(No Model.)

G. W. LOW & W. SHAKESPEARE, Jr.

GROUND GLASS ADJUSTER FOR CAMERAS.

No. 493,365. Patented Mar. 14, 1893.

Fig. 1.

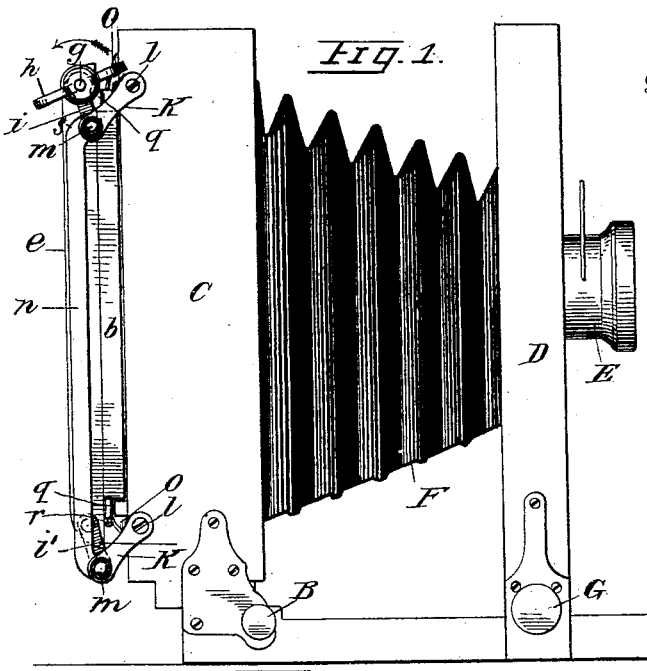


Fig. 2.

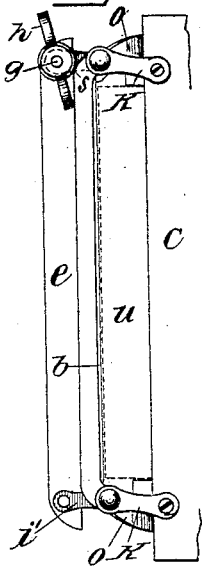


Fig. 3.

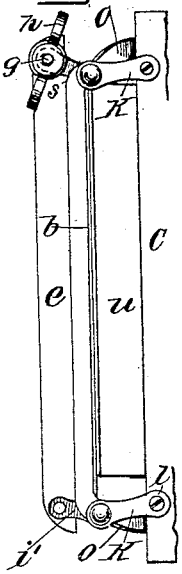


Fig. 4.

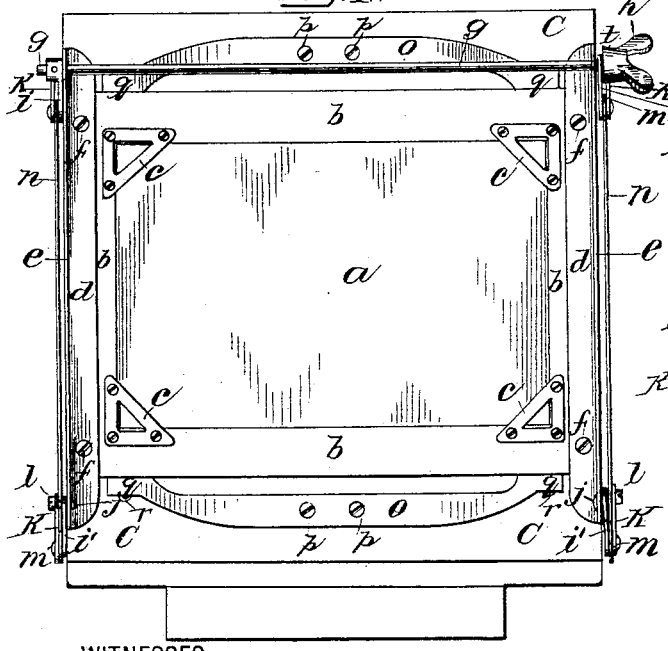


Fig. 6.

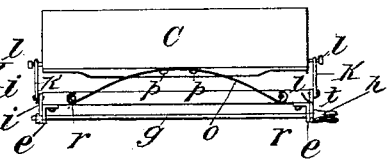
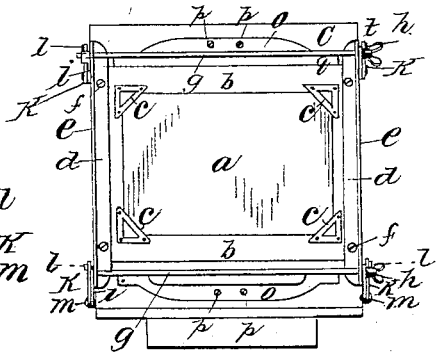


Fig. 5.



WITNESSES:
Edward C. Rowland
J. E. Hoffman.

INVENTORS:
Garrett W. Low
Wm. Shakespeare Jr.
BY
Phillips Abbott
ATTORNEY

UNITED STATES PATENT OFFICE.

GARRETT W. LOW AND WILLIAM SHAKESPEARE, JR., OF KALAMAZOO, MICHIGAN.

GROUND-GLASS ADJUSTER FOR CAMERAS.

SPECIFICATION forming part of Letters Patent No. 493,365, dated March 14, 1893.

Application filed July 12, 1892. Serial No. 439,764. (No model.)

To all whom it may concern:

Be it known that we, GARRETT W. LOW and WILLIAM SHAKESPEARE, Jr., citizens of the United States, and residents of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Photographic Cameras, of which the following is a specification.

Our invention relates to improvements in photographic cameras and it has special relation to mechanism or devices whereby the ground glass frame may be easily and quickly adjusted or moved to its several desired positions, and held to the camera permanently, so that liability of fracture &c. is done away with; and our invention is also so constructed and arranged that the same mechanism which actuates the ground glass plate, serves also to support and clamp the plate holder in position.

Figure 1, illustrates an elevation of the invention showing also the front portions of a collapsing camera. Fig. 2, is an elevation showing the parts in the position which they assume when the ground glass plate and its frame are in their rearmost position. Fig. 3, is an elevation showing the parts in the relation which they assume when the plate holder is in position against the rear end of the camera. Fig. 4, is a rear elevation of that which is shown in Fig. 1. Fig. 5, is a rear elevation similar to that shown in Figs. 1 and 4, but illustrating a modification. Fig. 6, is a plan view of that which is shown in Fig. 1.

The part lettered A, on the drawings represents an ordinary base pivoted at B to the camera box C. D, is the lens supporting frame. E, is the lens tube. F, is the bellows. G, is an ordinary milled button on the end of a shaft (not shown), by which the lens holding frame D, may be moved in and out in a manner now well understood. All of the parts above referred to may be of any preferred construction and need not be further described because they form no essential part of the invention.

Referring now to the parts which more particularly pertain to the invention, and having special reference to Figs. 1 to 4 inclusive, *a* is the ground glass. It is supported in a frame *b* by corner clips *c* or in any other preferred manner. *d* are two metallic pieces each provided with a flange *e* arranged at right angles and extending rearwardly. These rectangular flanges or pieces of metal are fastened to the back of the ground glass frame by screws *f*, *f*, &c., or other suitable means. *g* is a shaft which passes through holes made in the upper portion of the two flanges *e* and on the end of it is an ordinary thumb piece *h*. It is fast to the shaft or rod *g* so that by turning the thumb piece the shaft will be rotated. *i*, *i*, are two arms fastened rigidly to the rod *g* and *i'*, *i'* are two other like arms, they, however, are pivoted at *j*, *j*, to the flanges *e*, *e*, respectively near their lower ends. *k*, *k*, *k*, *k*, are arms similar to but preferably a little longer than the arms *i*, *i*, and *i'*, *i'*. These arms *k*, *k*, are pivoted at *l*, *l*, &c., to the sides of the camera near its rear edge, and these sets or pairs of arms are pivoted together at their meeting ends by rivets *m*, *m*, &c., so as to form devices resembling toggle arms. *n*, *n*, are two connecting rods which extend from the upper pair of toggles to the lower pair on each side of the camera, so that movement of the upper pair of toggle arms consequent upon turning the shaft *g* by its thumb-screw will be conveyed to the lower pair of toggles being transmitted by the connecting rods *n*, *n*. *o*, *o*, are springs which are fastened by screws *p*, *p*, or other like devices to the rear face or end of the camera and the free ends *q*, *q*, of these springs engage with pins *r*, *r*, (see Fig. 6,) on the upper and lower edges respectively of the plate holding frame *b*, and the construction and arrangement of the springs are such that when the plate holding frame is carried rearwardly by the operation of the devices described, they are put under unusual tension. They, however, have at all times a tension, the normal action of which is to hold the ground glass frame snugly against the rear of the camera box.

The operation of the parts as thus far described is a follows: Prior to the introduction of the plate holder, the parts are in the position shown in Fig. 1; that is to say, the toggle arms are flexed and consequently the springs *o*, *o*, exercising their force upon the

ground glass frame hold it firmly against the rear end of the camera box and in proper focal position. The operator, when the parts are in this position, defines and focuses his picture ready for the exposure. After this is done, in order to insert the plate holder, the thumb piece *h* is turned in the direction of the arrow in Fig. 1, whereupon the rod *q* is turned in the same direction and the arms *i*, *i*, are thrown upwardly and by reason of the connecting rods *n*, *n*, and the pivots *m*, *m*, the arms *i'*, *i'* and the arms *k*, *k*, are likewise carried upwardly, thus producing a toggle like action on the part of the combined sets of arms whereby the ground glass frame *b*, is projected rearwardly overcoming the stress of the springs *o*, *o*, and this movement is continued until the parts assume the position shown in Fig. 2, in which the toggle arms have gone beyond the center so that they will not drop again unless force is applied; and they are held in this position by reason of the engagement of the connecting rods *n*, *n*, at a point *s*, *s*, against the hub T of the thumb piece which acts as a stop and prevents further movement of the parts. While the parts are in this position the plate holder *u* shown in dotted lines in Fig. 2 and in full lines in Fig. 3, is slid into place whereupon the toggle arms are tripped and allowed to collapse or fold together by slightly turning the thumb piece in the reverse direction until the arms move back again beyond the dead center whereupon the springs *o* pull the ground glass frame snugly against the rear of the plate holder *u*, and hold it firmly in proper focal position against the rear end of the camera. The parts at this time are in the position shown in Fig. 3. The slide may now be drawn and the exposure made in the ordinary manner. To release the plate holder and turn it around to make the other exposure, if it be a double plate holder, it is only necessary to throw the toggle arms up again into the position shown in Fig. 2, draw out the plate holder, reverse it, insert it again, release the toggle arms and make the second exposure.

It will be observed that by reason of the mechanism described, combined and arranged as set forth, a very convenient, easily operated and accurate means is provided for doing the work suggested; and that all the movements are secured by simply turning the thumb-screw *h* in one direction or the other.

Although the construction shown is probably as good as any, yet the invention can be substantially employed by a somewhat modified construction, to wit, that shown in Fig. 5. In it instead of having the connecting rods *n*, *n*, which unite the upper and lower set of toggles so that they will both be operated by a single thumb piece, the connecting rods may be left off and two cross rods and thumb pieces be employed, which may be both exactly the same in construction and operation, one thumb piece and rod actuating the upper set of toggles and the other the lower set of toggles. This construction as above stated is illustrated in Fig. 5. Also it is not essential that the springs *o*, *o*, be used. It is better, however, to employ them.

What we claim is—

1. The combination with a camera of a ground glass frame, toggle arms connecting the frame with the rear of the camera a cross shaft rigidly attached to one of the arms of each set of toggle arms and a thumb screw attached to the cross shaft, which being turned will actuate the toggle arms, substantially as set forth.

2. The combination in a camera of a ground glass frame connected to the camera at opposite edges by double sets of toggle arms, a cross shaft provided with a thumb screw, and connecting rods between the double sets of toggle arms, whereby the turning of the thumb screw will actuate all of the toggle arms, substantially as set forth.

Signed at Kalamazoo, in the county of Kalamazoo and State of Michigan, this 9th day of July, A. D. 1892.

GARRETT W. LOW.
WILLIAM SHAKESPEARE, JUNIOR.

Witnesses:
WILLIAM SHAKESPEARE,
ALEXANDER ROBBINS.