

Fig. 1.

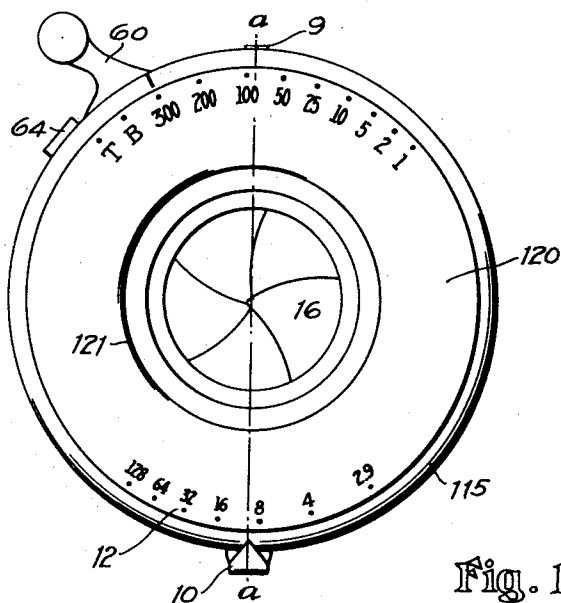


Fig. 19.

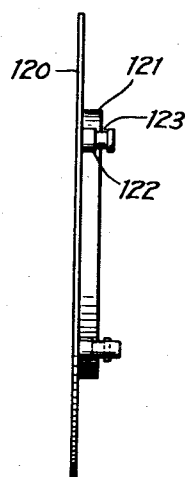
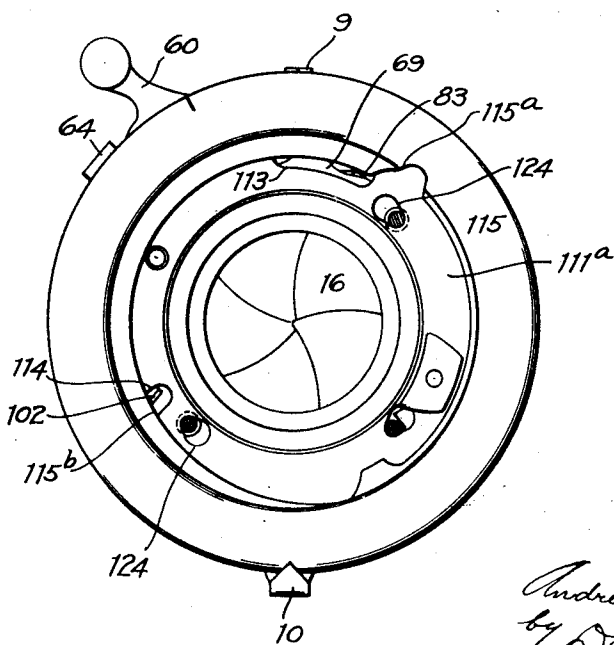


Fig. 2.

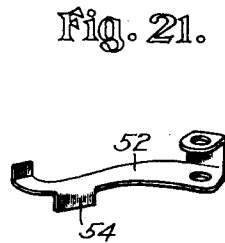
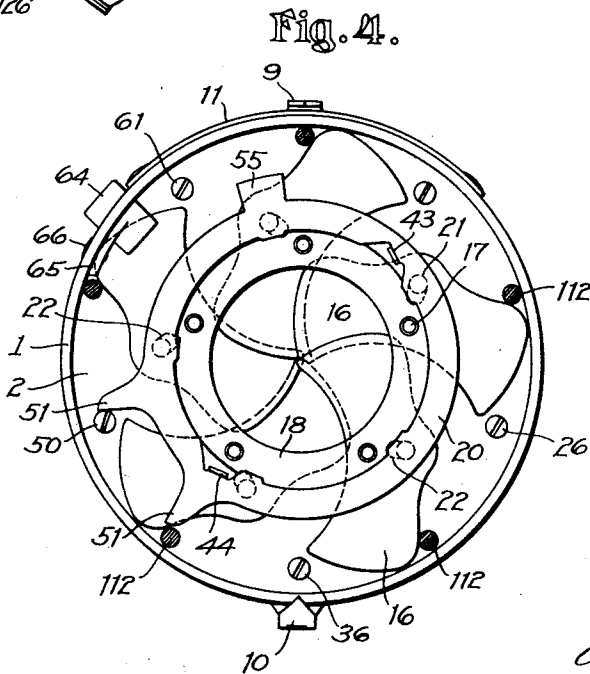
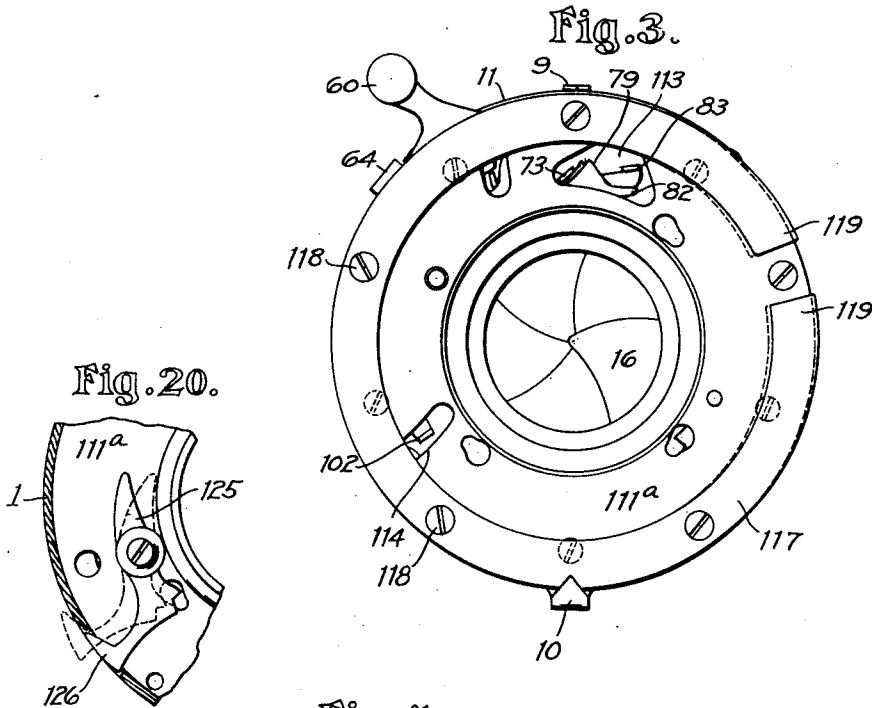


Inventor:
Andrew Wollesak
by *Davis & Sumner*
Attorneys.

A. WOLLENSAK.
 PHOTOGRAPHIC SHUTTER.
 APPLICATION FILED MAR. 9, 1916.

1,214,250.

Patented Jan. 30, 1917.
 8 SHEETS—SHEET 2.



Inventor:
Andreas Wollehsak
 by *Davis & Simms*
Attorneys.

1,214,250.

Patented Jan. 30, 1917.

8 SHEETS—SHEET 3.

Fig. 22.

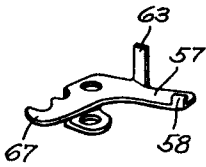


Fig. 5.

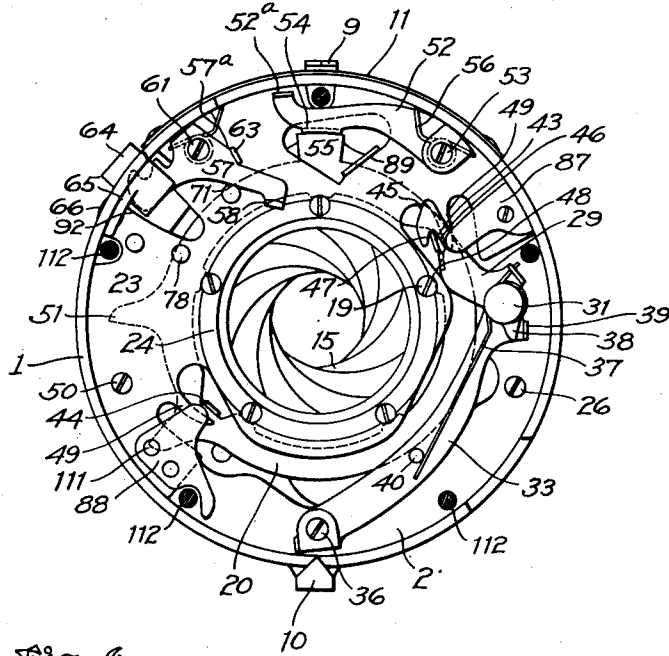


Fig. 6.

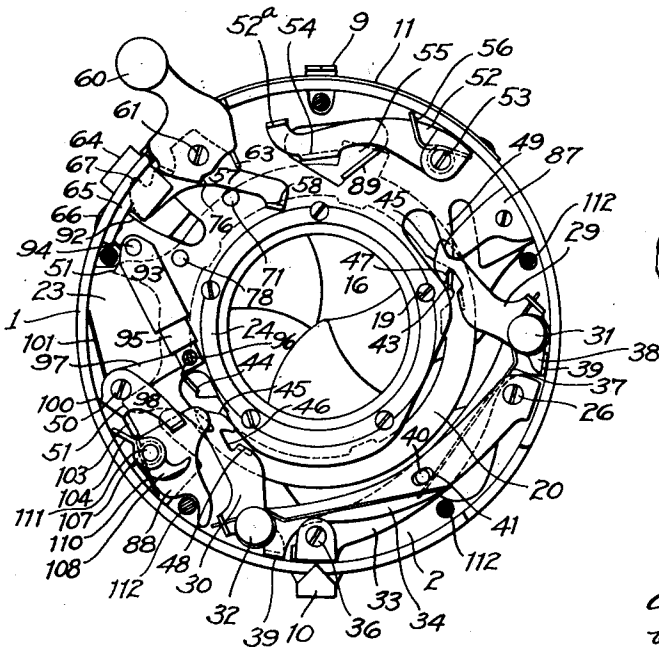
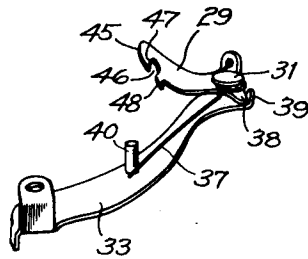


Fig. 23.



Inventor:

Andrew Wollesak
by *Davis Sumner*
Attorneys

A. WOLLENSAK.
 PHOTOGRAPHIC SHUTTER.
 APPLICATION FILED MAR. 9, 1916.

1,214,250.

Patented Jan. 30, 1917.

8 SHEETS—SHEET 4.

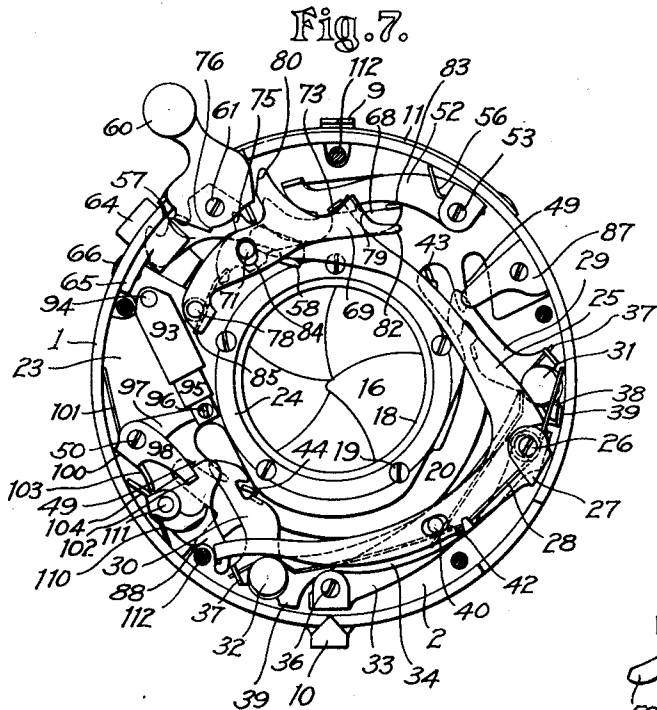
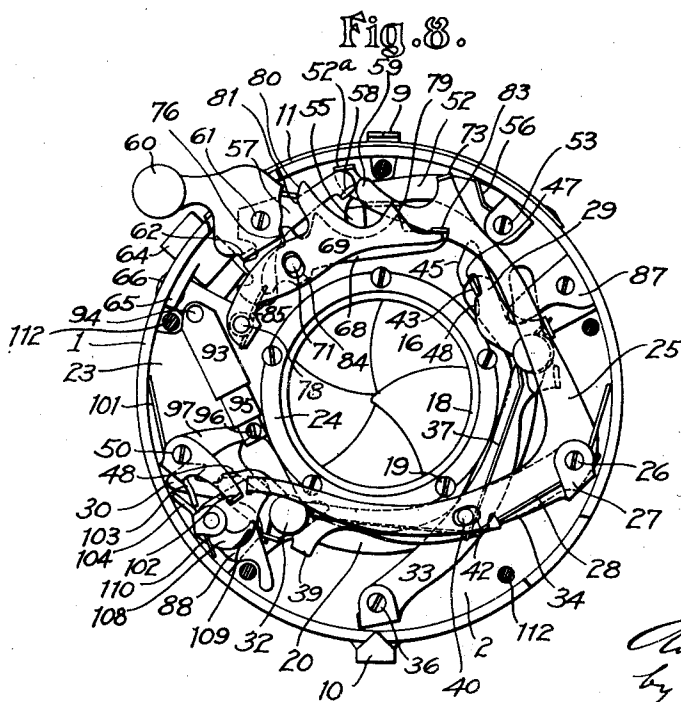
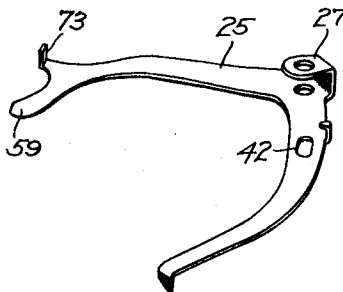


Fig. 24.



Inventor:
Audruer Wolleusak
 by *Davis & Linn*
 Attorneys

Fig. 9.

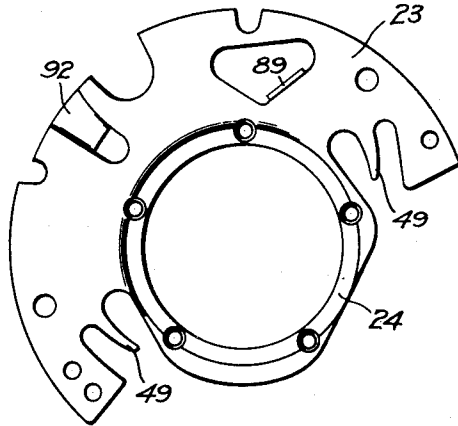


Fig. 11.

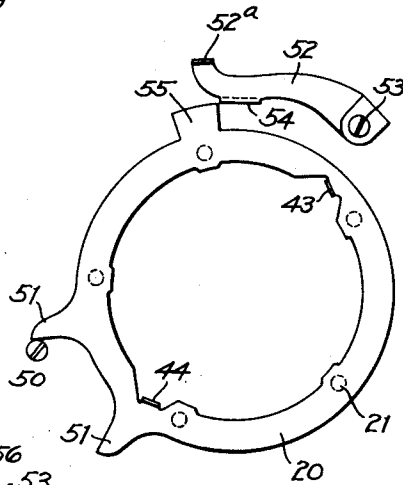
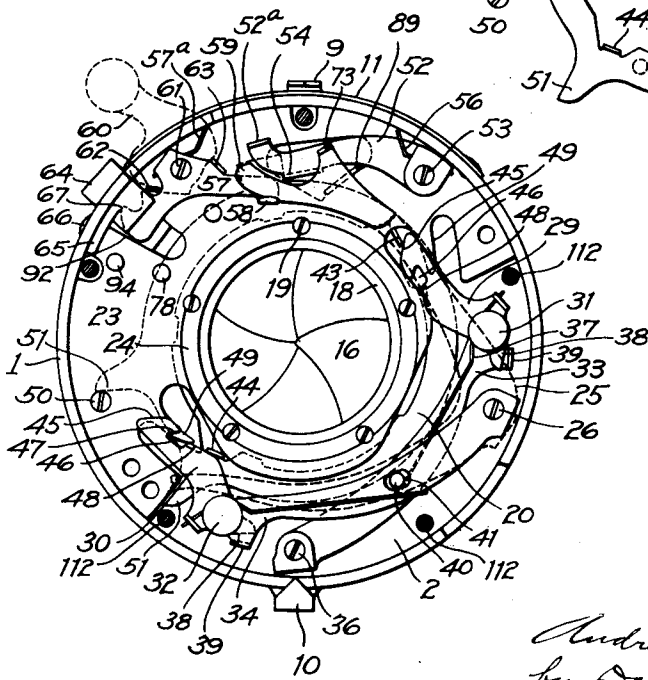


Fig. 10.



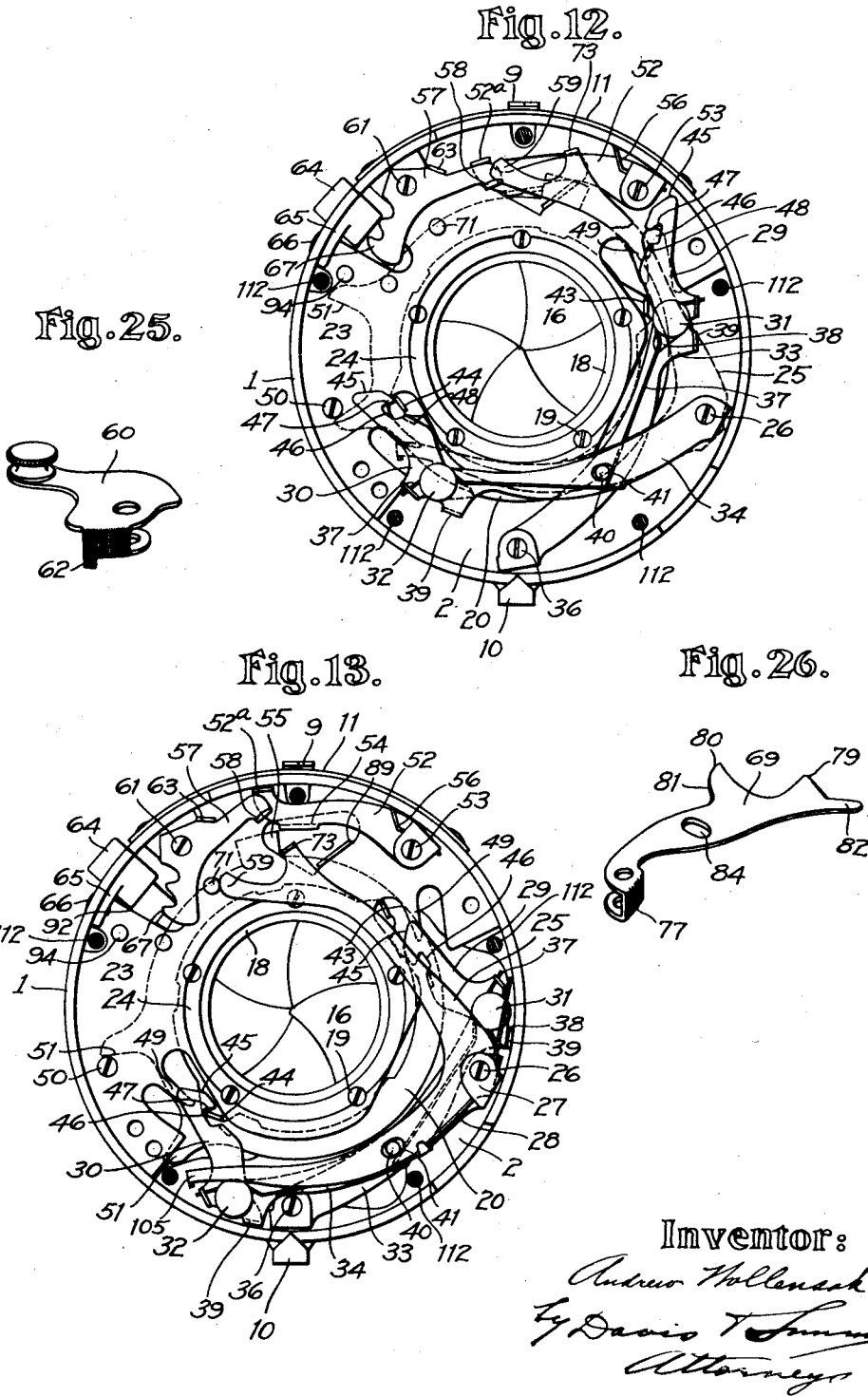
Inventor:
Andrew Wollesak
by *Davis & Sumner*
Attorneys

A. WOLLENSAK.
PHOTOGRAPHIC SHUTTER.
APPLICATION FILED MAR. 9, 1916.

1,214,250.

Patented Jan. 30, 1917.

8 SHEETS—SHEET 6.

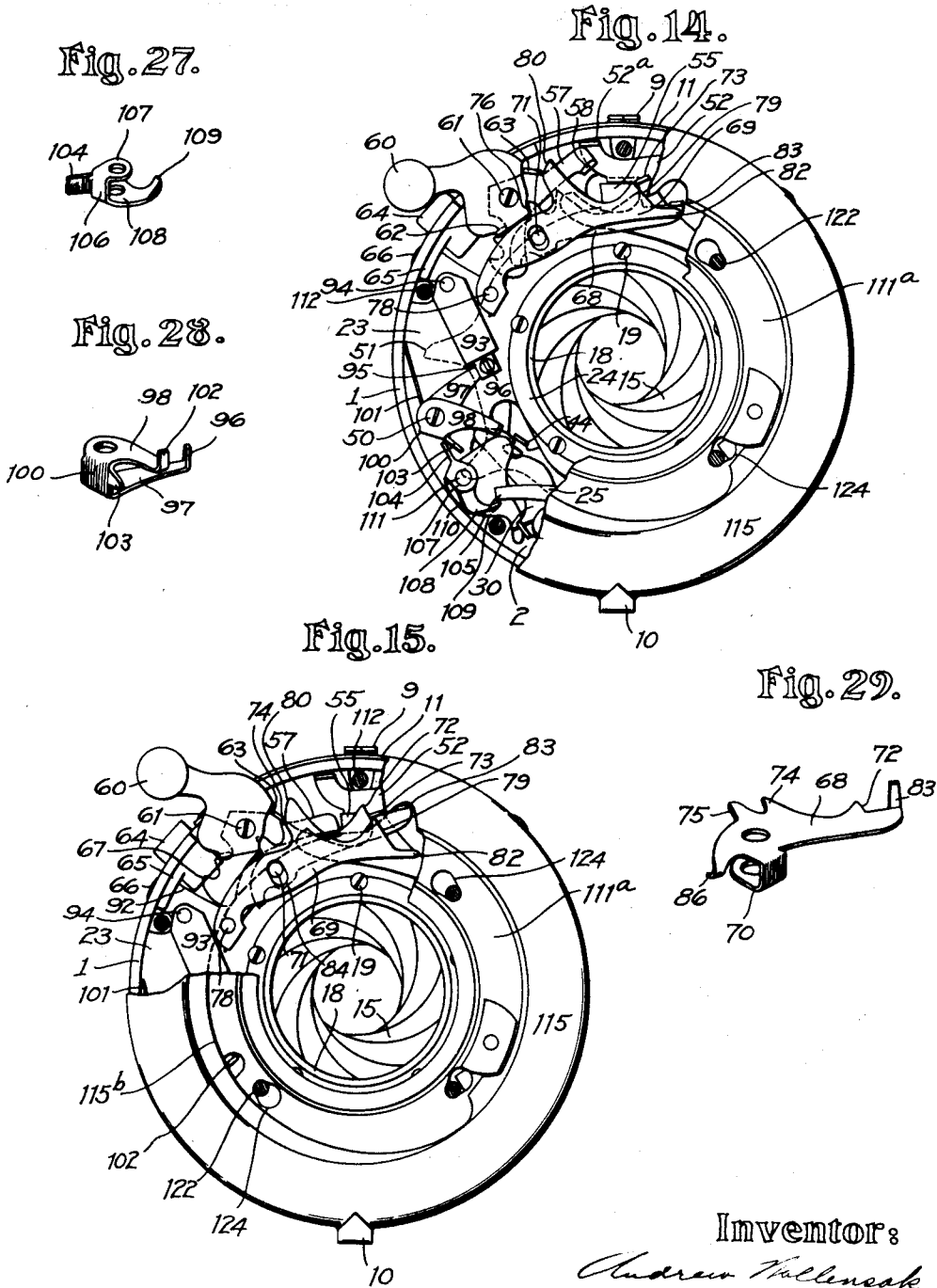


Inventor:
Andrew Wollesak
by *Davis & Linn*
Attorneys

1,214,250.

Patented Jan. 30, 1917.

8 SHEETS—SHEET 7.



Inventor:
Andrew Wolleuskak
by *Davis & Linn*
Attorneys

1,214,250.

Patented Jan. 30, 1917.
8 SHEETS—SHEET 8.

Fig. 16.

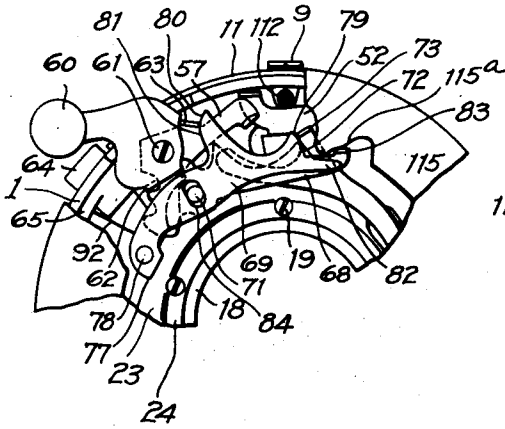


Fig. 17.

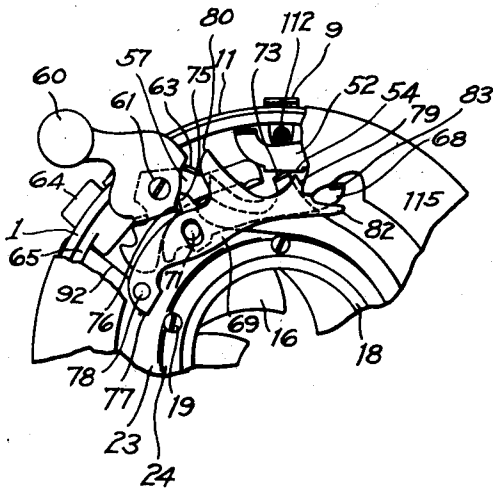
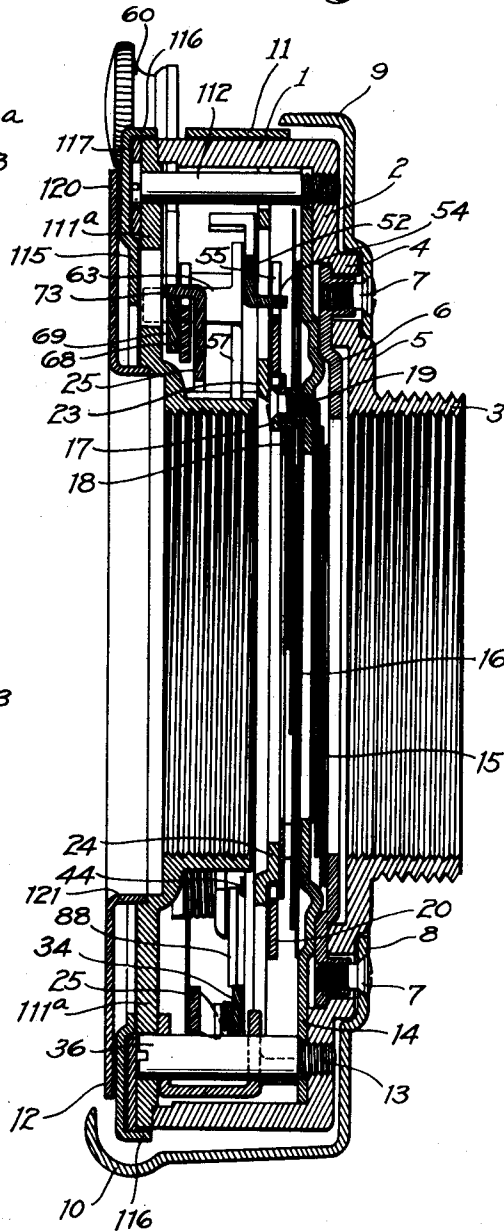


Fig. 18.



Inventor:

Andrew Wollesak
by Davis & Jimmy
Attorneys.

UNITED STATES PATENT OFFICE.

ANDREW WOLLENSAK, OF ROCHESTER, NEW YORK, ASSIGNOR TO WOLLENSAK OPTICAL COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

PHOTOGRAPHIC SHUTTER.

1,214,250.

Specification of Letters Patent. Patented Jan. 30, 1917.

Application filed March 9, 1916. Serial No. 83,180.

To all whom it may concern:

Be it known that I, ANDREW WOLLENSAK, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Photographic Shutters, of which the following is a specification.

The present invention relates to photographic shutters, and an object thereof is to provide an improved construction in which the photographic blades are adapted to open and close the exposure opening by a simultaneous continued movement in one direction.

Another object of the invention is to so construct a shutter having such blade movement that it may be operated automatically, that is, set and released by a single operating device.

Still another object of the invention is to provide a simple and inexpensive mounting for the exposure ring which connects with the blades to effect their movements.

A further object of the invention is to improve the connection between the wire release and the operating or actuating lever of the shutter.

A still further object of the invention is to improve the retarding mechanism so that it acts upon the blades while the latter are beyond the range of the exposure opening. And still another object of the invention is to provide an improved connection between the controlling ring and the shutter casing on which the ring is mounted.

To these and other ends, the invention consists of certain parts and combinations of parts all of which will be hereinafter described, the novel features being pointed out in the appended claims.

In the drawings:—Figure 1 is a front view of a shutter embodying the present improvements; Fig. 2 is a view of the shutter with the indicator plate removed; Fig. 3 is a view of the shutter with the indicator plate and the controlling ring removed; Fig. 4 is a view illustrating the exposure mechanism; Fig. 5 is an interior view of the shutter with parts removed, illustrating the connection between one of the latches and the exposure ring, the latch being shown in a position which it occupies while the shutter blades are open; Fig. 6 is an interior view with parts removed, showing

the shutter blades in one of their closed positions and the position of the latches at such time; Fig. 7 is an interior view of the shutter with the indicator plate, the cam ring, and the top or cover plate removed, the parts being in the positions which they occupy before the shutter is actuated; Fig. 8 is a view similar to Fig. 7, showing the parts in the positions which they occupy at the time the master member is about to be released by the actuating lever; Fig. 9 is a detail view of the plate which supports the bulb and time detents, and carries the fixed abutments which hold the latches out of connection with the exposure ring; Fig. 10 is an interior view of the shutter with the retarding mechanism removed as well as the bulb and time detents, the master member being shown partially in full lines and partially in dotted lines; the purpose of this view being to show the manner in which the latches are shifted alternately by the lugs on the exposure member into engagement with the fixed retaining devices; Fig. 11 is a detail view of the exposure member and its cooperating detent; Fig. 12 is a view similar to Fig. 10 in which the latches are shifted so that one of them is about to engage with the exposure member, while the other is held out of connection with the exposure member; Fig. 13 is a view similar to Figs. 10 and 12 showing the positions of the parts after the master member has been released and the blades closed; Figs. 14 and 15 are views of the shutter showing the front indicator plate removed and parts of the cam ring and top plate broken away in order to illustrate two positions of the time and bulb detents when the shutter is adjusted for time exposure; Figs. 16 and 17 are two detail views illustrating two positions of the time and bulb detents when the shutter is adjusted for bulb exposure; Fig. 18 is an axial section through the shutter on the line *a— a* of Fig. 1; Fig. 19 is a detail side view of the indicator plate; Fig. 20 is a detail view showing the manner in which the detent secures the indicator plate in position; Fig. 21 is a detail perspective view of the detent for holding the exposure ring against movement; Fig. 22 is a detail view of the operating or actuating lever which moves the master member against the action of its spring; Fig. 23 is a detail view of one of the latches which

shifts the exposure ring together with the supporting lever for such latch; Fig. 24 is a detail view of the master member; Fig. 25 is a detail view of the finger piece which forms part of the operating lever; Fig. 26 is a detail view of the bulb detent; Figs. 27 and 28 are detail views of two levers employed in the retarding mechanism; and Fig. 29 is a detail view of the time detent.

In the illustrated embodiment of the invention there is employed a casing comprising preferably a ring portion 1 projecting laterally from an annular or wall portion 2 and an externally and internally threaded flange or ring portion 3 projecting from the annular portion 2 in a direction opposite from that in which the ring portion 1 extends, the portion 3 serving for attaching the shutter to the camera. The wall or annular portion 2 is provided with two concentric depressed portions 4 and 5, and on one of these depressed portions the rotary member 6 of the iris diaphragm is seated. This rotary member may be connected by screws 7 with an indicator ring 8 arranged on the exterior of the casing, and having two pointers 9 and 10, the former cooperating with a scale 11 on the periphery of the casing and the latter cooperating with a scale 12 on the indicating plate of the shutter. Secured to the inner face of the wall 2 by screws 13 is a stationary iris plate or ring 14, the iris blades 15 being connected at one end to this plate and at the other end to the plate or rotary member 6 in any suitable manner as, for instance, in the manner shown in U. S. Letters Patent No. 993,431, granted to Wollensak Optical Company on May 30, 1911.

Next to the iris diaphragm the exposure mechanism is arranged. This mechanism embodies certain features which are novel in the art, and comprises in this instance a plurality of blades 16 pivoted at 17 on hollow posts which are struck up from the fixed iris plate 14. The form and operation of these blades are similar to those disclosed in U. S. Patent No. 961,192, granted June 14, 1910, to Wollensak Optical Company, in which the blades are adapted to open and close the exposure opening by simultaneous continued movement in one direction, and then performing the same operation in the other direction. The blades may be held on the posts 17 by a retaining ring 18, which is secured in place by screws 19 engaging the posts 17. This retaining ring may also serve as a bearing for the exposure or operating ring 20, the latter having lugs or pintles 21 extending from one face thereof and operating in slots 22 in the blades 16 for the purpose of connecting with the blades. These lugs or pintles 21 also cooperate with the outer periphery of the retaining ring 18, and in this way serve to guide the operat-

ing ring 20 in its rotary movement. This manner of securing the blades and supporting the operating ring is one of the features of the present invention.

For the purpose of supporting certain parts of the operating mechanism in spaced relation to the blades there may be provided a supporting plate 23, shown in detail in Fig. 9. This plate has a central depressed portion 24 lying in abutment with the retaining ring 18 and held thereto by the screws 19, so that the said parts of the operating mechanism are supported from a point within the exposure ring or member 20, and it is unnecessary to provide the wall 2 with posts which would interfere with the operation of the shutter blades. This plate also serves to retain the exposure ring 20 in cooperation with the retaining ring 18.

The operating mechanism for the blades or exposure mechanism comprises preferably a motor or master member 25, shown in detail in Fig. 24, and comprising preferably a curved lever pivoted substantially midway between its ends on a post 26 which forms an extension of one of the screws 13. In this instance this master member is provided with an extension 27 which is formed in one piece therewith and is also journaled on the post 26 in order to give rigidity to the master member 25. A spring 28 acts on the master member to move the latter in one direction.

In Patent No. 961,192 hereinbefore mentioned there is provided a connection between the master or motor member and the exposure mechanism whereby the master member can, by moving in one direction only, operate the exposure member in either one of two directions so that in each direction of movement of the exposure member the blades open and close the shutter by a continued movement of such blades in one direction. The mechanism therein shown is embodied in a so-called "setting" shutter, and it is the purpose of the present improvement to simplify the construction therein shown and at the same time adapt the same for use in what is known to the trade as an "automatic" shutter. The present mechanism comprises preferably two relatively movable latches 29 and 30 preferably pivoted, respectively, at 31 and 32 to movable supports 33 and 34, respectively. These supports in this instance are in the form of crossed levers pivoted at 26 and 36, respectively, and each carrying a spring 37 which operates upon its respective latch normally to hold a stop shoulder 38 on the latch against a stop shoulder 39 on its support. In this instance, the pivot 26 of the movable support 34 is common to the pivot of the master member 25, while the pivot 36 is a post forming an extension of one of the screws 13. Connection between the two

supports 33 and the master member 25 is preferably established by means of a pin or projection 40 on the lever 33, extending through a slot 41 in the lever 34 and a slot 42 in the master lever 25, so that when the master lever is moved in either direction, motion is transmitted to the movable levers or supports 33 and 34, and through them to the latches 29 and 30. Plates 87 and 88 are secured to the supporting plate 23 to extend over the latches to confine them against lateral movement.

The latches 29 and 30 are adapted to cooperate with lugs 43 and 44, respectively, on the exposure ring or member 20, the lugs being arranged substantially at diametrically opposite points on the exposure ring so as to be located on opposite sides of the exposure opening. It is apparent that both of these lugs will not lie simultaneously in positions where they can be operatively engaged by the latches 29 and 30, but that only one of such projections or lugs will lie in such operative position, and that when so arranged the latch 29 or 30 which cooperates therewith will first engage the lug or projection at the bevel portion 45 to place the spring of the latch under tension, after which the notch 46 will be reached, when the latch will hook over the projection so that upon the return movement of the master member 25 the shoulder 47 on the latch will engage the projection and pull the shutter blades first to an open position and then to the closed position by a continued movement of the blades in one direction.

On the next movement of the master member the other latch will be switched into connection with the exposure mechanism, while the latch previously operating will be switched out of operative connection with the exposure mechanism. For effecting this disconnection of either latch with the exposure mechanism, while the other latch is operating to produce the exposure operation, each latch is provided with an inclined face or shoulder 48 which is adapted to cooperate or engage with its corresponding lug or projection 43 or 44 on the exposure member when such lug or projection lies in inoperative position. This engagement or cooperation kicks the latch slightly to one side of the path it takes on effective operation, so that the lug or projection 48 forming the inclined face is shifted into cooperation with a stationary guide or abutment 49 which, in this instance, is formed on the supporting plate 23 and serves to retain or hold the latch out of the path of its projection on the exposure member 20 during the movement of said exposure member projection back to its normal or effective position. When a projection on the exposure member 20 is in effective position it cannot

be engaged by its latch, and as a consequence the latch moves toward the projection without being brought into engagement with the retaining device 49. The rotation of the exposure member 20 is limited in both directions by a stop 50 which forms an extension of one of the screws 13, and is engaged by two projections 51 on the exposure ring 20 at the two limits of the movement of the latter.

It is also desirable to provide some means of maintaining the exposure mechanism against accidental movement either under the action of jars or due to the engagement between the latches 29 and 30 and their respective lugs 43 and 44 on the exposure ring 20. To this end there may be provided a detent 52 which is preferably pivoted at 53 on a post which forms an extension of one of the screws 13. This detent has a lateral extension 54, the length of which corresponds to the length of the movement of the exposure member 20, so that opposite ends thereof may be engaged by opposite ends of a projection 55 on the exposure member 20. A spring 56 tends normally to move this detent 52 to retaining position.

Any suitable means may be employed for operating the master member to set position. In this instance a lever part 57, substantially in the form of a bell-crank, has a lateral projection 58 near one end for cooperating with the end 59 of the master member, cooperation taking place while the master member is being shifted to establish connection between one of the latches 29 and 30 and the exposure member 20, after which the lug 58 slips out of engagement with the master member to free the latter in order that said master member may return under the action of its spring 28 for effecting the opening and closing of the shutter blades. The arrangement of the lateral projection 58 on the operating lever 57 permits a greater movement of the master lever with a given throw or movement of the operating lever, as it is possible for the end of the actuating lever to move so as to engage the master lever at a point removed from its end and then to move toward the end of the master lever. The lever part 57 may be moved by a finger piece 60 which, in this instance, is formed from a separate piece of metal, turns on a post 61 on which the operating lever part 57 also turns, and carries a depending projection 62 which engages with the lever part 57. Engagement between the lever part 57 and the finger piece is also effected by a lug 63 on the lever 57 extending into engagement with the opposite side of the finger piece 60. A spring 57^a tends to hold the operating lever in normal position.

The shutter is also capable of being operated through the means of a release wire,

the sheath of which connects with an internally threaded tube 64 which is provided with a laterally extending arm 65 lying on the interior of the shutter casing and held against the inner wall of the latter by a screw 66. This tube 64 is cut away on the side opposite the operating lever 63 in order that the end 67 of the lever may project into the tube for engagement by the socketed end 68 of the release wire. By this arrangement, the release wire is prevented from becoming disengaged from the end 67 of the operating lever 57, when the shutter is actuated to close the same while being held open by the time detent to be hereinafter described. The construction of this securing device for the release wire forms one of the features of this invention. The supporting plate 23 is provided with a depression 92, which forms a continuation of the lower wall of the attaching tube and assists in the guiding action of the socketed end of the cable release wire.

When the master or motor lever 25 is shifted by the operating lever 57 the latter also engages a lateral projection 52^a on the detent 52 so as to shift the detent in order to free the exposure member 20. At the time the master member is freed by the operating member 57, the projection 54 on the detent 52 passes out of engagement with the projection 55 on the exposure member 20 so that the exposure member is free to turn under the action of the master member.

The shutter is provided with means whereby it may be held open until actuated a second time to close the same, or it may be held open as long as pressure is applied to the operating devices. Any suitable arrangement may be employed for producing these results, but in the illustrated embodiment two detents 68 and 69 are employed, the former holding the shutter open until the operating devices are operated a second time, and the latter holding the shutter open as long as pressure is applied to the operating devices. The detent 68 is provided with a bearing extension 70 struck up from the piece of metal from which the detent is formed and bent laterally so as to turn on the post 71, which projects from the plate 23. A shoulder 72 on the detent 68 is carried by the detent into the path of the extension 73 on the master lever, so as to hold the latter in a position to retain the blades in open position. Under normal conditions the shoulder 63 on the operating lever 57 coöperates with the shoulder 74 on the time detent 68 to hold the latter against movement into the path of the master lever, but when the operating lever 57 is moved to shift the master lever in order to place tension on the spring of the latter, the time detent 68 is freed by the operating lever 57 and permitted to move into the

path of the master member under the action of a spring to be hereinafter described. After the time detent 68 has moved into the path of the master member a shoulder 75 thereon enters into coöperation with the shoulder 76 on the finger piece part 60 of the operating lever, so that when the finger piece is again actuated the shoulder 76 will engage the shoulder 75 and shift the shoulder 72 on the time detent 68 out of the path of the projection 73 on the master lever. The time detent may be held out of operation by a controlling member to be hereinafter described.

The bulb detent 69 has a lateral bearing extension 77 which turns on a pin 78 extending from the supporting plate 23. This bulb detent is provided with a shoulder 79 which is adapted to move in the path of the shoulder extension 73 of the master member to hold the latter against movement as long as the bulb detent lies in its path. In order that the bulb detent shall be moved out of the path of the master member upon the return movement of the operating member 57, the bulb detent is provided with a cam face 80 which coöperates with the lateral shoulder 63 on the operating member. On the return movement of the operating member 57, the shoulder 63 rides on the cam face 80 and forces the bulb detent 69 in a direction to carry the shoulder 79 thereon out of the path of the projection 73 on the master member, after which the lateral shoulder 63 enters into coöperation with the shoulder 81 on the bulb detent 69, and holds the bulb detent against movement. The bulb detent is provided with an extension 82, which coöperates with a lateral shoulder 83 on the time detent, so that when the time detent is moved to its extreme position out of coöperation with the master lever by the controlling member which coöperates with said lateral extension 83, the bulb detent will also be held out of operation. The bulb detent overlies the time detent and is provided with a slot 84, which receives the pivot pin 71 of the time detent. A spring 85 is coiled about the pivot pin 78, and has one arm engaging the bulb detent 69 and the other arm extended and coöperating with a lateral extension 86 on the time detent 68, so that a single spring acts on the time and bulb detents, notwithstanding the fact that both are arranged to turn upon different centers. A lug 89 on the supporting plate 23 prevents the master lever from being pressed toward the supporting plate.

A retarding mechanism may be embodied in the shutter, and may be of any desirable form. In this instance there is employed a dash pot 93 pivotally supported at 94 on a pin that projects from the supporting plate 23. Within this dash-pot operates a plunger 95 to which is pivotally connected at 96

a bell-crank lever formed of two arms 97 and 98, each turning on the pin 50 and connected by a vertical portion 100. A spring 101 is arranged between the two arms of the bell-crank lever and acts on the latter in a direction to withdraw the plunger from the dash pot. The arm 98 or upper arm of the bell-crank lever has a lateral extension 102, which is controlled in such a manner as to cause the retarding action to be varied. From the vertical portion 100 of the retarding lever an arm 103 extends, and with this arm coöperates an arm 104 on an intermediate lever interposed between the retarding lever and the end 105 of the master member 25. This intermediate lever is also formed from a single piece of sheet material bent to provide a vertical portion 106, and two bearing portions 107 and 108, from the latter of which an arm 109 extends for coöperation with the end 105 of the member 25. A spring 110 is arranged between the bearing portions 107 and 108 about the pivot 111, which extends from the supporting plate 23. The end 105 of the master lever 25 is flexible so that when the master member is moved, under the action of the operating lever 57, it rides over the arm 109 of the intermediate lever of the retarding mechanism, without affecting such lever, but upon a return movement of the master lever, and while the latter is in such a position that the exposure blades are not visible through the exposure opening, the end 105 of the master lever engages with the arm 109 of the intermediate lever and shifts the latter against the action of its spring 110, eventually slipping off said intermediate lever to permit the latter to return to normal position under the action of its spring 110, this slipping off occurring while the blades are still beyond the field of the exposure opening, so that the retarding mechanism operates on the shutter while the blades are away from the field of the exposure opening. To prevent interference between the end 105 of the master lever and the parts beneath the same the end 105 travels in contact with the plate 88. When the intermediate lever of the retarding mechanism is acted upon by the master member, the arm 104 of the intermediate lever engages the arm 103 of the retarding lever, the engagement being such that the retarding lever arm 103 first slides away from the pivot of the intermediate lever until such a time that the two arms lie in flat engagement one upon the other, after which the end of the arm 104 engages the arm 103 and moves away from the pivot of the lever. By this coöperation, during the first part of the retarding action, the intermediate lever exerts on the retarding lever a maximum force which is gradually decreased as the retarding action proceeds. This is especially advantageous in a

construction in which the shutter blades move to open and close the exposure opening, by a simultaneous movement in one direction.

The casing is closed by a cover plate 111^a which is secured in place by five screws 112 arranged symmetrically between the five posts which are extended from the screws 13. This cover plate is provided with openings 113 and 114, through which extend the projections on the time detent and the retarding mechanism, so that said projections may coöperate with the controlling member 115, which is preferably in the form of a ring mounted to turn on the shutter casing and having portions 115^a and 115^b coöperating, respectively, with the projections 83 and 102. The manner of connecting this ring with the shutter casing is novel, and embodies a peripherally and laterally extending flange 116 on the ring engaged interiorly by frictional devices on the shutter casing to maintain the controlling ring in its adjusted position. In this instance the frictional devices embody a split ring 117 secured at 118 to the top plate 111, and having the portions 119, adjacent the split, resiliently mounted so that they project slightly beyond the periphery of the top plate 111^a, and in this way frictionally engage the interior face of the flange 116.

To maintain the controlling ring in place, and at the same time to close the openings in the top plate and provide suitable surfaces for the indicating means of the iris diaphragm and the shutter mechanism, there is provided an indicator plate 120 formed with a central aperture, which is surrounded by an inwardly-turned flange 121. This indicator plate also carries a number of projections 122 on its rear face, formed with notches 123 and adapted to engage in bayonet slots 124 in the top plate 111^a. To maintain the indicator plate in position, the cover plate 111^a carries, on its inner face, a pivoted detent 125, which engages one of the projections 122 after the latter has been interlocked with the bayonet-slots 124. A portion 126 of this detent extends to the exterior of the shutter casing, where it may be readily manipulated for the purpose of freeing the indicator plate, so that the latter may be turned slightly in order to be withdrawn from the bayonet slots 124.

The operation of the time and bulb detents has been set forth in detail in the foregoing description, and will not again be described especially as it is similar to that of the ordinary automatic shutter. For effecting the movement of the shutter blades, the actuating lever is moved either by the wire release or the finger piece 60, and this causes the projection 58 to shift the master lever 25 until the parts reach the position shown in

Fig. 8, where the exposure member is released by the detent 52 and one of the latches, in this instance, the latch 29, is in engagement with the projection 43 on the exposure member 20 while the other latch 30 is held by the holding device 49 so that it cannot engage its projection 44 on the exposure member. On the return movement of the master member under the action of its spring 28, the blades are pulled open, and then finally pulled closed by a movement in the same direction. On the next operation of the master lever, the other latch 30 moves to engage with its projection 44 on the exposure member while the inclined face 48 on the latch 29 engages its projection 43 so that the latch will be shifted into cooperation with the adjacent retaining device 49, and the operation of the shutter proceeds as before.

From the foregoing, it will be seen that there has been provided an improved exposure mechanism in which a rotary exposure ring turns upon a blade retaining ring by means of pintles which serve as operating projections for the blades. The bulb and time detents are supported from a plate which is secured within the exposure ring and serves to hold the latter in position. The actuating lever for the master lever cooperates with the latter in such a manner as to give an increased movement to the same for a given movement in the actuating lever. The retaining tube for the wire release is provided with an extension which serves to maintain the wire release in contact with the actuating or operating lever. The master lever connects with the exposure member or ring by two relatively movable latches which are alternately switched into and out of connection with the exposure member in order to move the latter in opposite directions. These latches are supported in a distinctive manner by two crossed levers connected to the master lever. An automatic shutter has been provided in which the master member is adapted to connect with the blades or exposure mechanism to move the latter in opposite directions, each of said movements producing an opening and a closing of the blades. Provision has been made whereby the exposure mechanism is released simultaneously with the master member. An improved retarding device has been provided by which the blades are effectively retarded while they are out of the field of the exposure opening. The manner of securing the controlling ring or member provides for effectively holding the latter in its different positions while, at the same time, permitting its ready adjustment.

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

1. In a photographic shutter, an exposure mechanism comprising a plurality of pivot-

ally mounted shutter blades, a retaining ring for said blades, and an actuating ring having projections thereon mounted to turn on the periphery of said retaining ring.

2. In a photographic shutter, an exposure mechanism comprising a plurality of pivoted blades, a retaining ring for said blades, and an actuating ring having pintles extending therefrom and engaging the blades, said pintles also bearing on the periphery of the retaining ring to guide the actuating ring in its rotary movement.

3. In a photographic shutter, an exposure mechanism comprising a plate having hollow bosses struck up therefrom, blades mounted to turn on said bosses, a retaining ring cooperating with the ends of said bosses, and a blade actuating ring having pintles extending therefrom and engaging the blades, said pintles bearing on the periphery of the retaining ring and guiding the actuating ring in its rotary movement.

4. In combination in a photographic shutter having a master member and an actuating lever therefor, a projection on the actuating lever engaging the master member at a point removed from the end thereof and traveling on the actuating movement of the actuating lever toward said end of the master lever to slip off the latter in order to free the same, one of said elements being laterally yieldable to permit the projection on the actuating lever to pass the master lever on the return movement.

5. In an automatic photographic shutter, the combination with a master member, of an actuating member therefor and two detents, one for bulb exposure, one for time exposure and both controlled by the actuating member, the detents being mounted on different turning axes, and a single spring acting on both detents to move them to detaining positions.

6. In an automatic photographic shutter, the combination with a master member, of an actuating member therefor and two detents, one for bulb exposure, one for time exposure, and both controlled by the actuating member, the detents being mounted on different pivots and one of the detents being provided with a slot which receives the pivot of the other detent to guide the first named detent.

7. In an automatic photographic shutter, the combination with the master member, of an actuating member therefor, and two detents, one for bulb exposure, one for time exposure, and both controlled by the actuating member, separate pivots for the detents, and a coil spring passed about one of said pivots and having one end engaging one of the detents and the other end engaging the other of said detents.

8. In a photographic shutter, the combination with a casing comprising a wall, a ring-shaped wall projecting from one side

of said wall, and an attaching tube projecting from the opposite side of said wall, of shutter blades pivotally mounted within the ring-shaped wall, a support supported by the pivots of said shutter blades, a master lever for controlling the operation of the shutter blades, an actuating member for the master member, and means for controlling the master member to produce bulb and time exposures, said means being mounted upon the support for the pivots of the shutter blades.

9. In a photographic shutter, the combination with a casing comprising a wall having a center aperture and a ring-shaped wall projecting from one side of the first-named wall, of a plate arranged within the casing, blades pivoted to the plate, a retaining ring for the blades, an actuating ring for the blades turning on said retaining ring, a supporting plate abutting said retaining ring and holding the actuating ring in place, and shutter operating mechanisms having portions thereof mounted upon the supporting plate.

10. In a photographic shutter, shutter blades movable in either of two directions to open and close the shutter by a continuous movement in one direction, and a motor member acting in one direction only, mechanism interposed between the motor member and the blades for operating the blades by the motor member in either of said two opposite directions to open and close the shutter by movement in each direction, locking means for holding the shutter blades closed after they have completed their movement in either direction, and actuating means for the master member, releasing the latter and the blades simultaneously.

11. In a photographic shutter, shutter blades movable in either of two directions to open and close the shutter by a simultaneous continuous movement of the blades in either of two opposite directions, a ring connected to said blades for operating them, a detent cooperating with said ring to hold the latter and the blades in closed position at the end of each of its movements in the two opposite directions, a motor member acting in one direction only, mechanism interposed between the motor member and the blade actuating ring for operating the blades by the motor member in either of two opposite directions to open and close the shutter by a movement in each direction, and actuating means for moving the master member in one direction, said actuating means releasing the master member and the shutter actuating ring simultaneously.

12. In a photographic shutter, shutter blades movable to open and close the shutter by a simultaneous continued movement of the blades first in one direction and then in

the other, a motor member acting in one direction only, and two latches having relative movement between them and interposed between the motor member and the blades for operating the blades by the motor member in either of two opposite directions to open and close the shutter by a movement of the master member in one direction.

13. In a photographic shutter, shutter blades, a motor member acting in one direction only, two latches having relative movement and moved by the master member, each latch acting to move the blades to open and close the shutter by a simultaneous continuous movement of the blades in one direction, one latch moving the blades in one direction and the other latch moving the blades in the other direction.

14. In a photographic shutter, shutter blades, a motor member acting in one direction only, two latches having relative movement and moved by the master member, each latch acting to move the blades to open and close the shutter by a simultaneous continuous movement of the blades in one direction, one latch moving the blades in one direction and the other latch moving the blades in the other direction, and means for alternately holding said latches out of connection with the blades.

15. In a photographic shutter, shutter blades, an exposure member connected to the shutter blades, and having two engaging portions, said exposure member when moving in one direction causing the blades to open and close the shutter and when moving in the other direction also causing the blades to open and close the shutter, two latches having relative movement and each adapted to cooperate with one of the engaging portions on the exposure member to shift the latter and a motor member acting on said latches.

16. In a photographic shutter, shutter blades, an exposure member connected to the shutter blades, two relatively movable latches adapted alternately to engage the exposure member to move the latter in opposite directions, and a master member for shifting said latches alternately into and out of connection with the exposure member.

17. In a photographic shutter, shutter blades, an exposure member connected to the shutter blades and having two engaging portions, two relatively movable latches, and a master member for moving said latches alternately one into engagement with an engaging portion on the exposure member for shifting the exposure member in one direction to open and close the shutter by a simultaneous continued movement of the blades in one direction and the other to cooperate with the other engaging portion to be shifted to an inoperative position.

18. In a photographic shutter, shutter

blades, an exposure member connected to the shutter blades and having two engaging portions, two relatively movable latches and a master member for moving said latches alternately one into engagement with an engaging portion on the exposure member for shifting the latter in one direction to open and close the shutter by a simultaneous continuous movement of the blades in one direction, and the other to cooperate with the other engaging portion to be shifted to an inoperative position, and devices for holding the latches out of operative positions after they have been shifted by the cooperating engaging portion on the exposure member.

19. In a photographic shutter, shutter blades, an exposure member connected to the shutter blades, two relatively movable latches adapted alternately to engage the exposure member to move the latter in opposite directions, two separately pivoted cross levers by which the latches are carried, and a master member cooperating with said levers for shifting the latches.

20. In a photographic shutter, shutter blades, an exposure member connected with the shutter blades and provided with two engaging portions, two relatively movable latches adapted alternately to engage the engaging portions on the exposure member to move the latter in opposite directions, two separately pivoted levers each carrying one of the latches, springs interposed between the latches and their levers and tending to move the latches toward the exposure member, a master member cooperating with both of said latch-carrying levers, and means for holding one of said latches out of cooperation with the exposure member while the other latch is moving the exposure member in order to open and close the shutter by a continued movement of the blades in one direction.

21. In a photographic shutter, shutter blades, an exposure ring connected to the shutter blades and provided with two projections on opposite sides thereof, two relatively movable latches adapted alternately to engage the projections on the exposure member to move the latter in opposite directions, two separately pivoted cross levers each carrying one of the latches, springs interposed between the latches and their levers and tending to move the latches toward the exposure ring, a master member having connection with both levers to move the latches alternately one into engagement with a projection on the exposure member for shifting the latter in one direction to open and close the shutter by a simultaneous continuous movement of the blades in one direction, and the other to cooperate with the other projection to be shifted to an inoperative position, and devices for holding the latches out of operative positions after they have been shifted by the projections on the exposure ring.

22. In a photographic shutter, having mechanism to be controlled, a controlling ring for such mechanism having a laterally-turned flange, and yielding friction-producing means acting on said flange.

23. In a photographic shutter having mechanism to be controlled, a controlling ring having a laterally-turned flange, and a split ring on the shutter engaging the inner face of said flange.

24. In a photographic shutter having an operating mechanism and a retarding mechanism for the shutter, provided with a retarder lever, an intermediate lever which is engaged by the retarder lever so that the latter first slides away from the pivot of the intermediate lever and the latter then slides away from the pivot of the retarder lever.

ANDREW WOLLENSAK.