

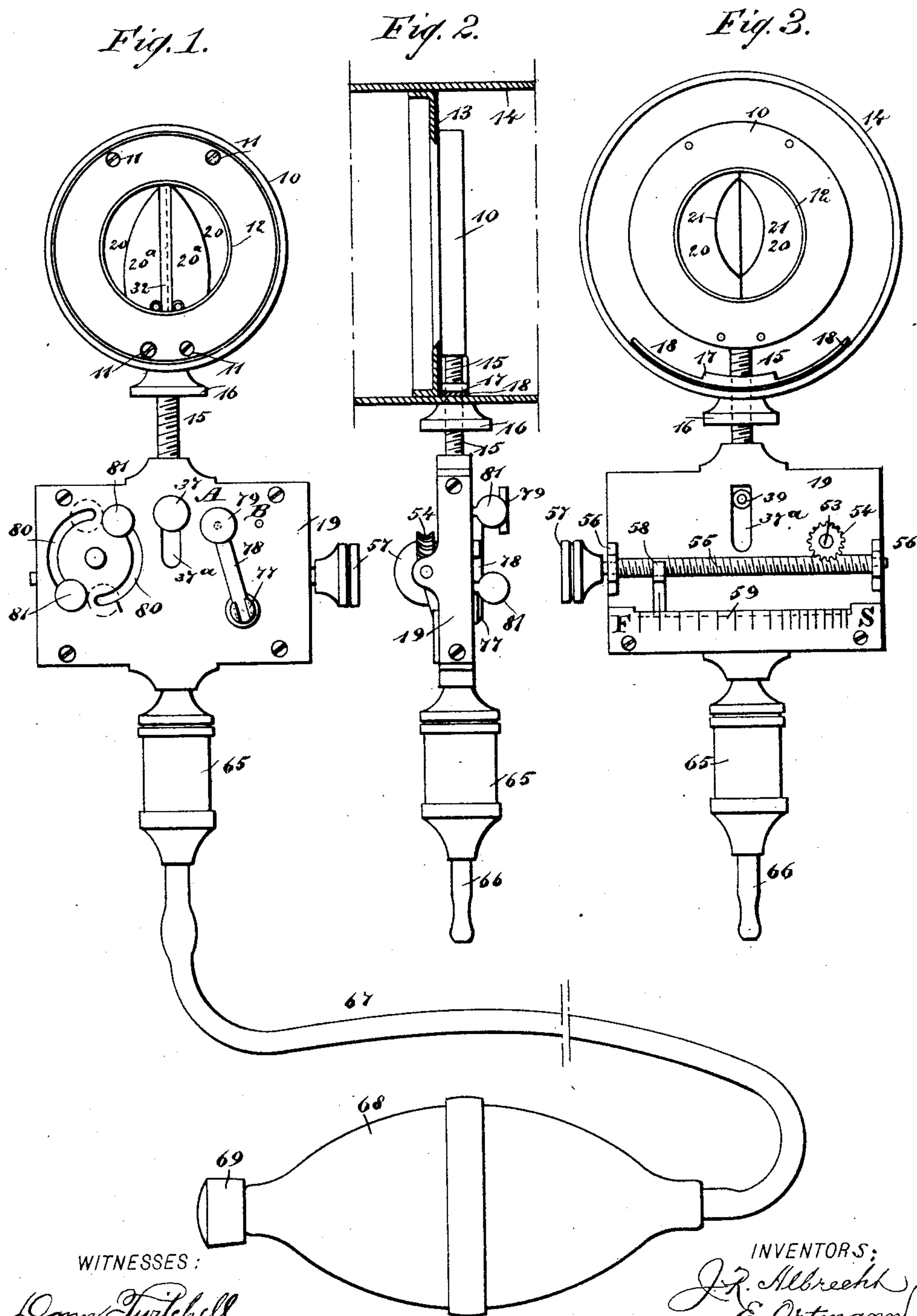
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3 Sheets—Sheet 1.

J. R. ALBRECHT & E. ORTMANN.
PHOTOGRAPHIC SHUTTER.

No. 475,654.

Patented May 24, 1892.



WITNESSES:

Donn Twitchell
C. Sedgwick

INVENTORS:

J. R. Albrecht
E. Ortman
BY Munn & Co

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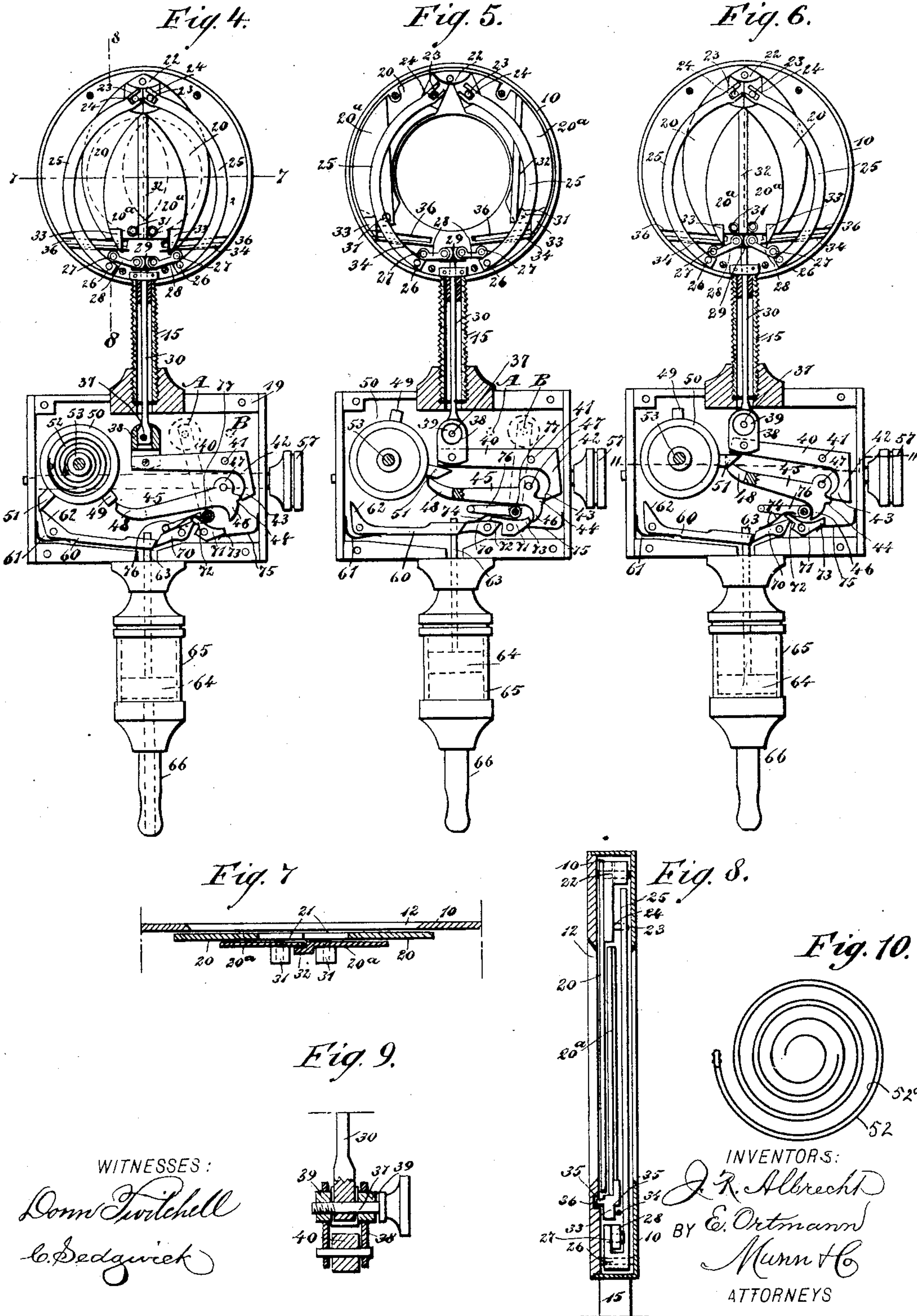
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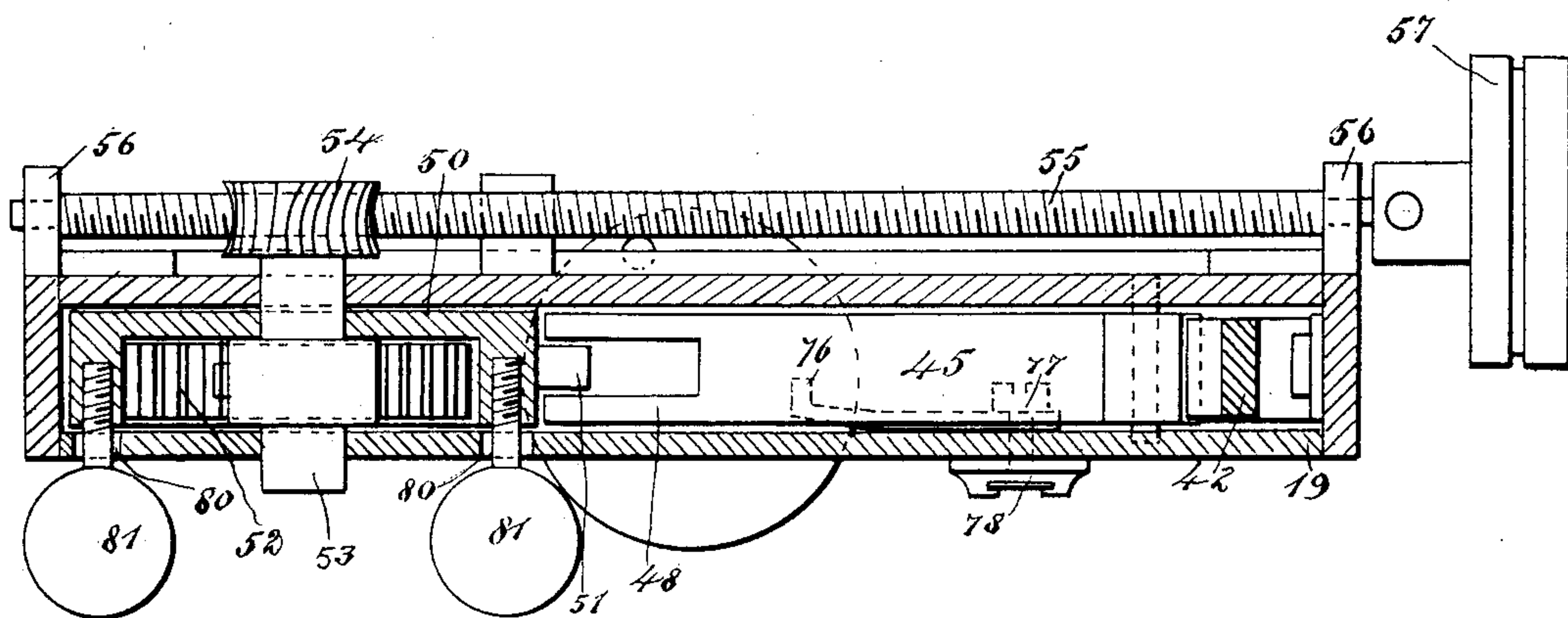
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Fig. 11.



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UNITED STATES PATENT OFFICE.

JULIUS R. ALBRECHT AND EMIL ORTMANN, OF NEW YORK, N. Y.

PHOTOGRAPHIC SHUTTER.

SPECIFICATION forming part of Letters Patent No. 475,654, dated May 24, 1892.

Application filed November 27, 1891. Serial No. 413,266. (No model.)

To all whom it may concern:

Be it known that we, JULIUS R. ALBRECHT and EMIL ORTMANN, both of New York city, in the county and State of New York, have
5 invented a new and Improved Lens-Shutter, of which the following is a full, clear, and exact description.

Our invention relates to improvements in lens-shutters for photographic cameras; and
10 the object of our invention is to produce a shutter which may be easily regulated and conveniently applied to lens-tubes of different sizes, which may be adjusted for use in making instantaneous photographs or for time-
15 exposures, which may be operated with the greatest rapidity, and which will show the largest possible opening for a shutter of its size.

A further object of our invention is to produce shutter-actuating mechanism to operate
20 in connection with the shutter, which mechanism may be quickly arranged so as to move the shutter fast or slow, which may also be arranged to lock the shutter in open position, and which may be operated by the simple
25 pressure of an air-bulb.

To this end our invention consists in a lens-shutter and its operating mechanism, the construction of which will be hereinafter described and claimed.
30

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the
35 views.

Figure 1 is a front elevation of the shutter and its operating mechanism. Fig. 2 is a side elevation of the same with the air-bulb removed, showing the shutter applied to a lens-tube somewhat larger than the shutter, the
40 tube being shown in section. Fig. 3 is a rear elevation of the shutter as applied to a tube larger than itself. Fig. 4 is a sectional elevation of the shutter and operating mechanism when set for use. Fig. 5 is a similar view, but with the shutter open. Fig. 6 is a similar
45 view with the shutter closed, but with the apparatus in its normal position. Fig. 7 is a sectional plan of the shutter on the line 7 7 in Fig. 4. Fig. 8 is an enlarged vertical section on the line 8 8 in Fig. 4. Fig. 9 is a detail sectional view of the connection between

the shutter-operating rod and its elbow-lever. Fig. 10 is a detail view of the barrel-spring, and Fig. 11 is a horizontal section on line 11
11 in Fig. 6.

The shutter proper is held within a carrier 10, which is composed, preferably, of two parts united by screws 11 and having a central opening 12. The shutter-carrier 10 may fit snugly
60 in a tube which is especially adapted to receive it, and in larger tubes it may fit against the apertured stop-plate 13, which is secured to the tube 14 in the usual way. The carrier is secured to a hollow exteriorly screw-thread-
65 ed spindle 15, which extends downward through the lens-tube and is provided with the thumb-screw 16, by means of which it may be adjusted. The spindle also carries a threaded curved block 17, having spring-arms
70 18, adapted to press against the inner wall of the tube 14, and by adjusting the spring composed of the block and arms within the tube-walls and the jam-nut 16 beneath the wall the carrier and connected apparatus may be held
75 in a desired position. It will be seen that this screw mechanism provides for centering the carrier. The lower end of the screw-spindle 15 is screwed into a perforated block or nut on the top of the case 19, which case carries
80 a locking and actuating mechanism, as hereinafter described.

The shutter carried within the carrier 10 consists of a pair of oppositely-arranged base-shutters 20, which slide on the front wall of
85 the carrier, which are cut away centrally, as shown at 21 in Fig. 3, so as to leave an opening, and which are hinged together and pivoted to the carrier near the top, as shown at 22 in Figs. 4 to 6, a form of hinge being used
90 which will enable the shutter to slide accurately, and a pair of oppositely-arranged inner shutters 20^a, which are carried by the shutters 20, as hereinafter described.

The shutters 20 are provided near their upper ends and adjacent to their pivot with laterally-extending studs 23, which extend into the forked ends 24 of the curved arms 25, which arms are oppositely curved and extend
100 downward within the opposite sides of the carrier, the arms at their lower ends being pivoted to the carrier, as shown at 26, and having short upwardly-extending cranks, which are pivoted, as shown at 27, to toggle-levers

28, which levers extend toward each other within the carrier and are pivoted at their inner ends to a block 29, produced on the upper end of a rod 30, which extends downward through the screw-spindle 15 and into the case 19, where it connects with a shutter-operating mechanism, as hereinafter described.

The inner shutters 20^a have straight inner edges which abut, and these shutters are pivoted near their lower inner corners, as shown at 31, to the base-shutters 20. One of the shutters 20^a has a flange 32 extending along its inner edge, which flange overlaps the adjacent shutter, as shown in Fig. 7, and thus thoroughly excludes light. Each shutter 20^a is provided at its lower outer corner with a depending cam 33, which slides between the front wall of the carrier and a wire rod 34, which is arranged tangentially within the carrier, and the cam has side bearing-surfaces 35, as best shown in Fig. 8, one of said surfaces being adapted to slide upon the wire 34 and the cam-surface on the opposite side extending into a groove 36, produced in the wall of the carrier. It will thus be seen that when the shutters 20 are opened the shutters 20^a will be carried with them a certain distance, and then the cam-surfaces on the cams 33, engaging the wire 34 and grooves 36, will cause the shutters 20^a to be fulcrumed on their pivots and their upper portions to swing back to the extreme outer portions of the carrier, as shown in Fig. 5, thus exposing a very large opening.

The operation of the main or base shutters 20 is as follows: In their normal position they are together, as in Fig. 6. If the rod 30 is depressed, the levers 28 will be first thrown into a horizontal position, as shown in Fig. 5, thus tilting the cranks of the arms 25 and throwing open the shutters 20, and the continuation of the downstroke of the rod carries the block 29 below the horizontal center of the levers 28, thus contracting the levers again and again closing the shutters. This brings the levers 28 into the position shown in Fig. 4, so that when the rod 30 is forced upward, as described below, the levers will spread and contract, thus opening and closing the shutters. The lower end of the rod 30 is pivoted on a thumb-screw 37, which thus holds the rod to a metallic socket 38, and in the socket are nuts 39, through which the thumb-screw extends, and by tightening the thumb-screw the nuts may be made to impinge on the rod. The thumb-screw 37 and the nuts 39 are adapted to move vertically in unison with the rod, as is also the socket 38, and the thumb-screw and nuts will slide in the vertical slots 37^a in the case 19. The socket 38 is pivoted at its lower end to an elbow-lever 40, which lever is pivoted near its rear end to the case 19, as shown at 41, and has a depending arm 42, the front side of which projects slightly forward in the direction of the body of the lever, as shown at 43, and this projection of the lever

is adapted to engage a lug 44 of a lever 45, which lever has also an inclined toe 46, adapted to engage a locking-lever, as hereinafter described, and the lever 45 is pivoted near its rear end, as shown at 47 in Figs. 4 to 6. The free end of the lever 45 is forked, as shown at 48, and is adapted to engage a spur 49 on the spring-barrel 50, which barrel is mounted in one end of the case 19 and is provided with another spur 51, which extends radially from it, but which is adapted to slide through the fork of the lever 45. The spring-barrel 50 is provided with an interior coil-spring 52, one end of the spring being secured to the barrel and the other to the shaft 53, and within the main spring is a supplemental spring 52^a, one end of which is secured to the barrel with the spring 52. The spring 52^a is coiled within the spring 52 and extends a greater part of the length of the latter, and the additional strength of the supplemental spring causes the device to work very quickly when the machine is set for instantaneous work, while it does not prevent the machine from being set for slow work. The shaft 53 of the spring-barrel 50 projects through the back side of the case 19 and carries a worm-wheel 54, which meshes with a worm 55, extending longitudinally of the case and mounted in brackets on the back side thereof. The worm 55 has a milled wheel 57 at one end by which it may be turned, and it carries a depending indicating-hand 58, which moves over the gage or scale 59, which is on the lower portion of the case-back. This scale is marked at one end with the letter "F" and at the opposite end with the letter "S" to indicate fast and slow, and the object of the worm is to regulate the speed of the shutter, which it does by adjusting the tension of the spring 52, as the spring actuates the shutter in the manner described presently, and it is obvious that when the tension of the spring is great it will work quicker than when it is less. The tightening or loosening of the spring is effected by turning the worm, which will also turn the wheel 54 and shaft 53, thus operating on the spring.

In the lower portion of the case 19 and near one end is a lever 60, which is pressed by a spring 61 and which has a toe 62, adapted to extend into the path of the spur 51, and which thus serves as a tripping-lever. The rear or inner end of the lever 60 extends to the center of the case and is secured to the piston-rod 63 of a piston 64, which piston works by the pressure of air in a cylinder 65, the latter being made in two parts and secured to the under side of the case 19. The piston-rod 63 extends upward into the case 19, and when the rod is pushed upward it will raise the inner end of the lever 60, thus depressing the outer end and moving it out of the path of the spur 51, so as to permit the rotation of the spring-barrel. The cylinder 65 has at its lower end a pipe 66, to which a

flexible tube 67 may be coupled, and this tube connects with an ordinary air-bulb 68, which bulb is preferably provided at one end with a removable cap 69, the function of which will be presently described. In the end of the case opposite the lever 60 are locking-levers 70 and 71, which are pivoted in the case, as shown, the inner end of the lever 70 being adapted to engage the end of the lever 60 and the inner end of the lever 71 having a projecting finger 72, which is adapted to overlap the outer end of the lever 70 and which has also an outwardly-extending portion 73, which is adapted to be engaged by the toe 46 of the lever 45. The levers 70 and 71 are normally pressed down in the center by a spring 74, and the rear end of the lever 71 is pressed upward by a spring 75, one end of which is secured to the case 19. The levers 70 and 71 are adapted to be held in a horizontal position, as in Fig. 5, when the shutter is to be locked in an open position, or they are adapted to be held at an angle to each other, as in Figs. 4 and 6, so as to permit the free movement of the lever 60. This adjusting of the levers 70 and 71 is effected by a crank-arm 76, which is adapted to press down on the forward or inner end of the lever 70, and this crank-arm is secured to a shaft 77, which projects forward through the case 19, as best shown in Fig. 1, and which is secured to a spring-handle 78, the free end of which terminates in a knob 79. It will thus be seen that by turning the knob inward or to the point marked A in the drawings the levers 70 and 71 will be tilted, as shown in Figs. 4 and 6, and by throwing the knob 79 over to the point marked B the arm 76 will be raised from the part 70, and the parts 70 and 71 will assume a horizontal position, as in Fig. 5. After the barrel has been turned in one direction it may be turned back by grasping the knobs, and the spur 51 will be caught and retained by the end 62 of the lever 60.

The front side of the case 19, opposite the spring-barrel 50, is provided with oppositely-curved slots 80, and secured to studs which are fastened to the barrel and project through the slots are knobs 81, and the knobs are intended to set the spring-barrel and connected parts so that the machine may be operated by the pressure of air.

The operation of the machine is as follows: The spring-barrel 50 and its contained spring are adjusted by means of the worm mechanism described above, so that the spring will have the requisite tension. The shutter and its carrier are properly adjusted in the lens, and assuming the parts of the shutter to be in the position shown in Fig. 5 the knobs 81 will be in the position shown in dotted lines in Fig. 1. It will thus be seen that the spring-barrel is held from turning by the spur 51 engaging the end 62 of the lever 60. To operate the shutter, the operator then presses

the bulb 68, which causes the air to lift the piston-rod 64 and rod 63, and the latter will lift the inner end of the lever 60, thus depressing the outer end and permitting the spring-barrel to turn. As the spring-barrel revolves, the spur 51 will pass through the forked end 48 of the lever 45 and will deliver a sharp blow on the free end of the lever 40, thus raising said lever, the socket 38, and the rod 30, and the latter by moving quickly upward will operate on the levers 28 and open and close the shutters, in the manner already described. The parts will then be in the position shown in Fig. 6, with the projection 43 of the lever 40 resting on the lug 44 of the lever 45, and with the spur 51 resting against the under side of the lever 40. To reset the shutter-rod for another operation, the operator grasps the knobs 81, which will have turned from the position indicated by dotted lines in Fig. 1 back to their original position, and in doing this the spur 51 will be carried back, so as to be caught and retained by the end 62 of the lever 60, and the spur 49 will engage the free end of the lever 45, thus depressing it and raising the lug 44, which, lifting on the arm 42 of the lever 40, will depress the inner end of the latter lever and draw down the rod 30 ready for another operation. For focusing or holding the shutter open for a time, exposure, as in Fig. 5, the knob 79 is thrown to the point marked B, thus raising the crank-arm 76 in the manner described, and the locking-levers 70 and 71 will assume a horizontal position, so as to raise the inner end of the lever 60 and free the spur 51, and the toe 46 of the lever 45 will engage the rear end 73 of the lever 71, while the heel 44 of the lever 45 will engage the projection 43 of the lever 40, thus balancing the pressure of the spring, so as to hold the shutters in the position shown in Fig. 5; but to do this the piston 64 must be held in a raised position, and it is necessary to keep the bulb 68 compressed, or else remove the cap 69 from the bulb, so that the air may enter the latter. When the bulb is allowed to expand, the pressure of the spring immediately returns the parts to their former position and closes the shutters.

Having thus described our invention, we claim as new and desire to secure by Letters Patent—

1. A lens-shutter comprising a cylindrical carrier having openings therein, oppositely-arranged shutters pivoted in the carrier and adapted to close the opening, a case connected with the carrier by a hollow spindle, a spring-barrel mounted within the case, a lever mechanism operated by the spring-barrel and adapted to work the shutters, a tripping-lever adapted to engage a spur of the spring-barrel, and a pneumatically-operated piston adapted to release the tripping-lever, substantially as described.

2. The combination, with the shutter-carrier having a threaded supporting-spindle

and having shutters mounted within it, of spring-arms, and a jam-nut mounted on the spindle and adapted to abut with the inner and outer portions of the lens-tube, substantially as described.

3. The combination, with the shutter-carrier having exposure-openings therein, of a pair of base-shutters pivoted therein and provided with a central opening, a pair of shutters pivoted on and near the free ends of the base-shutters and adapted to close the exposure-opening, a reciprocating rod held to enter the lower portion of the carrier, a lever-and-crank mechanism for opening the shutters by the movement of the rod, and a spring-actuated lever mechanism for moving the rod, substantially as described.

4. The combination, with the carrier having exposure openings and a supporting-spindle, of a pair of base-shutters pivoted in the carrier and provided with a central opening, a reciprocating rod mounted in the spindle and connected with the base-shutters by a lever-and-crank mechanism, whereby the shutters may be opened and closed, a pair of inner shutters pivoted on the base-shutters and adapted to close the exposure-opening, and a cam mechanism for throwing open the inner shutters, substantially as described.

5. A lens-shutter comprising a carrier having exposure-openings and a supporting hollow spindle, a pair of oppositely-swinging base-shutters pivoted within the carrier and having a central opening, a reciprocating rod mounted in the spindle and connected by a lever-and-crank mechanism with the base-shutters, whereby the latter may be opened and closed, a pair of inner shutters pivoted on the base-shutters and adapted to close the exposure-opening, said inner shutters being pivoted at their lower inner corners and having at their outer corners depending cams, and bearing-surfaces arranged within the carrier and adapted to engage the cams of the inner shutters, substantially as described.

6. In a lens-shutter, the combination, with the carrier having exposure-openings and the oppositely-swinging base-shutters mounted within the carrier, of inner shutters pivoted to the base-shutters near their free ends and adapted to close the exposure-opening, one shutter having a flange to overlap the adjacent shutter, and a cam mechanism for moving the inner shutters in relation to the base-shutters, substantially as described.

7. In a lens-shutter, the combination, with the carrier having exposure-openings, the hollow spindle supporting the carrier, and the reciprocating rod mounted in the spindle, of base-shutters pivoted in the upper portion of the carrier and adapted to swing therein, curved crank-arms mounted within the carrier, said crank-arms being pivoted at their lower ends and having their upper ends connected with the base-shutters, a lever connection between the cranks of the arms and the

reciprocating rod, and inner shutters mounted on the base-shutters and adapted to close the exposure-opening, said inner shutters having a movement independent of the base shutters, substantially as described.

8. In a lens-shutter, the combination, with the swinging shutters and the reciprocating rod operatively connected with the shutters, of a spring-barrel mounted adjacent to the lower end of the rod, a spur produced on the spring-barrel and adapted to raise the rod, a tripping-lever to engage the spur and trip the barrel, pneumatic mechanism for operating the tripping-lever, movable studs for effecting the return of the spring-barrel, and a lever mechanism for returning the reciprocating rod, substantially as described.

9. The combination, with the lens-carrier, the shutters mounted therein, and the reciprocating rod operatively connected with the shutters, of an elbow-lever having its longer arm pivotally connected with the rod and its shorter arm provided with a projection, a forked lever pivoted below the elbow-lever and having a lug thereon to engage the short arm of the elbow-lever, a spring-barrel mounted near the free ends of the levers, the said barrel having a spur to engage the forked lever and a spur to strike the free end of the elbow-lever, and pneumatic tripping mechanism for the spring-barrel, substantially as described.

10. The combination, with the lens-carrier having shutters therein, the hollow spindle supporting the carrier, the case connected with the spindle, and the reciprocating rod extending through the spindle and operatively connected with the shutters, of a spring-barrel pivoted in the case and provided with knobs adapted to oscillate in grooved slots in the case, a spur produced on the spring-barrel and adapted to raise the reciprocating rod, a lever mechanism adapted to engage another spur on the barrel and effect the return of the rod, and pneumatic tripping mechanism for the barrel, substantially as described.

11. The combination, with the case which supports the shutter-carrier and the spring-barrel mounted within the case and adapted to operate the shutter mechanism, of a scale produced exteriorly on the case, a worm mounted adjacent to the scale, an indicating-hand carried by the worm and adapted to move over the scale, and a worm-wheel secured to the shaft of the spring-barrel and adapted to engage the worm, substantially as described.

12. The combination, with the spring-barrel, its tripping-lever, the reciprocating shutter-rod, and the lever mechanism connecting said rod with the spring-barrel, of the spring-pressed locking-levers adapted to engage and lock the tripping-lever and the lever mechanism connecting with the shutter-rod, and a crank mechanism for adjusting the locking-levers, substantially as described.

13. The combination of the spring-barrel having projecting spurs, the reciprocating shutter-rod, the elbow-lever connected with the rod, the forked lever arranged between the elbow-lever and the spring-barrel spurs, the tripping-lever adapted to engage one of the spurs of the spring-barrel, the spring-pressed locking-levers adapted to engage the tripping-lever, and a crank-arm adapted to press upon one of the locking-levers, the locking-levers being adapted to hold the shutter open, substantially as described.

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