

Oct. 12, 1965

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3,211,070

PHOTOGRAPHIC OBJECTIVES

Filed Aug. 10, 1962

2 Sheets-Sheet 1

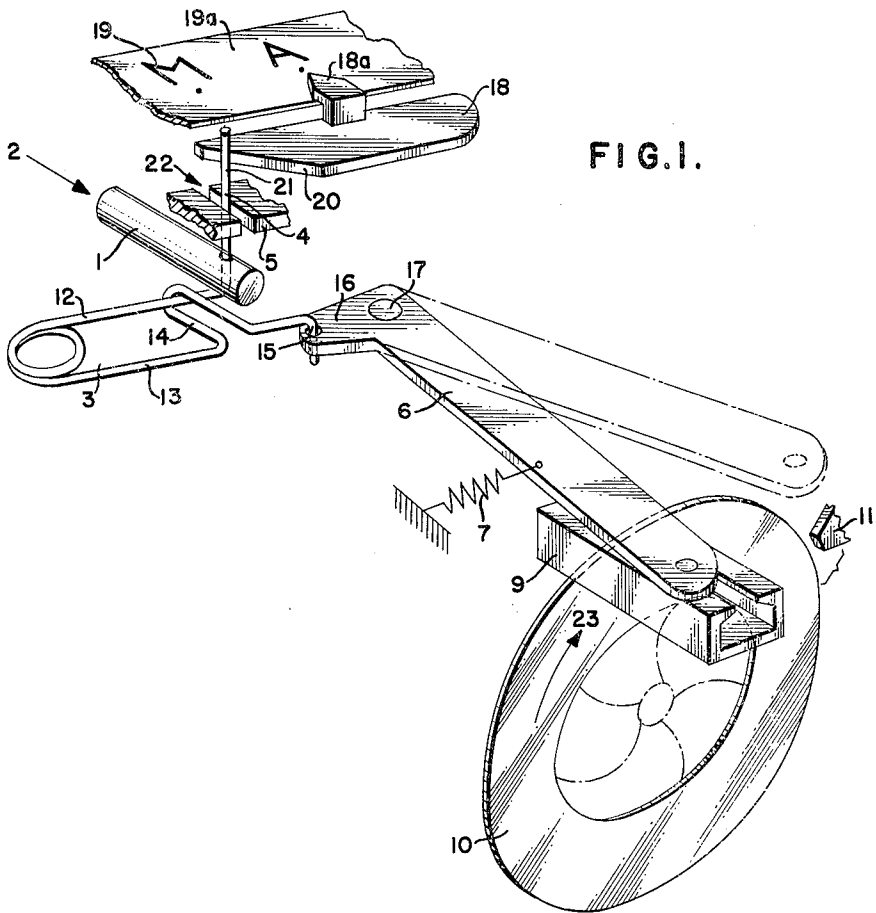


FIG. 1.

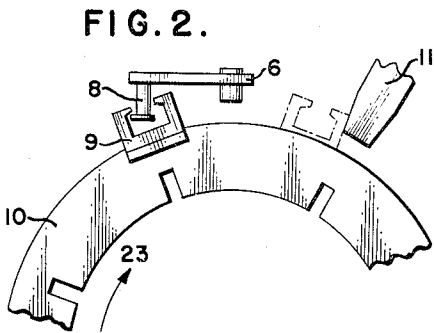


FIG. 2.

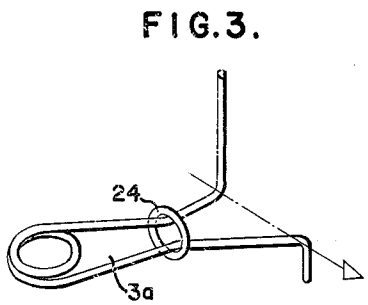


FIG. 3.

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## PHOTOGRAPHIC OBJECTIVES

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Filed Aug. 10, 1962, Ser. No. 216,226

Claims priority, application Germany, Sept. 7, 1961,

O 8,251; Sept. 12, 1961, O 8,253

3 Claims. (Cl. 95—64)

This invention relates to photographic objectives and refers more particularly to a photographic objective having a resilient diaphragm which opens again automatically.

There are objectives known in prior art, in which the diaphragm is operated from the camera by means of a pin which is depressed. The excessive movement of the pin can be then compensated by a spring. The movement of the pin is changed by a leverage into a rotary movement of the iris ring. Such constructions operate satisfactorily so long as the iris diaphragm retains its position during the focussing of the objective. Difficulties arise, however, when the iris diaphragm is shifted axially during the focussing of the objective.

An object of the present invention is to eliminate drawbacks of prior art constructions.

Other objects will become apparent in the course of the following specification.

The present invention also pertains to a photographic objective having a resilient automatically opening diaphragm wherein the diaphragm is actuated from the camera by a pin, the excessive movement of the pin being balanced by a spring, the longitudinal movement of the pin being changed by lever transmission into a rotary movement of the iris ring and wherein, furthermore, the diaphragm is shifted axially during the focussing of the objective; in accordance with the present invention the iris ring is provided with a guide which is engaged by a fixing pin upon an end of a transmission lever. A hair pin-like spring is connected to the actuating pin and to an arm of the lever to absorb excessive movement. The hair pin-like spring is advantageously so shaped that one leg of the spring is held in a tensioned state by a loop carried by the other end of the spring. A free leg of the spring is preferably bent vertically and the bent end is in engagement with the actuating pin. This end is guided along a straight guide, a setting member being provided with an inclined surface which engages this bent end of the spring for the purpose of actuating the iris ring manually.

According to another embodiment of the present invention a balance spring is provided one leg of which engages the transmission lever, while the free end of the other leg is in engagement with the actuating pin. There is also provided a separate movable pin having a conical portion and used to actuate the iris ring manually whereby one spring leg engages the body of the last-mentioned pin or the conical portion thereof. The last-mentioned pin extends preferably at an angle of about 90° transversely to the direction of the axis of the transmission pin.

The devices of the present invention provide simple and yet most effective means for operating diaphragms of photographic objectives automatically as well as manually.

The invention will appear more clearly from the following detailed description when taken in connection with the accompanying drawings showing by way of example, preferred embodiments of the inventive idea.

In the drawings:

FIGURE 1 is a perspective diagrammatic view illustrating a device constructed in accordance with the principles of the present invention.

FIGURE 2 is a partial plan view showing the iris ring with the fixing pin and the guide.

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FIGURE 3 is a perspective view of a differently constructed spring.

FIGURE 4 is a perspective view of a spring of yet another form.

FIGURE 5 is a perspective diagrammatic view illustrating a differently constructed device.

As shown in FIGURE 1, a pin 1 is actuated by pressure exerted in the direction of the arrow 2. The pin 1 is connected with a spring 3 having an L-shaped leg 12 the perpendicular end portion 4 of which is guided in a straight guide 5. The other leg 13 of the spring 3 has a loop or U-shaped portion 14 embracing the leg 12, and also has a bent end 15 connected with one arm 16 of a two-armed transmission lever 6 which is pivoted at 17.

Thus the movement of the pin 1 is transmitted through the spring 3 to the lever 6 which may swing about the pivot 17 from the position shown in full lines in FIG. 1 to the position shown in broken lines therein against the action of a spring 7 which tends to maintain the lever 6 in its inoperative position.

The other arm of the lever 6 carries a fixing pin 8 (FIG. 2) which engages a guide 9. The guide 9 consists preferably of a light-weight material, such as a plastic, and is firmly mounted upon the iris ring 10.

Therefore, when the lever 6 is actuated, the pin 8 will move along with it and will turn the guide 9 along with the iris ring 10. The rotation of the iris ring 10 is limited by a stop 11 which will engage the guide 9 in the end position of the iris ring, as shown by broken lines in FIG. 2. Thus if the movement of the actuating pin 1 continues beyond this point, i.e. if pressure continues to be exerted upon the pin 1 in the direction of the arrow 2, the iris ring 10 will not rotate any further due to the engagement of the guide 9 with the stop 11, and the excessive movement of the pin 1 will be absorbed by the spring 3, the leg 12 of the spring 3 bending toward the leg 13 and being guided in the leg portion 14, while the leg portion 4 moves along the guide 5.

It is apparent that as soon as pressure upon the pin 1 is released, the spring 7 will move the lever 6, the pin 1, and the iris ring 10 along with the diaphragm back to their initial positions.

The diaphragm can be also opened manually by means of the iris ring 10. This is accomplished by an indicator 18a which is firmly connected with a slide 18 having an inclined edge 20 adapted to engage the portion 4 of the spring 3.

When the user shifts the indicator 18a to the M position 19 upon a scale 19a, the inclined edge 20 of the slide 18 will engage at 21 the spring portion 4 and will move it along the guide 5 in the direction of the arrow 22. This manual actuation will have the same effect as if the pin 1 was actuated, namely, the spring 3 will be compressed and will actuate the lever 6 rotating the iris ring 10 until it is stopped by the stop 11. However, the iris ring will remain in the open position of the diaphragm determined by the stop 11.

If the position of the stop 11 is changed, the diaphragm opening will also change since then the iris ring 10 will be moved in the direction of the arrow 23 by the pin 8 of the lever 6 actuated by the tensioned spring 3.

The spring 3 may have different shapes, as illustrated in FIGS. 3 and 4.

FIGURE 3 shows a spring 3a the two legs of which are held together in a tensioned state by means of a ring or loop 24. These legs may be connected to the pin 1 and the lever 6 in the same manner as that of the spring 3 of FIG. 1.

FIGURE 4 shows a spring 3b of particularly strong structure so that it does not require either the loop 14 of the spring 3 or the ring 24 of the spring 3a. The legs of the spring 3b may be connected to the pin 1 and the lever

6 in the same manner as that of the spring 3 of FIGURE 1.

The construction illustrated in FIGURE 5, shows a balance spring 3c having a central looped portion wound about a pivot 4a, as well as two legs 5a and 7a. The leg 5a is located in a groove 6a provided in the actuating pin 2a. The leg 7a is connected to the arm 16 of the lever 6 which is similar in construction and operation to that illustrated in FIG. 1.

When the pin 2a is actuated by pressure exerted in the direction of the arrow 1a, the balance spring 3c will rotate around the pivot 4a and thus will turn the lever 6 which will turn the iris ring 10 by means of the pin 8. The rotation of the iris ring 10 is limited by the engagement of the stop 11 with the guide 9. If thereafter the pin 2a continues to move in the direction of the arrow 1a, this excessive movement will be absorbed by the balance spring 3a which will continue to bend elastically. As soon as pressure upon the pin 2a is released, the spring 7 will move the lever 6 along with iris ring 10 back to their initial positions.

This device is also adapted for manual adjustment without the automatic operation. For that purpose a third pin 14a is used which is provided with a conical portion 16a. When the pin 14a is moved in the direction of the arrow 15a, it will engage the leg 5a of the spring 3c and will tension the spring, so that the guide 9 of the iris ring will be pushed against the stop 11 and will stay in that position. Then the stop 11 can be moved until the desired diaphragm opening is provided.

It is apparent that the examples shown above have been given solely by way of illustration and not by way of limitation and that they are subject to many variations and modifications within the scope of the present invention. All such variations and modifications are to be included within the scope of the present invention.

What is claimed is:

1. In a photographic objective, in combination, an actuating pin, a swingable two-armed lever, a hair pin-

like spring having a substantially L-shaped leg and another leg connected with an arm of said lever, said L-shaped leg having an end portion connected with said pin, a guide receiving said end portion, a rotary iris ring, a guide firmly mounted upon said iris ring and rotatable therewith, a pin carried by the other arm of said lever and extending into said guide for rotating said guide and said iris ring when said lever is actuated, and a slide having an inclined edge adapted to engage and move said end portion to tension said spring, said slide being operable to tension said spring to operate the iris ring, whereby the first-mentioned pin provides automatic operation while said slide is used to provide manual operation.

2. In a photographic objective, in combination, an actuating pin, a swingable two-armed lever, a balance spring having one leg connected with said pin and another leg connected with an arm of said lever, a rotary iris ring, a guide firmly mounted upon said iris ring and rotatable therewith, a pin carried by the other arm of said lever and extending into said guide for rotating said guide and said iris ring when said lever is actuated, and a third movable pin having a conical portion and adapted to engage and move said one leg to tension said spring, the third mentioned pin being operable to tension said spring to operate the iris ring, whereby the first-mentioned pin provides automatic operation while the third-mentioned pin is used to provide manual operation.

3. A photographic objective in accordance with claim 2, wherein said third pin extends transversely to the first-mentioned pin at a substantial ninety degree angle.

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