

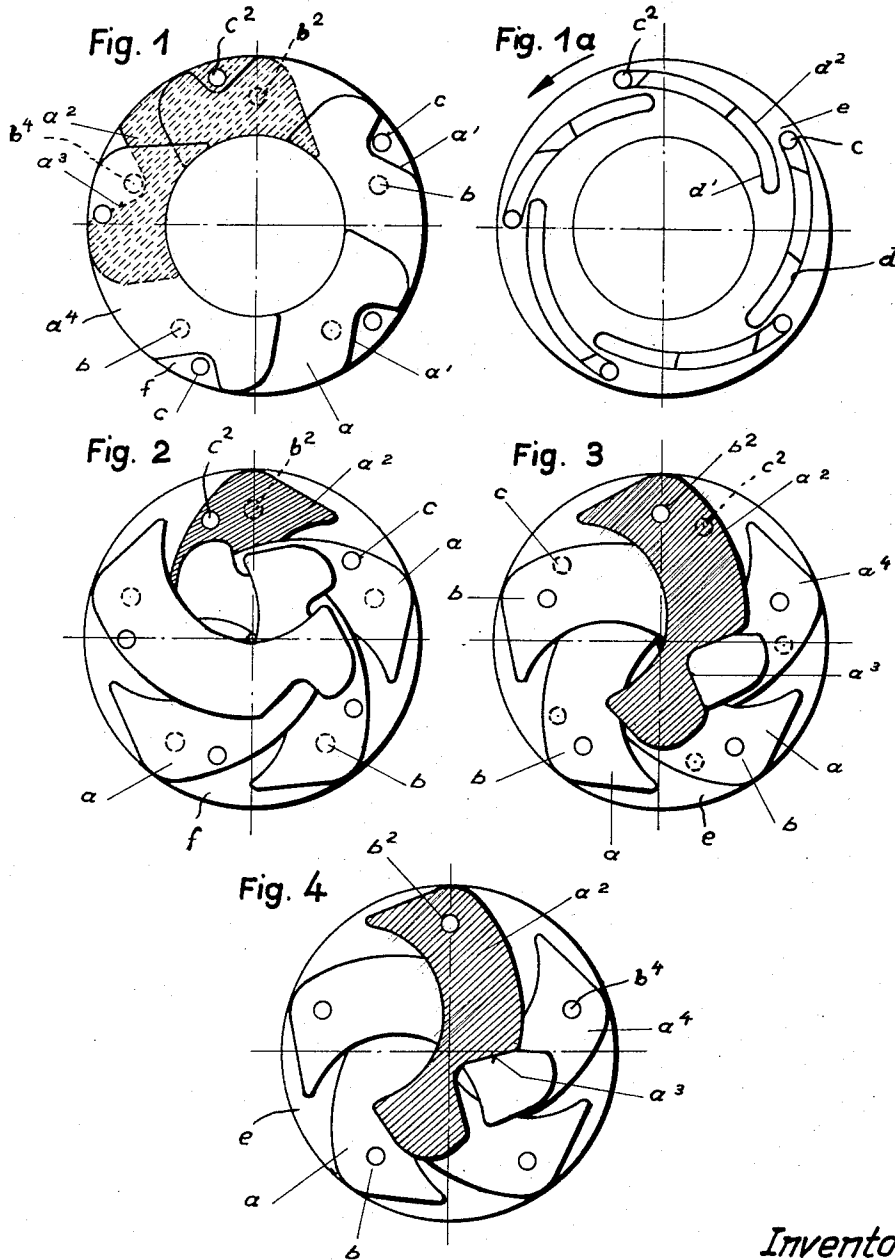
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OBJECTIVE DIAPHRAGM COMPOSED OF SWINGABLE LEAVES

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1

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**OBJECTIVE DIAPHRAGM COMPOSED OF
SWINGABLE LEAVES**

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My present invention relates to a diaphragm for optical objectives composed of a plurality of swingable, overlapping leaves each having a fixed fulcrum and, spaced from it, a projection slidably guided in a respective spiral or oblique groove of a setting ring which is rotatable about the diaphragm axis.

Diaphragms of this type, which include the well-known iris diaphragms, are not usually capable of complete closure unless their leaves are given a relatively intricate shape and are controlled by a rather complex setting mechanism. The general object of my invention is to provide an improved diaphragm of this character in which the desired complete closure, in an extreme position of the setting ring, is accomplished by simple means.

The invention realizes the above object by the provision of means on the setting ring adapted to guide at least one of the leaves for swinging movement of one of its edges beyond the center of the diaphragm while preferably maintaining some of the other leaves just touching the diaphragm center with their inner, arcuate edges. The leaf or leaves which are guided in this manner are preferably in an extreme position on the overlapping array, i.e. they are the ones farthest from and/or closest to the grooved setting ring. To bring about the movement described, the corresponding groove or grooves of the setting ring may be provided at their inner extremities with a bend turning more sharply toward the diaphragm center than do the corresponding extremities of the remaining grooves.

The invention will be described in greater detail with reference to the accompanying drawing in which:

Fig. 1 shows a front view of a diaphragm embodying the invention, comprising an array of iris leaves on a stationary mounting ring as seen upon the removal of the associated rotatable setting ring, the diaphragm being illustrated in wide-open position;

Fig. 1a is a view similar to Fig. 1 but with the setting ring in place;

Fig. 2 is another front view of the diaphragm, without setting ring, in nearly closed position;

Fig. 3 is a rear view of the diaphragm in the position of Fig. 2, as seen upon removal of the stationary mounting ring; and

Fig. 4 is a view similar to Fig. 3 but with the setting ring further rotated to effect complete closure of the diaphragm.

The iris diaphragm shown in the drawing comprises a plurality of curved, overlapping leaves *a* stacked between a rotatable setting ring *e*, seen in Figs. 1a, 3 and 4, and a fixed mounting ring *f*, visible in Figs. 1 and 2. Each of these leaves is swingable about a pivot pin *b*, projecting from mounting ring *f*, and provided with a guide pin *c* received in a corresponding, spirally extending groove *d* on the setting ring *e*. The leaves are bounded by concentric, arcuate edges which are centered on the optical axis of the associated objective and coincide with the edges of rings *e*, *f* when the diaphragm is in its wide-open position, as illustrated in Fig. 1, the outer one of the leaf edges being formed with a cutout *a'* to clear the guide pin *c* of its neighbor.

One of the iris leaves, located closest to the mounting

2

ring *f*, has been designated *a*² and differs slightly in shape from the others since its peripheral cutout *a*³ must clear the pivot pin *b*⁴ of the next-following leaf *a*⁴. This special iris leaf *a*², whose pivot pin has been designated *b*², has its guide pin *c*² received in groove *d*² of setting ring *e*. The latter groove has a bend at its inner extremity so that the terminal portion *d'* thereof approaches more closely toward the diaphragm center than do the corresponding portions of the remaining grooves *d*. Thus, when the setting ring *e* is rotated in the direction of the arrow (Fig. 1a), the iris leaves *a* and *a*² move from their wide-open position of Fig. 1 to a nearly closed position, as shown in Figs. 2 and 3, in which their inner arcuate edges are tangent to a small circle centered on the diaphragm axis. As the ring *e* is further rotated, the position of the leaves *a* changes only slightly as their pins *c* ride toward the inner end of groove *d*, yet the pin *c*² of leaf *a*² is guided by the knee *d'* of groove *d*² to accelerate the inward movement of that leaf whereby the latter is deflected into a position in which it overlies the small hole formed by the other iris leaves. This position, in which the inner, more highly curved edge of leaf *a*² has swung past the diaphragm center, is illustrated in Fig. 4.

It will be understood that the iris leaf guided for swinging movement past the diaphragm center need not be the leaf *a*² nearest the mounting ring *f* but that some other component of the diaphragm, e.g. the leaf *a*⁴ nearest the setting ring *e*, may be similarly guided. Naturally, both extreme leaves *a*² and *a*⁴ together, or any combination of leaves, may be operable in this manner.

The invention, therefore, is not limited to the specific embodiment described and illustrated but may be realized in various modifications thereof without departing from the spirit and scope of the appended claims.

I claim:

1. A diaphragm for optical objectives, comprising a mounting ring, a guide ring rotatable relatively to said mounting ring and substantially co-extensive therewith, a plurality of overlapping leaves with arcuate, concentric inner and outer edges disposed between said rings and pivotally secured to said mounting ring in angularly spaced positions, said inner and outer edges substantially registering with respective edges of both of said rings in a wide-open position of the diaphragm, said guide ring having a face adjacent said leaves provided with spirally extending grooves of substantially identical lengths, and a guide pin on each of said leaves received in a respective one of said grooves for inward movement of said leaves upon relative rotation of said rings whereby the inner edges of said leaves define progressively smaller diaphragm openings, the mutual spacing of said grooves being so close as to prevent an inward extension of said grooves with their original pitch for a distance sufficient to enable simultaneous convergence of said leaves into a position of complete diaphragm closure, at least one but less than all of said grooves being provided with a bent inner extremity of increased spiral pitch adapted to accelerate the terminal movement of the associated leaf, thereby causing the inner edge of the latter to swing past the axis of said rings so as to obstruct the residual diaphragm opening defined by the remaining leaves.

2. A diaphragm according to claim 1 wherein said one of said grooves is associated with a leaf positioned immediately adjacent one of said rings.

3. A diaphragm according to claim 1 wherein said one of said grooves is associated with the leaf positioned closest to said mounting ring.

References Cited in the file of this patent**UNITED STATES PATENTS**

622,592	Berger	Apr. 4, 1899
1,302,359	Garbutt	Apr. 29, 1919