(No Model.)

G. F. GREEN.

PHOTOGRAPHIC SHUTTER.

No. 342,693. Patented May 25, 1886.

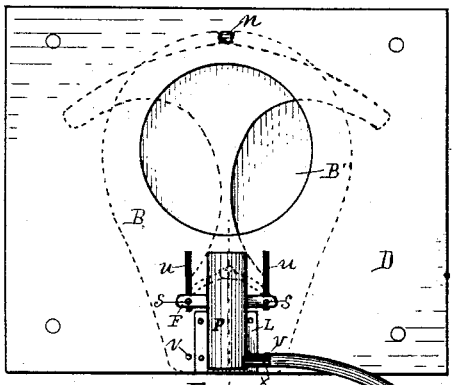


Fig. 1

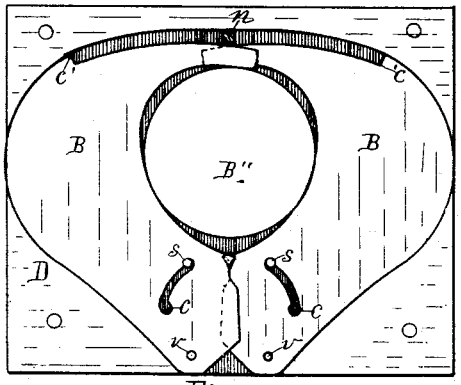


Fig. 2

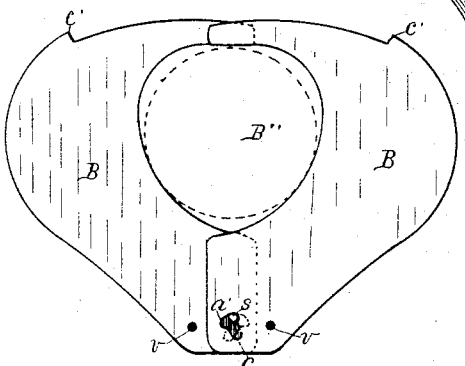


Fig. 4

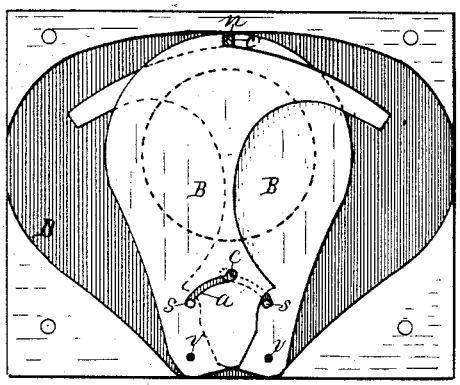


Fig. 3

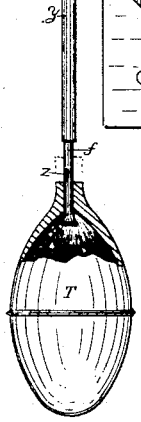


Fig. 6

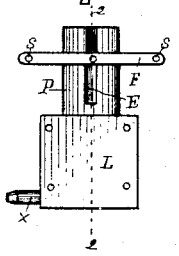
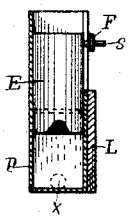


Fig. 8



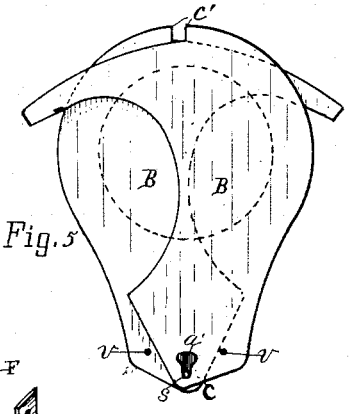


Fig. 5

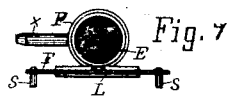


Fig. 7

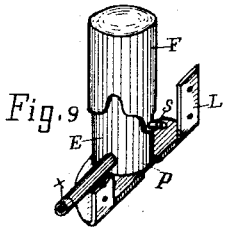


Fig. 9

Witnesses.
John C Perkins
Charlie Jenkins

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UNITED STATES PATENT OFFICE.

GEORGE F. GREEN, OF KALAMAZOO, MICHIGAN.

PHOTOGRAPHIC SHUTTER.

SPECIFICATION forming part of Letters Patent No. 342,693, dated May 25, 1886.

Application filed June 6, 1885. Serial No. 167,835. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. GREEN, of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented a new and useful Improvement in Photographic Shutters; and I do hereby declare that the following is a full and accurate description of the same.

My invention relates to shutters used with a photographic camera, in which the wings are operated by pneumatic pressure; and its object is to provide a means for perfectly controlling the opening and closing of said shutter with a positive dead motion; and it consists, first, in a positive lock for the shutter-wings, whereby, at the end of their movement they are locked against recoil; second, in hook-shaped shutters provided with actuating and locking pin or pins at the bottom and a positive stop-pin at the top; third, in a method for disconnecting the air-pressure bulb; fourth, in the direct connection of the engine to the shutter-wings.

In the accompanying drawings, Figure 1 is a side view of the shutter, showing the aperture in one side and a pneumatic engine for operating the wings, and also the tube and bulb for operating said engine. Fig. 2 is an interior view showing the wings in position, and slots with enlarged or curved ends. Fig. 3 is an interior view showing the wings in a closed position. Figs. 4 and 5 represent a modification of the wings shown in Figs. 1, 2, 3, whereby the same results may be obtained as with two pins. Figs. 6 and 7 are back and top views of my pneumatic engine with cross-head and two operating-pins. Fig. 8 is a section of the pneumatic engine, taken on dotted line 2 2 of Fig. 6. Fig. 9 shows more clearly and definitely the operation and working of the lock on the closing stroke of the shutter-wings, and the engine taking direct hold of the wings by a pin attached directly to the engine without the aid of levers or jointed arms.

My pneumatic engine is directly connected with the wings by a pin attached to or carried by the moving part of the engine to work both wings at the same time, as shown in Figs. 4, 5, 9; or two pins may be attached to the engine directly by the aid of a cross-head to actuate the wings separately but simultaneously. The pivots of the shutter-wings are placed near the bottom, and are located so that in opening or closing the center of gravity of the shutters will cross a line vertically drawn from said pivot, and then by their own gravity they will remain open or closed, and will thereby lock themselves automatically in said positions, and will remain permanently locked, especially on the closing stroke.

D D represents the shutter-case, having apertures B″ in its sides, and provided with hook-shaped wings B B, for the purpose of opening or closing said aperture. Said wings are pivoted to the case, as shown at *v v*, and are provided with holes or slots *a′*, having slightly enlarged or curved ends *c*, to receive the operative pins *s* at the end of the stroke, for the purpose of locking said wings B in an open or closed position.

The pneumatic engine consists of a stationary cylinder, P, and a piston-cylinder, E, sliding within the part P. The operative pin *s* is attached to the piston-cylinder E; or, if two pins are used, they are attached to the cross-head F, which at its middle is secured to the piston-cylinder E.

The pneumatic engine and its pin or pins *s* has a rectilinear reciprocation transverse or oblique to the direction of the slots *a′*, and the wings are thereby caused to swing on their pivots and open or close, according to the direction in which the engine is moving. At the end of the stroke said pin or pins enter the enlargements *c*, and not only lock the wings in the desired position, but prevent recoil. The weight of the wing falls on one side of a vertical line from its pivot when open and on the other side of said line when closed, and therefore the wings remain open or closed by gravity. Said wings are provided each with a projection or shoulder, *c′*, to engage with the stop-pin *n* when the wings are closed, but, if preferred, the stop *n* may be dispensed with, and the wings permitted to stop against each other's pivot-pins *v v*, as shown in Fig. 5; but for convenience I have adopted the stop *n*.

The pin *s* projects laterally through a slot in the cylinder P, and passes through a slot or slots *u u* in the side of the shutter-case into the slots *a′* in the wings. As before stated,

two pins and non-coinciding slots may be employed; but this is a matter of preference only, because, whether one pin or two are used, there will exist the same direct connection between engine and wings and the same mechanical action without the aid of levers or jointed arms.

It will be observed that when air is forced into, and then withdrawn from the lower end of the cylinder P through the tube *x* the inside cylinder, E, will be caused to reciprocate, thereby actuating the wings, as shown and described.

In operating my balancing and automatically-locking shutter the operator holds the bulb T in his right hand, and with his left hand presses the tube *f* into the bulb until the hole *z* is covered by the bulb, then compression of the bulb forcing air through said tube into the engine P, the piston-cylinder is forced outward, and the shutter is thereby opened. If a long exposure is required, the bulb, while still compressed, is drawn off the tube until the hole *z* is exposed and admits air to the bulb, when it is permitted to expand. The engine and shutters will thus be permitted to remain at rest. To close the shutters again, the bulb is first compressed, and then pushed forward on the tube until the hole *z* is covered, when, if the bulb is permitted to expand, air will be withdrawn from the cylinder P and the shutters closed.

I am aware that wings having slots are in use. I therefore do not claim such a combination, broadly; but

What I do claim is—

1. In combination, in a shutter for a photographic camera, the pivoted wings B B, having holes or slots *a'*, with enlarged or elongated ends *c*, to receive the actuating-pin at the end of the stroke to lock said wings in an open or closed position, substantially for the purpose described.

2. In combination, in a shutter for a photographic camera, the pivoted wings B B, a pneumatic engine to operate them, and the stop-pin *n*, or its equivalent, for the purpose described.

3. In combination with a shutter for a photographic camera, having pivoted wings B B, and a pneumatic engine to operate them, the tube *f*, with its hole *z*, and sliding bulb T, for the purpose specified.

4. In combination, in a shutter for a photographic camera, the pivoted wings B B, the pneumatic cylinder P, and the pin *s*, rigidly attached to and carried by said cylinder, and directly connected with the wings B B, thereby dispensing with the aid of joints, levers, or links intermediate as to the cylinder and its connection with the wings.

GEORGE F. GREEN.

Witnesses:
JOHN C. PERKINS,
CHARLIE JENKINS.