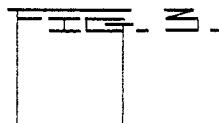
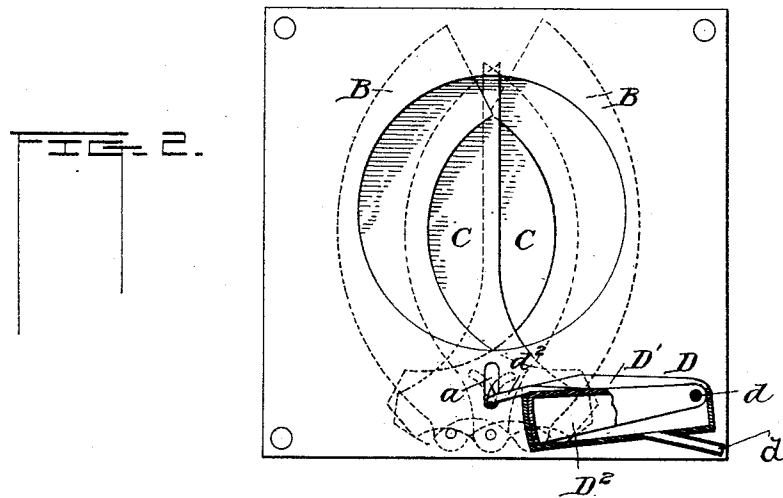
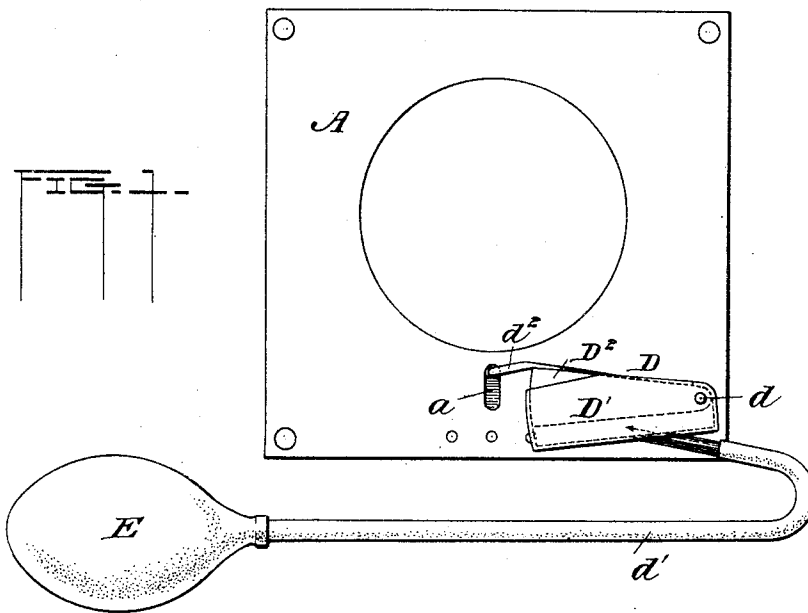


(No Model.)

G. F. GREEN.
PHOTOGRAPHIC SHUTTER.

No. 473,188.

Patented Apr. 19, 1892.



Witnesses

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UNITED STATES PATENT OFFICE.

GEORGE F. GREEN, OF KALAMAZOO, MICHIGAN.

PHOTOGRAPHIC SHUTTER.

SPECIFICATION forming part of Letters Patent No. 473,188, dated April 19, 1892.

Application filed September 9, 1890. Serial No. 364,487. (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 an Air-Engine to Work Photographic Shutters; and I do hereby declare that the same is accurately described and shown in the following specification and the drawings attached.

This invention relates to improvements in photographic shutters and means for operating the same, and has special reference to that class of shutters illustrated in my patents, numbered 342,693 and 362,211, dated May 25, 1886, and May 3, 1887, respectively.

The principal object of the invention is to provide means whereby the outside measurements of photographic shutters of the character referred to may be reduced so as to adapt them to be applied to cameras with small-sized front boards to which shutters of the usual size and construction cannot be applied on account of the lateral space required for working them.

In my aforesaid patents I have shown a pneumatic engine comprising, essentially, a stationary cylinder and a reciprocating piston-cylinder suitably connected to the shutters for operating the same; but for small-sized shutters having a small frame or ring case the space for the engine is very narrow, and owing to this fact and the length of stroke required to effect the opening and closing of the shutters, the usual common cylinder-engines are objectionable, there not being proper space for working them. To overcome these and other objections and at the same time to improve the general efficiency and simplify the construction of apparatus of this character, I have devised an improved pneumatic engine and means, substantially as herein-after described, by which shutters of the required size may be applied to cameras having a small frame or circular case and easily and quickly operated, the engine being adapted to be attached to the front of the shutter-case and being also arranged horizontally in respect to its work and provided with a pin or arm attached to the movable member of the engine, so as to provide increased lever-

age and adapt the same to actuate the shutter quickly without requiring a lengthy stroke of the moving part.

The invention will first be described in connection with the accompanying drawings, and then particularly pointed out in the claims at the end of this specification.

Referring to the drawings, in which like letters of reference are used to represent like parts of the apparatus, Figure 1 is a front elevation of a shutter-case with my improved air-engine applied thereto, the shutters being open. Fig. 2 is a front elevation of the same with the shutters closed, the rear portion of the air-engine case being removed, the air-bulb and a portion of the working part of the air-engine being also removed to show the interior construction; and Fig. 3 is a perspective view of the air-engine with part broken away to show the interior construction.

A represents the shutter-case, B B the outer or short-stroke wings, and C C the inner or long-stroke wings, which may be of any suitable construction, but are preferably of the form shown in my aforesaid patent, No. 362,211, of May 3, 1887. The shutter-wings B B C C may be pivoted and provided with curved slots to receive the actuating-pin carried by the movable member of the engine in the manner indicated in my last-mentioned patent, and as shown in Fig. 2 of the drawings, and as these parts are specifically set forth in said patent any further description of the same herein is not deemed necessary.

D denotes a pneumatic engine, which consists, essentially, of an outer triangularly-shaped casing D' and an inner similarly-shaped casing or hollow piston D², which parts are fitted closely together, the one within the other, and pivoted together at their reduced ends by means of a pivot-bolt d. The space within the casings D' D² communicates with a bulb or other suitable device E by means of a tube d', by which air may be forced through said tube into the engine for the purpose of actuating the movable part or piston D², and thereby effecting the opening or closing of the shutters.

The movable member D² of the engine is provided with an arm d², which is formed with

or has attached thereto a lateral extension or pin d^3 , which passes through an aperture or slot a in the shutter-case A and engages the slots in the pivoted ends of the shutter-wings B B C C, so as to cause said wings to open and close when the pin carried by said arm traverses the slots in the shutters in the manner indicated in my aforesaid patent of May 3, 1887. It will be observed that the air-engine lies parallel with or horizontal to its work, so that the arm carried by the vibrating piston D^2 , which latter is pivoted at the extreme rear end of the engine, has a long sweep, and is thereby adapted to operate the shutters quickly on the initial movement of the piston.

The operation of the apparatus will be readily understood from the foregoing description. By forcing air into the tube d' the inside and outside cases D' D^2 will be spread apart, lifting the arm d^2 , whose lateral extension or pin d^3 engages the slots of the shutters, and thereby the shutters will be thrown open. By releasing the compressed bulb (when a bulb is used) the air will be exhausted from the engine, and the partial vacuum thus produced will cause the movable parts of the engine to collapse or come together, and as the pin of the arm d^2 traverses the slots in the pivoted ends of the shutters in the opposite direction the arm d^2 , dropping down into the position

shown in Fig. 2, will close the shutters, as shown in the last-mentioned figure.

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

1. In a photographic apparatus, the combination, with the pivoted shutter-wings, of the pneumatic engine comprising the outer elongated casing, the piston pivoted at one end within said casing and provided at its free end with an arm having a pin or extension adapted to engage the pivoted ends of the shutter-wings, and an air-forcing device communicating with the interior of the piston-case, substantially as described.

2. In a photographic apparatus, the combination, with the shutter-case and the pivoted shutter-wings, of the pneumatic engine comprising the outer triangularly-shaped casing, the correspondingly-shaped piston pivoted at one end within said casing and provided at its free end with an arm having a lateral extension or pin adapted to engage the pivoted ends of the shutter-wings, and the air-tube and bulb communicating with the interior of the piston-case, substantially as set forth.

GEORGE F. GREEN.

Witnesses:

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