P. J. MUKAUTZ.

MEANS FOR OPERATING EXPOSURE SHUTTERS.

APPLICATION FILED SEPT. 9, 1912.

1,081,548. Patented Dec. 16, 191.

2 SHEETS—SHEET 1.

FIG. 1

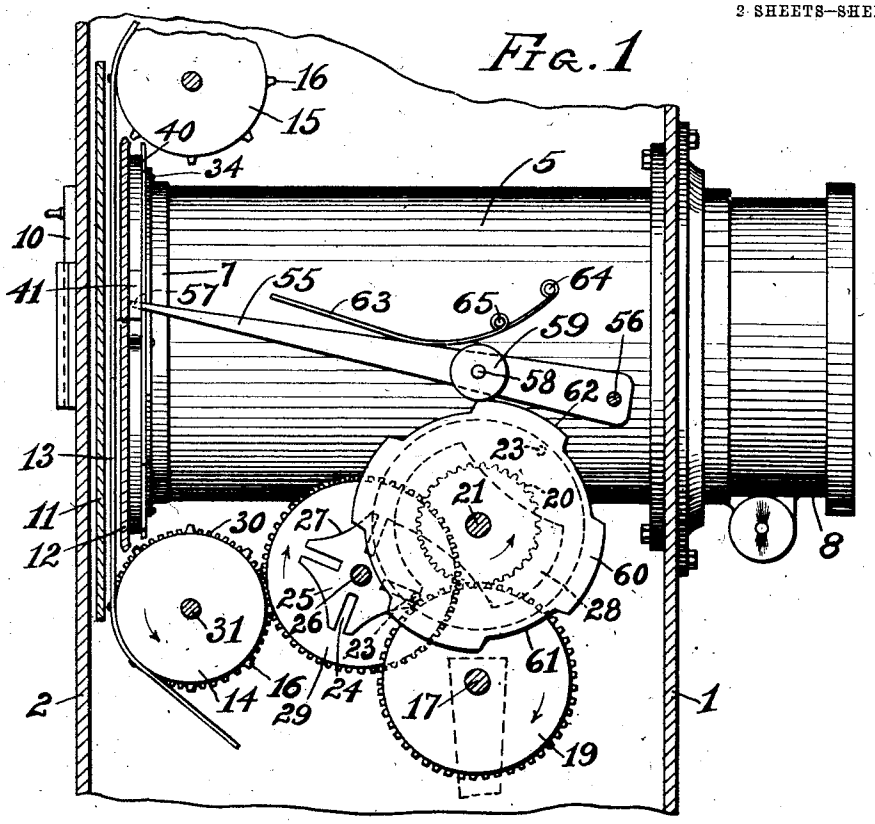


FIG. 5

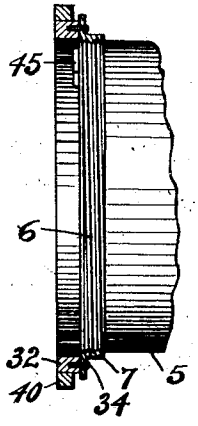
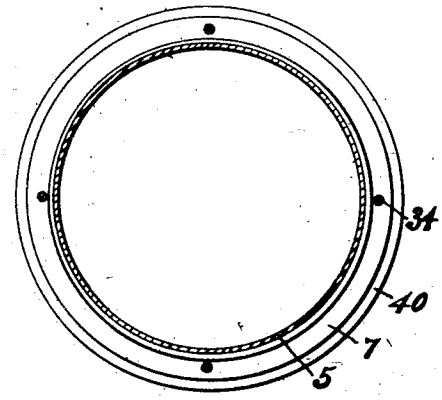


FIG. 6



Witnesses
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2 SHEETS—SHEET 2.

FIG. 2

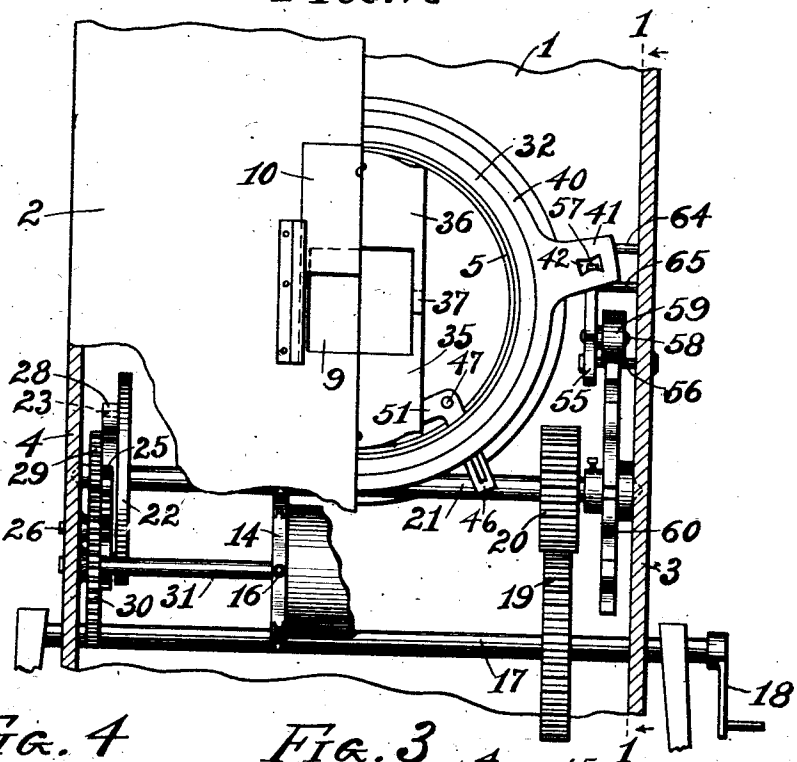


FIG. 4

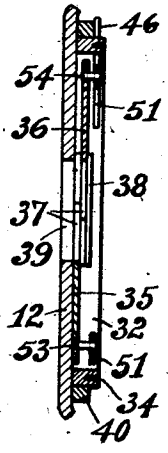
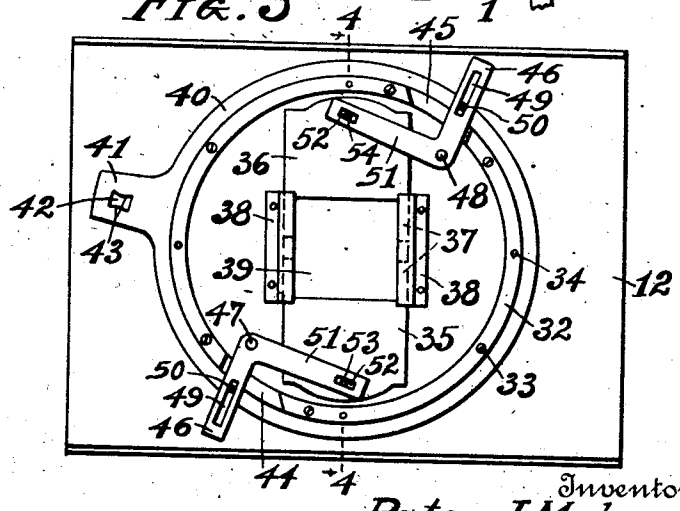


FIG. 3



Witnesses

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MEANS FOR OPERATING EXPOSURE-SHUTTERS.

1,081,548. Specification of Letters Patent. Patented Dec. 16, 1913.

Application filed September 9, 1912. Serial No. 719,404.

To all whom it may concern:

Be it known that I, PETER J. MUKAUTZ, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Means for Operating Exposure-Shutters, of which the following is a specification.

This invention relates to improvements in mechanism for automatically operating shutters, such as used in connection with apparatus for photographing, copying and projecting moving picture films.

The principal object of the invention is to provide mechanism of the above character, which is of simple construction, is positive in action and will coöperate with the mechanism for advancing the film step by step, so as to give the proper exposure when the film is stationary.

With the above and other objects in view, the invention consists in the combination and arrangement of the parts hereinafter fully described in connection with the accompanying drawings which illustrate a preferred embodiment thereof.

The novel features of the invention will be particularly pointed out in the appended claims.

In the drawings like characters of reference indicate corresponding parts.

Figure 1 is a longitudinal sectional elevation of a portion of an apparatus embodying my invention taken on line 1—1 of Fig. 2, Fig. 2 is a rear view of Fig. 1. certain parts being broken away to better show the construction, and one half being a view looking toward the bearing and sliding rings, Fig. 3 is an elevation of the guide plate with the means connecting the shutter blades to the sliding ring, Fig. 4 is a sectional view of Fig. 3 taken on line 4—4, Fig. 5 is a sectional view showing the manner of connecting the lens barrel to the flange collar and the latter to the bearing ring, Fig. 6 is an end view of Fig. 5.

In the drawings, the case for inclosing the mechanism consists of a forward end wall 1, a rear end wall 2 and the side walls 3 and 4. Mounted in the forward end wall 1 and fixed thereto is a lens barrel 5, the inner end of which terminates a little short of the rear end wall 2 and is threaded as shown at 6 for receiving a flanged collar 7 for a purpose hereinafter explained. A suitable lens 8 is slidably mounted in the forward end of the lens barrel. The rear end wall 2 is provided with a light admitting rectangular opening 9, which is in alinement with the lens 8 and may be conveniently closed by means of a sliding door such as 10.

Arranged in spaced relation within the case between the rear end wall 2 and the flanged collar 7 are guide plates 11 and 12, which are supported from the side walls and have openings therethrough corresponding to the rectangular opening 9 in the rear end wall of the case. The film, indicated by 13, is moved between the guide plates 11 and 12 before said openings thereof by means of lower and upper guide rollers 14 and 15 having spurs 16 for engaging aliming holes adjacent the edge of the film as is well known.

The guide rollers 14 and 15 may be rotated from a main driving shaft to move the film by a step by step movement involving alternate periods of rest and advance by any suitable means. As illustrated in the drawings, to the main driving shaft 17, which is mounted in the side walls of the case and may be rotated by a crank 18 or other suitable means, is fixed a gear wheel 19 which meshes with a gear wheel 20 secured to a balance shaft 21, having its ends rotatably mounted in the side walls of the case. Fixed to the balance shaft 21 is a pin wheel 22 carrying diametrically opposite pins 23 for engaging the radial slots 24 of a star gear 25, which is rotatably mounted on a stub shaft 26 supported from the side wall 4 of the case. The star gear 25 is cut out to form recesses 27 between its arms, and rigidly connected to the pin wheel 22 is a cam 28 for engaging said recesses of the star gear. The above constitutes a Geneva stop movement, and it will be readily seen that the continuous rotation of the pin wheel 22 will cause one of the pins 23 to engage one of the radial slots of the star gear and rotate the same one quarter of a revolution, and that as the pin leaves said slot, one end of the cam will engage one of the recesses in the star gear and thereby lock the star gear against rotation. Fastened to the star gear and rotatable therewith is a gear wheel 29, which meshes with a gear wheel 30 rigidly secured to the shaft 31 on which is fixed the lower guide roller 14. As the star gear

25 is alternately rotated and locked against movement, the film will advance step by step.

The mechanism coöperating with the above means for the purpose of giving the proper exposure when the film is at rest will now be described. A bearing ring 32, having an outside diameter a little less and an inside diameter substantially equal to the size of the flange of the collar 7 on the inner end of the lens barrel, is secured to the inner face of the guide plate 12 by screws 33, and to the flange of the collar as indicated at 34. A pair of oppositely disposed shutter blades 35 and 36, having inwardly projecting side tongues 37, the ends of which are adapted to overlap when the blades are in open position to serve as guides, are slidably mounted in suitable guides 38 fixed to the inner face of the guide plate 12 at the sides of its rectangular opening 39. These shutter blades are actuated from the main driving shaft to shut off the light during the advance movement of the film as follows. Rotatably mounted on the periphery of the bearing ring 32 is a sliding ring 40 having a laterally projecting arm 41 which is provided with a recess 42 preferably having opposite convex edges 43. The thickness of the sliding ring 40 is less than that of the bearing ring 32 and the latter is cut away at 44 and 45 to permit the attachment of the outwardly projecting arms 46 of a pair of bell-cranks to said sliding ring. The bell-cranks are pivoted to the inner face of the guide plate 12 at 47 and 48, and their outwardly projecting arms 46 are slotted at 49 to engage the pins 50 projecting laterally from said sliding ring. The inner arms 51 of the bell-cranks are similarly slotted at 52 for receiving pins 53 and 54 fixed in the shutter blades 35 and 36 near their outer ends.

A lever arm 55, for actuating the sliding ring 40 to open and close the shutter blades, is pivoted at one end to a pin or bolt 56 projecting inwardly from the side wall 3 of the case, and its free end 57 engages the convex edges 43 of the recess 42 in said sliding ring. The lever arm 55 is provided with a stub pin 58 on which is rotatably mounted a roller wheel 59 which is in engagement with the periphery of a disk cam 60 having alternately low and raised surfaces 61 and 62. The disk cam 60 is rigidly mounted on the balance shaft 21 in such relation to the position of the pin wheel 22, that when the latter is not actuating the star gear 25 to advance the film as already described, or in other words when the film is stationary, the roller wheel 59 is in contact with one of the raised surfaces 62 of the disk cam to hold the shutter blades in open position for giving the proper exposure. A curved flat spring 63, having its forward end portion connected to the side wall 3 at 64 and 65, presses downwardly on the lever arm 55 to keep its roller wheel 59 in contact with the peripheral low and raised surfaces of the disk cam 60.

A description of the operation follows: The rotation of the main driving shaft 17 by means of the crank 18, causes the gear wheel 19 to drive the gear wheel 20 which rotates the balance shaft 21. The pin wheel 22, being fixed to said balance shaft, operates the star gear 25 when one of its pins 23 engages a radial slot 24 of the star gear. As the pin 23 leaves the slot 24, one end of the cam 28 is brought into engagement with a recess 27 in the star gear to lock it against rotation. This imparts a positive alternate movement and rest to the star gear and also to the gear wheel 29 which is fixed to the star gear. The gear wheel 29 drives the gear wheel 30, and also the guide roller 14 which is rigidly secured to the same shaft, in the same manner, whereby the film 14 is moved step by step. When the end of the cam 28 begins to engage the recess 27 of the star gear and thus bring the film to rest, the raised surface 62 of the disk cam also begins to engage the roller wheel 59 and to hold the lever arm in its raised position thereby keeping the shutter blades open. The cam 28 and the disk cam 60 are of such relative construction; that during the time the cam 28 is holding the star gear locked against rotation, the disk cam is keeping the shutter blades open. When the star gear is being actuated by the pin wheel 22 and the film is advancing, the cam 28 is out of engagement with the recesses 27 and the roller wheel 59 is supported on one of the low surfaces 61 of the disk cam, thereby leaving the shutter blades closed.

It is to be understood that slight changes in the details of construction and arrangement of the parts may be resorted to within the scope of the claims.

Having fully described my invention, what I claim is:

1. In mechanism of the class described, the combination with means for advancing a film step by step, of means for directing light transversely through the film, shutters arranged between the film and the light directing means, a rotatably mounted ring, means connecting the shutters to the ring, and means for operating said ring from the means for advancing the film to open said shutters between the advance step by step movements of the film, substantially as described.

2. In mechanism of the class described, the combination with means for advancing a film step by step, of means for directing light transversely through the film, shutters arranged between the film and the light directing means, a rotatably mounted ring,

pivotally anchored bell-cranks, the bell-cranks being pivotally connected to the shutters and to the ring, a lever arm for operating said ring, and means coöperating with the means for advancing the film step by step to actuate the lever arm to open the shutters when the film is at rest and to close them when the film advances, substantially as described.

3. In mechanism of the class described, the combination with means for advancing a film step by step, of means for directing light transversely through the film, shutters arranged between the film and the light directing means, a rotatably mounted ring, pivotally anchored bell-cranks, the bell-cranks being pivotally connected to the shutters and to the ring, an arm projecting from the ring, a lever arm engaging the arm of the ring, a roller wheel carried by the lever arm, a cam having alternately low and raised surfaces for engaging the roller wheel, a spring bearing on said lever arm for holding said roller wheel in contact with the cam, and the cam being operated from the means for advancing the film step by step so that its raised surfaces will be in engagement with said roller wheel to hold the shutters open when the film is at rest and its low surfaces will be in engagement therewith to permit the keeping of the shutters closed by said spring when the film is being advanced, substantially as described.

4. In mechanism of the class described, the combination with means for advancing a film step by step, of means for directing light transversely through the film, a fixed bearing ring, shutters arranged within the bearing ring between the film and the light directing means, a sliding ring rotatably mounted on the bearing ring, pivotally anchored bell-cranks, the bell-crank being pivotally connected to the shutters and to the sliding ring, an arm projecting laterally from the sliding ring, the arm being provided with a recess, a lever arm pivoted at one end and its free end engaging said recess of the arm, a roller wheel carried by the lever arm, a cam having alternately low and raised surfaces for engaging the roller wheel, a spring bearing on said lever arm for holding said roller wheel in contact with the cam, and the cam being operated from the means for advancing the film step by step so that its raised surfaces will be in engagement with said roller wheel to hold the shutters open when the film is at rest and its low surfaces will be in engagement therewith to permit the keeping of the shutters closed by said spring when the film is being advanced, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

PETER J. MUKAUTZ.

Witnesses:
E. GAHAN,
NICHOLAS P. WHELAN.