

PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Photographic Curtain-Type Shutter.

We, FRANKE & HEIDECHE G.m.b.H., a German Body Corporate, trading as ROLLEI-WERKE FRANKE & HEIDECHE, of 196 Salz-dahlumerstrasse, Braunschweig, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The invention relates to a photographic curtain-type shutter in which the curtains, provided with their own spring mechanisms, are released successively to run-off by a separate release mechanism through two cam discs, the first cam disc for the first curtain being rigidly and the second cam disc for the second curtain being adjustably connected with the release mechanism, such shutter being known from East German Patent No. 5395.

15 In comparison with curtain-type shutters in which the running-off catch of the second curtain is released by the first running-off curtain, such shutters have the advantage that the running-off of the curtains is not hindered by such release impulses derived from them. Thus not only can a higher running-off speed and a more uniform running-off of the curtains be achieved, but in case of need the release mechanism can be given a still higher running-off speed in comparison with the running-off of the curtains, so that very small slit widths and very short exposure times become achievable.

20 Hitherto the setting of the second cam disc had to be effected by uncoupling from the cam disc shaft, rotation in relation to the first cam disc and recoupling, so that the setting knob accompanied the rotation in the running-off of the shutter.

40 It is the problem of the invention to design the release mechanism so that the mentioned setting knob for the exposure time did not

accompany the rotation in the running-off of the shutter and release mechanism, so that the setting becomes possible by reference to a stationary mark.

According to the present invention there is provided a photographic curtain-type shutter having two curtains, provided with their own spring mechanisms, which are successively releasable to run-off by means of a separate release mechanism through two cam discs, the first cam disc for the first curtain being rigidly, and the second cam disc for the second curtain being adjustably connected with the release mechanism, wherein the second cam disc is provided with several stepped cams and is loosely rotatable on an eccentric which is stationary in the running-off of the shutter and is rotatable for the purpose of slit adjustment, and is coupled to the first disc by a pin-slot connection, by which the second cam disc is radially displaced in running-off, so that according to the position of the eccentric a different cam releases a lever blocking the second curtain. The eccentric disc is preferably coupled through a pinion with a toothed segment lever which in turn is actuated with the setting shaft through a cam disc. The setting of the other exposure values is also greatly simplified in the case of such a non-displaceable fitting of the setting shaft and of the setting knob, so that the whole range not only of the exposure time and of the slit widths but also for example the position "B" is settable with one single knob, or this knob also controls for example the engagement of the escapement when greater slit widths are desired. For this purpose the cam disc controlling the eccentric disc is preferably connected with a further cam disc which controls the introduction of a lever into the stop of the cam disc by means of a stepped and circular cam, which lever is coupled with an escapement engaging peg,

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this cam disc being provided with a catch groove for a lever which in its rest position holds the bulb exposure catch in its inoperative position.

5 In a further development of the invention the circular cam and the stepped cam groove are so designed and arranged that successively they effect firstly the setting of stepped, widening slit widths, then the stepped shifting
10 of the escapement into the range of the engaging member stop and finally the liberation of the detent for bulb exposures, all this being effected by one single progressive rotation of the non-displaceable setting knob.

15 A constructional embodiment of the invention will now be described, by way of example, with reference to the accompanying drawings, wherein:—

20 Figure 1 shows the drive mechanism parts participating in the slot formation with the shutter ready to run-off;

Figure 2 shows the escapement control for the formation of longer exposure times with the escapement ineffective;

25 Figure 3 with the escapement effective; and

Figure 4 shows the drive mechanism parts effective in the case of "B" exposure.

30 The roller curtains on the spindle 1, which are wound up in known manner with stressing of their run-off springs, are provided with pawl discs 2 and 3 which are held by pawls 4 and 5 in the cocked position of the shutter. The ends 6 and 7 of the pawls 4, 5 rotatable
35 about the peg 8 lie adjacent cam discs of a separate mechanism 9, for example a spring housing, which can be wound up in common with the roller curtains e.g. by a differential gearing. A pawl 10 and pawl disc 11 hold
40 the spring mechanism 9 in the cocked position. A cam disc 12 is rigidly connected with the disc 11 and lies in the same plane as the pawl end 6 of the run-off pawl 4 of the first curtain.

45 A further cam disc 13 having several cams 14, 15, 16, 17 lies in the plane of the pawl end 7 of the run-off pawl 5 of the second curtain. This cam disc 13 is connected in the direction of rotation with the cam disc 12 by a slot-pin
50 connection 18, 19, but is rotatable about an eccentric 20 which in turn is rotatable coaxially about the common spindle 21 of the spring housing 9 and the cam discs 11 and 12. The angular distance of the cams 14, 15, 16, 17
55 from the cam of the disc 12 remains constant, but the disc 13 in running-off carries out wobbling movement on its eccentric in the direction of the slot 18, so that according to the position of the eccentric 20 one of the
60 cams 14, 15, 16, 17 comes so far radially outwards that it can actuate the pawl 7. According to the position of the eccentric 20 thus one of these four cams 14, 15, 16, 17 releases the pawl 7. The adjustment of the
65 eccentric is effected by a toothed segment

lever 22 through the toothed segment 23 and the pinion segment 14, which is seated on the eccentric 20. The lever 22 is controlled by a cam disc 24 on the shaft 25. As long as the
70 peg or pin 26 runs on the concentric circle 27 of the disc 24, no variation occurs. When however the pin 26 enters the stepped groove 28, the eccentric is rotated step by step by means of the eccentric disc 20, so that the
75 four steps 14, 15, 16, 17 of the cam disc 13 are transferred successively into the effective position.

On actuation of the release pawl 10 the drive mechanism 9 runs-off, whereby firstly the cam 12 releases the pawl 4 and releases
80 the first curtain to run-off. According to the position of the eccentric then one of the four cams 14, 15, 16, 17 comes into engagement with the pawl end 7, whereby the second curtain is released. In the embodiment
85 shown in Fig. 1, the cam 17 is situated in the effective position, so that this illustrated position corresponds to the maximum slit width, because only the last cam 17 can actuate the pawl 7. In the opposite eccentric
90 position the cam 14 would become effective, so that directly after liberation of the first curtain the cam 14 can actuate the pawl 7, 5 and liberate the second curtain. Thus this position corresponds to the minimum slit
95 width. In the embodiment shown in Fig. 1 four different slit widths are provided. The absolute slit width depends however not only upon the distance of the cams 14, 15, 16, 17 from the pawl 7 alone, but upon the running-
100 off speed of the drive mechanism 9.

It is obvious that in the known devices where the run-off catch of the second curtain is controlled by the curtain which runs-off first, the running-off speed of the first
105 curtain is decisive for the slit formation and cannot be increased beyond the limit given by this running-off speed of the first curtain. In the shutter according to the invention on the other hand the running-off speed, that
110 is to say the chronological succession of the release operation by the cam 12 and the next succeeding cam 14 of the release disc 13 of the second shutter can be shortened considerably by increased speed of the running
115 mechanism, so that with the apparatus according to the invention smaller slit widths and very much shorter exposure times become possible. Obviously it is possible in place of the four-stepped disc 13 to provide a disc with
120 less or more steps, but in practice a division into four steps is sufficient, while for the first step 14 the smallest possible angular distance from the release cam 12 is to be sought. On the shaft 25 of the cam disc 27 there is a
125 further cam disc 29 with a stepped graduation 30 and a catch groove 31. The peripheral part 32 lying between the two lies concentrically of the rotation shaft 25. The mutual position of the cam discs 27 and 29 on the
130

shaft 25 is selected so that the peg or pin 33 slides on the concentric surface 32, as long as the peg 26 is situated in the cam groove 28, that is to say the bell crank lever 35 rotatable about the peg 34 lies in the farthest position pivoted in the anti-clockwise direction. When the peg 26 is in the bottom of the groove 28, the cam 14 is effective, that is to say the smallest slit width is set. With progressive rotation of the disc 27 in the anti-clockwise direction the cams 15, 16 and 17 come into action, that is to say the wider slit widths are set. When the cam 17 becomes effective the pin 26 slides out of the groove 28 on to the concentric periphery of the cam disc 27. On further rotation the peg 33 comes on to the steps 30 of the cam disc 29, whereby the lever 35 can pivot step by step in the clockwise direction; thus the double lever 39 pivotable on its peg 36 comes with its end 37 more or less into the region of the shoulder 38 of the cam disc 12 and hinders its running-off. At the other end of the lever 37 the peg 40 of an escapement engages in a pin-slot connection 41. This arrangement achieves the object that in the position as illustrated, that is when the escapement is effective, on release of the release catch 10 firstly the run-off catch 6 of the first curtain is released by the cam 12, whereupon before the cam 17 for the second curtain becomes effective the running-off of the drive mechanism is hindered by abutment of the shoulder 38 on the lever 37, until the running-off pre-timer mechanism permits the escape of the lever 37 from the disc 12. Thereupon the cam 17 can release the second curtain. In the case of this arrangement or adjustment of the stepped disc 29 for the setting of various escapement times, the drive peg 40 of the escapement always remains in the same basic position, so that at all escapement times the same start conditions are given for the escapements; the lever arm 37 dipping into the region of the shoulder 38 also remains practically always radial, so that rebounds and thus inaccurate escapement effects are avoided. On further rotation of the shaft 25 with the cam discs 27 and 29 finally the peg 33 comes on to the concentric face 32, whereby the escapement becomes ineffective, and finally into an end position in which the catch groove 31 draws the peg 42 of a lever 43 radially inwards. This position is illustrated in figure 4. It corresponds to the "B" exposure that is to say in which on release of the shutter the running-off of the second curtain is hindered after opening of the shutter by the release itself as long as the release is pressed. In this position the end 44 of the lever 43 liberates the lever 45, so that the latter becomes free under the influence of a spring 46; at the same time the extension 47 is brought into the region of the cam 17 of the cam disc 13 and thus the running-off of the second curtain is prevented. On release the lever 48 also takes the lever 45 back by means of the tab 49 into the rest position, whereby the second curtain is released by the cam 17.

WHAT WE CLAIM IS:—

1. A photographic curtain-type shutter having two curtains, provided with their own spring mechanisms, which are successively releasable to run-off by means of a separate release mechanism through two cam discs, the first cam disc for the first curtain being rigidly, and the second cam disc for the second curtain being adjustably connected with the release mechanism, wherein the second cam disc is provided with several stepped cams and is loosely rotatable on an eccentric which is stationary in the running-off of the shutter and is rotatable for the purpose of slit adjustment, and is coupled to the first disc by a pin-slot connection, by which the second cam disc is radially displaced in running-off, so that according to the position of the eccentric a different cam releases a lever blocking the second curtain.
2. A photographic curtain-type shutter as claimed in claim 1, wherein the eccentric disc is coupled through a pinion with a toothed segment lever which in turn is actuated with a setting shaft through a third cam disc.
3. A photographic curtain-type shutter as claimed in claim 2, wherein with the third cam disc a fourth cam disc is connected which through a part stepped and part circular cam controls the insertion of a lever into a stop of the first cam disc, which lever is coupled with an escapement engaging peg which fourth cam disc is provided with a catch groove for a lever, which in its rest position holds a "B" exposure catch in its inoperative position.
4. A photographic curtain-type shutter as claimed in claim 3, wherein the third and fourth cam discs are so designed and arranged that they successively effect first the setting of stepped, widening slot widths, then the stepped shifting of the escapement into the range of said stop and finally the liberation of the catch for "B" exposures.
5. A shutter controlling and operating mechanism substantially as described with reference to and as illustrated in the accompanying drawings.

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