(No Model.) 2 Sheets—Sheet 1.

J. R. TREGO.

PHOTOGRAPHIC SHUTTER.

No. 422,664. Patented Mar. 4, 1890.

Fig. 1.

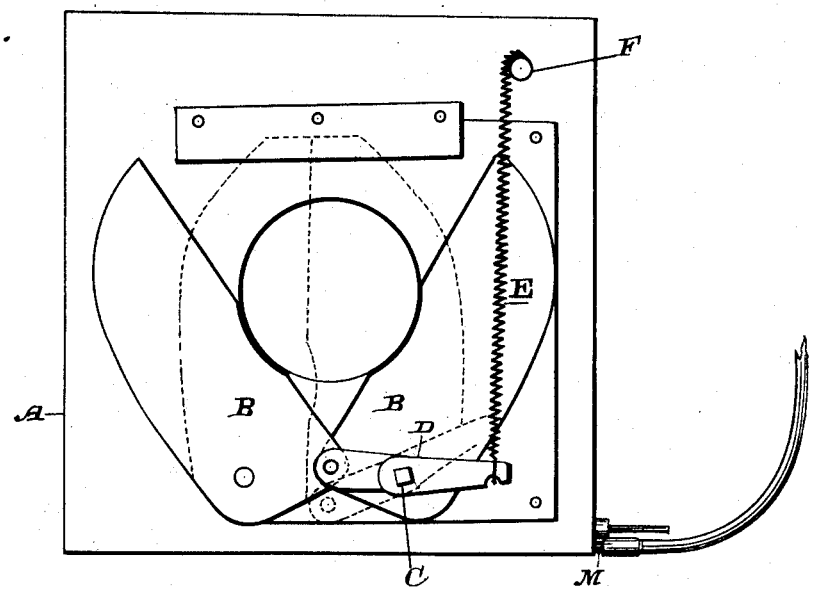


Fig. 2.

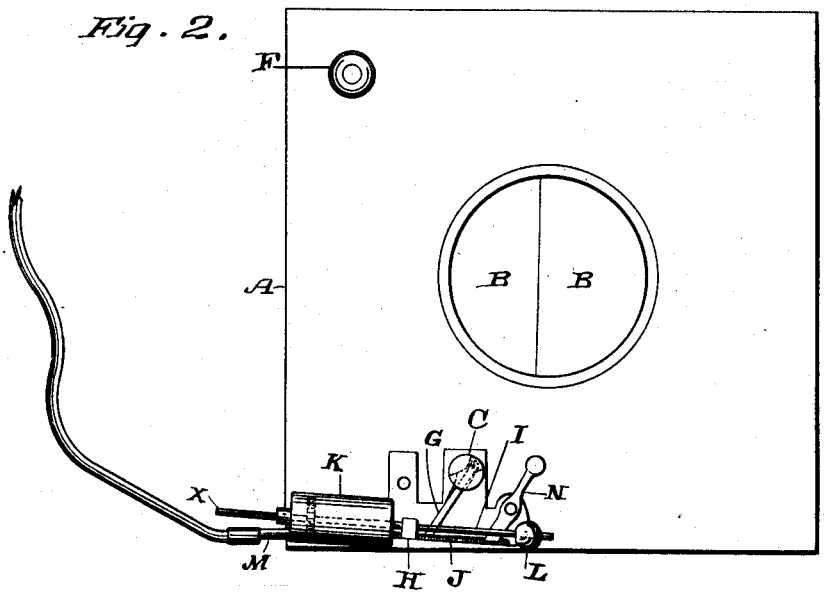
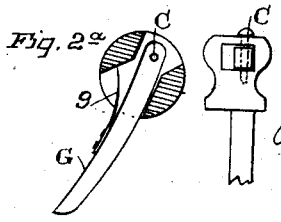


Fig. 2a.



Witnesses,
Geo. C. Strong.
L. L. Nurse

Inventor,
Joseph R. Trego
By Dewey & Co.
Attys

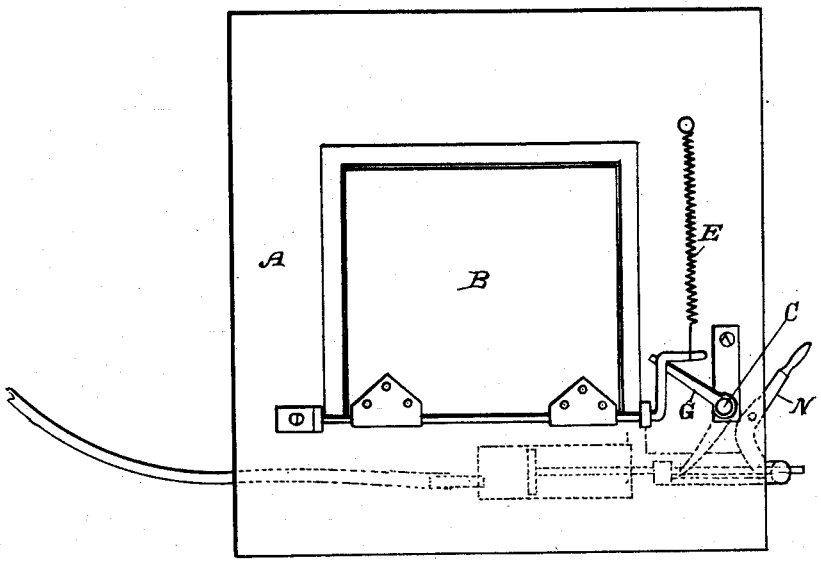
(No Model.) 2 Sheets—Sheet 2.

J. R. TREGO.

PHOTOGRAPHIC SHUTTER.

No. 422,664 Patented Mar. 4, 1890.

Fig. 3.



Witnesses,
Geo. H. Strong.
G. H. Nurse

Inventor,
Joseph R. Trego.
by Dewey & Co.
Attys

UNITED STATES PATENT OFFICE.

JOSEPH R. TREGO, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF TO HENRY C. OWENS, OF SAME PLACE.

PHOTOGRAPHIC SHUTTER.

SPECIFICATION forming part of Letters Patent No. 422,664, dated March 4, 1890.

Application filed September 2, 1889. Serial No. 322,789. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH R. TREGO, of the city and county of San Francisco, State of California, have invented an Improvement in Photographic Shutters; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in photographic shutters and the means for operating the same.

It consists of an air-impelled piston reciprocating in a cylinder, a piston-rod and slide, and a lever connected with the shutter and engaged by said slide, so as to be opened, and mechanism for closing the shutter when released, together with certain details of construction, which will be more fully explained by reference to the accompanying drawings, in which—

Figure 1 is a rear end view of a camera, showing a double transversely-moving shutter and the mechanism by which it is opened. Fig. 2 is a front end view showing the shutters closed. Fig. 3 is a view showing the mechanism for operating a shutter which is hinged from below. Fig. 2^a is an enlarged sectional view of the attachment of the arm G.

A is the front end of the camera, and B B are the leaves of the shutter, which are hinged in the lens-board below the opening through which the picture is to be taken, these leaves opening from and closing across a vertical central line in the usual manner. They are connected together by a lever-arm D, so as to open and close simultaneously, and are actuated as follows: C is a pin or shaft extending through the lens-board of the camera and one of the leaves of the shutter, and having a lever-arm D upon its inside connecting the shutters so that they move together, with a spring E, which acts to close the shutters, the tension of this spring being regulated by means of a suitable thumb-screw F. Upon the opposite or outer end of the pin or shaft C is a lever-arm G. This lever-arm is engaged by a slide or arm H, which is fixed to the piston-rod I, and projects to one side of said rod, so that one end of this slide travels in a guiding-slot J in a plate, upon which the air-cylinder K is fixed. At the opposite end of this plate is fixed a guide-post L, through which the piston-rod travels and by which it is kept in line. A piston is suitably fitted within the cylinder, and is impelled in one direction by the pressure of air introduced through the tube M, the force being produced by the usual compression-bulb which is used for this purpose.

The operation will then be as follows: The compressed air being suddenly forced into the rear end of the cylinder will force the piston to the end of its stroke, carrying with it the slide, which is fixed to the piston-rod. This slide engages the point of the lever-arm G, which is fixed to the shaft C, and acting through this shaft it opens the shutters with a rapidity depending on the speed of the piston. As the lever-arm travels in the arc of a circle about the shaft C, it will be manifest that as soon as the slide has passed beyond the arc of the lever-arm this arm will be released and the shutters will close instantly with a speed depending upon the tension of the closing spring.

To hold the shutter open for focussing, the end X of the piston-rod is pushed in flush with the cylinder-head. In this position the action of the spring upon the lever-arm produces a lateral pressure upon the slide, thus holding the shutter open as long as may be desired. When the focus has been obtained, a pressure upon the bulb will close the shutters, and the plate may be introduced and the exposure made without further work. For a time-exposure the lever N is turned up in front of the slide H, which stops said slide in the position described above.

It will be manifest that various forms of shutters may be used to suit the different classes of work to be done, the operation being similar in each case.

In Fig. 3 I have shown a single shutter hinged below the aperture and operated in the same manner by a piston and slide, and a lever-arm engaged by the slide, but moving at right angles to the one described in Figs. 1 and 2. In this case the shutter is not connected directly with the shaft C but the lever upon the inner end of this shaft engages a second crank-arm, which is connected with or formed in the shaft upon which the shutter is journaled. The spring in this case is also connected with the crank-arm of the journal-shaft and acts to close the shutter when re-

leased, as before described. The shutter may be stopped when opened by a lever similar to that shown in Figs. 1 and 2, the operation being in all respects similar, and the only changes made being such mechanical changes as are necessary to adapt it to the particular form of shutter used.

The arm G is pivoted within the head of the shaft C, so as to have a clearance, as shown in Fig. 2ª, to allow the slide H to pass the arm on its return, and a spring *g* returns the arm to its place in the head, in position to engage the slide again. This permits one to repeat the exposure.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination with a photographic shutter, the cylinder, the piston moving therein, the piston-rod and the slide or arm carried by said rod, and a shaft adapted to open the shutter and having a projecting arm or crank which is engaged by the arm or slide upon the projecting rod and is adapted to travel in an arc of a circle about the shaft, whereby the movement of the piston and rod acts to open the shutter, substantially as described.

2. The photographic shutter having the shaft connected therewith and adapted to open the shutter when rotated, an arm extending radially from said shaft, a cylinder with a reciprocating piston and piston-rod, and an arm or slide upon the piston-rod adapted to engage the lever-arm from the shutter-actuating shaft and release said lever-arm after the slide has passed beyond the arc of the lever-arm, substantially as described.

3. A photographic shutter having a rotary shaft connected with it, whereby it may be opened, and a spring whereby it may be closed when released, an arm projecting from the rotary shaft, and a slide or arm connected with the piston or piston-rod of an air-cylinder, said slide engaging the arm upon the shutter-actuating shaft, so as to open the shutter when the piston is impelled to the front end of the cylinder and to release the shutter before the piston has completed its stroke, substantially as described.

4. In combination with a photographic shutter, the shutter-actuating mechanism, as described, and the stop or lever adapted to stop the slide before it passes the lever-arm, substantially as described.

5. In a camera-shutter, the lever-arm G, pivoted so as to swing in a head fixed upon the shaft C, and the returning-spring *g*, substantially as described.

In witness whereof I have hereunto set my hand.

JOSEPH R. TREGO.

Witnesses:
S. H. NOURSE,
H. C. LEE.