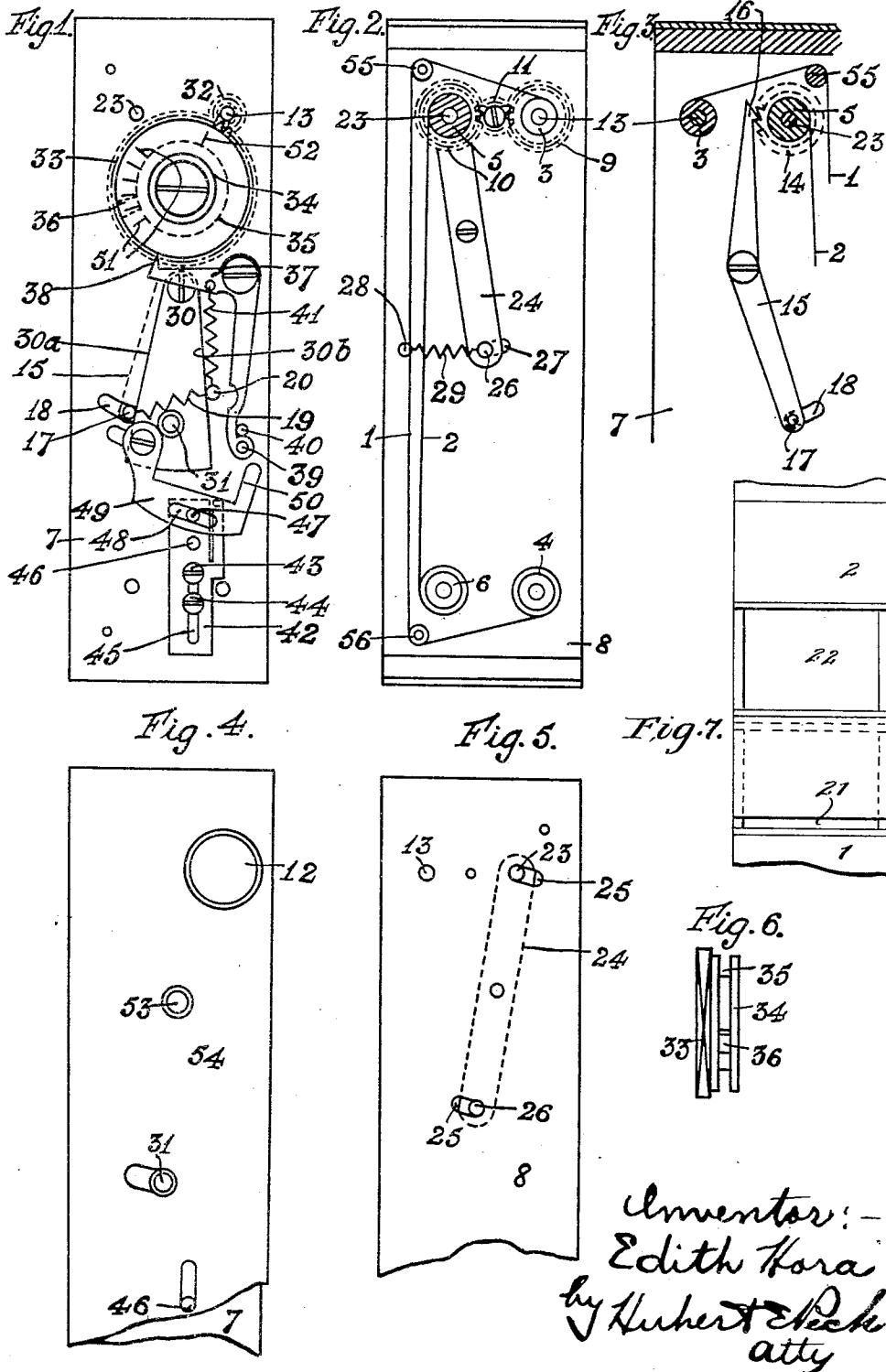


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 FOCAL PLANE SHUTTER AND ROLLER BLIND SHUTTER.  
 APPLICATION FILED OCT. 7, 1915.

1,204,154.

Patented Nov. 7, 1916.



# UNITED STATES PATENT OFFICE.

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## FOCAL-PLANE SHUTTER AND ROLLER-BLIND SHUTTER.

1,204,154.

Specification of Letters Patent.

Patented Nov. 7, 1916.

Application filed October 7, 1915. Serial No. 54,647.

*To all whom it may concern:*

Be it known that I, EDITH HORA, a subject of the King of Great Britain and Ireland, residing at Wandsworth, England, have invented new and useful Improvements in Focal-Plane Shutters and Roller-Blind Shutters, of which the following is a specification.

This invention has relation to focal plane shutters and to shutters of the ordinary before or behind lens pattern known as roller blind shutters and has for object to provide improvements therein or thereto by means of which the construction and operation shall be simplified and other advantages obtained.

The invention has reference to focal plane shutters or to ordinary before or behind lens pattern shutters known as roller blind shutters of the kind or type in which variation in duration of exposure is obtained by alteration in the width of the slit in the blind.

The invention further has reference to focal plane shutters or to ordinary before or behind lens shutters known as roller blind shutters of the kind or type in which the blind is of compound or bipartite construction, one part being movable in relation to the other, which is maintained stationary, for the formation of the slit or alteration in the width thereof, and each part being provided with a separate setting or winding roller, which rollers are geared and rotate together when setting the shutter, but are disconnected and capable of relative rotation for forming the slit or altering the width thereof.

In focal plane shutters or ordinary before or behind lens pattern shutters known as roller blind shutters of the kinds or types herein referred to and in accordance with this invention, the formation or adjustment of the slit is effected by moving one of the winding rollers, or one end of one of the winding rollers, away from, and thus out of gear with, the other, holding said secondly mentioned roller stationary and locked against unwinding, and rotating the first mentioned winding roller relatively thereto and winding an additional portion of one part of the blind thereon. Further in focal plane shutters or ordinary before or behind lens pattern shutters known as roller blind shutters of the kinds or types herein referred to, time exposure is obtained by bringing the openings in the two parts of

the blind into coincidence and arresting the motion of the blind when the opening is opposite the plate, said stoppage of movement being effected, in accordance with this invention, by the engagement of a stop on a wheel geared in mesh with the blind winding means by a catch or pawl normally free of, but adapted to be temporarily connected with and operated by the shutter release mechanism.

Referring now to the accompanying drawings, which are more or less diagrammatic, Figure 1 is an elevation of the winding knob side of a focal plane shutter in accordance with this invention, the cover plate being removed. Figs. 2 and 3 are sectional views of the shutter, the views being taken on opposite sides of the plane of section. Figs. 4 and 5 are elevational views of the opposite sides of the shutter. Fig. 6 is a view of the detail. Fig. 7 is a developed view of a portion of the blind.

Each part of the blind of bipartite construction is mounted, as is usual, on a pair of rollers. The part 1 of the blind is mounted on rollers 3, 4 and the part 2 on rollers 5, 6. These rollers are mounted on spindles having bearings in the sides 7, 8 of the shutter framing. One of the rollers of each pair, viz., 4 and 6 respectively, is under the influence of a spring which may be contained within a recess in the body of the roller in well understood manner. The other roller viz. 3 and 5 respectively, of each pair of rollers is the setting, or winding roller, is fixedly secured to its spindle and is of ordinary construction. The pairs of rollers are arranged in well known manner, that is to say, the spring rollers 4 and 6 are situated in the same plane, the other or winding rollers 3 and 5 being also in one plane; further the winding roller of each pair of rollers is or may be arranged diagonally opposite its spring roller. The winding rollers 3 and 5 are each provided with a toothed wheel 9, 10 respectively at the end adjacent the side 8 of the shutter framing.

11 is a pinion mounted on the side 8 of the shutter framing so as to mesh with the toothed wheels 9, 10. The rollers 3, 5 are thus geared together so that they rotate in the same direction. Rotation is imparted thereto by means of a knob 12 (Fig. 4) exterior of the shutter framing and mounted on one end of the spindle 13 upon which is mounted the winding roller 3. When the

knob is rotated, the winding rollers are also driven and the parts 1, 2 of the blind are wound on to the winding rollers 3, 5 off the spring rollers 4, 6 in opposition to the  
 5 springs. The winding rollers are also provided with locking means by which they and the blind can be held against the action of the springs. In the arrangement illustrated, a ratchet wheel 14 is secured to, or formed  
 10 on, the end of the winding roller 5 adjacent the side 7 of the shutter framing.

15 15 is a lever pivotally mounted on the inner face of the side 7 of the shutter framing and formed at one end with a nose 16 to engage the teeth of the ratchet wheel 14. 17 is a pin secured to the other end of the lever 15 and arranged to project through a slot 18 in the side 7 of the shutter framing.

19 is a spring connected at one end to the  
 20 pin 17 and at the other end to a pin 20 carried on the outer face of the side 7 of the shutter framing. The spring 19 acts to retain the nose 16 in engagement with the teeth of the ratchet wheel 14 and thus  
 25 the blind is locked against the action of the spring rollers 4 and 6.

The two parts 1, 2 of the blind are each provided with an opening 21, 22 respectively, and the arrangement is such that  
 30 the opening 22 in the part 2 is normally obscured or covered by the other part 1. As a consequence of this, the lens is capped when the blind is moved in relation thereto when setting the shutter. The slit is formed  
 35 by movement of one part of the blind in relation to the other so as to bring the openings more or less in coincidence. This movement is effected most easily by throwing the two winding rollers 3 and 5 out of  
 40 gear. The winding rollers are so mounted in the shutter framing that one roller, or one end of one of the rollers, can be moved away, from, and thus out of gear with, the other, which is held stationary, when the  
 45 shutter is set, by the locking means. In the arrangement illustrated, the one end of the spindle 23, on which the winding roller 5 is mounted, is mounted in a hole in one end of a lever 24 pivoted on the inner face  
 50 of the side 8 of the shutter framing.

25 (Fig. 5) is a slot in the side 8 of the shutter framing. The end of the spindle 23 mounted in the lever 24 passes into this slot. 26 is a pin at the opposite end of  
 55 the lever 24 and projecting through a slot 27 in the side 8 of the shutter framing.

28 is a pin secured to the inner face of the side 8 of the shutter framing and 29 is a spring connected to the pins 26 and 28.

60 The arrangement is such that the parts occupy the positions shown under normal circumstances. When it is desired to adjust the slit, pressure is applied to the pin 26 and the lever 24 is moved on its pivot  
 65 against the action of the spring 29. This

movement of the lever 24 causes the one end of the spindle 23, and therefore also the winding roller 5 to move away from the winding roller 3. The toothed wheel 10 is  
 70 thus moved out of mesh with the pinion 11 and the winding roller 3 can be further rotated by means of the knob 12 without any movement being imparted to the winding roller 5 which is held locked by engagement of the nose 16 with the ratchet wheel  
 75 14. It will be seen that the knob 12 acts in a dual capacity and is used to wind up the blind and also to regulate the slit and therefore the duration of the exposure.

30 is a lever pivoted to the outer face of  
 80 the side 7 of the shutter framing.

31 is a pin projecting outwardly from the lever 30. The pin 31 functions as the shutter release pin.

The pin 17 of the lever 15 is, by means  
 85 of the spring 19, held up against the edge 30<sup>a</sup> of the lever 30. Normally the edge 30<sup>b</sup> of the lever 30 abuts against the pin 20 on the side 7 of the shutter framing. The exposure is made by pressing the shutter  
 90 release pin 31 so that the edge 30<sup>b</sup> of the lever 30 moves away from the pin 20. The motion of the lever 30 is communicated, by means of pin 17, to the lever 15, which  
 95 latter lever moves and the nose 16 comes out of engagement with the ratchet wheel 14. The winding rollers 3, 5 are thus unlocked and the springs of the rollers 4, 6 wind the parts of the blind off the winding  
 100 rollers onto the spring rollers. The slit in the blind thus moves across the plate and exposes it to light action. When the exposure has been made, it is necessary to return the parts of the blind so that the  
 105 openings therein are mutually obscured or covered and the lens is capped as before mentioned. This movement is effected by throwing the two winding rollers 3, 5 out of gear as before described with reference  
 110 to the adjustment of the slit, so as to allow the part 1 of the blind to move in relation to the other under the action of the spring roller 4.

It will be understood that the slit may be formed and adjusted either before or after  
 115 the blind has been wound up ready for making the exposure. If the slit is formed before the blind has been wound up for making the exposure the lens will be uncapped when winding up the blind for making  
 120 the exposure. If the slit is formed after the blind has been wound up for making the exposure of course there will be no opening in the blind and the shutter will be self-capping.

As the blind is wound up, the two parts  
 125 thereof move together through equal distances, but the part 1 is moved separately through an additional distance to form the slit in the blind. Likewise when the ex- 130

posure is made, the return movement of both of the parts of the blind is made together and through a distance equal to the first mentioned, the mutual obscuring or covering of the two openings so that the lens will be capped when the blind is again wound up, being effected by a separate and additional movement of the part 1 of the blind which received the additional movement for the formation of the slit.

If each of the winding rollers 3, 5 has the same diameter the part 1 of the blind would, during exposure, move faster than the part 2 and the width of the slit in the blind would vary. This is due to the fact that, at the commencement of exposure, there is a larger number of turns of the part 1 on the winding roller 3 than there are turns of the part 2 on the winding roller 5, for the part 1 is moved through a greater distance than the part 2 in order to form and adjust the slit. This difficulty can, however, be more or less completely avoided by making the winding roller 5 of a slightly greater diameter than the winding roller 3.

32 is a pinion secured to the spindle 13 of the winding roller 3. This pinion is situated on the outer face of the side 7 of the shutter framing, and gears with a toothed wheel 33 rotatably mounted on the same face of the side 7.

34 is a grooved circular disk secured to the wheel 33. In the groove 35 of the disk 34 is a stop or projection 36 (Figs. 1 and 6).

37 is a bell crank lever pivoted on the outer face of the side 7 of the shutter framing.

38 is a projection on one of the arms of the bell crank lever 37. This projection 38, in one position of the bell crank lever 37, obstructs the path of the stop or projection 36 in the groove 35 of the disk 34. 39 is a pin extending outwardly from the end of the other arm of the bell crank lever 37.

40 is a pin carried by the side 7 of the shutter framing. Normally the bell crank lever abuts against this pin 40 as shown.

41 is a spring extending between the bell crank lever 37 and the pin 20. This spring 41 serves to retain the bell crank lever 37 in its normal position.

42 is a slotted plate which is held up against the side 7 of the shutter framing, by means of screws 43, 44 which pass through the slot 45.

46 is a pin projecting from the plate 42. The pin 46 serves to move the plate 42 upwardly or downwardly with respect to the screws 43, 44. 47 is another pin which projects from the plate 42 and engages a slot 48 in a more or less U-shaped member 49. This U-shaped member 49 is pivotally mounted on the lever 30.

When the parts occupy the positions shown in Figs. 1 and 4, instantaneous exposures only

can be made. To make a time exposure, the plate 42 is moved vertically upward toward the lever 30 by means of the projecting pin 46. By reason of the pin and slot connection 47, 48 the member 49 is rotated about its pivotal connection with the lever 30 until the inner edge 50 of one of its limbs contacts with the pin 39 projecting from the bell crank lever 37. The blind is then wound up by means of the knob 12 as before explained and the part 1 of the blind is in addition further wound up until the openings 21, 22 coincide. The shutter release pin 31 is then pressed to make the exposure. The bell crank lever 37 then moves as one with the lever 30 so that the projection 39 will obstruct the path of the stop or projection 36. At the same time the winding rollers are unlocked and the parts of the blind move together until their further motion is prevented by reason of the abutment of the stop or projection 36 against the projection on the bell crank lever 37. When this occurs the position of the openings 21, 22 coincide with the position of the plate to be exposed. When pressure is taken off the shutter release pin 31, the lever 30 is returned to the position shown by reason of the action of the spring 19 on pin 17. The bell crank lever 37 is also returned to its normal position by means of the spring 41. The projection 38 is therefore pulled out of the path of the stop or projection 36. The motion of the blind is prevented by the nose 16 engaging the ratchet wheel 14 until the shutter release pin 31 is again pressed to complete the exposure and cover the plate by the blind. The opening in the blind is capped as described with reference to instantaneous exposures.

For convenience the outer face of the disk 34 may have a series of marks 51 to facilitate the adjustment of the width of the slit in the blind. 52 is a similar mark for use when the openings 21, 22 in the blind are to be coincident for time exposures.

53 is an opening in a cover plate 54 which plate protects the mechanism shown in Fig. 1. After the blind has been wound up the part 1 is in addition further wound up until the appropriate mark 51 or the mark 52 is visible at the hole 53. The cover plate 54 is suitably slotted to allow for the movement of the pins 31 and 46 which project therethrough.

55, 56 are rollers which guide the part 1. Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. In a shutter of the kind referred to, the combination of two blinds having slits therein normally out of register, a plain roller and a spring roller for each blind, a geared connection between the two plain

rollers, a spring controlled lever adapted to  
move one of said plain rollers out of gear  
with the other plain roller, a second spring  
controlled lever adapted to prevent motion  
5 of the firstly mentioned plain roller when  
moved out of gear with the other plain  
roller, a graduated setting disk geared to  
the secondly mentioned plain roller, a stop  
carried by said graduated setting disk, a  
10 spring controlled pivoted member movable  
into the path of said stop, shutter releasing  
means adapted to operate said second spring  
controlled lever, a movable member adapted  
to connect said pivoted member to said  
15 shutter releasing means, and means adapted  
to move such movable member to make or  
break said connection.

2. In a shutter of the kind referred to, the  
combination of two blinds, having slits  
therein normally out of register, a plain 20  
roller and a spring roller for each blind, a  
geared connection between the two plain  
rollers, a spring controlled lever adapted  
to move one of said plain rollers out of gear  
with the other plain roller, a second spring 25  
controlled lever adapted to prevent motion  
of the firstly mentioned plain roller when  
moved out of gear with the other plain  
roller, a graduated setting disk geared to the  
secondly mentioned plain roller, and shut- 30  
ter releasing means adapted to operate said  
second spring controlled lever.

Dated this 21st day of September, 1915.

EDITH HORA.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."