 8b which in their rest positions are in a first electrical state, i.e. in this case constantly open. For the operation of the contact tongues each of the supply rollers 3 and 5 is provided with a respective actuation member in the form of a cam 3a, 5a.

35 Fig. 1a shows the shutter in its tensioned condition. The first blind 1 is pulled out and thus covers over an image aperture or shutter pupil 9. The second blind 2 is wound up on the supply roller 5. The cams 3a and 5a face away from the synchronising contact 8, which is open.

40 In the situation shown in Fig. 1b the first blind has run down. At the same time the

supply roller 3 and the take-up roller 4 have rotated in the direction shown by the arrow and the image aperture 9 is freed. Upon the run-down of the supply roller 3 the cam 3a has also rotated therewith and has thus impinged on the contact tongue 8a which it presses upwardly to cause it to bear on the tongue 8b. In this phase of the shutter run-down the synchronising contact 8 is in a second electrical state, i.e. in this case closed, so that the giving of an impulse for the tripping of the flash apparatus takes place.

45 In Fig. 1c now the second blind 2 has also run down, and at the same time the supply roller 5 as well as the take-up roller 6 have rotated. With the supply roller 5 the cam 5a has also rotated, and at the end of the rotation has arrived at the position shown in the Figure, in which it raises the second contact tongue 8b. The synchronising contact 8 is thus opened again, which must be the case after the shutter has been released, on the grounds of safety.

50 In Fig. 1d the winding phase, or tensioning phase, of the shutter is shown. In this phase both the shutter blinds 1 and 2 are guided back, while tensioning the springs contained in them or respectively working together with them, into their respective first positions. At the same time also all rollers 3 to 6 rotate in the directions indicated in Fig. 1 by arrows, and with the rollers 3 and 5 also the cams 3a and 5a rotate back into their initial positions. It is important that the two cams are spaced by equal distances from the respectively associated contact tongues 8a and 8b at any given instant, so that both turn by equal amounts and without touching one another back again into their initial positions.

55 In contrast to known synchronising contacts, the synchronising contact 8 remains open throughout the return movement of each of the two shutter members taking place during the shutter winding operation, so that a second contact, that is to say a safety contact, which is provided, as described above, in known cameras and opened during shutter winding is not necessary.

60 The illustrated shutter is a roller-blind focal plane shutter with vertically running blinds, but alternative arrangements may be roller-blind focal plane shutters with blinds running horizontally, i.e. in the film transport direction or sliding-plate focal plane shutters. In each case, however, the preferred arrangement is one in which both of the actuation members operating the contact tongues are spaced at any instant by equal amounts from the respective contact tongues during the shutter winding operation, so that the contact tongues move back into their initial positions at equal rates, i.e.

maintaining their spacing from one another.

The synchronising contact 8 gives, in the cycle of shutter releasing, shutter run-down, and shutter re-tensioning, one impulse on only one occasion, that is to say when only the first blind has run down. The contact remains open also during the return movement of the blinds. Thereby, it is avoided that at another position in the camera an additional contact must be opened in the synchronisation current circuit to render in-operative any making of contact during shutter winding.

15 WHAT WE CLAIM IS:—

1. A camera comprising a focal plane shutter which comprises a first shutter member movable from a first position to a second position to uncover an image aperture and a second shutter member movable from a first position to a second position to cover the image aperture, and a flashlight actuation mechanism which comprises an electrical switch means maintained in a first electrical state when the shutter members are both in their respective first positions or both in their respective second positions, means actuatable by movement of the first shutter member from its first position to its second position to bring the electrical switch means into a second electrical state and means actuatable by movement of the second shutter member from its first position to its second position to return the electrical switch means to the first electrical state, the flashlight actuation mechanism being so arranged that throughout the return movement of each of the two shutter members from its respective second position to its respective first position the electrical switch means is constrained to remain in the first electrical state.

2. A camera as claimed in claim 1, wherein the shutter members comprise blinds arranged to move from respective supply rollers to respective take-up rollers in moving from their respective first positions to their respective second positions.

3. A camera as claimed in either claim 1 or claim 2, wherein the electrical switch means comprises a pair of movable contact elements so operable by respective actuation members associated with the shutter members that during movement of the first shutter member from its first position to its second position one of the actuation members moves one of the contact elements into contact with the other, during movement of the second shutter member from its first position to its second position the other actuation member moves said other contact element out of contact with said one contact element, and the actuation members during the return movement permit the respective contact elements to move back to their positions occupied when the shutter members were in their respective first positions without permitting the contact elements to touch one another.

4. A camera as claimed in claim 3, when appendant to claim 2, wherein the actuation members comprise cams carried on the respective supply rollers.

5. A camera substantially as hereinbefore described with reference to the accompanying drawing.

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