

PATENT SPECIFICATION

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COMPLETE SPECIFICATION.

Improvements in or relating to Shutters for Photographic Cameras.

- We, JOHAN STEENBERGEN, a Dutch subject, OTTO DIEBEL, a German citizen, HUGO FRAUENSTEIN, a German citizen, EMIL ENGLISCH, a German citizen, 5 HERMANN SCHUBERT, a German citizen and CONRAD KOCH, a German citizen, trading as IHAGEE KAMERAWERK STEENBERGEN & COMPANY, of 24, Schandauer Strasse, Dresden, A. 19, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—
- 15 The present invention relates to shutters for photographic cameras and more particularly to a combined delay action and exposure-timing mechanism for slit shutters.
- 20 Exposure-timing devices for obtaining different times of exposure associated with slit shutters are already known and it is further known to release these devices automatically by means of so-called delay action devices arranged in or on the mechanism. In the majority of the known constructions, the said exposure-timing devices and delay action devices operate separately and each of them has to be separately wound up. It has, however, also already been proposed to provide a release mechanism for camera shutters comprising two cam discs controlled by a single spring and adjustable with regard to one another.
- 35 The invention consists in a combined delay action and exposure-timing mechanism for slit shutters for photographic cameras, wherein the delay action is determined by two cam discs controlled by a single clockwork retarding mechanism, and the cams of the discs co-operate with two levers serving respectively for locking and releasing pinions controlling the release of the two spring tensioned plates or screens of the slit shutter, a further lever being provided which is adapted to lock the shutter opening pinion and which is releasable by known means, such as a press button, the operation of which also starts the clockwork retarding mechanism. One of the first-named levers may be turned into an inoperative position by a throw-out device whereby the mechanism may be caused to operate only as an exposure-timing mechanism. 55
- When the mechanism is employed as a combined delay action and exposure-timing mechanism, i.e. as an exposure-timing mechanism in which delay action is provided, it is, after it has been set for the time of exposure, for example two seconds, wound up. By way of example it will be assumed that the mechanism is adapted to run down in about thirty seconds. When the shutter mechanism is now released it will first run for twenty-eight seconds to cause the delay action and will then release the shutter so as to give the exposure of two seconds for which the mechanism has been set. 60
- A preferred constructional form of the combined delay action and exposure-timing mechanism according to the invention is illustrated by way of example in the accompanying drawings, in which: 65
- Fig. 1 is a side view of the apparatus, Fig. 2 is a plan of the mechanism in the wound up or tensioned condition when operating as a combined delay action and exposure-timing mechanism, 70
- Fig. 3 is a plan of the mechanism corresponding to Fig. 2 with the parts in the positions which they occupy shortly before the closing of the slit shutter, 75
- Fig. 4 is a plan of the mechanism in the tensioned or wound up condition when operating solely as an exposure-timing mechanism, and 80
- Fig. 5 is a section of the winding knob showing the means for adjusting the time of exposure. 85
- Referring to the drawings: The reference numerals 1, 2 denote two cam discs rotatably mounted one above the other on the frame of the mechanism and adapted during their rotation to act in turn one on each of two double-armed levers 5 and 11 fulcrumed at 7 and 14 respectively. The lever 5 is controlled by a tension spring 8 carried by a pin 10 mounted on the frame and acts at its end 9 on the one end of a double-armed lever 19 fulcrumed at 20. The lower end 21 of the said lever 19 is adapted to engage with a shutter opening pinion 38, and the 90 95 100 105

lower end 15 of the lever 11 is adapted to engage with a shutter closing pinion 39. The said pinions 38 and 39 which turn together with one another during the operation of the mechanism and are adapted to be adjusted relatively to one another are associated in the usual manner with the rollers 36 and 37 of a slit shutter. The cam discs 1 and 2 are adapted to be rotated by means of a clockwork retarding mechanism comprising pinions 23 and governed by an escapement controlled by a single anchor member 24. The said anchor member 24 is adapted to be locked in position or set free by the action of one arm 25 of a three-armed lever fulcrumed at 27 and controlled by a spring 28. One arm 26 of the said three-armed lever is adapted to engage with the shutter opening pinion 38. The said three-armed lever is adapted to be displaced by means of a press button 34 so as to set free the anchor member 24 and, when the lever is so displaced, a pin 32 provided on it, engages with the hook-shaped end 31 of a three-armed lever 29 fulcrumed at 30 and controlled by a spring 33. At the same time the lever arm 26 is disengaged from the shutter opening pinion 38.

The arrangement and function of those parts of the mechanism which have not yet been referred to will be hereinafter made clear by describing the mode of operation of the said mechanism.

The mode of operation of the combined delay action and exposure-timing mechanism as applied to a slit shutter when both delay action and exposure-timing are required (see Fig. 2) is as follows: Before the mechanism, which is initially in the unwound condition, can operate as a delay action and exposure-timing device it must be wound up by clockwise rotation of a winding knob 40 adapted to rotate the cam discs 1 and 2 as hereinafter described, whereby when the mechanism is wound up the levers and the cam discs 1 and 2 are brought into the position shown in Fig. 2. During the operation of winding up the mechanism the spring-controlled cam discs 1 and 2 which are located one above the other and are normally mechanically connected with one another in desired relative positions by means of a pin 42 provided on the knob 40, are turned by means of the said winding knob 40 in a clockwise direction. As a result of this turning movement the cam 3 of the upper cam disc 1 presses the spring-controlled lever 5 fulcrumed at 7 upwards. The lever 5 is provided on its underside with an inclined surface, and in consequence of this it slides past the pin 6 and comes to rest behind this latter,

whilst the cam 3 is turned onwards until the cam 4 of the lower cam disc 2 reaches an end stop 12 fixed to the frame, the mechanism being then fully wound up. When the one end of the lever 5 is pressed upwards in this way as aforesaid the other end 9 of the said lever 5 moves downwards and in consequence of this the spring-controlled lever 19 fulcrumed at 20 is enabled to move into the vertical position. During this movement the end 21 of lever 19 engages with the shutter opening pinion 38 of the slit shutter so as to lock the latter. After the cam 4 of the lower cam disc 2 has passed the upper arm of the spring-controlled lever 11 fulcrumed at 14 during the winding up of the mechanism, the said lever comes to rest upon the periphery of the cam disc 2. As a result of this movement the end 15 of the said lever 11 comes into engagement with the shutter closing pinion 39 of the slit shutter. It is to be understood that the said shutter is wound up separately in the ordinary way.

The release of the devices which have now been wound up or tensioned can be effected by known means (for example, as shown in the drawing by a press button, or in the case of reflex cameras by upwardly moving mirrors or the like), the retarding action being effected by means of the aforesaid clockwork retarding mechanism, the pinions 23 of which, during the running down of the mechanism, are in operative engagement with the said cam discs.

The variation of the periods of delay action and exposure are obtained by adjustment of the relative positions of the cam discs with regard to one another by means of the pin 42 on the knob 40 as hereinafter described. The nearer together the cams are set the shorter is the exposure time and the longer is the delay action period.

The release of the combined delay action and exposure-timing mechanism is effected by operating the press button 34, whereby the pin 32 of the lever 25 is brought into engagement with the hook-shaped end 31 of the lever 29 and is maintained in this position. At the same time the anchor member 24 is set free so that it can swing freely, and the locking member 26 engaging with the wheel 38 is disengaged therefrom as a result of which the clockwork retarding mechanism controlled by the anchor member 24 commences to run down, whereby the cam discs are turned in a counter-clockwise direction. As soon as the cam 3 engages with the lever 5 the latter is moved away from its support 6 and as a result of the action of the spring 10 acts upon the lever

19 through the medium of its end 9 and presses it sharply on one side so that the end 21 of the lever 19 is disengaged from the shutter opening pinion 38. The said pinion 38 therefore now runs down together with the first roller 36 whereby the slit shutter is opened. By the opening of the slit shutter the delay action period is terminated and inasmuch as the clockwork retarding mechanism continues to run in the previous direction of rotation the exposure period for which the mechanism has been set commences.

The cam 4 turns onwards until it has reached the lever 11 and presses the upper arm of the latter away from the cam disc 2. The lower end 15 of the lever 11 which served as a locking member for the shutter closing pinion 39 (Fig. 3) now releases the said pinion so that the latter runs down together with the second roller 37 appertaining to it, whereby the slit shutter is closed.

The mode of operation of the mechanism when employed only as an exposure timing mechanism having adjustable exposure times but without delay action (see Fig. 4) is as follows: In order to render it possible to employ the mechanism solely as an exposure-timing mechanism up to about thirty seconds, a throw-out lever 16 fulcrumed at 14 and having cams 13 and 17 is provided. The said lever 16 is, in order to change the setting of the mechanism from that for combined delay action and exposure-timing to that for exposure-timing alone, turned by hand by any suitable known manipulating means in a counter-clockwise direction so that its upper end moves towards the left as shown on the drawing.

By this movement of the lever 16 the cam 17 provided thereon comes into engagement with the recess 18 of the lever 19 and the latter is moved in such manner as to bring its end 21 out of its locking engagement with the shutter opening pinion 38 and to prevent for the time being any further such locking engagement. As a further result of the aforesaid movement of the lever 16, a cam 13 provided thereon comes into a position in which it bears against the stop 12. The cam 13 now forms a stop and the mechanism can only be wound up until such time as the cam 3 strikes against the said cam 13, i.e. can only be wound up to the extent necessary for the exposure timing. The position of the cam disc 1 which carries the cam 3 being adjustable, the time of exposure can of course be adjusted as desired.

After the aforesaid adjustments the exposure-timing device and slit shutter are wound up in the manner previously

described and the press button 34 is operated. The pin 32 of the lever 25 is thereby brought into engagement with the hook-shaped end 31 of the lever 29 and is maintained in that position. As a result of this the anchor member 24 which was previously locked is set free and the lever arm 26 is disengaged from the shutter opening pinion 38 so that the said pinion runs down together with the roller 36 appertaining to it and the slit shutter is opened. With the opening of the slit shutter the period of exposure for which the apparatus has been set commences. As soon as the cam 4 has reached the lever 11 the latter is pressed away from the cam disc 2 and the lower end 15 of the said lever serving as a locking member for the shutter closing pinion 39 is set free (Fig. 3). As a result of this the release wheel 39 together with the second roller 37 appertaining to it runs down and the slit shutter is thus closed.

The adjustment of the mechanism for the desired time of exposure is effected in the following way:

The winding knob 40 (Fig. 5) is pulled upwards against the action of the spring 41 arranged in the interior of the knob, whereby the pin 42 is lifted out of one of the holes 43 of the cam discs. The cam disc 1 is then displaced with regard to the second cam disc 2 by turning the knob to the extent which is necessary to give the desired time of exposure. When the knob is then released the pin moves owing to the action of the spring into one of the openings 43 and the cams are thus coupled and retained in their position with regard to one another. The said cams 3, 4 then operate in the above-described manner, after the release of the locking member 26, to close the shutter, the time of exposure corresponding to the distance of the cams from one another.

Associated with the pinion 39 is a cam 35, which at the termination of the operation of the mechanism strikes against one arm of the lever 29 and causes the latter to release the pin 32, whereby the lever 26 is brought back into the initial position by the action of the spring 28.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A combined delay action and exposure-timing mechanism for slit shutters for photographic cameras, comprising two levers (such as 19, 11) adapted respectively to lock the shutter opening and shutter closing pinions, a pair of cam discs relatively adjustable and controlled by a single clockwork retarding mech-

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- anism, the cam discs acting in turn one on each of the said levers, and a further lever adapted to lock the shutter opening pinion and releasable by known means, 5 such as a pressure button, the operation of which also starts the clockwork retarding mechanism.
2. A combined delay action and exposure-timing mechanism for slit shutters 10 for photographic cameras, according to claim 1, characterised in that the change-over of the setting of the mechanism so as to operate for exposure-timing only is effected by the displacement of a throw- 15 out lever (16) in such manner as to throw out the delay action by moving one of said first-named levers into an inoperative position and retaining it in such position.
3. A combined delay action and exposure-timing mechanism for slit shutters 20 for photographic cameras, according to claim 2, characterised in that the lever (16) is provided with a projecting cam (13) which, when the mechanism is being set for operation for exposure-timing only, comes into position to act as an end stop for a cam (3) provided on one of said cam discs, viz. the cam disc (1) by means of which the time of exposure is adjusted. 25
4. The combined delay action and exposure-timing mechanism for slit shutters 30 for photographic cameras, substantially as described with reference to the accompanying drawings.

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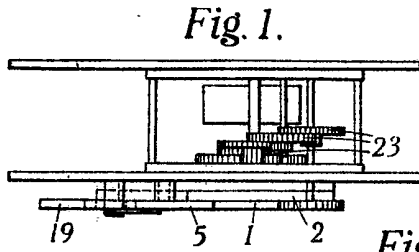


Fig. 1.

Fig. 2.

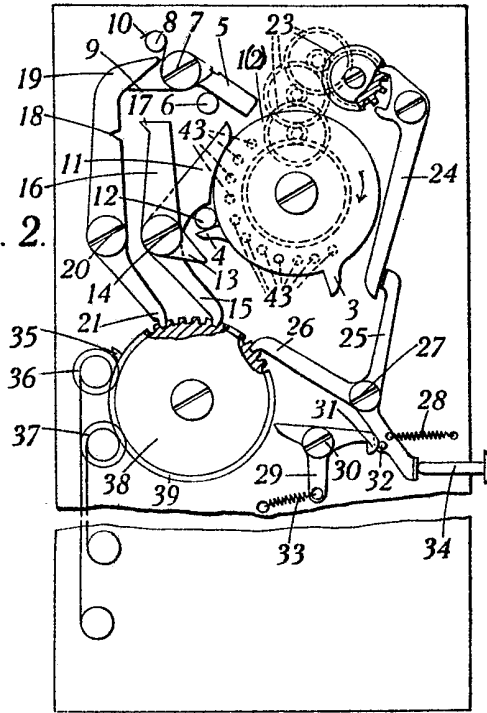


Fig. 5.

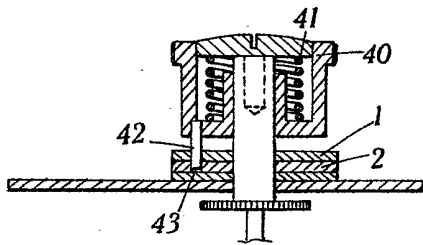


Fig. 3.

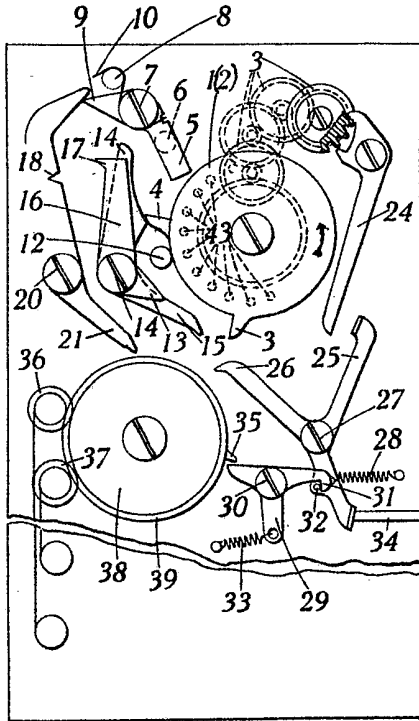
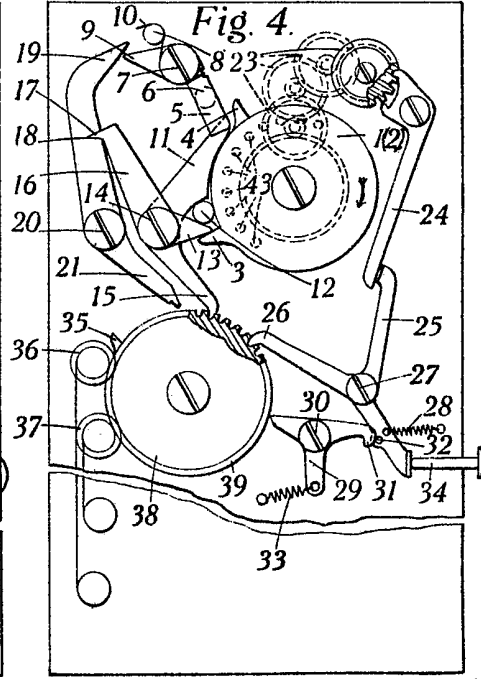


Fig. 4.



[This Drawing is a reproduction of the Original on a reduced scale.]