United States Patent [19]

Schill

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[45] **Jan. 30, 1973**

[54] **PHOTOGRAPHIC SHUTTER WITH RECIPROCATING SHUTTER BLADE DRIVING MEMBER AND ELECTRONIC TIMING DEVICE**

[75] Inventor: **Hermann Schill,** Schwarzw, Germany

[73] Assignee: **Prontor-Werk Alfred Gauthier G.m.b.H.,** Calmbach/Schwarzwald, Germany

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[21] Appl. No.: **125,846**

Related U.S. Application Data

[63] Continuation of Ser. No. 771,502, Oct. 29, 1968, abandoned.

[52] **U.S. Cl.** ..... **95/53 EB,** 95/63

[51] **Int. Cl.** **G03b 9/62**

[58] **Field of Search** ..... 95/53 EB, 62, 63

[56] **References Cited**

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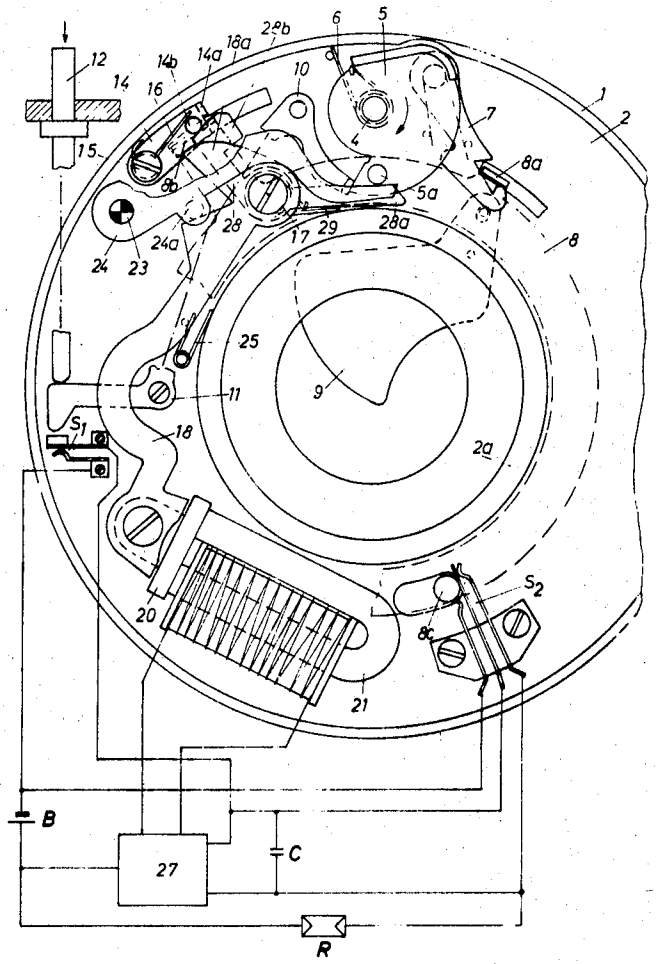
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Primary Examiner—Samuel S. Matthews
Assistant Examiner—Michael L. Gellner
Attorney—March, Gillette & Wyatt

[57] **ABSTRACT**

A photographic shutter having a driving member which when moved from a normal position moves the shutter blades by means of a reciprocating actuating member first into an open and then into a closed position. An electronic timing device controls an armature lever which is subject to the action of a return spring. The armature lever cooperates with a lever blocking the actuating member in the open position of the blades for the duration of the timing action. An additional disengaging member is provided which, when the driving member is returned to its normal position, disengages the catch lever.

2 Claims, 5 Drawing Figures

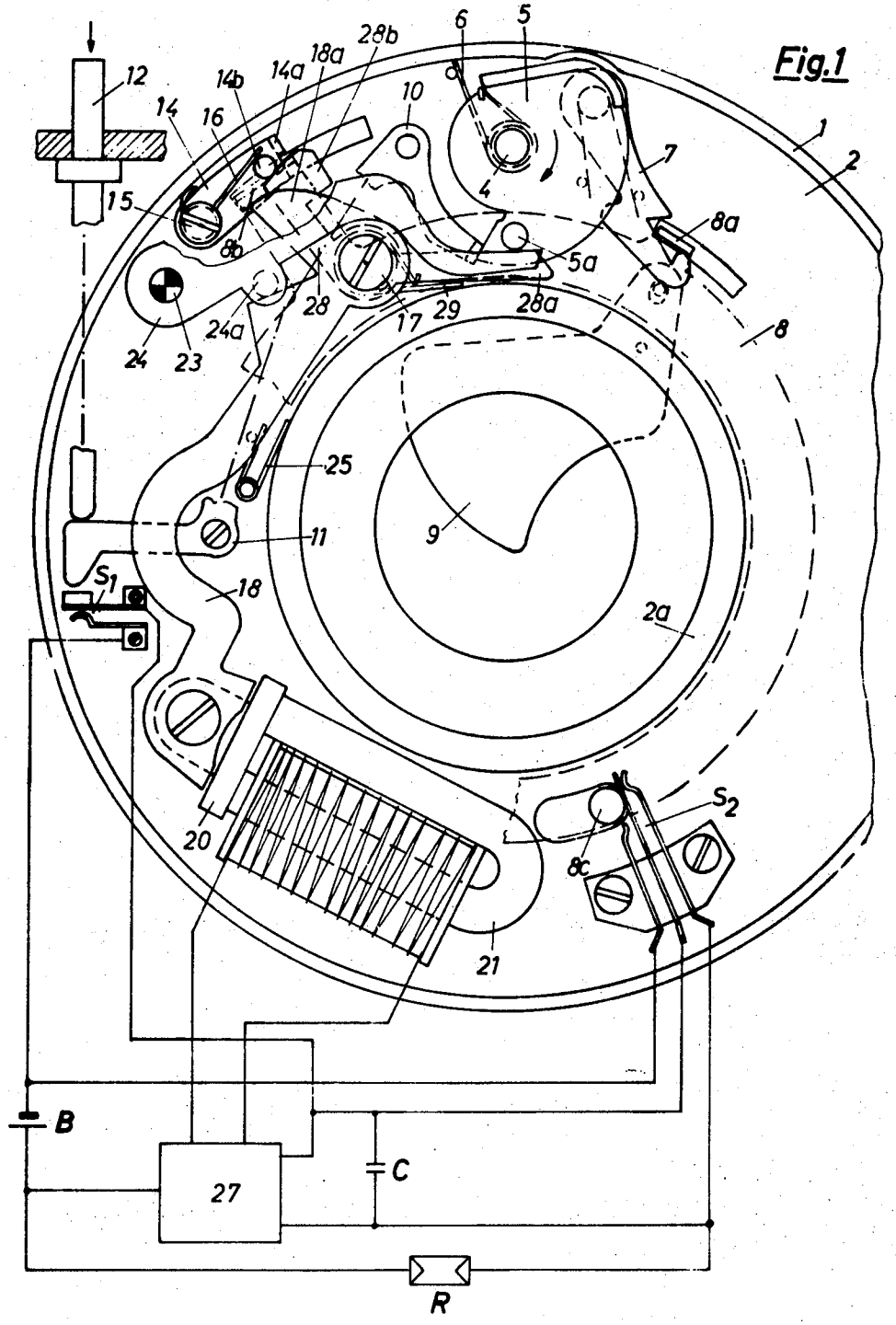


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SHEET 1 OF 2

Fig.1



INVENTOR
Hermann Schill
BY
March, Gillette & Wyatt
ATTORNEYS

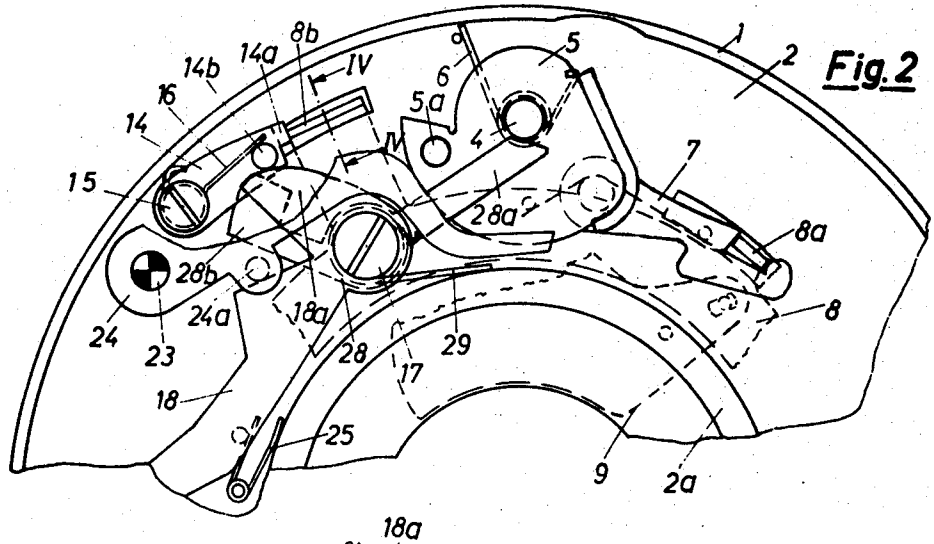


Fig.2

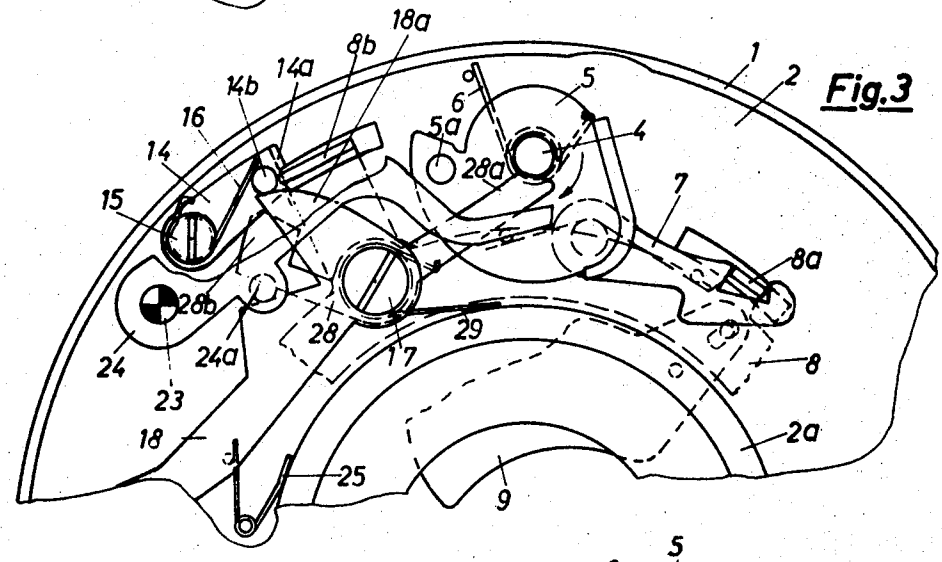


Fig.3

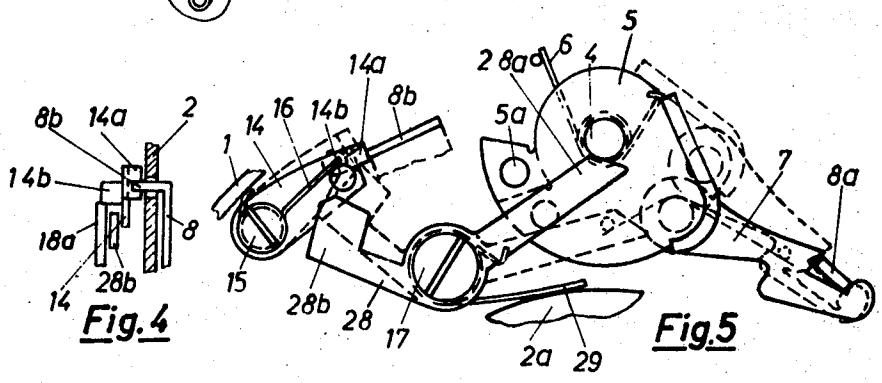


Fig.5

Fig.4

INVENTOR
Hermann Schill
BY
March, Gillette & Wyatt
ATTORNEYS

PHOTOGRAPHIC SHUTTER WITH RECIPROCATING SHUTTER BLADE DRIVING MEMBER AND ELECTRONIC TIMING DEVICE

This is a streamline continuation of application Ser. No. 771,502, filed Oct. 29, 1968, now abandoned.

The invention concerns a photographic shutter the driving member of which moves the shutter blades from a closed position, by means of a reciprocating actuating member, into an open position and then closes them again, an electronic timing device being provided which controls an armature lever subject to the action of a return spring; this armature lever co-operates with a stop lever locking the actuating lever in the open position of the blades for the duration of the shutter timing action.

When taking photographs with ambient, light actuated timing, it may happen that when this light is poor, extremely long exposure times are necessary. Thus it may occur that the photographer, being of the opinion that an exposure has been completed, attempts to recock the shutter: Since the shutter actuating ring is locked in the open position of the blades for the duration of the timing, the driving mechanism cannot be returned into the cocked position because of the engagement of the blade ring with its driving member. If the photographer, in ignorance of this condition exerts force, then it is inevitable that parts of the blocking gear train will be damaged or broken.

The object of the invention is to eliminate these deficiencies in shutters of the kind referred to above by providing an additional disengaging member which when transferring the driving member into its normal position, acts on the stop lever. In this way the stop lever is pushed out of the stop position during the cocking process, should this not already have occurred at the end of the exposure timing. Therefore the shutter can be cocked again independently of the action of the electronic timing device without additional manipulation.

Preferably the disengaging member is made as a two-armed lever mounted coaxially with the armature lever.

The invention is described below with reference to the accompanying drawings, in which:

FIG. 1 shows an electronic shutter fitted with an additional disengaging lever in the cocked position, the release mechanism being indicated only by chain-dotted lines except for the release button on the camera side,

FIG. 2 is a fragmentary view of the shutter shown in FIG. 1, the blade driving mechanism of which is locked in the open position of the blades by the stop lever,

FIG. 3 is a partial view of the blade driving mechanism in its movement phase shortly after disengagement,

FIG. 4 is a part section taken on the line IV—IV of FIG. 2,

FIG. 5 shows the toggle drive, the additional disengaging lever and the stop lever in positions corresponding to the open position of the blades, the dotted lines indicate the positions of these parts the cocking procedure, just after the stop lever has been disengaged.

In a housing 1 of a photographic shutter there is a base plate 2 provided with a pipe socket 2*a*, serving to mount the shutter drive mechanism. The latter consists of a driving disc 5 fixed to a shaft 4, a driving spring 6

acting thereon, and a driving pawl 7, the free end of which so co-operates with the actuating part 8 of the blades 9 provided with lugs 8*a*, that during the action of the driving disc of the blade ring, which always start from a normal position, the blade ring and blades execute a reciprocating movement. To lock the driving disc 5 in the cocked position in FIG. 1, a two-armed stop lever 10 is used, one lever arm of which is engaged by a further two-armed release lever 11, also only indicated in this figure. This lever is actuated by means of a camera release 12 only partly shown, and by further intermediate member which is only shown by a chain-dotted line.

To retain the blades 9 in the open position for the period of an exposure time determined by an electronic switching device described below, the blade ring 8 has a further lug 8*b* projecting through a slot in the base plate 2, in front of which, in the open position of the blades 9, (FIGS. 2 and 4) there is a lug 14*a* on a spring-loaded stop catch 14. This catch is mounted on a spindle 15 and supports a pin 14*b* with which a spring 16 engages and urges the catch into a stop position. An armature lever 18 mounted on a pin 17 is provided for moving the stop catch 14 out of the stop position at the end of shutter timing, with a lifting arm 18*a* co-operating with the pin 14*b* of the stop catch. On the free end of the lever 18 there is an armature 20 which co-operates with an electromagnet 21 connected in the circuit of an electronic timing device. During the cocking procedure the armature lever 18 is pressed against the electromagnet 21. For this purpose there is a lever 24 mounted on a pin 23 which when the driving disc 5 is transferred into a cocking position, is rotated clockwise by a pin 5*a* of this disc and causes the free end of the armature lever to be brought against the electromagnet 21 under the action of the spring 25 by means of a pin 24*a*.

The electronic timing device is a known transistorized relaxation circuit and therefore is not shown in detail. This circuit includes an electronic switch 27 which employs a RC circuit comprising a photoelectric resistor R and capacitor C, and actuates the electromagnet 21. A contact switch S_1 is used to connect the electronic time control circuit to a battery B this switch closing when the release 12 is actuated. A further change-over switch S_2 is provided to short-circuit the capacitor C in the contact position corresponding to the closing position of the shutter. At the beginning of the opening movement, it enables the capacitor to charge and simultaneously establishes a parallel path to the switch S_1. A pin 8*c* which in the basic position of the blade ring retains the change-over switch in the contact position shown, is mounted on the blade ring 8 for actuating the change-over switch S_2. When the blade ring 8 moves the contact tongue of the change-over switch S_2 follows the pin and changes over into the opposite contact position, not shown.

As already indicated, the stop catch 14 is not moved out of its stop position by the armature lever 18 until the end of the timing operation. When taking a photograph with a relatively long exposure time the photographer may attempt to recock the shutter although the action of the electronic timing device has not yet finished. This is not possible since the stop pawl 14 is still in the stop position, and note that during a cocking

movement from the shutter open position shown in FIG. 2, the driving disc 5 must drive the blade ring 8 in an anti-clockwise direction. This rotary movement of the blade ring 8 is however prevented since stop lever 14 is still in the stop position, so that if force is exerted on the cocking lever, the mechanism may be damaged. Thus, to avoid such breakage or distortion in the mechanical gear train, the stop lever 14 has a further two-armed disengaging lever 28 associated therewith besides the armature lever 18, which co-operates with the driving disc 5; premature cocking moves the stop catch out of the stop position. The disengaging lever 28 is mounted coaxially with the armature lever 18 biased by a spring 29, and its arm 28*a* abuts against the pin 5*a* of the driving disc 5.

To take a photograph the release lever 12 is depressed; this closes the switch S_1 and simultaneously the driving disc 5 is released by pivoting of the stop lever 10 in a clockwise direction. This action occurs subject to the unfluence of the spring 6, the blade ring 8 being moved into the open position as shown in FIG. 2, in which the lug 14*a* of stop lever 14 engages with the lug 8*b* of the blade ring, so that the driving mechanism is blocked.

Closure of the switch S_1 connects the electromagnet 21 and the electronic time control circuit to battery B. The electromagnet 21 therefore retains the armature lever 18 after the start of the driving disc 5, in the position shown in FIG. 1. The action of the driving disc changes over the disengaging lever 28, biased by the spring 29, to the position shown in FIG. 2, in which the arm 28*b* of the disengaging lever is located outside the movement path of the pin 14*b* so that in the open position of the shutter the pawl 14 can drop in front of the lug 8*b* of the blade ring 8.

When the blade ring 8 moves switch S_2 changes over into its other contact position, beginning the timing of the electronic control circuit. At the end of the timing action the electromagnet 21 is de-energized and spring 25 now swings the armature lever 18 in a clockwise direction. Thus catch lever 14 is moved out of the stop position by the lifting arm 18*a* of the armature lever 18, so that the shutter can close again (FIG. 3).

If it does occur that the photographer, in ignorance of the fact that the exposure timing action has not yet been completed and consequently the blade ring is still blocked, attempts to recock the shutter, the catch lever 14 is pushed out of the stop position by the additional disengaging lever 28. In FIG. 5, the parts shown in full lines are in positions corresponding to the open position of the shutter. Thus, when the cocking lever, not shown, is actuated, the driving disc 5 is rotated in an anti-clockwise direction during the reversal phase of the toggle drive 5, 7. The pin 5*a* strikes against the arm 28*a*, rotating the disengaging lever 28 clockwise. The arm 28*a* slides beneath the pin 14*b* causing the stop catch 14 to be swung out. Finally, when the driving disc 5 has reached the position shown in broken lines in FIG. 5, the catch lever 14 on the lug 8*b* of the blade ring 8 has been completely disengaged, so that during the final part of the cocking movement the blade ring can return unhindered into its normal or blade closed position.

I claim

1. A photographic shutter having blade members forming a part thereof comprising a driving member to move the shutter blades from a normal position into an open position following a selected open-time period, an armature lever and a return spring to position the lever, a second lever for blocking the actuating means in the open position of the shutter blades, electronic means to control the movement and timing of the armature lever to release said second lever, means for holding the shutter in its open position for the duration of a selected and controllable time action, and a supplementary disengaging member to disengage the blocking lever upon return of the driving member to its normal position.

2. A shutter according to claim 1, wherein the disengaging member is formed as a two-armed lever mounted coaxially with the armature lever.

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