O. H. GRUSS.

PHOTOGRAPHIC SHUTTER.

APPLICATION FILED AUG. 20, 1914. RENEWED DEC. 26, 1917.

1,274,262.

Patented July 30, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

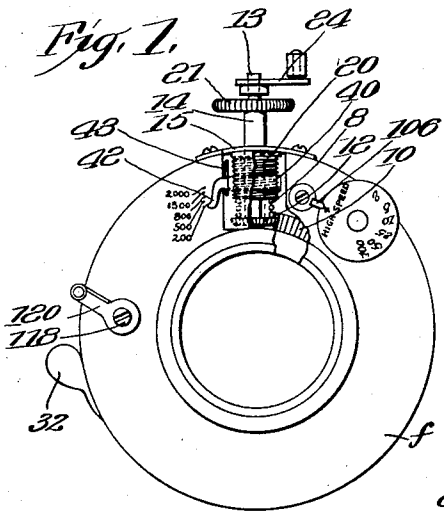


Fig. 2.

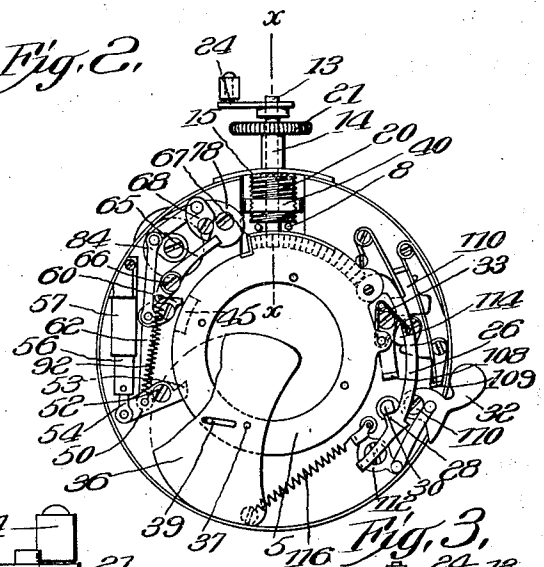


Fig. 4.

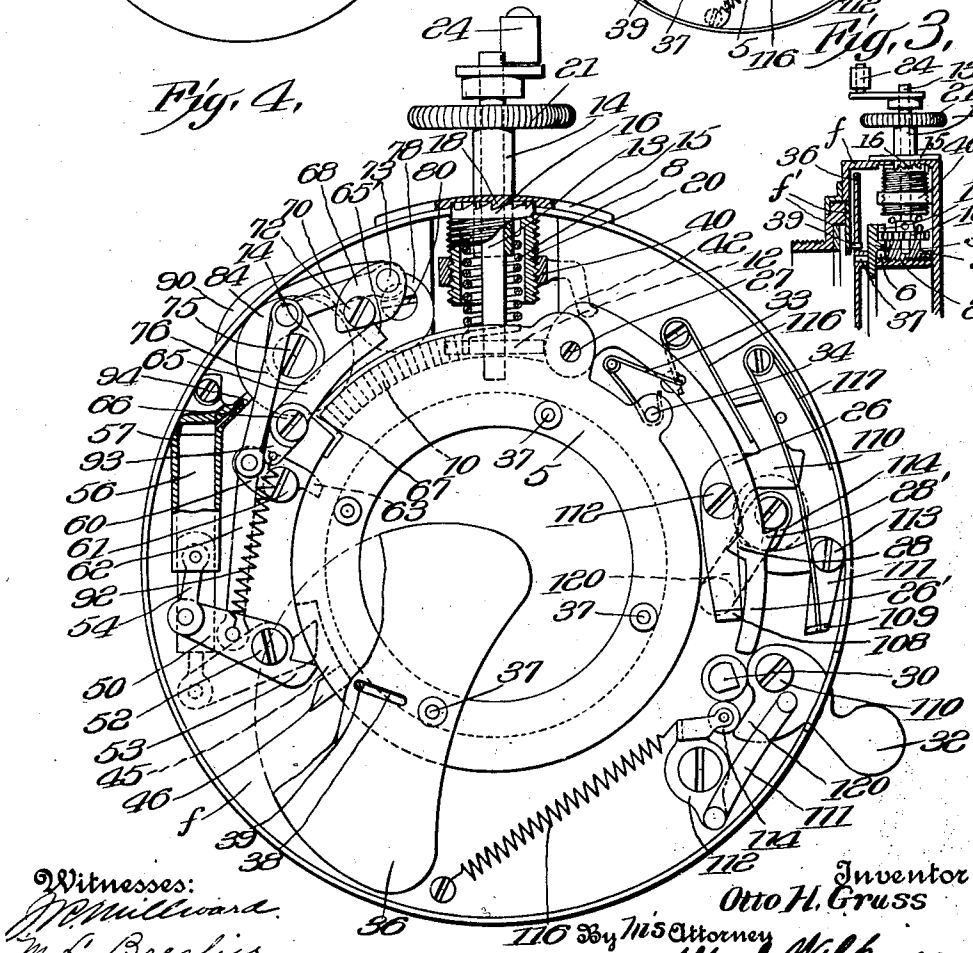


Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 5.

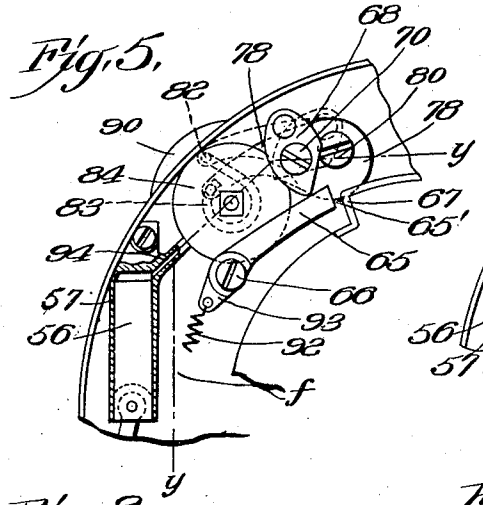


Fig. 6.

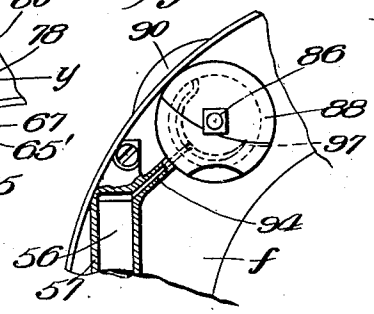


Fig. 7.

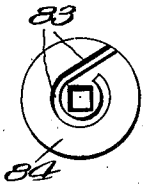


Fig. 8.

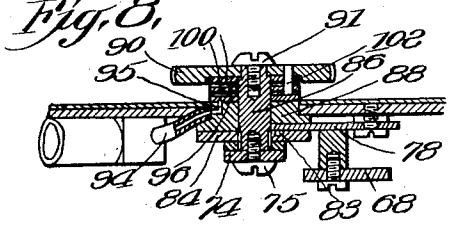


Fig. 9.

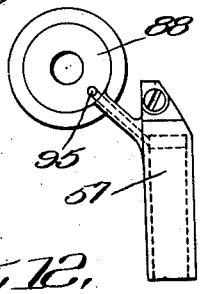


Fig. 10.

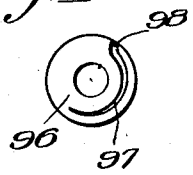


Fig. 11.

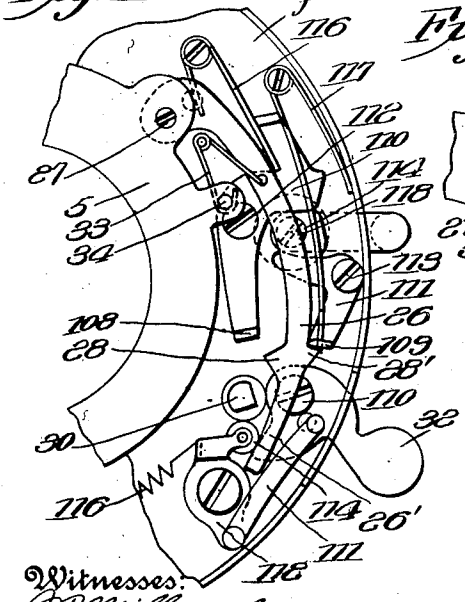
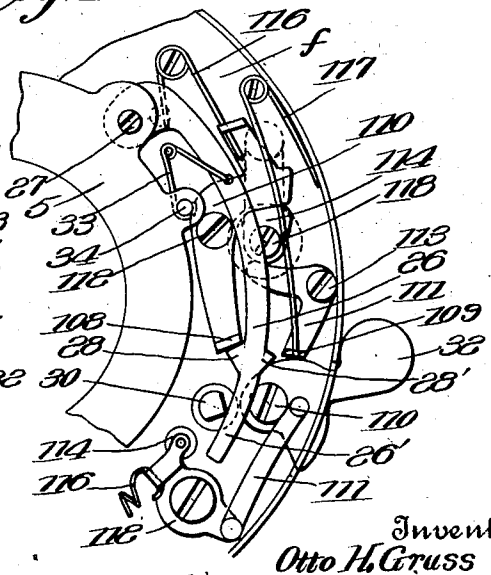


Fig. 12.



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UNITED STATES PATENT OFFICE.

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PHOTOGRAPHIC SHUTTER.

1,274,262. Specification of Letters Patent. Patented July 30, 1918.

Application filed August 20, 1914, Serial No. 857,685. Renewed December 26, 1917. Serial No. 208,983.

To all whom it may concern:

Be it known that I, OTTO H. GRUSS, a subject of the German Emperor, residing at Jamaica, in the county of Queens and State of New York, have invented new and useful Improvements in Photographic Shutters, of which the following is a specification.

This invention relates to improvements in photographic shutters and particularly to the type of shutter herein disclosed which provides for a particularly wide range of adjustment for timing of the exposures whereby it operates for making both very rapid, instantaneous, and slow exposures in addition to the usual bulb and time exposures.

A valuable feature of the present invention consists in an improved construction and organization designed to provide a particularly simple means for adapting the shutter to operate for the taking of high speed or slow, or retarded, exposures and which performs its function upon merely adjusting a single regulating part. Another important advantage accompanies the particular embodiment of the foregoing features as here shown wherein the retarding device for slow exposures is arranged to perform the additional function of cushioning the impact of the actuating parts at the end of their movement; thus additional means for that purpose is eliminated. A further important feature of my invention resides in an improved indicator associated with the tension setting device for high speeds which provides for conveniently observing the interval of exposure to which the actuating spring is energized.

The foregoing and other features and advantages of my invention are illustrated in the accompanying drawings wherein the reference characters of this description are applied to the corresponding parts in the several views.

Of the views, Figure 1 shows in front elevation a desirable embodiment of my invention with a portion of the casing broken away. Fig. 2 is a rear elevation thereof with the rear plate removed and the parts in energized position. Fig. 3 is a partial cross sectional view on line x—x of Fig. 2. Fig. 4 is an enlarged view similar to Fig. 2 with the parts in spent position. Figs. 5 and 6 are fragmental views in rear elevation with certain of the parts removed better to show the controlling parts. Fig. 7 is a detail front elevation of the adjusting cam. Fig. 8 is a cross-sectional view on line y—y of Fig. 5. Fig. 9 is a front elevation of the air check and port member detached. Fig. 10 is a rear elevation of the adjusting valve member. Figs. 11 and 12 are partial rear elevational views showing the release parts respectively set for bulb and time exposures.

The embodiment of my invention as here illustrated in Figs. 1 and 3 is of actual size and in the remaining figures is enlarged twofold. It is shown as a so called "between lens shutter" with the operating parts mounted upon a suitable ring shaped frame f. An inner bearing ring 2 is threaded to an inner sleeve flange 3 of the frame f and provides a bearing upon which the shutter driving or actuating ring 5 is rotated. As shown ball bearings 6 are interposed between the bearing and actuating rings in a suitably formed ball race formed between the ring members and closed by the sleeve flange 3.

The actuating ring 5 is arranged to be moved under the influence of a torsional driving spring 8 and to that end is provided with a segmental rack 10 on its front surface, the teeth of which are engaged by a pinion 12 directly connected to the spring 8 and mounted upon a setting spindle 13 journaled at its inner end in the frame f and at its outer end within a journaled sleeve 14; the sleeve 14 being journaled within a bearing plate 15 attached to the peripheral flange of the frame f. The sleeve 14 has secured thereon a ratchet disk 16 having ratchet teeth on its upper face to coact with a fixed detent 18 integral with and on the inner face of the stationary plate 15. The outer end of the operating spring 8 is secured to the sleeve 14 by being attached to a screw collar or barrel 20 formed integral with the ratchet disk as best shown in Fig. 4. The sleeve 14 is extended outwardly and has on its end a knurled thumbpiece 21 by which it is turned for adjusting the tension of the motor spring 8. The parts 14, 16, 20 and 21, rigidly secured together, form the stationary holding member, adjustable as described and held up against the holding detent 18 by the pressure of the spring 8 which is under com-

pression for that purpose. Thus when it is desired to reduce the torsional tension of the spring the thumb-piece 21 is depressed sufficiently to release the ratchet 16 from holding engagement with the detent 18.

For setting of the driving mechanism preparatory to making the exposures the setting spindle 13 has affixed on its outer end a crank 24 by which the spindle and pinion 12 are rotated to move the actuating ring 5 to the right from the position of Fig. 4 to the position of Fig. 2. A holding escapement lever 26 is pivoted at 27 on the ring 5 in position then to engage, by means of a detent 28 thereon, the fixed set pin 30 on the frame so that the actuating ring is held in set position until released by the usual release lever 32. A spring 33 engages within an aperture in the holding lever and with a pin 34 on the ring and acts constantly to pull the lever inwardly so that it is held against stop pin 30.

The shutter flies or blades 36 of customary form are suitably fulcrumed on the driving ring 5 at 37 and have elongated slots 38 therein engaged by the fixed pins 39—39 carried on the back or closing plate *f'* of the frame. The operating movement of the ring 5 moves the fulcrum pins 37 to pass center, the movement thereof beginning and terminating at points equi-distant to either side of the fixed pins 39 and the flies are formed to co-act so that when so moved they will close the aperture at the extremities of their movement and provide an opening for the exposure during the movement from one position to the other in the customary manner.

The arrangement in so far as described provides for making rapid instantaneous exposures for upon release of the actuating ring 5 it is free and unretarded in its movement so as to operate under the full pressure exerted by the driving spring 8. A desirable range of adjustment for the exposures so produced is from one two hundredth to one two-thousandth part of a second exposure in accordance with the tension produced by the adjusting of the ratchet 16.

To enable the operator more readily to observe the interval of exposure for which the motor spring is energized an indicator collar 40 is threaded onto the screw barrel 20 and has extending therefrom a pointer 42 passed outwardly through a slot 43 in the casing whereby it is held from rotation. Consequently upon the rotation of the screw barrel on adjusting the spring tension the indicator collar 40 will be moved by the thread and to coact with the pointer 42 thereof I provide suitable graduation on the exterior front face of the casing preferably in the manner shown in Fig. 1. The setting of the driving spring can therefore be conveniently observed by the operator.

It is desirable to cushion the end of the stroke of the driving ring so as to reduce the vibration which would result from the impact of the parts when stopped. As here shown a lug 45 is provided on the front face of ring 5 to engage at the end of its movement with a stop lug or shoulder 46 integrally formed on the frame *f*. For the purpose of cushioning the engagement therewith I provide a pivotal retard arm 50 fulcrumed at 52 and formed with a nose 53 projected into the path of the lug 45 to be engaged thereby just preceding engagement with the stop lug 46. The outer end of the retard arm 50 is pivotally connected by a link 54 to a plunger 56 fitted to a cylinder 57 to form an air check for retarding the movement of the retard arm 50. A setting lever 60 is fulcrumed at 61 and connected to the retard arm by link 62 so that upon moving the drive-ring to set position the lug 45 thereof will engage a projection 63 of the setting lever and move the retard arm to a rearward position dotted in Fig. 4.

The plunger 56 is then partially withdrawn and is thus held by the engagement of the lug 45 with setting lever 60 as best shown in Fig. 2, until the actuating ring is released from set position. Then, as readily understood, at the end of its unretarded stroke the lug encounters the nose 53 of retard arm 50 in the dotted position of Fig. 3 and moves the arm, under the control of air-check 56—57 to full line position before engaging stop lug 46. An effective pneumatic buffer is thus produced to absorb the severe shocks of the high speed exposures.

In accordance with my invention the air-check 56—57 described is also employed for obtaining retarded or slow exposures and to this end I provide for adjusting the size of the outlet port of the cylinder for varying the influence of the air-check and also for effecting controlling engagement of the retard connections with the actuating ring 5 at an early period of its stroke. For the latter purpose I have provided a contact cam arm 65 fulcrumed at 66 and provided with a forward inclined surface arranged to be engaged by a hardened steel shoulder 67 of the drive ring upon the setting of a cam-lever 68 for slow exposures. When so set, as best shown in Fig. 5, the cam lever 68 by its engagement with cam arm 65 causes the arm to assume a position to be engaged by the shoulder 67 of the actuating ring which occurs when the flies are in open position. The forward inclined edges 65' of the cam-arm produces an outwardly directed force to rock the cam-lever 68 on its fulcrum 70 but this force, by reason of the small angle of the cam surface, is insufficient in itself to remove the cam-arm from engaging position. Therefore a spring 92 is arranged to coöperate with the action of the cam surface in removing the contact cam arm from retard-

ing engagement with the drive-ring shoulder 67 and is arranged to be effective upon the release of the setting lever by the movement of the lug 45 from engaging position. The retractile spring 92 is connected to a short extension 93 of the cam arm and at its other end to the retard-arm 50 so that it applies a force on the cam-arm tending to rock it out of engagement and imparts movement to the retard arm 50 against the influence of the air-check 56—57. The movement of the retard arm thus produced is effective to time the withdrawal of the contact arm 65 and to that end it is connected to the cam lever 68 through connections comprising a link 72 pivotally connected to the cam lever at 73 and to an arm 74 journaled on screw stud 75, a second link 76 also pivoted to the arm 74 and at its other end connected to a setting lever 60 which, as described is connected by link 62 to the retard arm 50. Through these connections the spring 92 acts to rock the cam lever 68 so as to control the withdrawal of the contact arm 65 from its engaging position, the action thereof being retarded by the air-check so that the cam-lever is rocked slowly upon its pivot 70 and correspondingly retarding the release of the drive ring shoulder by the contact arm which is effected by the conjoint action of the inclined edge 65′ and the action of spring 92. Thus the actuating ring is intercepted in its movement by the cam arm 65 and retarded in proportion to the resistance offered by the air-check 56—57 which as hereinafter described is regulated for varying the slow exposures.

The arrangement for setting of the cam lever 68 for slow exposures and for unretarded or rapid exposures consists in supporting this cam-lever 68 upon an adjustable movable member or arm 78. As shown the fulcrum stud 70 of the cam lever is carried by the arm 78 which is fulcrumed upon a frame stud 80 so as to be swung inwardly to move the cam arm 65 through the engagement of the cam lever into position to be engaged by the drive-ring shoulders 67 or into an outer position of Fig. 3 so as to be out of engagement therewith. To so move the adjusting arm 78 for retarded and unretarded movement of the driving ring it is elongated as best shown in Figs. 5 and 6 and is provided with a pin 82 on its end fitted to a cam-slot 83 in the front face of cam disk 84 fitted to a squared portion of an adjusting spindle 86 (Figs. 5, 6 and 7). This adjusting spindle is journaled within a stationary port member 88, carried on the frame, and is extended outwardly through the frame where it is provided with a thumb-piece 90 clamped thereon by screw 91. By rotating thumb-piece 90 the arm is moved inwardly to the concentric inner portion of the groove 83 (full line position Fig. 5) for taking of slow retarded exposures when as described the cam arm 65 is moved into engaging position. Or upon rotating the thumb-piece 90 to the dotted position of Fig. 5 with the pin 82 in the outer end of the groove the cam lever 68 will be withdrawn to allow the cam arm 65 to move out of engaging operative position under the influence of a retractile spring 92 attached to the short extension 93 of the cam arm and at its other end to the retard-arm 50. The spring tends constantly to withdraw the cam arm from operative position. Thus by the simple manipulation of the thumb-piece 90 the retarding mechanism is rendered operative for slow or inoperative for rapid exposures.

As a further desirable feature I have incorporated with the described adjusting means a valve device for changing the size of the outlet port of the air-check cylinder 57 thereby to vary the resistance offered by the air-check in retarding the driving ring so as to adjust the time of exposure. To that end I have devised the arrangement best disclosed in Figs. 6, 8, 9 and 10 wherein the outlet port of the cylinder 57 communicates through a tube 94 to a port 95 in fixed port member 88. The port 95 opens on the outer surface of the port member and to coact therewith a rotary valve disk 96 is journaled on spindle 86 and is provided with a tapering slot 97, concentric and in registration with the port 95. 97 at its enlarged end is provided with a peripheral outlet port 98. Flat springs 100 are interposed between the thumb-piece 90 and the valve disk so as to press the valve disk tightly onto the port member and a pin 102 is carried by the valve disk to enter an aperture in the thumb-piece 90. Thus rotation of the thumb-piece 90 will rotate the valve disk to vary the size of the outlet port of the air check to increase or lessen the resistance of the air check for governing the duration of slow exposure. A desirable embodiment of this feature provides for an adjustment of the interval of slow exposure from one half second to one-hundredth part of a second and when so operating it is desirable to have the motor spring set to its low tension. In the arrangement shown upon moving the thumb-piece 90 to the position where the retarding cam-arm is out of operative engagement, that is to the position for rapid exposure, the closed end of the valve slot is moved into registration with the port 95 so as to provide a comparatively strong buffer for high speed work.

In the improved arrangement as described I have thus associated the means for setting the retard devices and the means for the adjusting thereof for different lengths of exposure so as to be regulated upon manipulation of the single thumb-piece 90. As shown in Fig. 1 the thumb piece is suitably marked to indicate by relation to a fixed pointer 106, the interval of exposure for which the

valve is set and the position of disengagement of the retard devices for the making of unretarded exposures.

In Figs. 4, 11 and 12 are shown my improved release and escapement mechanism adapted for operating the shutter for instantaneous, bulb or time exposures. The operation thereof is effected by movement of the pivoted release lever 32 and is controlled by the adjustment of suitable adjustable detents 108 and 109 with relation to movable detents of the holding lever 26 of the driving ring 5. The release-lever 32 is journaled on pin 110 and extended outwardly through a suitable slot in the casing. By means of link 111 pivotally connected to it and to a roller arm 112, the movement of the release lever is transmitted to the roller arm to cause a roller 114 journaled in the arm to engage the holding lever 26 for disengaging the detent 28 thereof whereby it operates under the influence of the driving spring 8. A return spring 116, connected to the roller arm 112 and to the frame, operates normally to hold the roller arm and release lever in initial position of Fig. 2.

Detents 108 and 109 are integrally formed on bell levers 110—111 fulcrumed on frame pins respectively at 112—113 and held against an eccentric or cam 114 by springs 116—117 arranged as shown. The adjusting cam 114 is secured on the inner end of stud 118 journaled in the frame member *f* and having affixed on its outer end at the front of the casing a setting finger 120 as indicated. With the cam 114 set in the position of Figs. 2 and 4 the detents 108 and 109 are removed from engaging position with the opposite detents 28 and 28′ of lever 26 and upon the release of the detent 28 from holding pin 30 the actuating ring is permitted to complete its full movement, opening and closing the flies for a snap or instantaneous exposure. To so operate, elongated tail portion 26′ of lever 26 engages the holding pin 30 for part of the movement to hold the detent 28 free of fixed detent 108. In Fig. 2 the shutter is shown set for instantaneous exposure and in Fig. 4 it is shown with the release lever 32 depressed and the parts having completed their operative movement. As shown in its depressed position an extension 120 of the release lever engages the roller 114 and acts as a stop therefor.

Upon adjusting the cam 114 to the position of Fig. 11, the detent 109 is moved by spring 117 into position of engagement with the lever detent 28′ whereby it is engaged thereby to hold the lever 26 when the release lever is depressed and held depressed as shown. However, as the detent 108 is still in non-engaging position upon the release of the release lever 32 arm 26 will, under the action of its spring 33, and the force of the drive-spring disengage from detent 109 and complete its movement. As the detents 108—109 are positioned to engage the detents of lever 26 midway of its movement, the flies are held in open position when thus engaged so that with the adjustment just described the exposure will be made as long as the release lever is depressed but terminated upon the release thereof. This provides for the customary bulb exposure.

For time exposures, the setting lever is moved to bring the cam 114 to a third position of Fig. 12 which then permits both stationary detents 108—109 to assume an engaging position. The action when so set, causes the detent 28′ to engage detent 109 as in Fig. 11 when released from holding pin 30. Then upon release of release lever 32 the driving ring is again immediately intercepted by engagement of detent 108 with holding arm detent 28, so that the flies are still held in open exposing position. The flies are again closed only as a second depression of the release lever 32 which causes the disengagement of detent 28 from detent 108 so that the actuating ring 5 completes its movement. Detent 109 is beveled as shown at its inner edge and a very slight ineffective movement is permitted the holding arm when disengaged from detent 109 and again engaged by detent 108 so that when the holding arm is again rocked outwardly by the engagement of roller 114 with the tail portion thereof, the detent 28′ will pass behind detent 109 so as to release the shutters.

The shutter arrangement as described is of simple and substantial construction wherein the devices thereof are correlated in a manner which greatly contributes to ease and convenience in adjusting to a wide range of work. In addition to simplifying the adjustment I have designed certain features to operate in a double capacity and thereby materially reduce the number of parts required.

As many changes could be made in the described construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof it is intended that all matter contained in the foregong description or shown in the drawings shall be interpreted as illustrative and not in a limiting sense.

Having described my invention I claim:

1. In a photographic shutter, the combination with the casing, shutter flies suitably supported and a driving member therefor, of a driving spring for the driving member operatively connected therewith, an adjustable member for energizing the driving spring comprising a screw-barrel having a ratchet and an external setting lever connected therewith, and said adjustable member being connected to the driving

spring, an indicator collar threaded to the screw barrel, a pointer on the indicator collar extended through a slot to the exterior of the casing, a stationary holding detent on the casing to be engaged by the ratchet and suitable marking to co-act with the pointer for indicating the interval of exposure for which the driving element is set.

2. In a photographic shutter the combination with the shutter flies, a driving member therefor and a driving element operatively connected with said member, of a retard device suitably arranged, means for effecting engagement of the retard device with the driving member to act as a buffer therefor at the end of its movement and means for effecting retarding engagement between the retard device and the driving member when the flies are in exposing position for making retarded exposures.

3. In a photographic shutter, the combination with the shutter flies, a driving member therefor and a driving element operatively connected with said member, of an air-check device suitably arranged, means for effecting engagement of the air-check device with the driving member to act as a buffer therefor at the end of its movement, connections for effecting retarding engagement between the air-check device and the driving member when the flies are in exposing position and an adjusting member therefor adapted to position the connections to be operative for retarding the exposures or to be inoperative for making rapid exposures substantially as described.

4. In a photographic shutter, the combination with the flies, a driving member therefor and a driving element operatively connected with said member, of an air-check device suitably arranged connection to effect retarding engagement of the air-check device with the driving member when the flies are in exposing position, a valve member for regulating the resistance of the air-check device and a single adjusting member connected both to said connections and to said valve whereby it will operate to effect engagement and disengagement of the connections for retarded and unretarded exposures and to regulate the interval of retarded exposure.

5. In a photographic shutter, the combination with the shutter flies, a driving member therefor and a driving element operatively connected with said member, of an air check device suitably arranged, means for effecting engagement of the air-check device with the driving member to act as a buffer therefor at the end of its movement, connections for effecting retarding engagement between the air-check device and the driving member when the flies are in exposing position, a valve member for regulating resistance of the air-check device and a single adjusting member connected to both said connections and to said valve member whereby it will operate to effect engagement and disengagement of the connections for retarded and unretarded exposures and to regulate the interval of retarded exposure.

6. In a photographic shutter, the combination with the flies, a driving member therefor and a driving element operatively connected with said member, of an air-check device suitably arranged connections to effect retarding engagement of the air-check device with the driving member, when the flies are in exposing position, a stationary port member having an outlet port for the air-check device, a valve disk-element rotatively supported and provided with a tapering outlet groove concentric with the port and a single adjusting member connected both to said connections and to said valve disk whereby it will operate to effect engagement and disengagement of the connections for retarded and unretarded exposures and to regulate the interval of retarded exposure.

7. In a photographic shutter, the combination with the flies, a driving member therefor and a driving element operatively connected with said member, of an air-check device suitably arranged, a retard contact arm arranged to be movable into position of engagement with the driving member, means for applying a force thereto for removing the contact arm from engaging position, connections interposed between the contact arm and the air-check whereby the withdrawal of the contact arm from engagement is retarded by the latter and an adjusting member for the connections adapted to position the parts whereby the contact arm is engaged by the driving-member for retarding the exposures and whereby the contact arm is withdrawn from its engaging position for making unretarded exposure.

8. In a photographic shutter, the combination with the flies, a driving member therefor and a driving element operatively connected with said member, of an air-check device suitably arranged, a shoulder on the driving member, a retard contact arm arranged to be movable into the path of said shoulder and formed with an inclined surface to be engaged thereby and to produce an outwardly directed thrust thereon, a spring arranged to supplement the inclined surface in withdrawing the contact arm from engagement, connections interposed between the contact arm and the air check whereby the withdrawal of the contact arm from engaging position is retarded by the latter, said connections comprising a shifting member, a cam lever suitably fulcrumed thereon to engage the contact arm for retarding its movement and connections from the cam-lever to the air-check, a spring suit-

ably connected to effect the rocking of the cam-lever to permit the release of the drive-member shoulder and engaging means initially to retain the contact arm in engaging position.

9. In a photographic shutter, the combination with the flies, a driving member therefor and a driving element operatively connected with said member, of an air-check device suitably arranged, adjustable connections to effect retarding engagement of the air-check device with the driving member when the flies are in exposing position, a stationary port member having an outlet port for the air-check device and a valve element rotatively supported and provided with a tapering outlet groove concentric with the port for regulating the interval of retarding exposure.

10. In a photographic shutter, the combination with the flies, a driving member therefor and a driving element operatively connected with said member, of an air-check device suitably arranged, a retard contact arm suitably fulcrumed to be rocked into position of engagement with the drive-member provided with an inclined engaging surface, a shoulder on the drive-member opposed to the inclined surface to engage said surface and produce an outwardly directed thrust thereon, connections interposed between the contact arm and the air check whereby withdrawal of the contact arm from engaging position is retarded by the latter, said connections comprising a shifting member, a cam lever suitably fulcrumed thereon to engage the contact arm for retarding its movement and pivotal connections from the cam-lever to the air check, a spring connected to the pivotal connections and to the contact arm to supplement the inclined surface of the latter in effecting its movement and operative to shift the cam lever to permit the withdrawal of the contact-arm, engaging means initially to retain the contact arm in engaging position and for the setting thereof, an adjusting member having a cam groove and a projection provided on the shifting member to enter the groove whereby the retarding parts are adjusted to operate for making retarded exposures or to be inoperative for making rapid exposures.

11. In a protographic shutter, the combination with a suitable casing, shutter flies and a driving member therefor, of a driving element for the driving member operatively connected therewith and an escapement mechanism for the driving member comprising a movable detent arm pivotally connected to the driving member, a stationary set pin carried by the casing to be engaged thereby for setting of the shutters, a release lever suitably fulcrumed and adapted to effect release of the detent arm from engaging position, adjustable detents to intercept the detent arm with the shutters in exposing position and an elongated tail portion on the detent arm adapted to be moved by the release lever to release the detent arm from the adjustable detents substantially as described.

12. In a photographic shutter, the combination with a suitable casing, shutter flies and a driving ring-member therefor, of a driving element operatively connected to the driving member and an escapement mechanism for the driving member comprising a movable detent arm pivotally connected to the driving member, a stationary set pin carried by the casing to be engaged thereby for setting of the shutters, a rocking lever fulcrumed to engage and release the detent arm from engaging position, adjustable detents to intercept the detent arm with the shutters in exposing position, an elongated tail portion on the detent arm adapted to be engaged by the rocking arm to release the detent arm from the adjustable detents, a release lever suitably fulcrumed and extended to the exterior of the casing connections between the release lever and the rocking arm whereby the latter is moved and a stop shoulder on the release lever to limit the movement of the rocking arm by engagement therewith.

13. In a photographic shutter, the combination with a suitable casing, shutter flies and a driving member therefor, of a driving element for the driving member operatively connected therewith and an escapement mechanism for the driving member comprising a movable detent arm pivotally connected to the driving member, a stationary set pin carried by the casing to be engaged thereby for setting of the shutters, a release lever suitably fulcrumed and adapted to effect the release of the detent arm from engaging position, adjustable detents to intercept the detent arm, an adjusting cam therefor, said detents being suitably fulcrumed, springs acting thereon to hold them in engagement with the adjusting cam and an elongated tail portion on the detent arm to be engaged on the operation of the release lever to release the detent arm from the adjustable detents substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OTTO H. GRUSS.

Witnesses:
C. F. POTTER, Jr.,
H. T. JEFFREY, Jr.