No. 703,007. Patented June 24, 1902.

R. SCHÜTTAUF.

PHOTOGRAPHIC CURTAIN SHUTTER.

(Application filed Sept. 9, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

Fig. 2.

Fig. 3.

Witnesses
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(No Model.) 3 Sheets—Sheet 2.

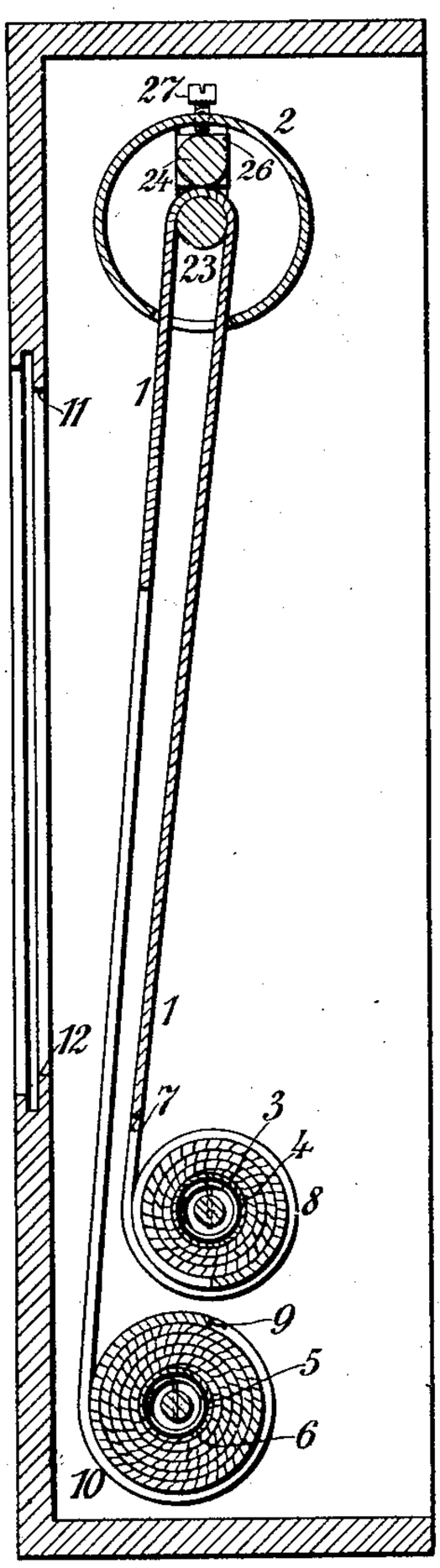

Fig. 4.

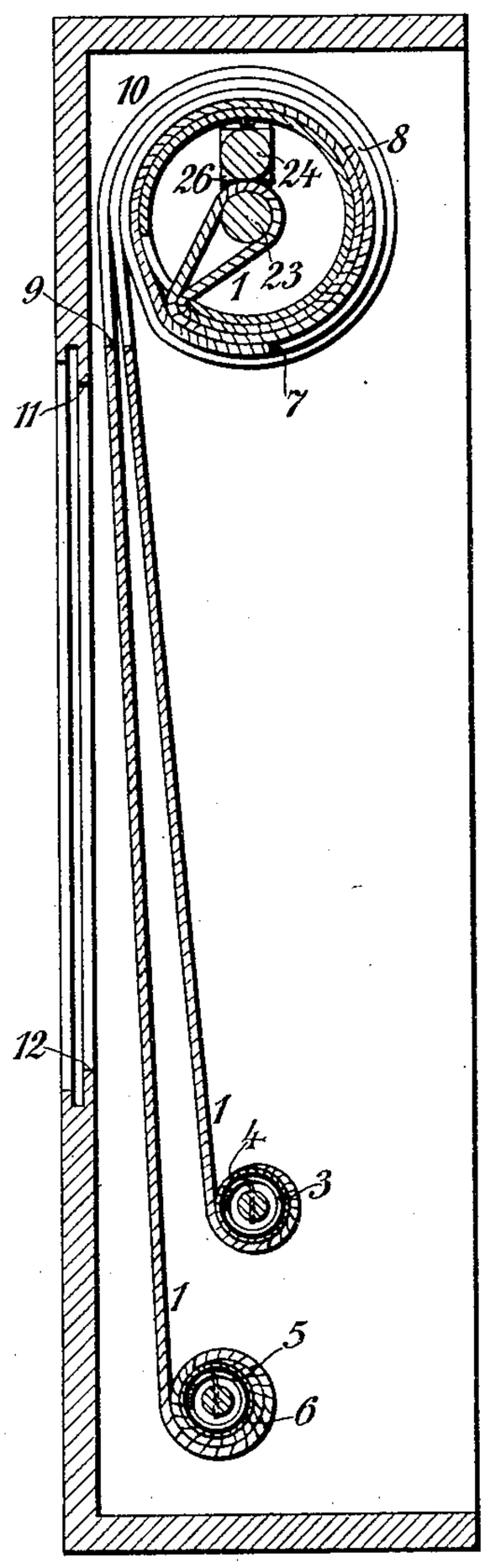

Fig. 5.

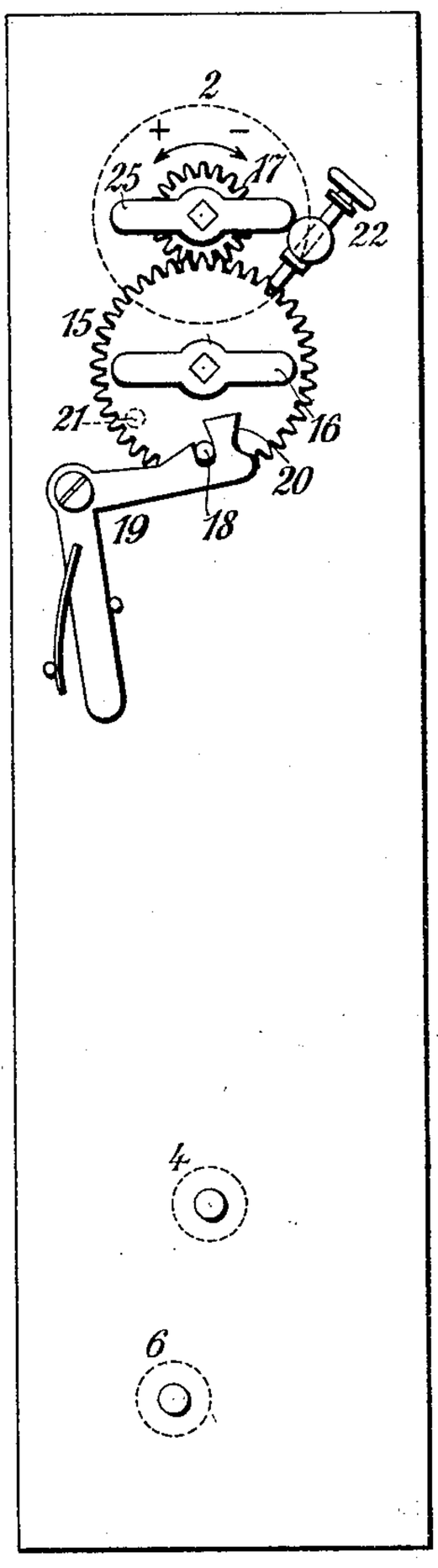

Fig. 6.

Fig. 10.

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(No Model.) 3 Sheets—Sheet 3.

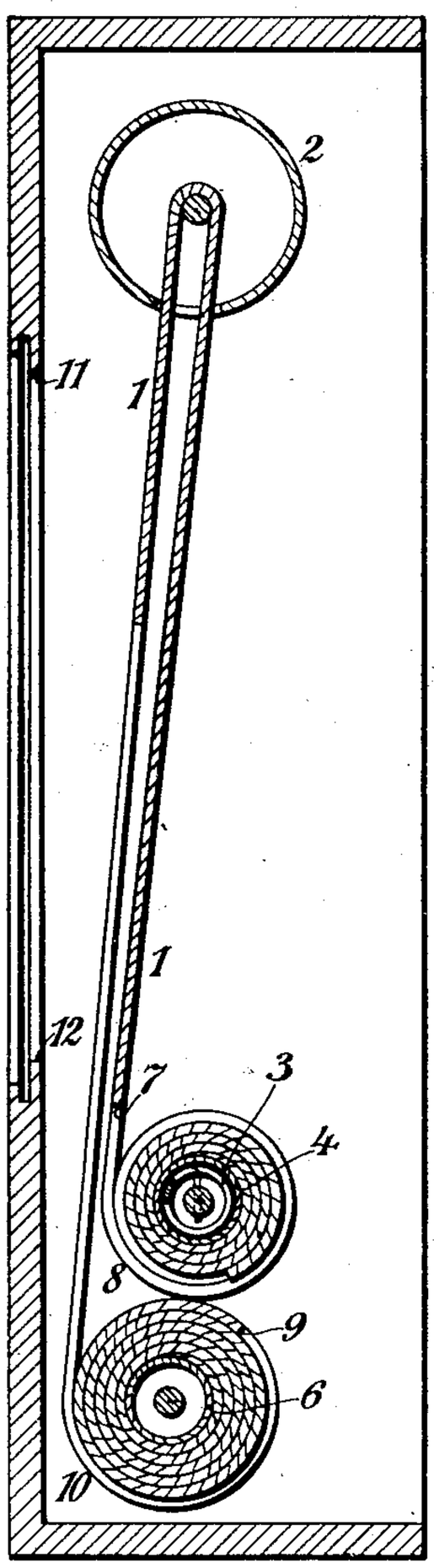

Fig. 7.

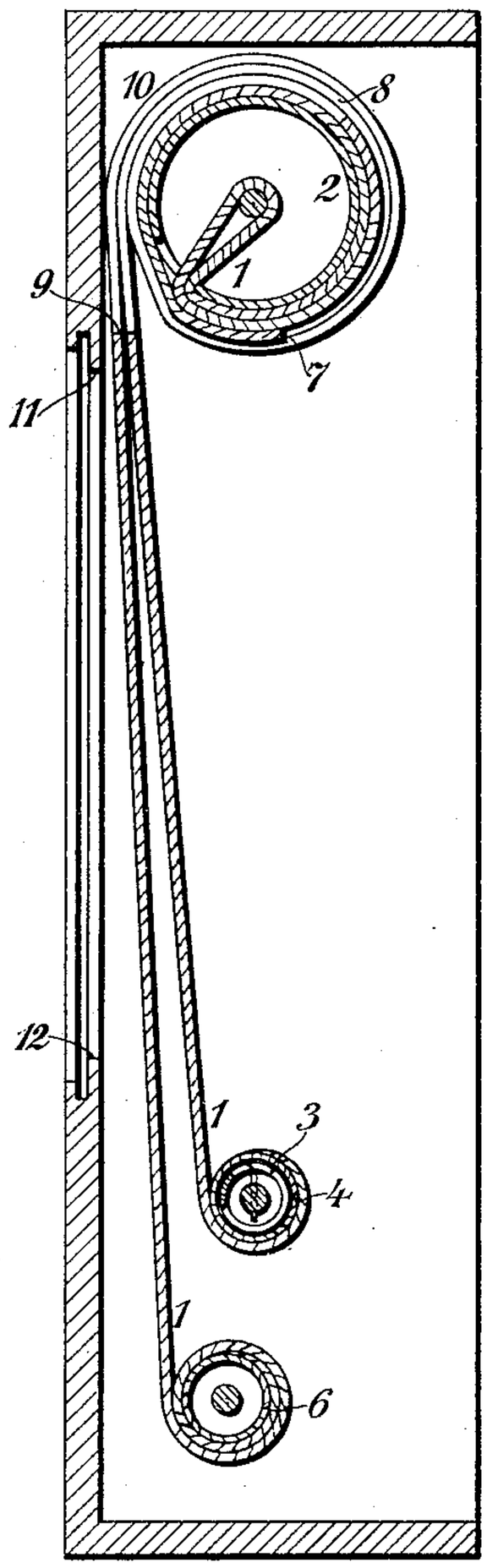

Fig. 8.

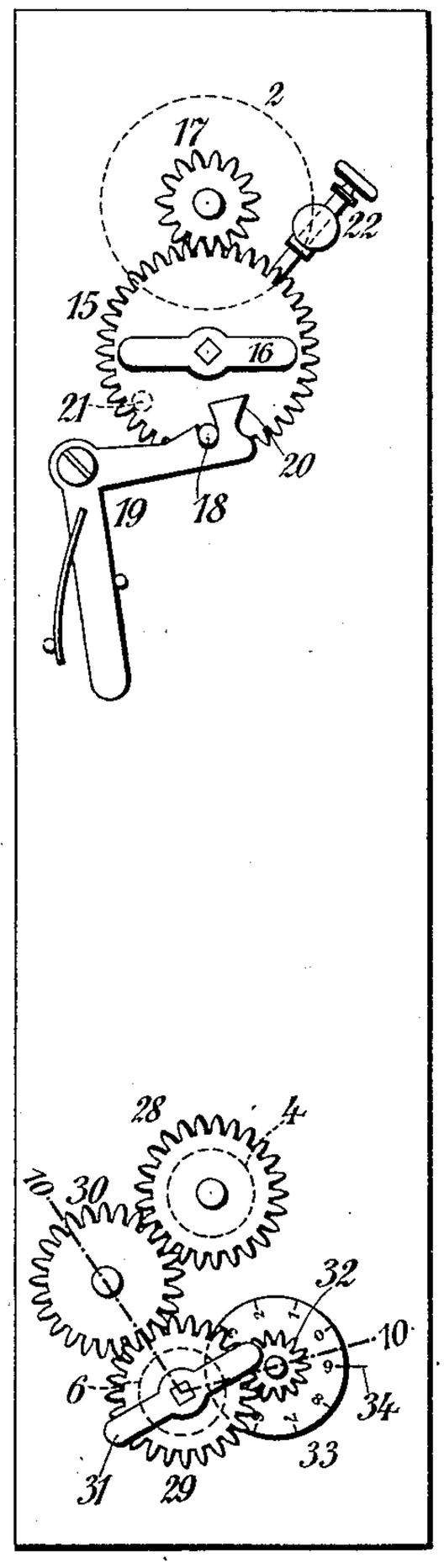

Fig. 9.

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UNITED STATES PATENT OFFICE.

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PHOTOGRAPHIC CURTAIN-SHUTTER.

SPECIFICATION forming part of Letters Patent No. 703,007, dated June 24, 1902.

Application filed September 9, 1901. Serial No. 74,735. (No model.)

To all whom it may concern:

Be it known that I, RICHARD SCHÜTTAUF, mathematician, a subject of the King of Prussia, Emperor of Germany, residing at Carl Zeiss strasse, Jena, in the Grand Duchy of Saxe-Weimar, German Empire, have invented a new and useful Photographic Curtain-Shutter, of which the following is a specification.

The roller-blind shutters having an adjustable aperture at present in use are confined to two principal patterns. The one consists of two blinds having an opening in each and so arranged that the aperture resulting from the partial coincidence of both openings may be enlarged or reduced at will by an appropriate displacement of one of the blinds. In the other pattern only a single blind is employed, the width of the aperture being varied by the opposite edges of the aperture being brought closer together or moved apart. The means for the latter object are somewhat complicated, so that the total device is not more simple than the first one, in which two separate blinds are used.

The roller-blind shutter having an adjustable aperture (described below) occupies an intermediate position between the two patterns mentioned above.

Figure 1 is a section through a shutter constructed according to the invention, this shutter being run down. Fig. 2 is the same section, but the shutter being set. Fig. 3 is an elevation of this shutter when set. Fig. 4 is a section through a modified shutter which is run down. Fig. 5 is the same section, but the shutter being set. Fig. 6 is an elevation of this shutter when set. Fig. 7 is a section through another modified shutter run down. Fig. 8 is the same section, but the shutter being set. Fig. 9 is an elevation of this shutter when set. Fig. 10 is a section on the broken line 10 10 of Fig. 9.

In the arrangement of Figs. 1 to 3 the blind 1 is drawn through several clefts of the setting-roller 2 and one end is tightened by the spring 3 of the exposure-roller 4, whereas the other is tightened by the spring 5 of the exposure-roller 6. The width of the aperture depends on the position of the edge 7 of opening 8 and edge 9 of opening 10, respectively. The aperture is shown to be adjusted to its greatest possible width when the interval between edges 7 and 9 equals that between the edges 11 and 12 of the back of the camera-frame. If it be desired to reduce the width of the aperture, it is only necessary to turn the handle 13 (marked —) of exposure-roller 4, Fig. 3, in the direction of the arrow while the shutter is run down, Fig. 1. When the aperture is to be widened again, the handle 14 (marked +) of exposure-roller 6 is similarly turned in the direction indicated by an arrow. As the blind undergoes several bends in the clefts of the setting-roller 2 sufficient friction is produced between the blind and the roller to maintain any extreme adjustment of the aperture, although the powers of the springs 3 and 5 rather differ from each other when the aperture is very small or very large.

The winding mechanism shown in Fig. 3 presents no remarkable features. The spur-wheel 15, connected with a handle 16, is in gear with a similar wheel 17, secured on the axle of the setting-roller 2. A pin 18 on wheel 15 is caught by the lever 19 as soon as the setting movement is completed. This pin serves also to arrest the running-down movement by coming in contact with the projection 20 of the lever 19. It thus prevents the setting-roller 2 from running beyond the position shown in Fig. 1 and producing thereby a recoil of the blind. The same pin 18 or, as shown in the drawings, a second pin 21 works, for the purpose of time exposures, in combination with the sliding bolt 22. When such exposure is intended, the blind is adjusted for the maximum aperture and the bolt 22 changed from the extreme position shown in the drawings to the other extreme position onto wheel 15, so that immediately the full aperture is gained the running-down movement of the blind is arrested by contact between pin 21 and bolt 22 till the latter is again withdrawn.

In Figs. 4 to 6 the blind is passed through a cleft in the setting-roller 2, then between two secondary rollers 23 and 24, and hereafter back through the same cleft. Roller 23 is coaxial with roller 2, and after passing to the outside through the hollow pivot of

this roller and through the spur-wheel 17, secured to the pivot, it carries the handle 25. The bearings 26 of roller 24 are guided in slots at both ends of roller 2 and held under pressure by screws 27. The width of the aperture is regulated when the blind is run down, as shown in Fig. 4. When it is desired to widen the aperture, handle 25 is to be turned in the direction of the arrow marked +, and a rotation of this handle in the direction of the arrow marked — narrows the aperture. The bearings of one of the secondary rollers 23 24 may be constructed to act with sufficient friction so that when the blind is adjusted to an extreme width of aperture the disparity of tension of the springs 3 and 5 induced thereby cannot undo the said adjustment.

In the last modification illustrated by Figs. 7 to 10 the blind is again twice passed through the same cleft in setting-roller 2, intermediately being slung about the axle on which the roller is fixed. The two exposure-rollers 4 and 6 are connected, by means of the spur-wheels 28 and 29, with the intermediate wheel 30, so as to turn simultaneously and in the same direction. The first step in altering the width of the aperture would be to put these wheels out of gear, for which purpose wheel 29 is connected with a handle 31 and fitted to the axle of roller 6 in such a manner as to allow of longitudinal displacement. Then a portion of the blind would be wound from roller 6 upon roller 4, or vice versa. In order to admit of both widening and narrowing of the aperture (by turning the handle 31 of roller 6 in either direction) the spring 5 of roller 6 is omitted, spring 3 of roller 4 being made more powerful in proportion. When seizing handle 31 and drawing it outward into the position shown by dotted lines in Fig. 10, so as to bring the wheel 29 out of gear with the intermediate wheel 30, the wheel 29 enters simultaneously into gear with a wheel 32, which is rigidly fixed to a rotatable circular scale 33. The relative position of this scale to the fixed index-line 34 indicates the width of the aperture. After this width has been adjusted handle 31 is shifted back, and thereby wheel 29 put out of gear with wheel 32 and again into gear with wheel 30. As one of the two ends of blind 1 winds upon the setting-roller 2 inside and the other outside of it, hence the former with a smaller radius than the latter, it follows that if both ends of the blind were to have equal tension the rolls upon the exposure-rollers 4 and 6, which being coupled turn with equal angular velocity, should possess correspondingly-different radii. As, however, the radii of the two rolls vary with different adjustments of the aperture, it is impossible to avoid that one of the sides of the blind should become a little slack with a narrow aperture or the other side similarly with a very wide aperture. However, experiments have proved that this causes no disadvantage whatever.

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

1. In a roller-blind shutter having an adjustable aperture the combination with a single blind having two openings, of a setting-roller, to which the blind is shiftably attached by a point between the openings, exposure-rollers for both ends of the blinds, means for rotating the setting-roller so as to wind up the blind, means for catching the setting-roller after the blind has been wound up, a spring action for rotating the exposure-rollers when the blind is released, and means for shifting the blind, essentially as described.

2. In a roller-blind shutter having an adjustable aperture the combination with a single blind having two openings, of a setting-roller to which the blind is shiftably attached by a point between the openings, two exposure-rollers one for each end of the blind, means for rotating the setting-roller so as to wind up the blind, means for catching the setting-roller, a spring for rotating one exposure-roller, a handle for rotating the other exposure-roller, and means for connecting and disconnecting both rollers, essentially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD SCHÜTTAUF.

Witnesses:
PAUL KRÜGER,
AUGUST VUSSPICKEL.