

J. E. THORNTON.  
 PHOTOGRAPHIC ROLLER BLIND SHUTTER.  
 APPLICATION FILED JULY 26, 1907.

924,947.

Patented June 15, 1909.  
 3 SHEETS—SHEET 1.

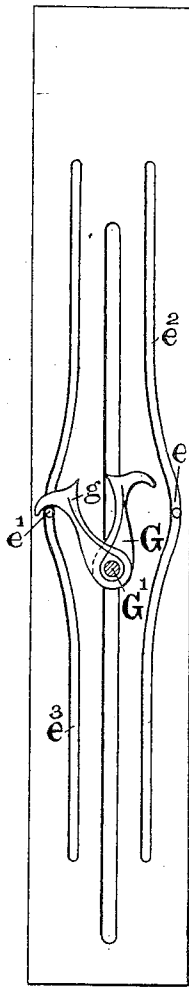


Fig. 10.

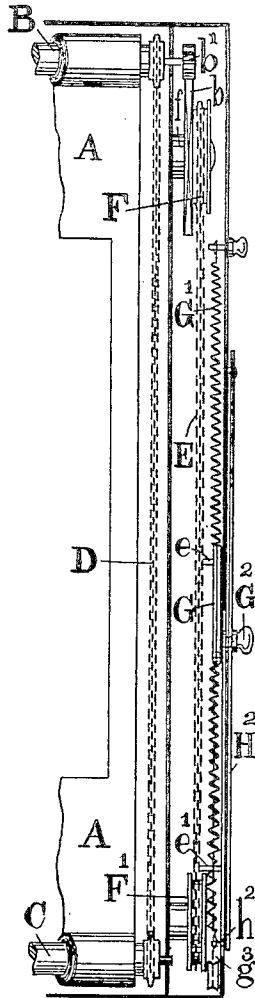


Fig. 1

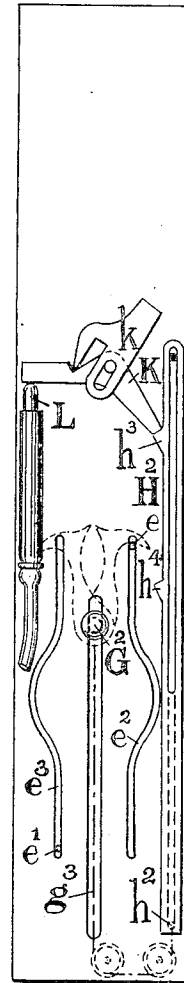


Fig. 2.

WITNESSES.

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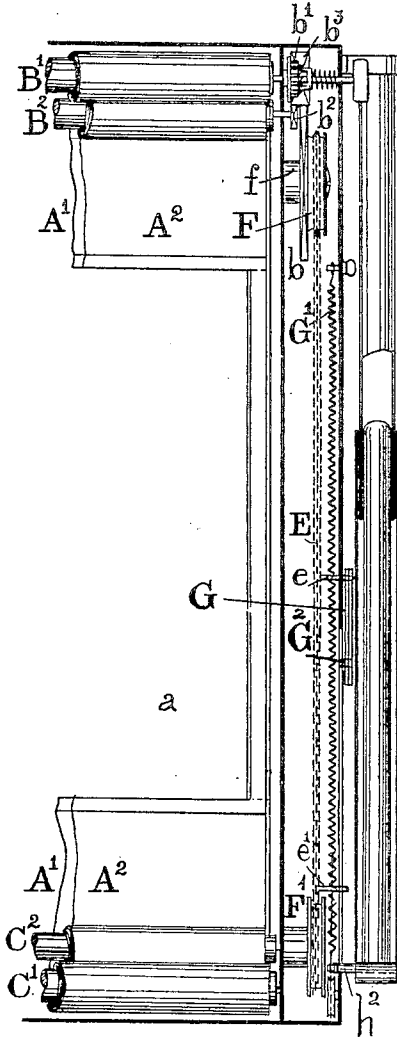


Fig. 3.

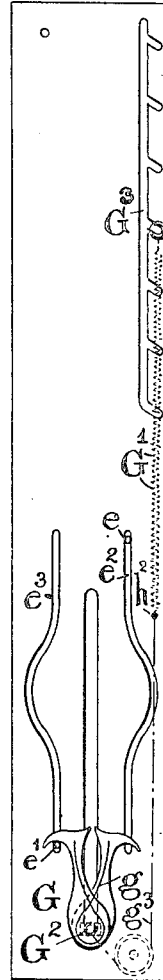


Fig. 6.

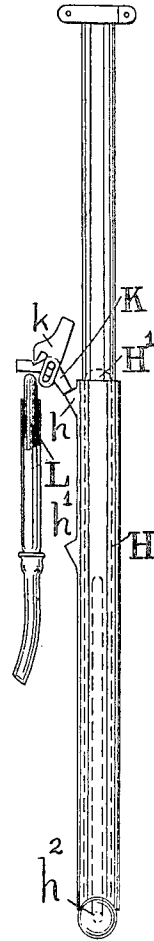


Fig. 7.

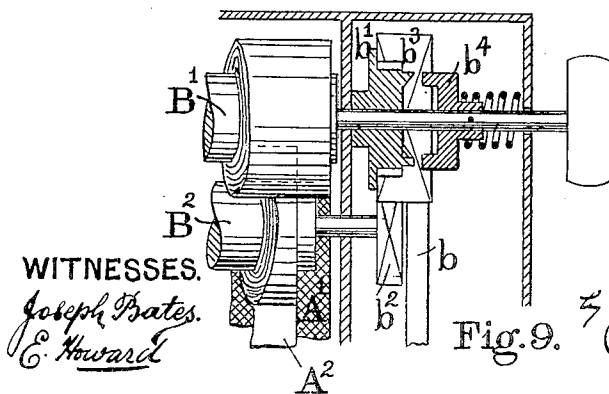


Fig. 9.

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 3 SHEETS—SHEET 3.

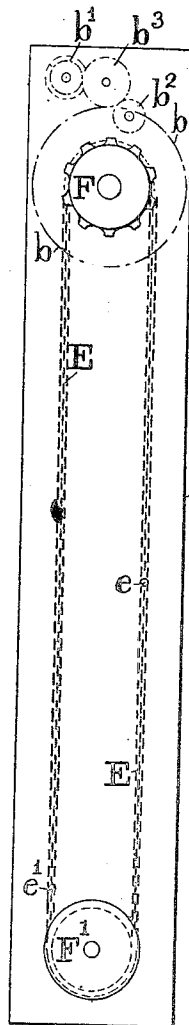


Fig. 5.

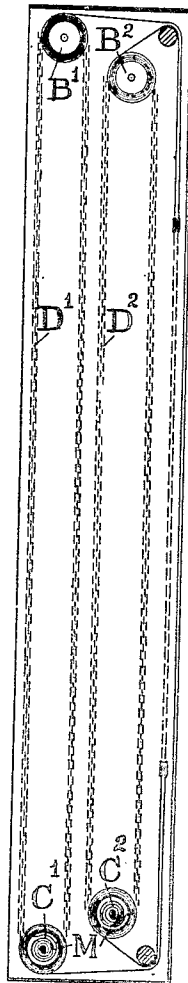


Fig. 8.

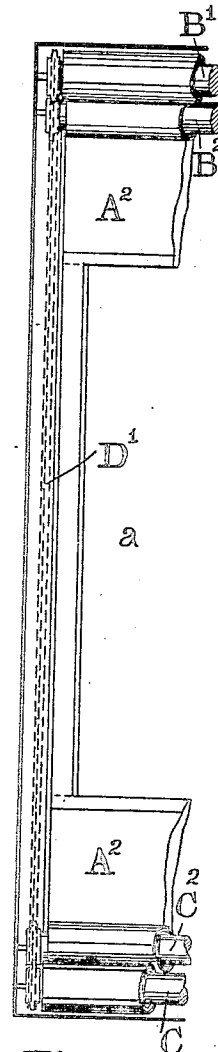


Fig. 4.

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*att'y*

# UNITED STATES PATENT OFFICE.

JOHN EDWARD THORNTON, OF ALTRINCHAM, ENGLAND.

## PHOTOGRAPHIC ROLLER-BLIND SHUTTER.

No. 924,947.

Specification of Letters Patent.

Patented June 15, 1909.

Application filed July 25, 1907. Serial No. 385,538.

*To all whom it may concern:*

Be it known that I, JOHN EDWARD THORNTON, British subject, and resident of Altrincham, county of Chester, England, have invented certain new and useful Improvements in Photographic Roller-Blind Shutters, of which the following is a specification.

This invention relates to roller blind shutters for photographic cameras in which the blind will travel alternately or successively in either direction for exposure and is thus set after each exposure for the next without uncovering the plate.

The shutter may be of such design that it may be applied to work in front of the plate adjacent to the focal plane; or close behind the lens or in front of the lens; or between the combinations of a multiple lens.

The invention will be fully described with reference to the accompanying drawings forming part of the specification.

Figure 1. is a side elevation showing part of a single blind shutter to which the invention is applied—parts being in section. Fig. 2. is an end elevation of same. Fig. 3. is a side elevation showing part of a double blind shutter—parts being in section. Fig. 4. is a corresponding side elevation showing the other ends of the blind rollers. Fig. 5. is an end elevation showing the continuous driving chain E. Fig. 6. is an end elevation showing the driving spring and spring clips G for engaging the pins on the driving chain. Fig. 7. is an end elevation showing pneumatic timing device. Fig. 8. is an elevation of the other end showing the chain gearing the top roller with the bottom roller. Fig. 9. is an enlarged detailed view showing the roller clutch. Fig. 10. is an end elevation showing a modification for giving a longer travel to the spring clips.

The roller blind A shown in the single blind shutter, Figs. 1 and 2, the blinds A' and A<sup>2</sup> shown in the double blind shutter in Figs. 3, 4, and 8, are of the usual form and construction made of opaque material such as oilcloth, rubber cloth, or the like, having an exposure opening *a* of the requisite size provided with stiffening strips to keep the edges of the opening straight. The spring driven rollers usual in this type of shutter are dispensed with and instead plain rollers without springs B or B' and B<sup>2</sup> are placed at the top of the shutter and plain rollers without springs C or C' and C<sup>2</sup> are placed at the bottom of the shutter to which the blinds are at-

tached. The top blind roller B is geared by a connecting chain D with the bottom blind roller C and the top blind roller B' is geared by a connecting chain D' with the bottom blind roller C' and the rollers C<sup>2</sup> with the roller B<sup>2</sup> by the chain D<sup>2</sup>, so that each pair of rollers are caused to rotate in unison.

In the single blind shutter (Figs. 1 and 2) the blind roller B is driven by a pinion *b* gearing into a small pinion *b'* on the end of the roller. In a double blind shutter (Figs. 3, 5, 8 and 9) the blind rollers B' B<sup>2</sup> are driven by a pinion *b* gearing with an intermediate or carrier wheel *b<sup>3</sup>* which gears with both the small pinions *b'* *b<sup>2</sup>* on the ends of the respective rollers B' B<sup>2</sup>. Thus in either construction the desired number of revolutions to wind the blind onto the rollers B or B' and B<sup>2</sup> from the rollers C or C' and C<sup>2</sup> or vice versa to wind the blinds onto the rollers C or C' and C<sup>2</sup> from the rollers B or B' and B<sup>2</sup> is imparted to the rollers from the pinion *b* through the gear wheels to the top rollers, and from the top rollers to the bottom rollers by the chains D or D' and D<sup>2</sup> the top and bottom rollers in both cases rotating synchronously in either direction and in the case of the double blind shutter the two sets of rollers B' and C' B<sup>2</sup> and C<sup>2</sup> and the two blinds A' and A<sup>2</sup> all moving together first in one direction and then in the reverse direction.

The driving mechanism for imparting motion to the rollers is the same in both cases, and one description will serve for both, corresponding reference letters being employed on the different figures of the drawings, and comprises a driving wheel F and pinion *b* an endless chain E a spring G' and spring connecting clip G. The driving pinion *b* is affixed to or driven by a sprocket wheel F on the same pin or spindle *f* to which motion is given by an endless driving chain E passing over the sprocket wheel F and over a loose or idle wheel F' at the bottom of the shutter case, see Figs. 3 and 5. The chain E is provided with two pins *e e'* with either of which a spring clip or catch G may engage and as the chain E travels the pin *e* moves in one direction and the pin *e'* moves in the reverse direction so that when the blind is set the pin *e* is at the top while the pin *e'* is at the bottom or vice versa. The pins pass one another midway of their travel. The pins *e e'* are placed to travel in slots *e<sup>2</sup>* and *e<sup>3</sup>* in a plate attached to the case. The slots *e<sup>2</sup>* and *e<sup>3</sup>* are curved or bent outward at the center to

take the ascending pin out of the path of the spring clip G. See Fig. 6.

The spring clip G is formed with two arms of anchor or other shape inclined on the top, which are pressed outward by springs *g*. When the clip is pressed against a pin it is forced inward and then springs outward again to engage the pin. The spring clip G is connected to a spiral or other spring *G'* by a chain *g<sup>3</sup>* so that when the clip G is raised the spring *G'* is placed in tension and tends to draw the clip G back. When the clip is released it is drawn back by the spring *G'* and moves the chain E, thereby rotating the blind rollers B and C and B' and C' causing the blind A and the blind A' to wind off one roller onto the other. It will thus be seen that the blind is always left in the set position after an exposure, and is alternately moved in one direction or the other to effect an exposure, the clip engaging the pins *e* *e'* alternately. The spring *G'* may be tightened by any convenient mechanical device, such as a rack *G<sup>3</sup>* or the end may be attached to a screw or to a drum or it may be otherwise lengthened or shortened.

The spring clip G is raised by a knob *G<sup>2</sup>* or other appliance and is held against the pressure or pull of the spring *G'* by a detent and trigger of any suitable form which can be withdrawn to release it when an exposure is desired.

The speed of travel of the blind may be regulated by a pneumatic buffer (see Fig. 7) such as a cylinder H and plunger H' and for instantaneous exposures this may be retained by the release trigger K acting against a lug or projection *h* thereon; for time exposure a second projection *h'* is employed by which the cylinder can be arrested when the cylinder has made the desired length of travel. The cylinder H is connected by a pin *h<sup>2</sup>* to the chain *g<sup>3</sup>* or it may be connected to the driving chain E; a second lever *k* is pivoted to the trigger K, which can be placed in the path of the lug *h* which as it passes, returns the end of the lever K into the path of the second lug *h'* to arrest its travel for a time exposure. The trigger is operated by a pneumatic plunger L in the ordinary way or it may be operated by hand or by any other suitable device.

Instead of the pneumatic timing device comprising a cylinder and piston a sliding plate H<sup>2</sup> with lugs *h<sup>3</sup>* and *h<sup>4</sup>* acted upon by a similar trigger arrangement may be employed. Or a pawl may be employed to engage with one of the wheels on the roller ends. Or any other form of releasing or arresting mechanism may be employed such as are now commonly applied to photographic shutters.

Referring to Figs. 3 to 9 in which the invention is shown applied to a double blind shutter in which two blinds, one overlapping

the other are employed to vary the size of the aperture, such blinds traveling together. The blinds A' and A<sup>2</sup> are each mounted on the two plain rollers without springs and each pair of rollers are geared together and one pair geared to the other pair so that when set all will move together. The rollers B' and C' are geared together by the chain or band D' and the rollers B<sup>2</sup> and C<sup>2</sup> are geared together by the chain or band D<sup>2</sup> and the rollers B' and B<sup>2</sup> are geared together by the pinion *b<sup>3</sup>* so that all rotate in unison. The blind rollers may be geared together in any other suitable manner. To vary the overlapping of the two blinds and the width of the exposure slit between them, the driving pinion *b'* is connected to the spindle of the blind roller B' by a clutch which can be thrown out of gear to permit of the rotation of that roller to wind up or unwind one blind without the other. The arrangement of the blinds is simply the two blinds A' A<sup>2</sup> are locked and travel as one for exposure—first in one direction for one exposure and then in the opposite direction for the next exposure, and are unlocked to alter the slit, then clamped again for exposure. The means for carrying this out are modified to suit the maker's requirements.

In one form of clutch see Fig. 3 and Fig. 9 the pinion *b'* is loose on the shaft and a toothed collar or clutch member *b<sup>4</sup>* is fixed to the shaft and by moving the shaft longitudinally the collar is moved out of engagement with the pinion leaving the shaft and roller free to be rotated without moving the other roller. In another form the rollers B' B<sup>2</sup> are simultaneously driven by two driving pinions one of which is fast upon and the other loose upon a sleeve. Fast upon the same sleeve is a clutch member by withdrawing which from the pinion the sleeve may be rotated with one pinion only thereby winding one blind without the other. The pinion may have a number of holes or indents which may be graded so that the position of the clutch member relative to the pinion will indicate the width of slit.

Any form of indicator or scale showing the degree of variation made and its effect upon the exposure in fractions of a second or the like, may be employed. Thus not only can the exposure be varied by altering the slit, but by the pneumatic brake device also. To compensate for any "slack" of the blinds due to the constantly varying diameters of the top and bottom rollers respectively, I insert a spring M in one roller of each pair, which will always exert sufficient pull on the blind to take up any slack which may be formed. The roller would in that case be connected to the positively driven roller spindle through the medium of this spiral spring.

The shutter and mechanism described is applicable for either a lens hood shutter, a focal plane shutter, or for a shutter placed behind the lens or between the members of the lens.

What I claim as my invention and desire to protect by Letters Patent is:—

1. In a roller blind shutter the combination with the blind and blind rollers and means to connect the top and bottom blind rollers to rotate synchronously of a driving pinion by which motion is transmitted to the rollers, a sprocket wheel connected to the driving pinion, an endless driving chain passing around the sprocket wheel, a reciprocating spring clip to engage the chain and a spring to operate it, and means to connect the clip alternately to different points of the chain to cause it to travel first in one direction and then in the reverse direction, substantially as described.

2. In a roller blind shutter the combination with the blind and blind rollers and means to connect the top and bottom blind rollers to rotate synchronously of a driving pinion by which motion is transmitted to the rollers, a sprocket wheel connected to the driving pinion, an endless driving chain, passing around the sprocket wheel, a reciprocating spring clip to engage the chain and a spring to operate it, means to connect the clip alternately to different points of the chain to cause it to travel first in one direction and then in the reverse direction and means to arrest and release the spring clip substantially as described.

3. In a roller blind shutter the combination with the blind and blind rollers and means to connect the top and bottom blind rollers to rotate synchronously of a driving pinion by which motion is transmitted to the rollers, a sprocket wheel connected to the driving pinion, an endless driving chain passing around the sprocket wheel, a reciprocating spring clip to engage the chain and a spring to operate it, and pins  $e$   $e'$  attached to and projecting from the chain with which the spring clip engages substantially as described.

4. In a roller blind shutter the combination with the blind and blind rollers and means to connect the top and bottom blind rollers to rotate synchronously of a driving pinion by which motion is transmitted to the rollers, a sprocket wheel connected to the driving pinion, an endless driving chain, passing around the sprocket wheel, a reciprocating spring clip to engage the chain and a spring to operate it, pins  $e$   $e'$  attached to the chain with which the clip engages and a slotted plate to guide the pins substantially as described.

5. In a roller blind shutter the combination with the blind and blind rollers and

means to connect the top and bottom blind rollers to rotate synchronously of a driving pinion by which motion is transmitted to the rollers, a sprocket wheel connected to the driving pinion, an endless driving chain passing around the sprocket wheel, pins affixed to and projecting from the driving chain, a reciprocating spring clip to engage the pins alternately, a spring to operate the clip, a slotted guide plate to guide the pins, and means to arrest the travel of and release the spring clips substantially as described.

6. In a roller blind shutter the combination with two blinds  $A'$   $A^2$  of two plain top rollers  $B'$   $B^2$  two plain bottom rollers  $C'$   $C^2$  without springs means for gearing the top roller  $B'$  with the bottom roller  $C'$ , and the top roller  $B^2$  with the top roller  $C^2$ , means for coupling the two pairs of rollers together and a spring driving mechanism connected to the top rollers to drive all the rollers synchronously substantially as described.

7. In a roller blind shutter the combination with two roller blinds  $A'$   $A^2$  two plain top rollers  $B'$   $B^2$  and two plain bottom rollers  $C'$   $C^2$  without springs, of chains  $D'$   $D^2$  to gear the top rollers with the bottom rollers, pinions  $b'$   $b^2$  and  $b^3$  to gear the top rollers together, a driving pinion  $b$  gearing with the pinion  $b^3$  a continuous driving chain  $E$  and means to drive the chain alternately in one direction and the reverse, substantially as described.

8. In a roller blind shutter the combination with two roller blinds  $A'$   $A^2$ , two plain top rollers  $B'$   $B^2$  and two plain bottom rollers  $C'$   $C^2$  without springs, of chains  $D'$   $D^2$  to gear the top rollers with the bottom rollers, pinions  $b'$   $b^2$  and  $b^3$  to gear the top rollers together, a driving pinion  $b$  gearing with the pinion  $b^3$  a continuous driving chain  $E$  and means to drive the chain alternately in one direction and the reverse, and means to disconnect the top rollers to adjust the blinds substantially as described.

9. In a roller blind shutter the combination with two roller blinds  $A'$   $A^2$  two plain top rollers  $B'$   $B^2$  and two plain bottom rollers  $C'$   $C^2$  without springs, of chains  $D'$   $D^2$  to gear the top rollers with the bottom rollers, pinions  $b'$   $b^2$  and  $b^3$  to gear the top rollers together, a driving pinion  $b$  gearing with the pinion  $b^3$  a continuous driving chain  $E$  and means to drive the chain alternately in one direction and the reverse, a clutch member on the pinion  $b'$  and a clutch member  $b^4$  attached to the roller shaft by which the top rollers can be disconnected to adjust the blinds substantially as described.

10. In a roller blind shutter the combination with two blinds  $A'$   $A^2$ , of two plain top rollers  $B'$   $B^2$ , two plain bottom rollers  $C'$   $C^2$  without springs, means for gearing the top roller  $B'$  with the bottom roller  $C'$  and the top

roller B<sup>2</sup> with the top roller C<sup>3</sup>, means for coupling the two pairs of rollers together and a spring driving mechanism connected to the top rollers to drive all the rollers synchronously and means to disconnect the two top rollers to adjust the blinds relatively to one another substantially as described.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN EDWARD THORNTON.

Witnesses:

ERNALD SIMPSON MOSELEY,  
MALCOLM SMETHURST.