No. 885,236. PATENTED APR. 21, 1908.

W. F. FOLMER.

ROLLER BLIND SHUTTER.

APPLICATION FILED JAN. 24, 1907.

3 SHEETS—SHEET 1.

Fig. 2.

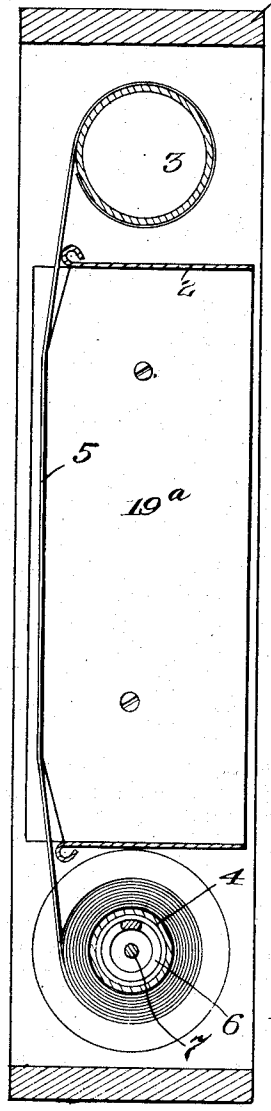
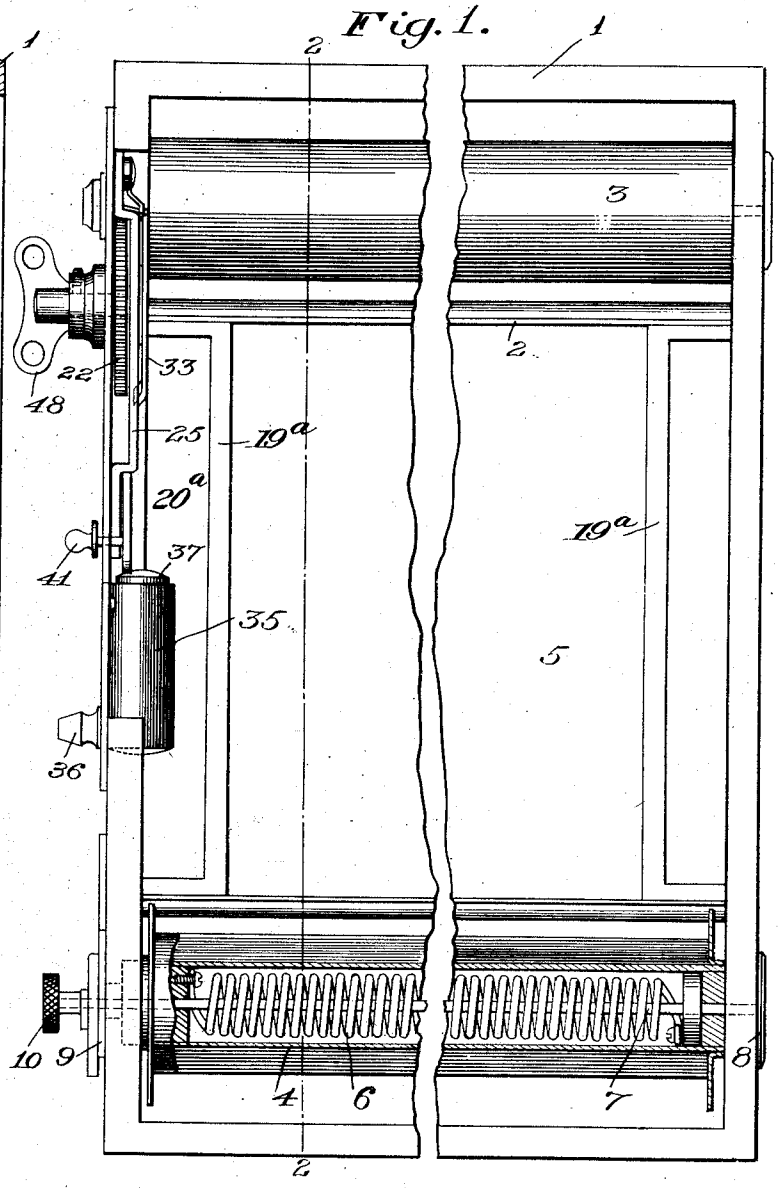


Fig. 1.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 3.

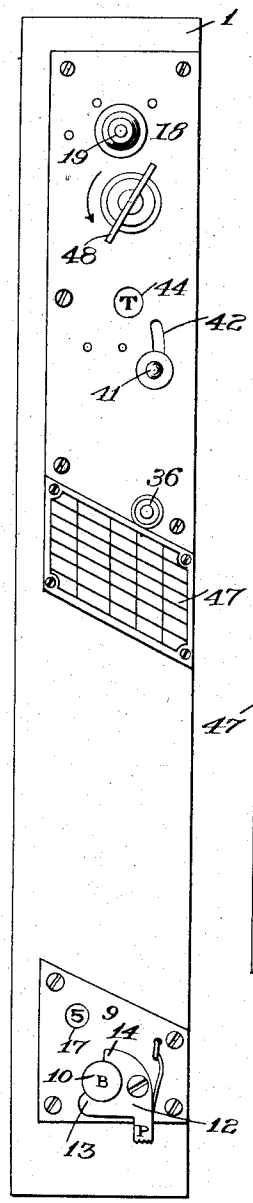


Fig. 4.

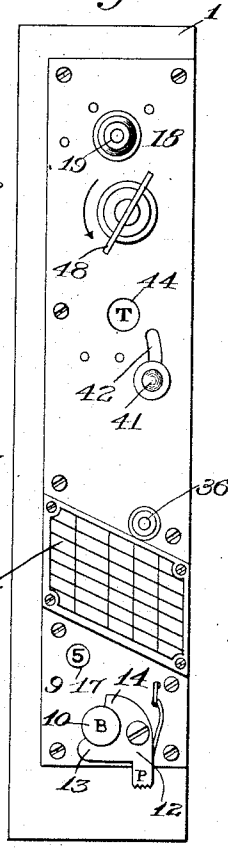
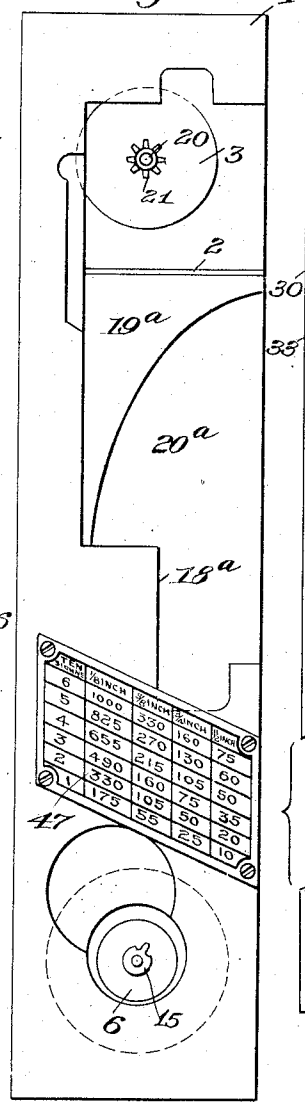
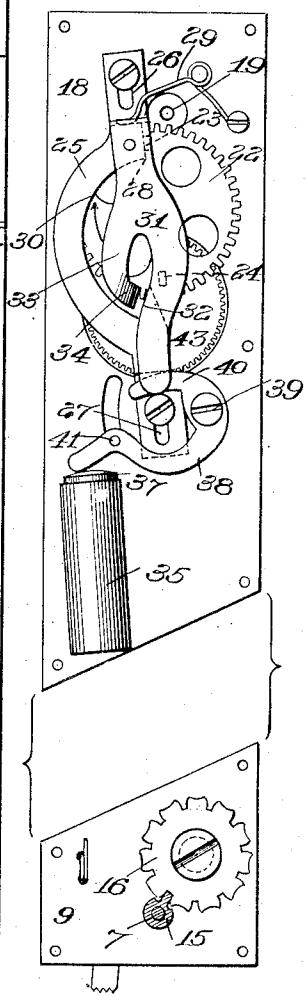


Fig. 5.



Pen.	½ Inch	¾ Inch	1 Inch	Roller
6	1000			
5	825	330	160	75
4	655	270	130	60
3	490	215	105	50
2	330	160	75	35
1	175	105	50	20
		55	25	10

Fig. 6.



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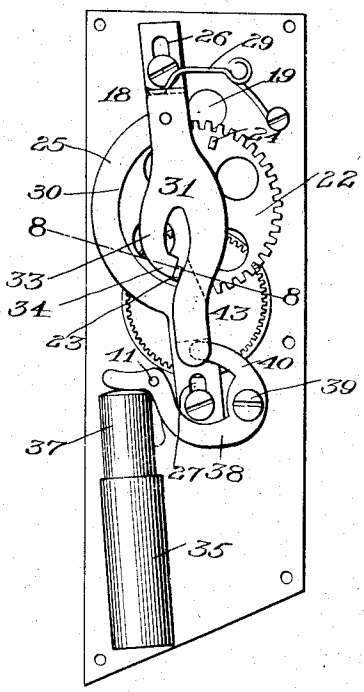
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3 SHEETS—SHEET 3.

Fig. 7.



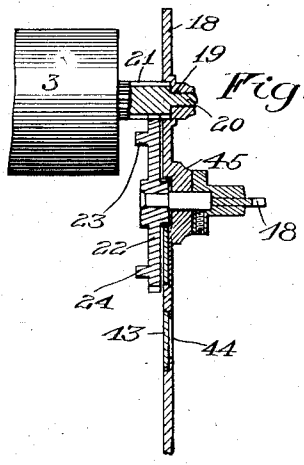


Fig. 10.

Fig. 9.

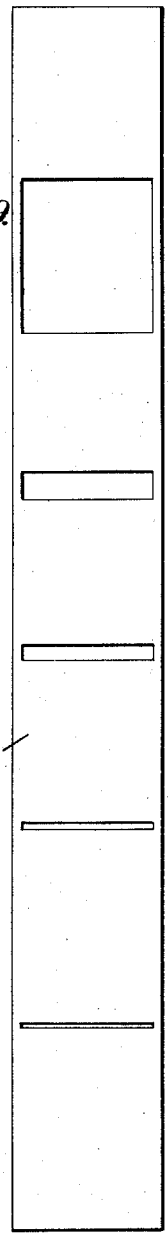


Fig. 8.

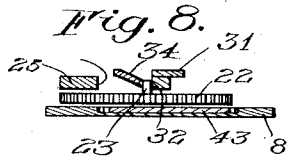


Fig. 11.

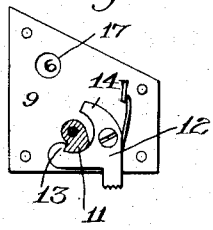
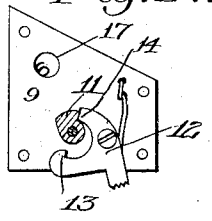


Fig. 12.



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UNITED STATES PATENT OFFICE.

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ROLLER-BLIND SHUTTER.

No. 885,236. Specification of Letters Patent. Patented April 21, 1908.

Application filed January 24, 1907. Serial No. 353,778.

To all whom it may concern:

Be it known that I, WILLIAM F. FOLMER, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Roller-Blind Shutters; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of the specification, and to the reference-numerals marked thereon.

My present invention relates to improvements in photographic shutters, and more especially to that class commonly known as "focal plane" shutters employing a flexible curtain having suitable apertures adapted to move across the field of the lens to produce the desired exposures, and its object is to provide improvements in the mechanism for controlling the movements of the curtain, and also to provide improvements in the construction of and mode of applying the roller supporting and curtain operating mechanism whereby these parts may be employed interchangeably on shutters of different dimensions.

To these and other ends the invention consists in certain improvements and combinations of parts, all as will be hereinafter more fully explained, the novel features being pointed out in the claims at the end of the specification.

In the accompanying drawings: Figure 1 is an elevation of a photographic shutter constructed in accordance with my invention. Fig. 2 represents a transverse section on the line 2—2 of Fig. 1. Figs. 3 and 4 are side elevations of shutters of different dimensions showing the mode of applying the roller supports and curtain operating mechanism thereto. Fig. 5 is a view of the shutter similar to that shown in Fig. 4 but on an enlarged scale, the roller supports and curtain-operating devices being removed to illustrate the manner in which the casing is cut away to receive them. Fig. 6 is a view of the under side of the plates carrying the roller supports and curtain operating and controlling mechanism, the parts being shown in normal position. Fig. 7 shows the relative arrangement of the parts of the curtain controlling devices immediately after an exposure. Fig. 8 is a sectional view on the line 8—8 of Fig. 7, showing a safety device or check for preventing rebounding of the curtain after each exposure. Fig. 9 is a view of the curtain unwound from the rollers. Fig. 10 is a detail view of a device for indicating the width of the opening in the curtain which will cross the field of the lens on the next exposure, and Figs. 11 and 12 are views of the exterior of the plate supporting the roller and indicator, showing the escapement for the actuating spring.

Similar reference numerals in the several figures indicate similar parts.

Shutters constructed in accordance with the present invention are especially adapted to be arranged substantially in or parallel to the focal plane of the lens of cameras and similar apparatus, although of course it will be understood that it may be placed in different positions for cutting off the light from the lens, or for controlling the exposures of sensitized materials. The shutter shown in the present form of the invention comprises, generally, a casing 1 having a frame 2 therein for defining the exposure aperture, and having curtain rollers 3 and 4 mounted in the opposite ends thereof, the flexible curtain or blind 5 having its ends attached to these rollers and adapted to be unwound from the roller 3 and wound upon the roller 4 under the action of a spring 6 in effecting the exposures, this curtain actuating spring in the present instance being inclosed within the roller 4, one end of the spring being attached to the roller 4, and its other end is attached to the supporting shaft 7. This shaft has one end thereof journaled in a bearing plate 8 in one side of the shutter casing, and its opposite end is journaled in a plate 9, the latter being adapted to be secured to the opposite side of the shutter casing, and the said shaft is preferably provided with means for adjusting it to set the spring under different tensions in order that the speed of the curtain may be adjusted as desired. This is accomplished in the present instance by providing a milled head 10 on the shaft exterior to the casing, and also providing an offset stop or projection 11 on the shaft arranged to coöperate with a spring-operated escapement 12, the latter being pivoted on the plate 9 and having pallets 13 and 14 arranged to alternately engage the projection 11 as the escapement is rocked to permit unwinding movement of the shaft by a step-by-step movement, the escapement being so constructed as to permit the shaft to be freely turned in a direction to wind the spring, and the escapement

operating automatically to retain the shaft from unwinding.

The different tensions on the curtain-actuating spring determine the speed of the movement of the curtain in producing the exposures, and it is preferable to provide an appropriate device for indicating the different tensions on the spring in order that the speed of exposure may be known previous to an exposure, the device shown in Fig. 6 being employed in the present instance, embodying a toothed member 15 fixed on the roller shaft 7 and arranged to coöperate with a correspondingly recessed disk 16 pivoted on the under side of the plate 9, one of the teeth 16[a] formed between the recesses and adjacent to the toothed member when in normal position being so formed as to constitute a Geneva stop to prevent initial winding in the wrong direction and also overwinding, this disk being provided with numerals or other characters appropriate to designate the different exposures, and these characters are arranged to register with a sight aperture 17 in the plate 9.

The mechanism just described normally operates the roller 4 to unwind the curtain from the roller 3 and carry the exposure apertures therein across the field of the lens, and the device for controlling the movement of the curtain preferably operates on the roller 3 to control the unwinding movement thereof, the winding effort of the roller 4 producing a tension on the curtain that will retain the curtain taut between the spool and across the exposure aperture.

The curtain-controlling devices employed in the present embodiment of the invention are shown most clearly in Figs. 6 and 7, and are carried by the upper plate 18 which is adapted to be fitted on the side of the casing above the lower plate 9. The side of the casing is cut away, as shown in full lines in Fig. 5 at 18[a], to accommodate the various working parts about to be described, while adjacent thereto is provided an inner reinforcing block 19[a] also recessed at 20[a] for the same purpose and useful as a guide for the curtain in its various movements. The plate 18 has a bearing 19 for one end of the shaft 20 of the roller 3, the other end of the said shaft being suitably journaled in the opposite side of the shutter casing, the shaft 20 being provided with a pinion 21 arranged to coöperate with a master gear 22 by means of which the operation of the curtain is controlled. This gear in the present instance is provided with a pair of diametrically-opposite projections 23 and 24 projecting laterally from its inner face, and adapted to coöperate with a suitable controlling device embodying an escapement in the present instance, having a yoke 25 provided with the guiding portions 26 and 27 secured to and guided on the plate 18 so as to reciprocate transversely of the axis of the master gear, a shoulder 28 on the yoke being arranged to normally rest in the path of the projections 23 and 24 of the master gear as the latter is turned by the roller 3, a spring 29 normally operating on the escapement to hold the said shoulder in the path of the said projections to arrest the movement of the master gear at such points that the imperforate portions of the curtain will cover the exposure opening of the shutter between the instantaneous or automatically timed exposures, and will center the opening for the time exposure. This yoke 25 is provided with a cam surface 30 leading to the shoulder 28 for permitting a ratchet movement of the projections 23 and 24 past the shoulder 28 during the reverse movement of the master gear for winding the curtain upon the roller 3 preparatory to the desired exposure or exposures, while movement of the master gear in the opposite directions will be prevented by engagement of the projection 23 or 24 with the shoulder or abutment 28 of the escapement.

In order to prevent liability of rebounding movement of the master gear and consequent buckling or loosening of the curtain across the exposure aperture after the exposures, and especially after the very rapid exposures, which in some cases might permit a leakage of light past the curtain, it is preferable to employ a check safety device, in the present instance, a latch or detent being arranged to engage behind one of the projections on the master gear after it has passed a given point and thus prevent reverse movement of the master gear. This device in the present instance is composed of a cross arm 31 rigidly attached to the escapement and provided with a shoulder 32 arranged to rest in the path of one of the projections on the master gear while the escapement is in actuated position, as shown in Fig. 7, and a finger 33 projecting laterally from this arm and provided with a laterally-offset latch 34 arranged to be deflected by one of the projections on the master gear in moving into engagement with the shoulder 32, the latch at that time moving behind the projection and confining the latter between the latch and the shoulder 32 of the escapement, and when the escapement is released and returns to normal position under action of the spring 29 the latch will move out of the path of the projections of the master gear. The shoulder 32 is formed in the present instance by a plate 1 (shown in dotted lines in Figs. 6 and 7) secured in any suitable manner to the underside of the cross arm 31. Any suitable means may be provided for actuating the escapement to effect the different exposures, a pneumatic motor being shown in the present instance comprising a cylinder 35 having a tube-attaching nipple 36 thereon extending through the plate 18 to which it is

riveted to serve as a fastening for the cylinder, and to provide a connection exteriorly of the plate 18 for the usual bulb tube.

A piston 37 is fitted into this cylinder and is arranged to actuate the lever 38, the latter being pivoted to the plate 18 at 39 and provided with a finger 40 arranged to move the escapement into actuated position against the action of the spring 29, by engagement with the plate forming the shoulder 32. In order to permit manual operation of the shutter also, a suitable operating projection 41 is preferably provided on the lever 38, and extending through a slot 42 in the plate 18 to the exterior of the shutter casing, lifting of this projection serving to carry the shoulder 28 of the escapement out of the path of the projection 23 and permit rotation of the master gear until the projection 23 just released engages the shoulder 32 of the escapement. The ratio of gearing between the master gear and the roller 3, of course, would be determined by the length of curtain to be carried across the field of the lens at each exposure, the ratio being such in the present instance that a sufficient amount of the curtain will be fed at each half revolution of the gear 22, but this may be varied to suit different requirements.

In order to enable the operator to determine the width of the aperture in the curtain that will cross the field of the lens at the next exposure, it is preferable to employ a suitable indicator, the device shown in the present instance for serving this purpose embodying a disk 43 journaled in the under side of the plate 18 and having characters thereon for appropriately indicating the character of the next exposure, these characters being arranged to register with a sight aperture 44 in the plate 18, and this disk may be operated by any of the curtain-controlling mechanism described, it being turned in the present instance by means of a pinion 45 on the master gear.

In manufacturing shutters of the type described in different sizes to accommodate films, plates or sensitized materials of different sizes, or to adapt them to cameras of different sizes, the cost of manufacture may be materially reduced by so constructing the plates 9 and 18 and their connected parts that they may be applied interchangeably to shutter casings of different sizes, and Figs. 3 and 4 illustrate a mode of constructing these parts that will enable them to be made of ample size, and they may be also applied to comparatively small shutters without change, and consists in arranging the indicator disk 16 at the upper left hand corner of the lower plate 9, and arranging the motor 35 and the supporting nipple thereon at the lower right hand corner of the upper plate 18, and cutting the edges of these two plates obliquely, or on a line extending between the part 36 on the upper plate and the upper edge of the disk 16 on the lower plate so that these parts may be brought together very closely, and the scale or table 47, which is preferably arranged between the plates 9 and 18 for facilitating selection of the appropriate exposure has its upper and lower edges cut on lines corresponding to those of the lower and upper edges of the plates 18 and 9 respectively, so that it may be fitted compactly between the upper and lower plates.

In preparing the shutter for an exposure, the handle 48 secured to the shaft of the master gear is rotated in the direction indicated by the arrow in Fig. 3, winding the curtain on the roller 3 until the character indicating the aperture of the desired width is visible through the sight aperture 44, the master gear being turned during this operation in the direction indicated by the arrow in Fig. 6 causing the projections thereon to coöperate with the cam surface 30 of the escapement to operate the latter and permit these projections to engage the shoulder 28 of the escapement and thus normally prevent unwinding movement of the roller 3 under the action of its actuating spring. The shutter is released by lifting movement of the lever 38, either under the influence of the piston 37 of the motor or by the manually-operated projection 41, moving the escapement to actuated position as shown in Fig. 7, the shoulder 28 of the escapement being moved out of the path of the projections of the master gear and the shoulder 32 being moved into a position to engage the projection at the opposite side of the gear and thereby arrest the movement thereof, the latch 34 engaging behind the projection after striking the arresting shoulder to prevent its rebounding. The movement of the master gear just described will permit rotation of the rollers sufficient to move a slit of the curtain completely across the field of the lens in making the rapid or automatically timed exposures, and to carry the full sized opening into and out of register with the exposure opening of the shutter.

A photographic shutter constructed in accordance with my present invention prevents possibility of fogging the negative by reason of a rebounding of the unwinding roller that will loosen or buckle the curtain between the rollers or permit it to return the aperture toward the field of the lens after an exposure has been completed by reason of the safety device or check described, and furthermore not only insures maintenance of the proper coöperative relation of the parts composing the mechanism of the shutter, but these parts are so mounted that they may be bodily applied interchangeably to shutters of different dimensions, thereby insuring their correct operation, and cheapening the cost of the shutters as all of the parts may be pro-

duced by the same dies or tools and assembled most conveniently.

I claim as my invention:

1. In a photographic shutter, the combination with a suitable casing, a curtain or blind therein provided with an exposure opening, and suitable curtain operating means, of a member arranged to operate with the curtain, a controlling device mounted to coöperate with said member, for controlling the movements of the curtain, and a check coöperating with said member and controlling device for preventing retrograde movement of the curtain after an exposure.

2. In a photographic shutter, the combination with a suitable casing, curtain rollers mounted therein, a curtain arranged to be operated by said rollers and having a suitable exposure aperture, and a curtain actuating spring operating on one of said rollers, of a member operatively connected to one of said rollers, an escapement arranged to coöperate with said member for arresting the movement of the curtain, and a check coöperating with the said member to prevent retrograde movement of the curtain after an exposure.

3. In a photographic shutter, the combination with a suitable casing, curtain rollers mounted therein, a curtain arranged to be operated by said rollers and having a suitable exposure aperture, and a curtain actuating spring operatively connected to one of the rollers, of a member operatively connected to one of said rollers, an escapement arranged to coöperate with said member to arrest the movement of the curtain, and a latch on one of the parts arranged to automatically engage the other part to prevent retrograde movement of the curtain after an exposure.

4. In a photographic shutter, the combination with a suitable casing, curtain rollers mounted therein, a curtain passing over said rollers and having an exposure aperture therein, and a curtain actuating spring operating on one of said rollers, of a gear operatively connected to the roller opposite to the one provided with said actuating spring, and having projections thereon, an escapement having a shoulder thereon arranged to coöperate with the projections of said gear to arrest the movement of the curtain, and a latch on the escapement arranged to coöperate with said projections to retain them in coöperative relation with the shoulder of the escapement to prevent retrograde movement of the curtain.

5. In a photographic shutter, the combination with a suitable casing, curtain rollers mounted therein, a curtain arranged to be operated by the said rollers and having a suitable exposure aperture, and a curtain actuating spring adapted to operate one of said rollers, of curtain controlling mechanism embodying a rotatable member operatively connected to the curtain roller opposite to that operated on by said spring, and provided with a projection, an escapement having a shoulder thereon adapted to coöperate with said projection to arrest the movement of the curtain, and a latch arranged to coöperate with said projection to retain it in coöperative relation with said shoulder and prevent retrograde movement of the curtain.

6. In a photographic shutter, the combination with a suitable casing, curtain rollers mounted therein, a curtain arranged to be operated by said rollers, and suitable curtain operating means, of a controlling member arranged to operate with the curtain, and having a projection thereon, an escapement having a portion thereon arranged to coöperate with said projection to arrest the movement of the curtain, and a latch arranged on the escapement and adapted to coöperate with the projection on the controlling member for preventing retrograde movement of the curtain after an exposure.

7. In a photographic shutter, the combination with a suitable casing, curtain rollers mounted therein, a curtain arranged to be operated by the said rollers, and suitable means for operating the curtain, of a curtain controlling and setting member arranged to operate with the curtain and having a projection thereon, an escapement having a shoulder arranged to coöperate with said projection when the escapement is in actuated position to arrest the movement of the said member, and a latch carried by the escapement arranged to be engaged by said projection when the escapement is in actuated position to prevent retrograde movement of the said member, and arranged to be free of said projection when the escapement occupies a normal position.

8. In a photographic shutter, the combination with a suitable casing having curtain rollers therein, a curtain arranged to cooperate with said rollers, and suitable curtain operating means, of a curtain controlling and setting member operatively connected to one of the rollers, and having projections thereon, an escapement having a shoulder thereon arranged to coöperate with one of said projections when the escapement is in normal position to retain the curtain from operation, and provided with a second shoulder arranged to coöperate with a projection when the escapement is in actuated position to arrest the movement of the said member after an exposure has been effected, and a latch on the escapement arranged to be engaged by one of the projections of the said member when the escapement is in actuated position to prevent retrograde movement of the curtain after an exposure has been effected.

9. In a photographic shutter, the combination with a suitable casing having cur-

tain rollers therein, and a curtain arranged to be operated thereby, of a curtain controlling member operatively connected to one of the rollers and having a projection thereon, an escapement having a portion adapted to coöperate with said projection when the escapement is in actuated position to arrest the movement of said member, and a latch adapted to coöperate with said projection when the escapement is in actuated position to prevent retrograde movement of said member embodying an arm movable with the escapement and yieldable in a direction laterally of the plane of movement of said projection and provided with a laterally turned projection-engaging portion.

10. In a roller blind shutter, the combination with a suitable casing, curtain rollers arranged therein and having their ends journaled in one side of the shutter casing, and a curtain for said rollers, of upper and lower bearing plates adapted to provide bearings for the other ends of said rollers and secured to the side of the casing, an indicator arranged at one side of the lower plate, shutter controlling mechanism carried by the upper plate and embodying a releasing device arranged at the side of the plate opposite to that of the lower plate on which the indicator is arranged, the proximate edges of the said plates extending obliquely between the indicator and releasing device.

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