Fig. 1

Fig. 2

Fig. 3

Fig. 4

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The invention is described hereinafter with respect to the drawings in which:

FIG. 1 is a plan view of a diaphragm housing with its cover removed and with parts broken away to show a diaphragm setting ring and two diaphragm blades in their open position, the guide slots by which the blades are set being arranged in the bottom of the housing and being in the form of continuous slots.

FIG. 2 shows the housing of FIG. 1 with the cover removed and the diaphragm blades set to the position corresponding to the smallest diaphragm aperture;

FIG. 3 shows a cross-sectional view of the diaphragm housing of FIG. 1 along the line 3-3 of FIG. 1;

FIG. 4 is an enlarged cross-sectional view of a diaphragm blade along the line 4-4 of FIG. 1;

FIG. 5 is another embodiment of the invention corresponding to FIG. 1 but with a modification of the control members;

FIG. 6 shows the apparatus of FIG. 5 with the diaphragm blades set for the smallest aperture; and FIG. 7 is a cross-sectional view of the housing of FIG. 5 along the line 7-7.

FIGS. 1 to 3 show the bottom 1 of a housing for a lens diaphragm having an edge 1a for concentrically guiding a diaphragm setting ring 2. A cover 3 is attached to the edge 1a by means of several machine screws 4. The diaphragm housing may be built into a shutter housing of a photographic camera in accordance with known forms of construction, although the shutter housing is not shown for reasons of clarity. Several diaphragm blades 5, each rotatably mounted, are associated with the diaphragm setting ring 2.

As may be seen in the drawings, the adjusting movements of the diaphragm blades 5 are effected by turning the diaphragm setting ring 2 which has an arm 2a provided for this purpose. This arm may be operatively connected to a manually operable diaphragm member, or control, on the camera shutter or to a sensing slide of an automatic exposure system built into the camera. The arm 2a extends through an opening 1b in the edge 1a of the housing bottom 1. The circumferential dimension of this opening is determined by the movement of the arm necessary for setting the range of diaphragm values, for example, values from "2.8" to "22."

Each of the blades 5 is connected to the diaphragm setting ring 2 and to the housing 1 by a pair of adjusting pins 5a and 5b, which engage in separate slots, one for each diaphragm blade, 4c formed in the bottom of the housing 1. While the slots shown are in the form of an elongated 5, these slots may also be developed as two individual slots. The curvature of each of the slots 1c is calculated to transform the rotary motion of the diaphragm setting ring 2 and its arm 2a with respect to the motion of the diaphragm blades 5 into a linear relationship. In order to transmit the rotary movement of the adjusting ring 2 to the blades 5, one of the two adjusting pins 5a and 5b, and preferably pin 5a, fits into a slot 2b in the ring. The latter slot extends approximately radially with respect to the center of the diaphragm. The second pin 5b of each blade 5 extends through a slot 2c which is large enough so that it merely serves as a passage for the pinion and does not interfere with the motion thereof.

In FIG. 1, the blades 5, of which only two of the five actually included in a preferred embodiment, are shown, and these blades are in positions corresponding to the full diaphragm aperture 6. When the blades are so positioned, the arm 2a engages one end of the opening 1b while the adjusting pins 5a and 5b occupy the positions shown in the guide slots 1c. The arm 2a may be rotated...
to rotate the diaphragm ring either manually or by means of engagement with a sensing slide of an automatic exposure system, as stated hereinabove. This rotation causes the pins 5a to move radially outwardly in the slots 2b as these pins, together with the pins 5b traverse the guide slots 1c. The engagement of the pins 5a and 5b into the individual diaphragm blades 5 causes these blades 5 to pivot inwardly toward the center of the diaphragm aperture 6 until the diaphragm aperture reaches its smallest value as shown in FIG. 2. This figure shows all of the diaphragm blades and thus the contour of the smallest diaphragm aperture can be made out quite clearly. When the diaphragm blades reach the position of smallest aperture, the arm 2a reaches the other end of the opening 1b within which this arm is constrained.

In the embodiment shown in FIGS. 5 to 7, the arrangement of the slots is reversed from the arrangement in FIGS. 1 to 3. In FIGS. 5 to 7 the bottom of the diaphragm housing is indicated by reference numeral 11 and is provided with an edge 11a. A diaphragm setting ring 12, the motion of which is guided and constrained by the bottom 11 and the edge 11a, has an arm 12a which extends through an opening 11b in the edge. The diaphragm blades, of which there are five in the embodiment of FIGS. 5 to 7, although only two are shown for the sake of clarity, are associated with the diaphragm setting ring 12 to be controlled thereby. Several guide slots 12b, one for each of the blades, are arranged in the diaphragm setting ring 12 and, just as in the embodiment of FIGS. 1 to 3, these guide slots may be arranged so that there are two for each of the blades rather than one as shown. The position of each of the blades 13 is controlled by a pair of adjusting pins 13a and 13b which extend into the guide slots 12b. Each adjusting pin 13a extends into a substantially radially extending slot 11c in the bottom 11 of the diaphragm housing. In addition, another slot 11d is formed in the bottom 11 adjacent to each of the blades 13, and a second adjusting pin 13b extends through the slot 11d. As in the earlier embodiment, the slot 11d is large enough so that it does not obstruct the motion of the adjusting pin 13b during the setting of the diaphragm blades 13. Because of the arrangement of a slot 11d for each of the adjusting pins 13b, the latter can be made just as long as each of the adjusting pins 13a, which prevents the pins 13b from being removed from engagement with the guide slot 12b. The slots 11d may be dispensed with if the dimensions of the adjusting pins 13b are shortened accordingly. In the embodiment shown in FIGS. 5 to 7 the guide slot 12b is so shaped that the motion of the diaphragm blades 13 is made relatively linear. A cover 14 fixed by means of screws 15 to the edge 11c of the bottom 11 is provided for the axial guiding of the diaphragm setting ring 12 and the blades 13. The function of the diaphragm shown in FIGS. 5 to 7 is similar to that of the arrangement of FIGS. 1 to 4, so that no special explanation is deemed to be necessary.

What is claimed is:

1. Diaphragm control apparatus comprising: a plurality of diaphragm blades; a first ring; a second ring concentric with said first ring, at least one of said rings being rotatable with respect to the other; a guide slot in said first ring; a substantially radial slot in said second ring; a first pin attached to each of said diaphragm blades and extending through both of said slots; and a second pin attached to each of said blades and extending into said guide slot to be engaged thereby.

2. The apparatus of claim 1 comprising a diaphragm housing and in which said first ring is fixedly connected to said housing and said second ring moves with respect to said first ring.

3. The apparatus of claim 2 in which said first ring comprises the bottom of said housing.

4. The apparatus of claim 1 comprising a diaphragm housing and in which said second ring is fixedly connected to said housing.

5. The apparatus of claim 4 in which said second ring comprises the bottom of said housing.

6. Diaphragm control apparatus comprising: a plurality of diaphragm blades; a first ring; a second ring concentric with said first ring, at least one of said rings being rotatable with respect to the other; a separate guide slot in said first ring for each of said blades; a separate radial slot in said second ring for each of said blades; a plurality of first pins, each of said first pins being attached to one of said diaphragm blades and extending through one of said radial slots and one of said guide slots; a plurality of second pins, each of said second pins being attached to one of said diaphragm blades and extending into the same guide slot as the first pin of the same blade, whereby relative rotation of one of said rings with respect to the other of said rings forces both pins of each of said blades to move along the respective one of said slots to pivot said blades.

7. Diaphragm control apparatus comprising: a plurality of diaphragm blades; a first ring; a second ring concentric with said first ring, at least one of said rings being rotatable with respect to the other; a plurality of first and second guide slots in said first ring arranged so that there is one first and one second guide slot for each of said diaphragm blades; a plurality of substantially radial slots in said second ring, the number of said radial slots being equal to the number of said blades; a plurality of first pins, each of said first pins being attached to each of said diaphragm blades and extending through one of said substantially radial slots and one of said first guide slots; a plurality of second pins, each of said second pins being attached to each of said diaphragm blades and extending into one of said second guide slots corresponding to the diaphragm blade to which said second pin is attached, whereby relative motion of one of said rings with respect to the other of said rings causes each of said first pins to traverse a respective one of said first guide slots corresponding to one of said diaphragm blades and each of said second pins to traverse a respective one of said second guide slots corresponding to the diaphragm blade to which said second pin is attached.

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