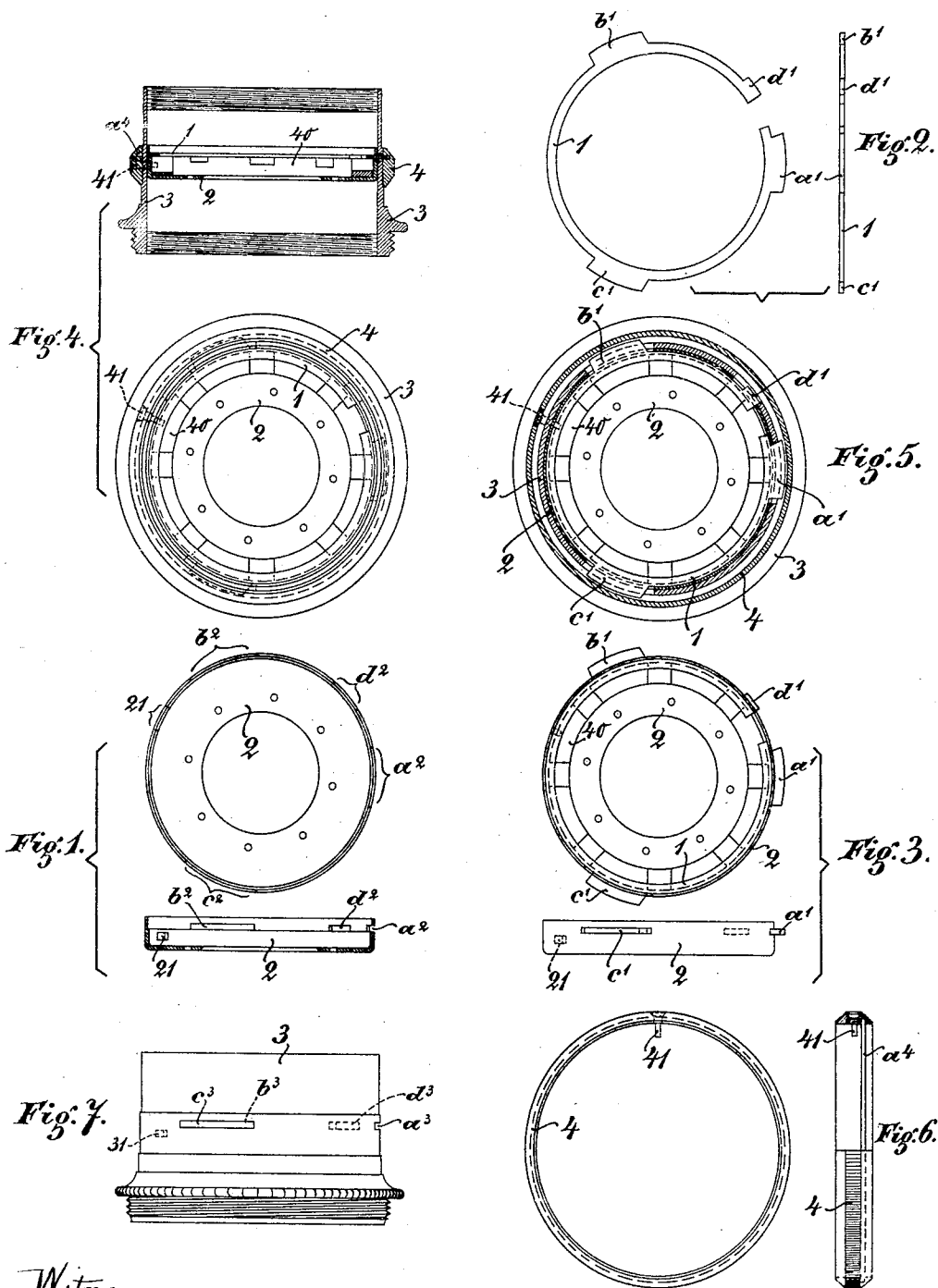


(No Model.)

M. BERGER.
IRIS MECHANISM CASING.

No. 562,270.

Patented June 16, 1896.



Witnesses:

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Inventor:

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UNITED STATES PATENT OFFICE.

MAX BERGER, OF JENA, GERMANY, ASSIGNOR TO THE FIRM OF CARL ZEISS,
OF SAME PLACE.

IRIS-MECHANISM CASING.

SPECIFICATION forming part of Letters Patent No. 562,270, dated June 16, 1896.

Application filed March 26, 1896. Serial No. 585,006. (No model.) Patented in Germany December 2, 1894, No. 84,996, and in England December 12, 1894, No. 24,187.

To all whom it may concern:

Be it known that I, MAX BERGER, a subject of the King of Saxony, residing at Jena, in the Grand Duchy of Saxe-Weimar, German Empire, have invented a new and useful Iris-Mechanism Casing, (for which I have obtained patents in Germany, No. 84,996, bearing date December 2, 1894, and in Great Britain, No. 24,187, bearing date December 12, 1894,) of which the following is a specification.

My invention relates to optical apparatus containing a lens or a combination of lenses and in connection therewith an iris mechanism adapted to be used either as a diaphragm of adjustable aperture or as an iris-shutter or in both ways.

The invention consists in simplified means for combining the iris mechanism with the instrument, and according to its main feature the annular cover of the casing, which includes the iris mechanism, is secured in its place in the following manner: The ring which forms the cover is open, that is to say, split up, and is provided on its outer circumferential surface with teeth adapted to be inserted into notches or slots in the cylindrical wall of the casing, so that the cover, when introduced into the casing, may be held in proper position by its teeth engaging the said notches or slots.

An accessory feature of the invention is that the teeth of the ring are made long enough to project through the slots of the casing, so as to enter into notches or slots in the lens-tube, into which the iris-casing is inserted. In this way the cover serves also as a locking-ring which secures the casing in proper position within the lens-tube.

According to a third feature of the invention the teeth are so long as to project also from out of the slots of the lens-tube and to engage an annular groove—or sectional grooves, the number of which is equal to that of the teeth—provided in a hand-ring which embraces the lens-tube and is connected with the iris mechanism, so as to vary the iris-aperture when turned in the one or the other direction. During such movement of the hand-ring the ends of the teeth of the locking-ring serve as guides which prevent the narrow hand-ring

from jamming on the lens-tube. When the casing, the lens-tube, and the hand-ring are brought into their operative relative positions, they may be secured in these positions by inserting the locking-ring—that is to say, the cover of the casing. Vice versa the said parts are unlocked by removing the cover of the casing.

The locking-ring may be of a yielding or elastic nature and in its unstrained condition may have a diameter equal to or larger than that which it must assume for the purpose of engaging with its teeth the slots or notches in the casing, and if preferred one tooth only placed between the ends of this locking-ring may suffice for retaining the same in its operative position. When, however, the ring is provided with a tooth at each end—that is to say, with at least two teeth—it may in its natural state even have a less diameter than in the locking position, for in that case the teeth at both ends of the ring, under the tension of the ring, which has been bent outwardly for insertion, are pressed against the adjacent ends of the two corresponding slots, so that the locking-ring is thereby prevented from returning to its original position. It is not, however, absolutely necessary that the alterations of shape, to which the locking-ring is subjected, should be kept within the limits of its elasticity, so that the ring resumes its original shape whenever released. Indeed, locking-rings may in some cases be employed, which cannot, strictly speaking, be described as elastic at all, but are simply flexible.

In the accompanying drawings, Figure 1 represents a plan and a sectional elevation of a ring 2 of angular section, forming the main part of the iris-casing. Fig. 2 represents a plan and an elevation of the locking-ring 1, which serves as cover for the main part 2 of the iris-casing. Fig. 3 represents a plan and an elevation of the iris-casing, the cover 1 being inserted into the main part 2 and a ring 40 for operating the blades which confine the iris-opening being shown. The operating-ring 40 and the iris-blades connected to it and to the casing 2 may be of any suitable construction; but in the example shown it has

been supposed that the blades are pivoted to the casing and engage the operating-ring in notches of different depth, according to a construction shown in Letters Patent No. 524,670, Figs. 1 to 4. Fig. 4 represents a sectional elevation and a plan of the total system of cylinders or rings united by the locking-ring, viz: besides this ring or cover 1 the main part 2 of the iris-casing, the operating-ring 40 of the iris-blades, the lens-tube 3, and a hand-ring 4, which embraces this tube and serves to turn the operating-ring 40. Fig. 5 represents a section through the system of rings transversely to its axis. Fig. 6 represents a plan and an elevation, partially in section, of the hand-ring 4. Fig. 7 represents an elevation of the lens-tube 3.

The arrangement as shown is an illustration of all features of the invention. The first and innermost of the combined rings, the cover 1 of the iris-casing, at the same time answers the purpose of a locking-ring, being provided with teeth $a' b' c' d'$, which enter the slots $a^2 b^2 c^2 d^2$ and $a^3 b^3 c^3 d^3$ of the rings 2 and 3, respectively, though its proper object is to afford a support to the diaphragm-operating ring 4, which rests at the other side against a projection in the main part 2 of the casing, so that this operating-ring is properly guided to be turned round its axis. Furthermore, the fourth and outermost cylinder, *i.e.*, the adjusting or hand ring 4, which is rigidly connected with the diaphragm-operating ring 40 by means of a pin 41, screwed into the hand-ring and engaging by its end a recess in the operating-ring, is provided on its inner surface with an annular groove a^4 , to which may be substituted a series of separate sectional grooves corresponding to and engaging the teeth $a' b' c' d'$ of the locking-ring 1. By means of its groove a^4 the hand-ring is guided on the said teeth when turned in the one or the other direction for reducing or enlarging the iris-aperture. The extent of

such movement of the said hand-ring may be so proportioned as to correspond to the intended maximum and minimum apertures of the iris by proportionately determining the length of the slot 21 in the main part 2 of the diaphragm-casing and of the slot 31 in the lens-tube 3, which slots are provided for the pin 41, connecting the hand-ring 4 and the diaphragm-operating ring.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. The combination with an iris-mechanism casing of a cover consisting of an open ring provided with exterior teeth, and slots in the casing corresponding to the teeth of the ring, substantially as shown and described.

2. The combination with an iris-mechanism casing, of a cover consisting of an open ring provided with exterior teeth, slots in the casing corresponding to the teeth of the ring and a lens-tube fitted on the casing and provided with slots corresponding also to the teeth of the ring, substantially as shown and described.

3. The combination with an iris-mechanism casing, of a cover consisting of an open ring provided with exterior teeth, slots in the casing corresponding to the teeth of the ring, a lens-tube fitted on the casing and provided with slots corresponding also to the teeth of the ring, a rotatable hand-ring for varying the iris-aperture fitted on the lens-tube and recessed at its inner surface so as to be guided by the teeth of the open ring, substantially as shown and described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

MAX. BERGER.

Witnesses:

OTTO WAEDELEIN,
ERWIN RAABE.