No. 699,161. Patented May 6, 1902.

J. FORSHEIM.

PANORAMIC CAMERA.

(Application filed Nov. 7, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

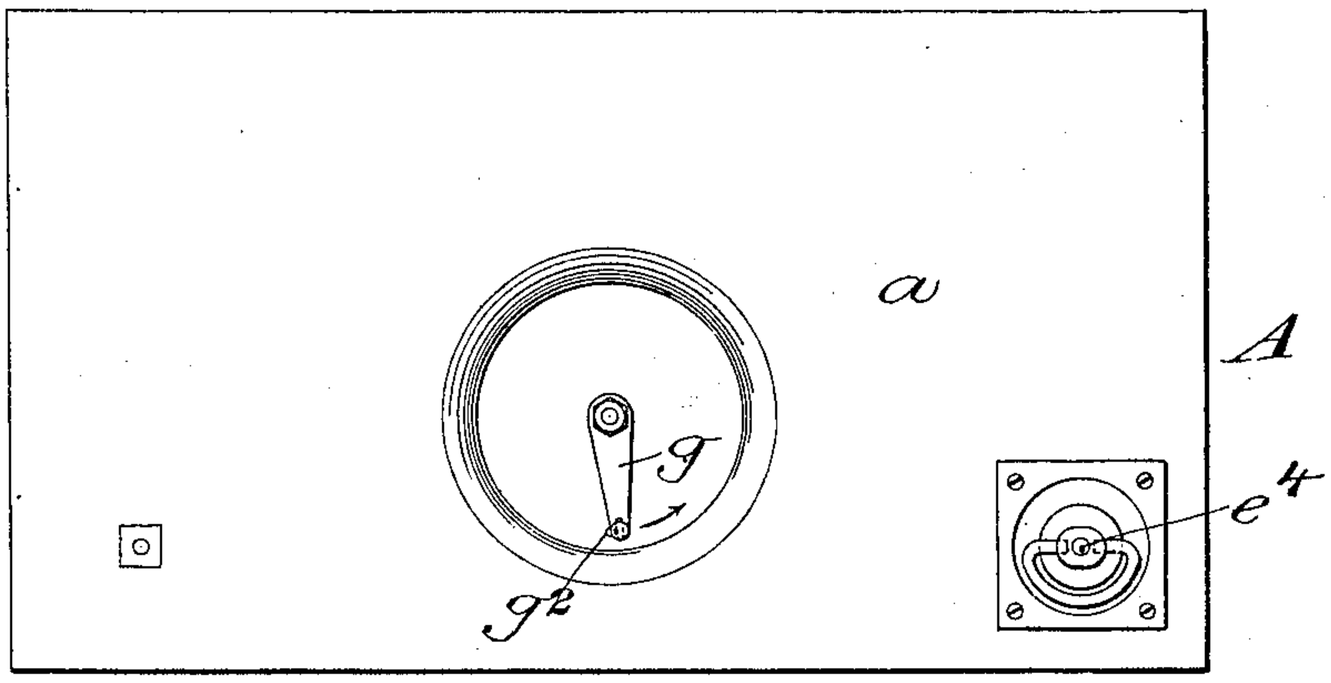


Fig. 2.

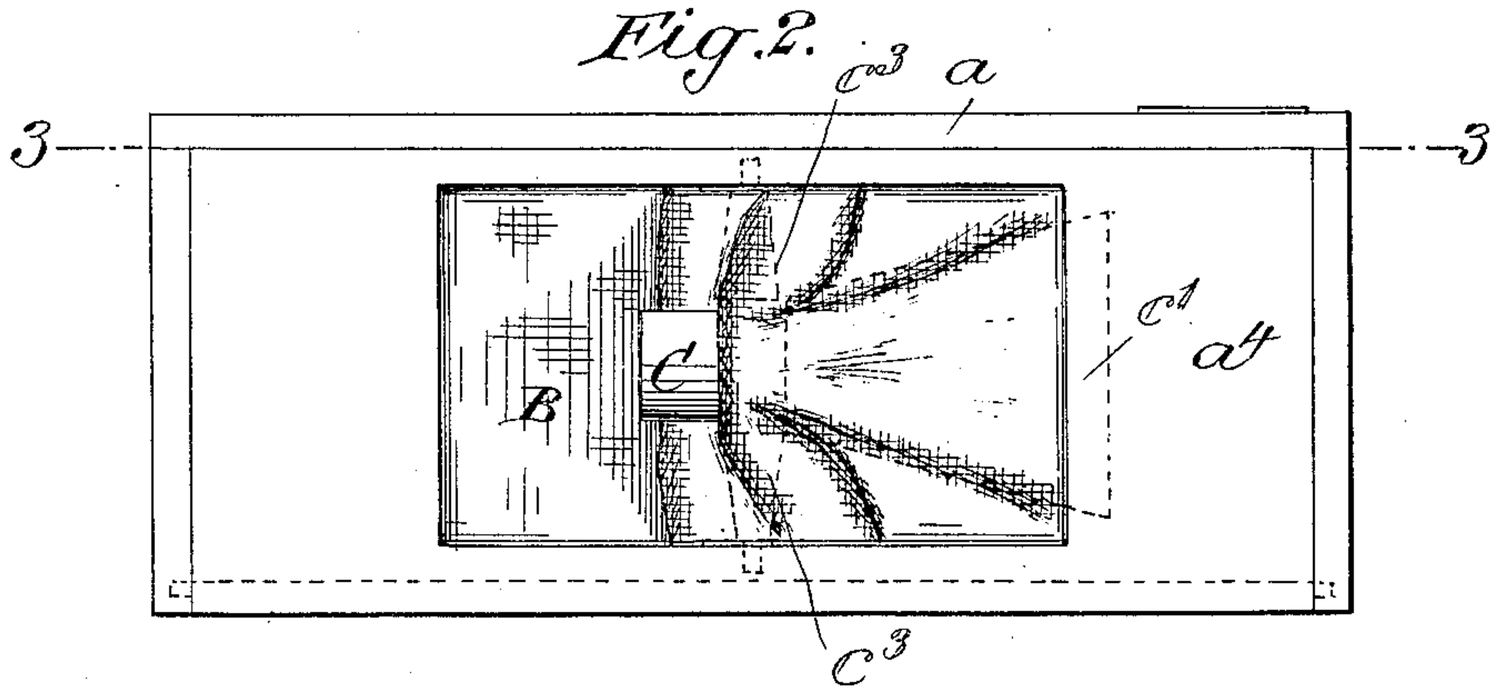
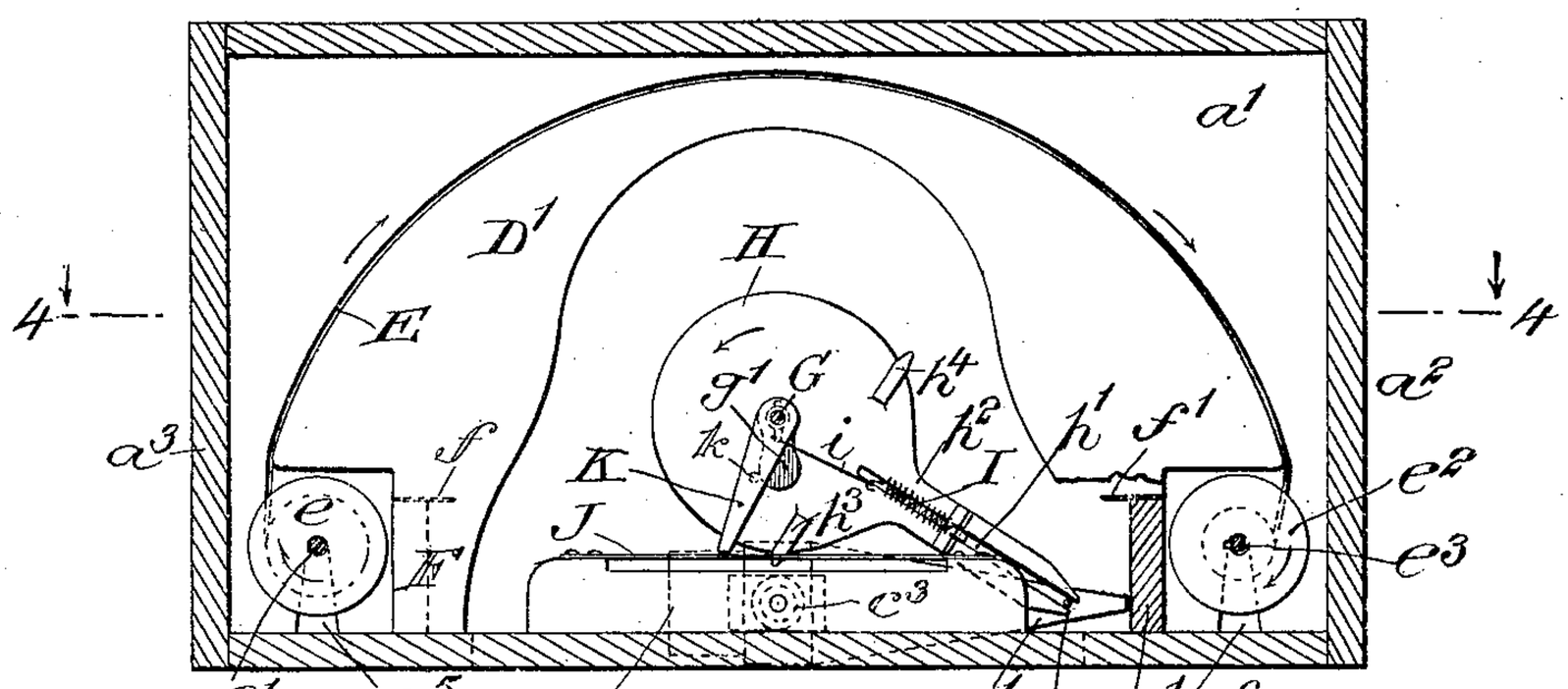
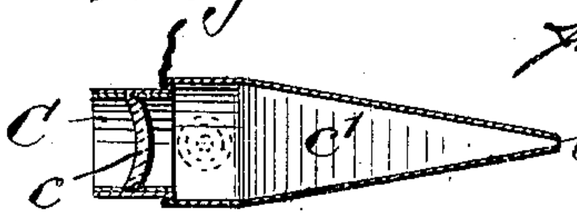


Fig. 3.



Witnesses:-
George Barry Jr.
Edward Dieser.

Fig. 11.



Inventor:-
Joseph Forsheim
by attorneys
Munn & Co.

No. 699,161. Patented May 6, 1902.

J. FORSHEIM.

PANORAMIC CAMERA.

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(No Model.) 2 Sheets—Sheet 2.

Fig. 4.

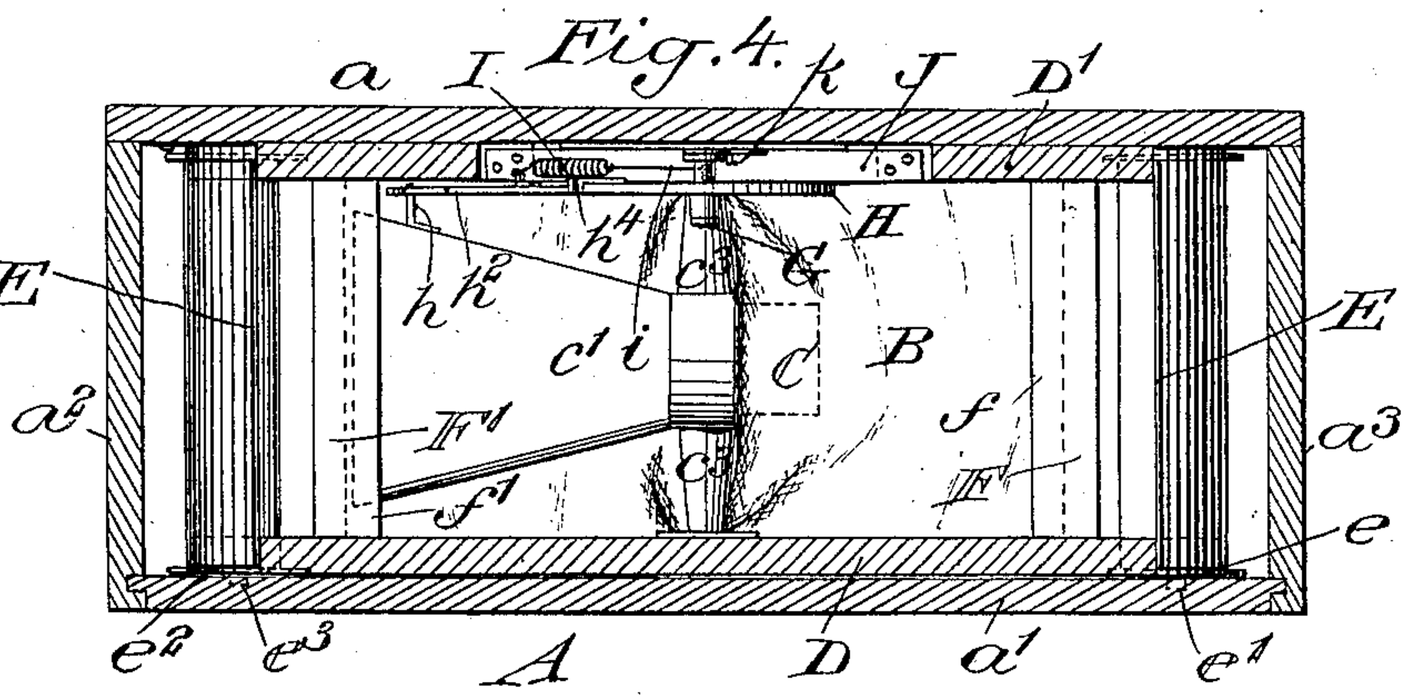
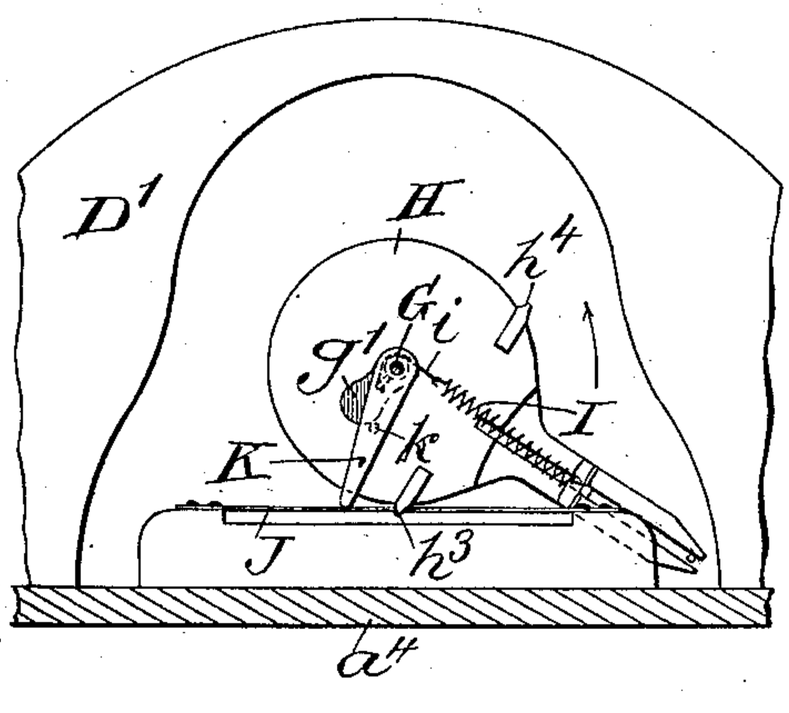


Fig. 5.

Fig. 6.



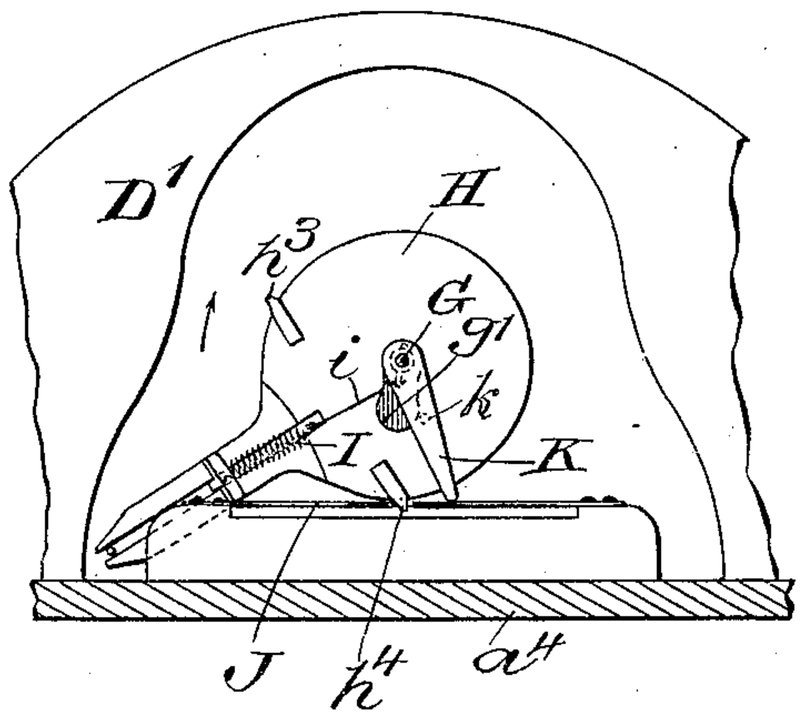


Fig. 7.

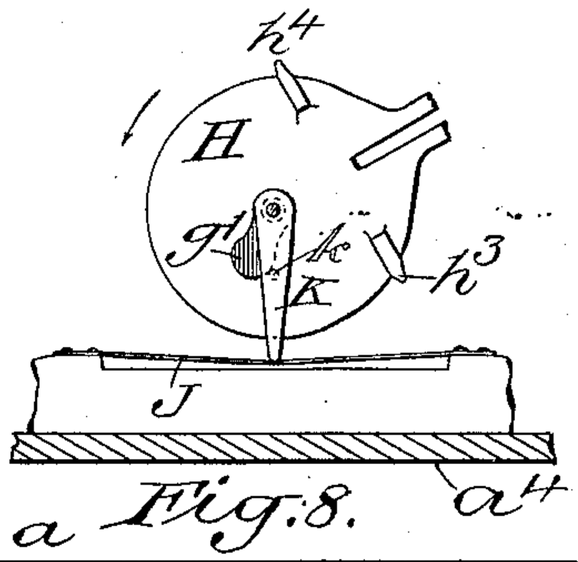


Fig. 8.

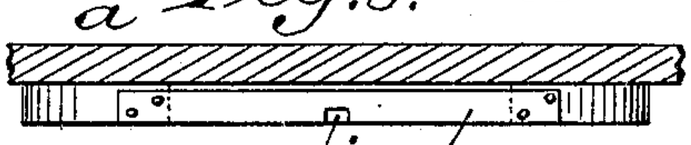


Fig. 9.

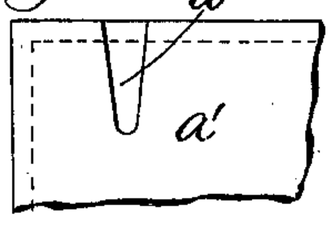


Fig. 10.

Witnesses:-
George Barry Jr.
Edward Fiedot

Inventor:-
Joseph Forsheim
by attorneys
Brown & Lund

UNITED STATES PATENT OFFICE.

JOSEPH FORSHEIM, OF NEW YORK, N. Y., ASSIGNOR TO EASTMAN KODAK COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

PANORAMIC CAMERA.

SPECIFICATION forming part of Letters Patent No. 699,161, dated May 6, 1902.

Application filed November 7, 1899. Serial No. 736,103. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH FORSHEIM, a citizen of the United States, and a resident of the borough of Manhattan, in the city and State of New York, have invented a new and useful Improvement in Cameras, of which the following is a specification.

My invention relates to an improvement in cameras, and more particularly to that class known as "panoramic" cameras.

The object of my invention is to produce a panoramic camera in which means are provided for placing the lens and its holder under tension, tending to swing it in either of two opposite directions to make an exposure.

A further object is to provide a simple actuating device for carrying out the above object, whereby a single spring may be set for throwing the lens and its holder in both directions.

A still further object is to provide means for temporarily locking the lens-holder at the limits of its swinging movement, a single tension-spring, and a single operating device for setting the spring and releasing the lens-holder.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 represents a top plan view of the camera. Fig. 2 represents a front view of the same. Fig. 3 is a horizontal sectional view taken in the plane of the line 3 3 of Fig. 2. Fig. 4 is a vertical sectional view taken in the plane of the line 4 4 of Fig. 3. Fig. 5 is a detail view showing the lens-holder-operating device in the position which it assumes after setting the spring and when about to release the locking device. Fig. 6 is a similar view showing the position of the parts after the locking device has been released and the holder swung over and locked in its opposite position. Fig. 7 is a detail view of the same parts, showing the locking-spring depressed and the lens-holder-controlling disk in a position intermediate the limits of its swinging movement. Fig. 8 is a detail view showing the locking-spring in front elevation. Fig. 9 is a fragmentary view of one corner of the bottom of the camera-box, showing the groove therein for the reception of the bottom of the film-spool. Fig. 10 is a vertical section through the said groove; and Fig. 11 is a horizontal longitudinal section through the lens, its holder, and light-confining tube.

The camera-box as a whole is denoted by A, its top by a, and its bottom by a', which bottom may be removed for the purpose of gaining access to the interior of the camera-box, in the present instance by having a sliding engagement with the sides a^2 a^3. The front a^4 of the camera-box is provided with a rectangular opening which is closed by means of a flexible curtain B, which curtain prevents the access of light to the interior of the camera-box.

The lens-holder is denoted by C and its lens by c. The lens-holder is provided with a light-confining tube c', having its open end to the rear of the lens developed to form a vertically-elongated narrow slit c^2, through which the light is projected from the lens onto the film or sensitized surface. The lens-holder is carried by a vertically-arranged shaft or axle c^3, the lower end of which is mounted in suitable bearings in a bottom marginal guide D, located adjacent to the bottom a' of the camera-box, and the upper portion of the said vertical shaft c^3 is mounted in suitable bearings in a top marginal guide D′, located adjacent to the top a of the camera-box.

The front end of the lens-holder C projects through the flexible curtain B, the said curtain being fulled to such an extent as to permit the lens-holder and its light-confining tube to swing from one position substantially parallel with the front of the camera-box to its other position, substantially parallel with the front of the box, without disturbing the attachment of the curtain to the said box-front.

The rear edges of the marginal guides D D′ are curved in an arc with the axis of the lens-holder as a center. A film E is arranged to be drawn around the said curved edges of the guides from a film-spool e, loosely mounted on a vertical axle-pin e' to a winding-spool e^2, fixed to rotate with an axle-pin e^3. The axle-pin e' is fixed at its upper end in the top of the camera-box and its bottom end is fitted

to enter an open-ended groove a^5, extended inwardly on the upper surface of the bottom a' of the box at its forward end. The axle-pin e^3 is mounted to rotate in the top a of the box, and it is provided exterior to the box with the usual winding-handle e^4. The lower end of the winding-pin e^3 is fitted to enter an open-ended groove a^6, similar to the groove a^5 in the removable bottom a' of the box. By this arrangement the spools e e^2 may be readily inserted or removed from the camera-box by sliding the bottom of the box a short distance to the rear sufficient to release the free ends of the pins e' e^3 from their engagement with the grooves a^5 a^6.

The upper marginal guide D′ may be permanently secured to the top of the camera-box, and the lower marginal guide is rigidly spaced from and secured to the top marginal guide by means of vertical pillars F F′, extending between the said guides at their forward edges adjacent to the front of the camera-box.

Vestibules for protecting the slit c^2 in the light-confining tube are formed by providing the rear edges of the vertical pillars F F′ with flexible flaps f f', projecting a sufficient distance inwardly to intercept the path traversed by the inner end of the light-confining tube as it is swung from one position to the other. The sensitized surface is thus exposed from the time the light-confining tube leaves one of the vestibules until it enters the opposite vestibule.

The means which I employ for swinging the lens and its holder in either of two opposite directions for making an exposure is constructed and arranged as follows: A stub axle G is mounted to rotate in the top a of the camera-box, which axle projects a slight distance into the interior of the box and a sufficient distance above the top of the box to permit an operating-handle g to be attached thereto. A lens-holder-operating disk H is loosely mounted upon the stub-axle G, which disk has a pin and slot connection with the lens-holder in the present instance by providing the light-confining tube c' with a pin h, which is adapted to travel along in a radial groove h' in an outwardly-projecting arm h^2 of the disk G. A short coil-spring I is secured at one end to the disk H a short distance out upon the arm h^2, the other end of the spring being attached to a flexible connection i secured to the stub-axle G in position to be wound around the same as the axle is rotated. This rotary action of the stub-axle serves to extend the spring I, and thereby set it under tension tending to swing the disk, and thereby the lens-holder.

The device which I employ for temporarily locking the holder at the limits of its swinging movement comprises a plate-spring J, having a notch j therein in position to engage one or the other of a pair of teeth h^3 h^4, projecting from the periphery of the disk H. The spring J is depressed in the following manner for releasing the operating-disk H after the stub-axle G has been rotated a sufficient distance to impart a sufficient tension to the spring I to swing the disk H, and thereby the lens-holder, over into its other position: A spring-releasing arm K is loosely mounted upon the stub-axle G, with its free end in engagement with the spring J. This arm K is provided with a pin k, located in position to be engaged by a tripping-arm g', fixed to the axle G in such position as to cause it to engage the pin k and swing the arm K a sufficient distance to cause it to depress the spring J and then permit the spring to return to its normal position ready to again lock the disk at the limit of its other movement as the rotation of the axle G is completed. A pin g^2 uprises from the top of the box in position to engage the handle g to limit the movement of the axle G to a single rotation in either direction.

Supposing the film to be drawn into position around the marginal guides as to present its sensitized surface along its concave face, the operation of the device is as follows: The handle g at the top of the camera is turned a complete revolution. The first portion of the movement will extend the spring I because of the winding of the flexible connection i around the axle G, and the last part of the movement of the handle will cause the tripping-arm g' to engage the spring-releasing arm K and cause the arm to engage the spring J and release the disk H. The swinging movement of the disk H, caused by the tension of the spring I, will, through its pin-and-slot connection with the holder C, swing the holder from one position through an arc around to its other position and lock it there. At the same time the objects to be photographed are projected upon the sensitized surface of the film through the light-confining tube c'. The parts are then in a position to make another exposure by a reverse movement of the handle g.

The pin-and-slot connection between the operating-disk H and the lens-holder serves to cause the lens-holder to swing at a uniform speed during its entire swinging movement, even though the tension of the spring I is decreased, because as the tension of the spring decreases the pin carried by the holder is brought nearer to the axis of the disk H along the slot h'.

It is evident that changes might be resorted to in the form and arrangement of the several parts without departing from the spirit and scope of my invention. Hence I do not wish to limit myself strictly to the structure herein set forth; but

What I claim is—

1. In a panoramic camera, a lens and its holder and means for placing the holder under tension tending to swing it in either of two opposite directions to make an exposure, substantially as set forth.

2. In a panoramic camera, a lens and its holder provided with a light-confining tube, and a single operating device for swinging the lens-holder in either of two opposite directions to make an exposure, substantially as set forth.

3. In a panoramic camera, a lens and its holder provided with a light-confining tube, a tension-spring arranged to swing the lens-holder in opposite directions and means for setting the spring, substantially as set forth.

4. In a panoramic camera, a lens and its holder provided with a light-confining tube, means for swinging the lens-holder in opposite directions and a locking device under the control of the lens-holder-swinging means for temporarily locking the lens-holder at the limits of its swinging movement, substantially as set forth.

5. In a panoramic camera, a lens and its holder provided with a light-confining tube, a spring for swinging the holder in opposite directions, means for temporarily locking the lens-holder at the limits of its swinging movement and a device for imparting tension to the spring and releasing the lens-holder, substantially as set forth.

6. In a panoramic camera, a lens and its holder, an operating-disk having a pin-and-slot engagement therewith, a tension-spring, a device for temporarily locking the said disk and means for imparting tension to the said spring tending to swing the holder and for releasing the disk and thereby the holder, substantially as set forth.

7. In a panoramic camera, a lens and its holder mounted to swing, a stub-axle, a rotary disk carried thereby having a radial elongated slot therein, a pin carried by the holder in engagement with the said slot and a tension-spring engaged with the disk and the axle whereby rotary movement of the axle will impart a tension to the spring to swing the disk and thereby the holder, substantially as set forth.

8. In a panoramic camera, a lens and its holder mounted to swing, a stub-axle, a holder-operating disk carried thereby, a spring for locking the disk and means for releasing the spring comprising an arm loosely carried by the said axle and a tripping-arm fixed to the axle in position to operate the first-named arm as the axle is rotated, substantially as set forth.

9. In a panoramic camera, a lens and its holder mounted to swing, a stub-axle, a holder-operating disk mounted thereon, a tension-spring secured to said disk and having a flexible connection with the said axle whereby, as the axle is rotated, in either direction, the spring will tend to rotate the disk and thereby the holder in a corresponding direction, substantially as set forth.

10. In a panoramic camera, a lens and its holder provided with a light-confining tube, means for swinging the holder and tube in opposite directions and vestibules for closing the inner end of the tube at the limits of its swinging movement comprising flexible flaps projecting into the path of the swinging movement of the tube, substantially as set forth.

11. In a panoramic camera, a camera-box having a removable bottom, top and bottom marginal guides secured within the box independently of the said bottom, and axle-pins for receiving the film-spools having their free ends removably engaged in the said bottom, substantially as set forth.

12. In a panoramic camera, a lens and its holder mounted to swing, a stub-axle, a holder-operating disk carried thereby, a spring for locking the disk and means for engaging the spring to release the disk and permit the spring to again return to its locking position, substantially as set forth.

13. In a panoramic camera, a lens, a light-directing chamber pivoted to swing together with the lens in opposite directions and means for swinging the said light-directing chamber and lens to make an exposure during the swinging movement in each of the two opposite directions, substantially as set forth.

14. In a panoramic camera, a lens, and light-directing chamber pivotally mounted to swing together in opposite directions, means for swinging the lens and light-directing chamber to effect an exposure during the opposite swinging movements, and means for automatically locking the lens and light-directing chamber at both ends of each swinging movement, substantially as set forth.

15. In a panoramic camera, the combination with film-holding devices embodying curved film-guides, and a pivoted oscillatory tube, of a reversible spring-motor for actuating the tube in opposite directions alternately, and a catch for retaining and releasing the tube.

16. In a panoramic camera, the combination with film-holding devices embodying curved film-supports, and film-chambers at the ends, of a pivoted oscillatory tube, one end of which is movable over the film-guides and into line with the closed sides of the film-chambers, a reversible spring-motor for actuating the tube in opposite directions alternately, and a catch for retaining and releasing the tube.

17. In a panoramic camera, the combination with curved film-guides, the film-chambers at the ends, and the flaps on the inner sides of the walls of the chambers, of the pivoted oscillatory tube, one end of which is movable over the film-guides and beyond the flaps, a reversible spring-motor for actuating the tube in opposite directions alternately, and a catch for retaining and releasing the tube.

18. In a panoramic camera the combination with a suitable case having a curved film-support and a swinging lens-holder adapted to turn on an axis concentric with said film-support, of mechanism adapted to turn said lens-holder alternately in opposite directions and comprising an actuating-spring, means for

straining said spring and resetting said mechanism after each exposure for the next exposure, and means for manually releasing said mechanism, substantially as and for the purposes set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 28th day of October, 1899.

JOSEPH FORSHEIM.

Witnesses:
FREDK. HAYNES,
C. S. SUNDGREN.