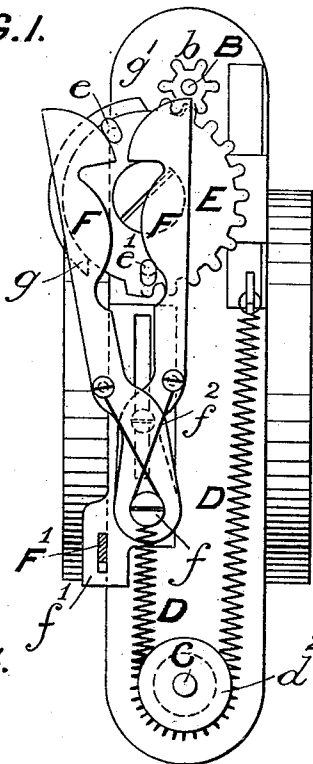
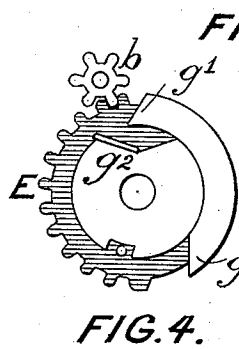
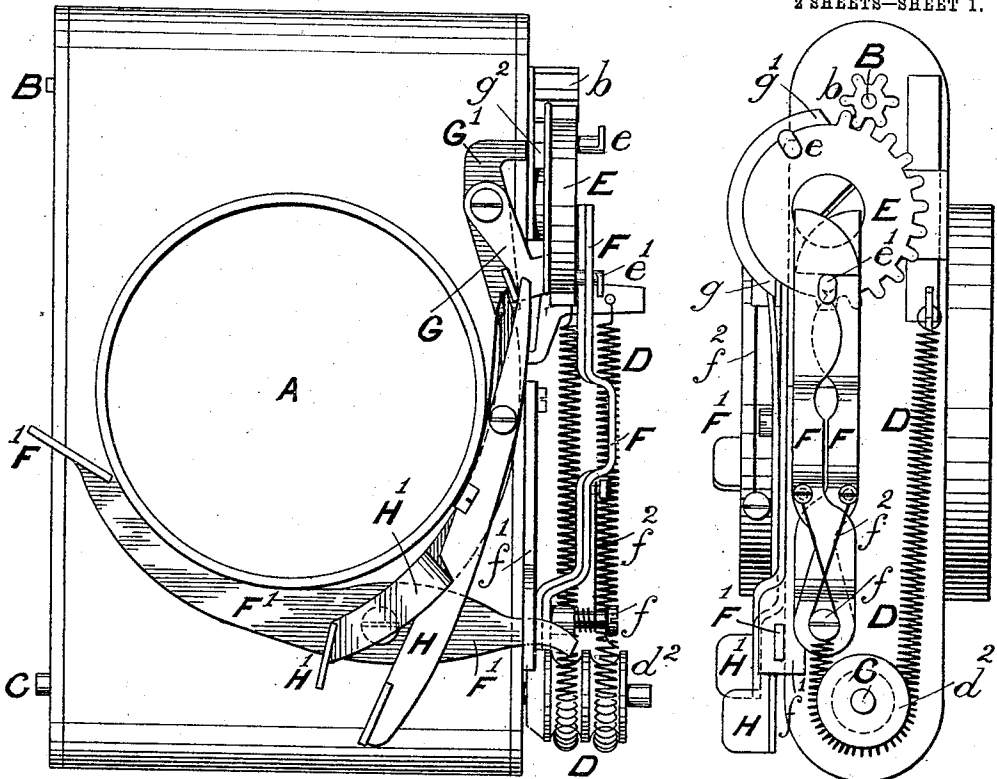


J. E. THORNTON.
 PHOTOGRAPHIC SHUTTER.
 APPLICATION FILED DEC. 10, 1899.

934,581.

Patented Sept. 21, 1909.

2 SHEETS—SHEET 1.



WITNESSES.
E. Howard
Joseph Bates

INVENTOR
J. E. Thornton
by J. C. Harrison
att'y

J. E. THORNTON.
 PHOTOGRAPHIC SHUTTER.
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934,581.

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 2 SHEETS—SHEET 2.

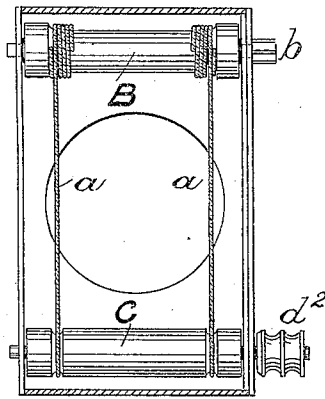


FIG. 6.

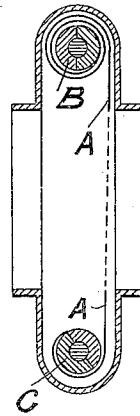


FIG. 7.

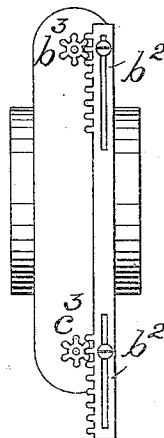


FIG. 8.

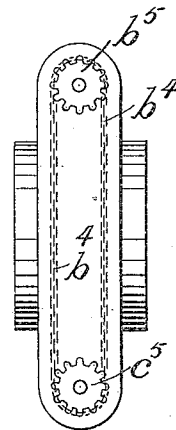


FIG. 9.

WITNESSES.

E. Howard
Joseph Prates

INVENTOR.

J. E. Thornton
by O. C. Anderson
att'y.

UNITED STATES PATENT OFFICE.

JOHN EDWARD THORNTON, OF MANCHESTER, ENGLAND.

PHOTOGRAPHIC SHUTTER.

934,581.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed December 19, 1899. Serial No. 740,949.

To all whom it may concern:

Be it known that I, JOHN EDWARD THORNTON, a subject of the Queen of Great Britain, and residing at Manchester, in the county of Lancaster, England, whose postal address is Worsley Mills, Hulme, Manchester, aforesaid, have invented certain new and useful Improvements in Photographic Shutters, of which the following is a specification.

This invention primarily relates to single roller blind shutters arranged to move in two directions to expose the lens, first in one direction and then in the reverse direction, in order that it may be unnecessary to first cover the lens and sensitive plate before setting the shutter for another exposure. This form of shutter is therefore termed a safety or self-capping shutter.

The invention consists essentially in the combination with roller blind shutters, of mechanism for operating the blind first in one direction and then in the reverse direction by the same spring.

The invention will be fully described with reference to the accompanying drawings.

Figure 1. is a front elevation of the shutter. Fig. 2 is an end elevation showing the actuating mechanism. Fig. 3. is an end elevation showing the actuating mechanism in a different position. Fig. 4. is an elevation showing the reverse side of the disk E and the stops g g' g'' thereon. Fig. 5. is an end elevation showing a modification. Figs. 1 to 5 are drawn to an enlarged scale. Fig. 6. is a sectional elevation showing one form of mechanism for causing the rollers to rotate in either direction in unison. Fig. 7. is a transverse section through rollers and blind. Fig. 8. is an end elevation showing another form of mechanism for causing the rollers to rotate together in unison. Fig. 9. is an end elevation showing another form of mechanism for causing the rollers to rotate together in unison.

The blind A employed in connection with this invention, is a flexible single blind, mounted on two rollers B and C which moves across the lens in one direction for one exposure (being wound up onto one roller) and moves back again across the lens in the opposite direction for the next exposure (being then wound up onto the other roller). The two rollers B and C to which the ends of the single blind are secured, are so connected that the blind A,

and the rollers B and C, always move together in unison. The point to be observed is, that a movement of one of the rollers in either direction, shall cause a similar movement of the blind, and the action is such that the blind is given a reciprocating motion.

My invention consists of the combination with a roller blind and its roller, of means for causing the rollers to rotate in either direction in unison, and a spring for giving motion thereto, in such a manner that the blind shall have a reciprocating movement in order that it may make an exposure on both the out and return portions of the cycle.

A shutter made according to this invention comprises the following elements:—
1. A blind suitably connected with two rollers; means for connecting such rollers and blind so that all may work in unison, a driving spring or springs for operating the rollers, directly or through suitable gearing in such a manner as to control the movement of the blind. 2. A release for setting in action the shutter blind such as pneumatic ball and tube, a cord, a trigger or other convenient arrangement, may be added and a suitable frame or case to carry the whole working parts in correct position in relation to each other, completes the shutter.

The single flexible blind A, is mounted upon the two rollers B and C, which are connected together by cords or bands a , by a rack b^2 gearing with pinions b^3 and c^3 or by a chain b^4 on wheels b^5 and c^5 , so that the rotation of either of the rollers in one direction unwinds the blind from one, and winds it upon the other, and vice-versa. One roller therefore only requires to be operated to move the blind backward and forward, or cause it to reciprocate. For this purpose springs D are connected to the blind roller B, in such a way, that in whichever direction the roller be rotated from its normal or zero position, the springs D will be put in tension and when it is released will rotate it in the reverse direction.

On the end of the driving roller B a small pinion b , is fixed, with which a quadrant disk E gears, the relative sizes being such that approximately one half revolution of the quadrant disk E will give the desired number of revolutions to the pinion b and blind roller B. Upon the quadrant disk E are

fitted two projecting pins e e' with which a pair of pivoted fingers or levers F are caused to engage. The levers F are pivoted on a stud f carried by a sliding plate or bracket f' to which the end of the springs D are also attached. The springs D pass around the loose pulley d^2 as there is not sufficient length in the shutter to allow of their lying altogether in the direct line of action. The levers F are made with a notch or shoulder at their free ends to embrace the pins e and e' , and as they are moved upward and come into contact with the pins, the inclined shape of the end causes them to be forced apart and open with a scissor like action, and they then close upon one of the pins by the action of the springs f^2 . The opening movement of the levers F is facilitated by the inner edge being pressed against the pin which has previously been engaged (see e' Fig. 3), the lever F being shaped as shown in Fig. 1. to pass over the head of the pin before it closes back over the other pin. The force of the springs D is thus alternately applied first to one pin and then to the other, to rotate the disk quadrant E , first in one direction and then in the reverse, as at each movement of the disk the uppermost pin stops short of the dead center.

The disk E is on its inner or reverse side provided with a stop piece fitted thereto furnishing two stops g g' projecting from the back. A detent or finger G pivoted upon the case of the shutter engages alternately with stops g g' to hold the disk E (when the blind is set) against the force or action of the spring D until released.

The finger or detent G is drawn back to effect the release of the disk E and with it of the blind A by the pivoted trigger H , operated by the hand or finger of the operator or in any other convenient way.

For time exposure the disk E is provided with a third stop g^2 with which a second detent G' engages to arrest the travel of the blind. The detent G' is thrown into contact with the stop g^2 by the second trigger H' and arrests the travel of the blind and holds it until the detent G' is withdrawn. The backward movement of the trigger lever H' withdraws the detent and permits the travel of the blind to be resumed.

The shutter is re-set for exposure by the lever F' the end of which engages with the sliding bracket f' . When the free end of the lever F' is depressed the bracket f' is raised to connect the actuating mechanism, by means of the levers F with the uppermost pin e on the disk quadrant E .

In the modification shown in Fig. 5. the levers F are omitted and the spring D is connected to a lever D^2 loose on the roller spindle. It is moved around by the operator until it rests against the uppermost stop and when the disk is released it causes it to

rotate nearly half a revolution. The cords shown in Fig. 6. pass around the bottom roller to cause it to rotate.

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

1. In a photographic shutter the combination with a flexible blind, rollers upon which the blind is wound, and a spring for operating the rollers and the blind of means to connect the rollers to cause them to rotate in unison, and means to connect the actuating spring with the roller, to rotate the rollers and blind first in one direction and then in the reverse direction for successive exposures.

2. In a photographic shutter the combination with a flexible blind, rollers upon which the blind is wound and a spring for operating the rollers and the blind of means to connect the rollers to cause them to rotate in unison, means to connect the actuating spring with the roller to rotate the rollers and blind first in one direction and then in the reverse direction for successive exposures, and means to set and release the blind.

3. In a photographic shutter the combination with a flexible blind having a reciprocating motion in reverse directions for successive exposures, rollers upon which the blind is wound, and mechanism connecting the rollers to cause them to rotate in either direction in unison, of a driving spring to actuate the rollers, mechanism for connecting the spring to one roller and setting it to operate first in one direction and then in the reverse direction and mechanism for releasing and setting in action the shutter blind, substantially as described.

4. In a photographic shutter the combination with the blind, the blind rollers and the mechanism connecting the rollers to cause them to rotate in unison, of a wheel on the blind roller, a toothed disk E gearing therewith provided with two projecting pins and mechanism for connecting thereto a spiral spring acting in the direction of its length to rotate the disk and the blind roller first in one direction and then in the reverse direction, substantially as described.

5. In a photographic shutter the combination with the blind, the blind rollers and mechanism connecting the rollers to cause them to rotate in unison, of a pinion on the blind roller, a toothed disk E gearing therewith provided with two pins, a spring D acting in the direction of its length connected to the disk E , levers F to which the spring D is attached and which alternately engage the pins e and e' to rotate the disk first in one direction and then in the reverse, the sliding bracket f' and the operating lever F' , substantially as described.

6. In a photographic shutter the combination with the reciprocating blind, the blind rollers and mechanism connecting the rollers

to cause them to rotate in unison, of a wheel on the blind roller, a toothed disk gearing therewith, a spring operating in the direction of its length, mechanism for connecting the spring with the rollers, a detent for holding the disk from rotation when set, and a trigger lever for withdrawing the detent and releasing the blind for exposure, substantially as described.

7. In a photographic shutter a flexible reciprocating blind moving in reverse directions for successive exposures, rollers to which the blind is attached, mechanism connecting the blind rollers to cause them to rotate in unison, a pinion on the blind roller and a toothed disk provided with projecting pins gearing therewith, in combination with a long spiral spring acting in the direction of its length, mechanism for connecting the spring with the roller to rotate it alternately in different directions, the detent G to hold the disk when set, a trigger lever to withdraw the detent to release the blind and a detent G' to arrest the blind substantially as described.

8. In a photographic shutter the combination with a reciprocating flexible blind, blind rollers to which the blind is attached, mechanism connecting the blind rollers to cause them to rotate in unison, and mechanism

for rotating the rollers alternately in opposite directions, of the detent G for retaining the roller when set and the detent G' for arresting the travel of the blind substantially as described.

9. A photographic shutter comprising in its construction a flexible blind, two rollers to which the blind is attached, mechanism connecting the rollers to cause them to rotate in unison in either direction, a driving pinion on the roller end, a toothed disk E provided with projecting pins gearing therewith, a long spiral driving spring D acting in the direction of its length, mechanism for connecting the driving spring alternately with one and then the other of the pins on the toothed disk E, a detent G to hold the roller when set, and detent G' to arrest the travel of the roller for time exposures, the trigger lever H to release the detent G and the trigger lever H' to release the detent G' substantially as described.

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

JOHN EDWARD THORNTON.

Witnesses:

J. OWDEN O'BRIEN,
E. HOWARD.