

A. WOLLENSAK.
 PHOTOGRAPHIC SHUTTER.
 APPLICATION FILED AUG. 3, 1914.

1,143,926.

Patented June 22, 1915.

Fig. 1.

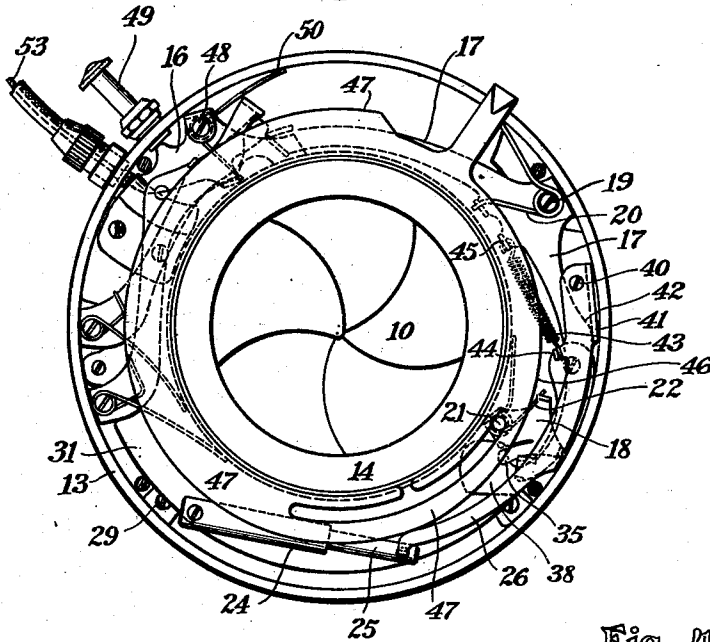


Fig. 2.

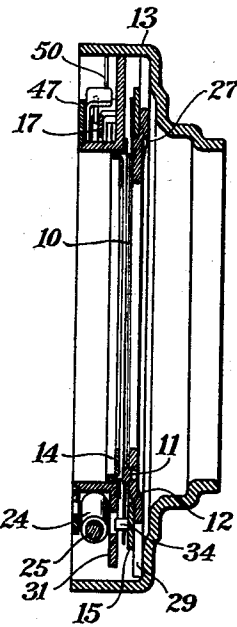


Fig. 4.

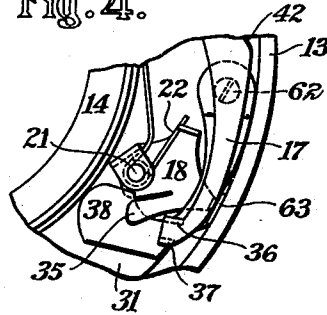


Fig. 3.

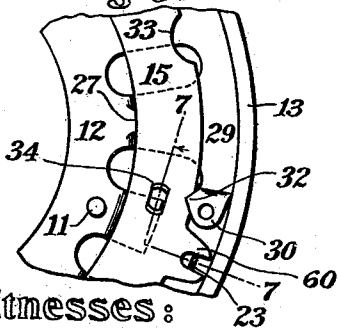
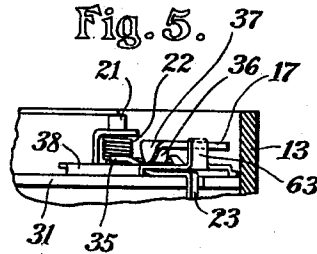


Fig. 5.



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PHOTOGRAPHIC SHUTTER.

1,143,926.

Specification of Letters Patent.

Patented June 22, 1915.

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To all whom it may concern:

Be it known that I, ANDREW WOLLENSAK, a citizen of the United States, and resident of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Photographic Shutters, of which the following is a specification.

This invention relates to photographic shutters of the automatic type, in which all the movements of an "instantaneous" exposure may be produced by a single stroke of an actuating member or lever, and in which the duration of the exposure, when of the instantaneous type, is regulated by a pneumatic retarder or equivalent device.

A shutter of the type above referred to is disclosed, for example in United States Letters Patent No. 1,035,762, issued to me August 13, 1912, and the object of the present invention is to simplify and improve the construction of a shutter such as that disclosed in said patent, in several respects which will be hereinafter pointed out.

In the accompanying drawings: Figure 1 is a front-elevation, and Fig. 2 is a vertical axial section, of a shutter embodying the present invention, with the omission of the front cover-plate and certain other parts having no bearing on the present invention; Fig. 3 is a partial front elevation, on a greatly enlarged scale, showing a portion of the blade-ring and the bearing-member which supports it; Fig. 4 is a detail front-elevation, showing particularly the lever which actuates the blade-ring and the parts immediately associated therewith; and Fig. 5 is a view of the same parts from beneath.

The drawings illustrate a shutter which, in its general mode of operation, is substantially similar to the shutter of my said patent, or to other well-known shutters, and of which, therefore, only certain portions are hereinafter described, in setting forth the particular features of construction in which the present invention is embodied.

The illustrated shutter has the usual overlapping shutter-blades 10, mounted to swing on pivots 11 formed upon an annular bearing-plate 12 which is mounted in the casing 13 of the shutter. To confine the shutter-blades in their proper plane and retain them upon the pivots, they are engaged in front by a ring 14 suitably fixed in the casing.

The blades are actuated, in a well-known manner, by an annular member or blade-ring 15, provided with pivots 34 engaging openings in the blades, as shown in Fig. 2. The power by which the shutter-mechanism is actuated is provided, in the usual manner, by the movement of an actuating-lever 16, which is pivoted on a stud 48 and operated by the usual spring 50 and manual controlling-means, 49 and 53, the actuating lever is connected with the blade-ring by mechanism including the usual master-lever 17, which is suitably articulated with the actuating-lever. The master-lever is connected with the blade-ring, as in my said patent, by a blade-lever 18, which coöperates with the lower end of the master-lever. The master-lever is pivoted on a screw 19, and is moved in one direction, and held in its normal position, by a spring 20 coiled upon the pivot. The blade-lever is mounted on a pivot-pin 21, and its movement in one direction is produced by a spring 22, the opposite movement being produced by its co-action with the master-lever. The blade-lever has a rearwardly-projecting arm 23 (Fig. 5), which engages a bifurcated lug 60 on the blade-ring 15 (Fig. 3), so that swinging movements of the blade-lever cause partial rotative movements of the blade-ring, which result in swinging movements of the shutter-blades 10.

The movements of the shutter-mechanism, in producing what are commonly described as "instantaneous" exposures having generally a duration of not over a second, are controlled, in the usual manner, by a pneumatic retarder, comprising a cylinder 24 pivoted within the casing, and a piston 25 which is pivoted to the end of a retarder-lever 26. In addition to the parts specifically referred to, it will be understood that the shutter may have any ordinary or suitable detent-mechanism for controlling the movements of the blade-actuating mechanism in producing exposures other than instantaneous.

One feature of the present invention resides in the structure of the bearing-ring 12, by which the blade-ring and the blades are supported, and in the manner in which this bearing-ring engages and coöperates with the blade-ring 15. As shown in Figs. 2 and 3, the bearing-ring is so pressed, or other-

wise formed, as to have two annular portions lying in different planes, the outer portion extending rearwardly, so that the front surface of the blade-ring is substantially in the same plane as the front surface of the inner portion of the bearing-ring. This formation of the bearing-ring produces an annular shoulder about which the blade-ring turns, but this shoulder is not sufficiently pronounced or square to provide suitable bearing-surfaces for guiding the blade-ring in its rotative movements. Accordingly, in the process of forming the bearing-ring it is punched from the rear at a number of spaced points 27 (Figs. 2 and 3), so as to shear small portions of the metal forwardly in line with the inner edge of the blade-ring, thus producing pronounced shoulders affording suitable bearing-surfaces for the ring.

Another novel feature of the bearing-ring 12 resides in the arrangement by which it is provided, not only with a bearing-surface for the rear surface of the blade-ring, but also with bearing-lugs which engage the front surface of the ring and maintain it in place against the rear bearing-surface. As shown in Fig. 3, the bearing-ring has outwardly-projecting portions 29, which are seated against the back of the casing 13 (Fig. 2), to which they may be fastened by screws or in any other suitable manner. Projecting forwardly, however, from each of the parts 29 are lugs 30, which are shown as perforated to receive screws by which other portions of the shutter may be secured in place. Each of these lugs 30 lies in a position in front of the blade-ring, and is extended inwardly, as at 32 in Fig. 3, so as to over-hang the front surface of the blade-ring, thus providing a front bearing for the ring, and retaining it securely against the rear bearing-surface. To permit the blade-ring to be introduced, without distortion, between the lugs 30 and the body of the bearing-ring it is provided with notches 33 in its outer margin, which may be brought, by rotation of the ring, into line with the lugs, but which are out of line with these lugs in all operating positions of the mechanism.

Another feature of the invention relates to the manner in which the master-lever 17 coöperates with the blade-actuating lever 18. As in the shutter described in my said patent, the blade-actuating lever has a forwardly-inclined lug 35, over which the master-lever rides freely, owing to its resiliency, during its movement from normal position, and against the end of which the master-lever exerts force, resulting in a swinging-movement of the blade-actuating lever, upon the return-movement of the master-lever. In previous shutters, how-

these parts has been such that the master-lever normally presses against the forward surface of the blade-actuating lever during the movement of the two levers in both directions, thus subjecting the blade-actuating lever and its pivot to a certain amount of friction, and it has also been found that under certain conditions the master-lever might interlock with the edge of the blade-actuating lever in such a way as to prevent the proper performance of its functions by the shutter-mechanism. In the present construction these disadvantages are avoided by the use of a guide upon which the master-lever rests and slides, except at the moment when it is riding over the inclined lug on the blade-actuating lever during the first movement of the master-lever, thus relieving the blade-actuating lever entirely, except at that moment, from the lateral pressure of the master-lever. As shown particularly in Figs. 4 and 5, the master-lever is provided at its lower end with two rearwardly-bent lugs 36 and 37, the lug 36 being that which coöperates with the inclined lug 35 on the blade-actuating lever, while the lug 37 normally rests and slides upon a member 38, which constitutes the guide above referred to. This guide-member is so shaped from sheet-metal as to lie under the lug 35 and over other parts of the blade-actuating lever, and it is fixed in place by a screw 62, and provided also with an upwardly-bent lug 63, which serves as a stop for the master-lever.

In the normal position of the master-lever both lugs 36 and 37 rest against the guide 38, owing to the resiliency of the master-lever, and no pressure is exerted upon the blade-actuating lever. During the first movement of the master-lever it is supported in this manner until the lug 36 engages and rides over the lug 35, and as soon as this has occurred the lugs 36 and 37 again engage the guide and remain in such engagement, without exerting any lateral pressure upon the blade-actuating lever, while the master-lever is performing its return-movement by which the blade-actuating lever is caused first to open and then close the shutter-blades, through the intermediation of the blade-ring 15.

Another feature of the invention resides in the simple construction and arrangement of the retarder and its connection with the master-lever. As shown particularly in Fig. 1, the retarder-lever 26 is pivoted on a stud 40, and lies in front of the master-lever. It has a rearwardly-bent lug 41 near its pivoted end, which coöperates with a salient part or projection 42 on the edge of the master-lever. A tension-spring 43 connects the two levers, being attached to hooks 44 and 45 on the retarder-lever and the master-lever, respectively, and this spring tends

constantly to hold the levers in engagement, and to cause the retarder-lever to follow the master-lever when the latter makes its movement from normal position preparatory to operative engagement with the blade-actuating lever 18. The amplitude of the movement of the retarder-lever is limited, however, by the engagement of the hook 44 thereon with a cam-like portion 46 on the edge of the controller-ring 47, this latter being the usual device for controlling the operation of the retarder and the detents of the shutter. Accordingly the retarder-lever does not follow the master-lever throughout the setting-movement of the latter, the further movement of the master-lever being permitted by the connecting-spring 43.

The air within the retarder-cylinder 24 offers some resistance to the inward movement of the piston 25 during the setting movement of the retarder-lever above described, but the tension of the spring 43 is sufficient to overcome this resistance during the time provided by the setting movement of the master-lever. The spring 43 subjects the master-lever to a certain resistance or load in its setting movement, but as this spring also tends to draw the master-lever back on its return movement, the spring 20, primarily provided for this purpose, may be made of correspondingly less strength, so that no undue amount of force is necessary in actuating the master-lever. When the shutter is adjusted for instantaneous exposures of the longest duration the piston 25 is moved fully within the cylinder 24, so that the retarder-lever has at this time its longest stroke, but the parts are so adjusted that even at this time the retarder-lever does not move far enough to interfere with the first part of the return-movement of the master-lever, during which the shutter-blades are being moved to open position, and consequently both the opening and the closing movements of the blades are practically instantaneous, as is requisite for the best results.

In the shutter of my said patent, and in other shutters of the same type, the retarder has been arranged to cooperate with the master-lever in such a manner that it is released before the completion of the exposure-movement of the master-lever, and is then immediately returned to operative position by a spring provided for that purpose. In this previous arrangement, therefore, the force of the spring in question is opposed to that of the spring by which the exposure-movement of the master-lever is produced, and consequently the latter spring has to be proportionately stronger, while the mechanism is subjected to greater strain and friction than would otherwise be incurred. In the present arrangement, how-

ever, since the retarder is set during the setting movement of the master-lever, and through a spring which tends to assist the exposure-movement of the lever, the master-lever-actuating spring can be made weaker than would otherwise be necessary: and it is particularly to be noted that this action of the retarder-setting spring occurs at the time when it is particularly valuable, namely, when the master-lever is performing the first, unretarded part of its exposure-movement; during which it is moving the blades quickly to wide-open position.

A further advantage of the present arrangement lies in the fact that the master-lever does not have to trip over the retarder, as in previous shutters, during its setting movement.

While the several features of the invention are preferably employed in conjunction to produce a shutter of simple construction and reliable action, it will be apparent that they are not limited to such conjoint use and that the invention is not, in general, limited to the embodiment thereof hereinbefore described and illustrated in the accompanying drawings.

I claim:—

1. In a shutter, the combination, with a blade-ring, of a bearing-ring, for supporting the blade-ring, comprising inner and outer portions lying in different parallel planes and connected by an inclined portion; the metal of the bearing-ring having separate portions sheared, at said inclined portion, to produce substantially square edges providing bearings for the inner edge of the blade-ring.

2. In a shutter, the combination, with a blade-ring, of a bearing-ring, for supporting the blade-ring, having inner and outer portions lying in different parallel planes and connected by a shouldered portion providing a bearing for the inner edge of the blade-ring, and lugs, on said outer portions, overhanging the outer face of the blade-ring and retaining its inner face in engagement with the outer portion of the bearing-ring.

3. In a shutter, the combination, with a retarder-member and a master-lever, of abutments thereon coöperable to cause the retarder-member to have its operative movement during, and in consequence of, the later part of the exposure-movement of the master-lever; a spring connecting the master-lever and the retarder-member and tending to cause said abutments to remain in engagement and to cause the retarder-member to follow the master-lever and perform its inoperative movement during the setting movement thereof; and means for arresting such inoperative movement of the retarder-member before the completion of the setting-movement of the master-lever, whereby

said spring is subjected to a tension tending to assist the exposure-movement of the master-lever.

4. In a shutter, the combination, with a
5 lever having an inclined lug, and a second
lever having an extremity adapted to ride
yieldingly over said lug, in one direction of
movement of the second lever, and to co-
operate with said lug to actuate the first
10 lever during the opposite movement of the
second lever, of a guide-member located ad-
jacent the first lever and engaged by the

second lever so as to receive the resilient
pressure thereof and relieve the first lever
therefrom except when the extremity of the 15
second lever is riding over said lug as afore-
said.

In testimony whereof, I affix my signature
in presence of two witnesses.

ANDREW WOLLENSAK.

Witnesses:

FARNUM F. DORSEY,
D. GURNEE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."