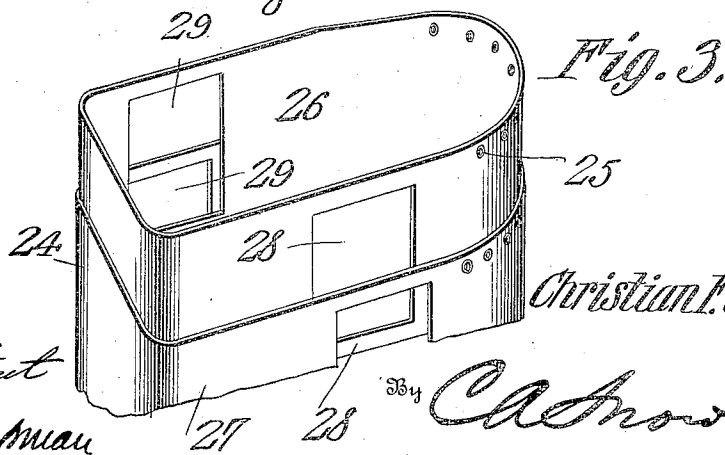
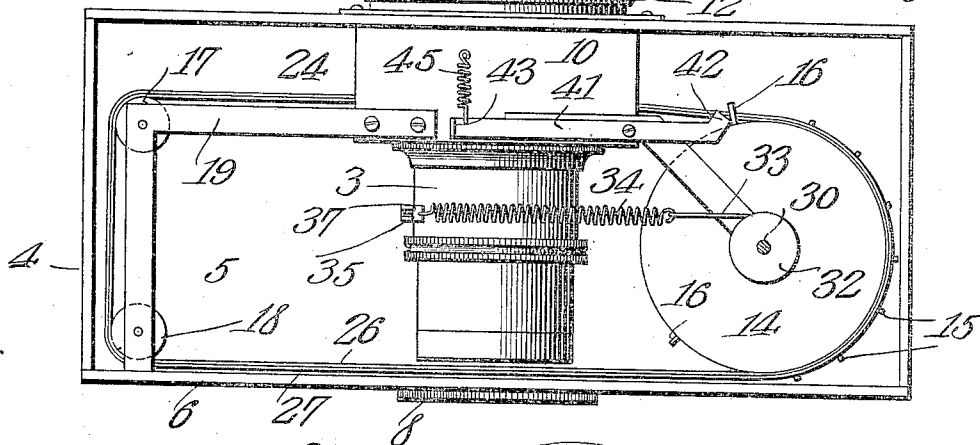
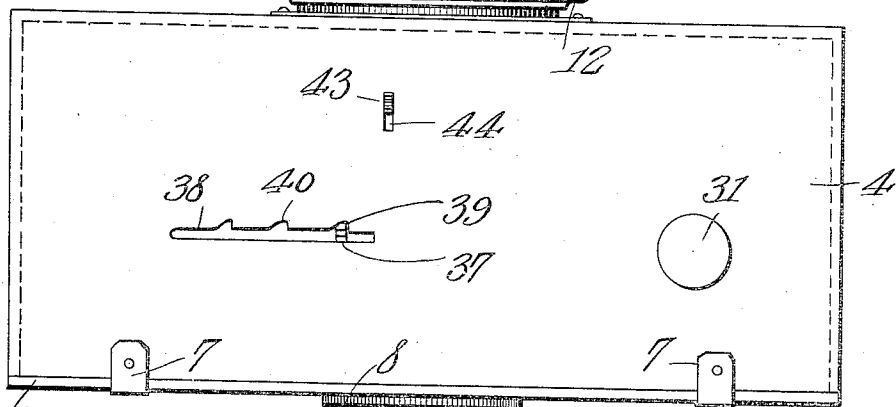


C. F. J. NISS.
 PHOTOGRAPHIC SHUTTER.
 APPLICATION FILED OCT. 19, 1908.

940,714.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

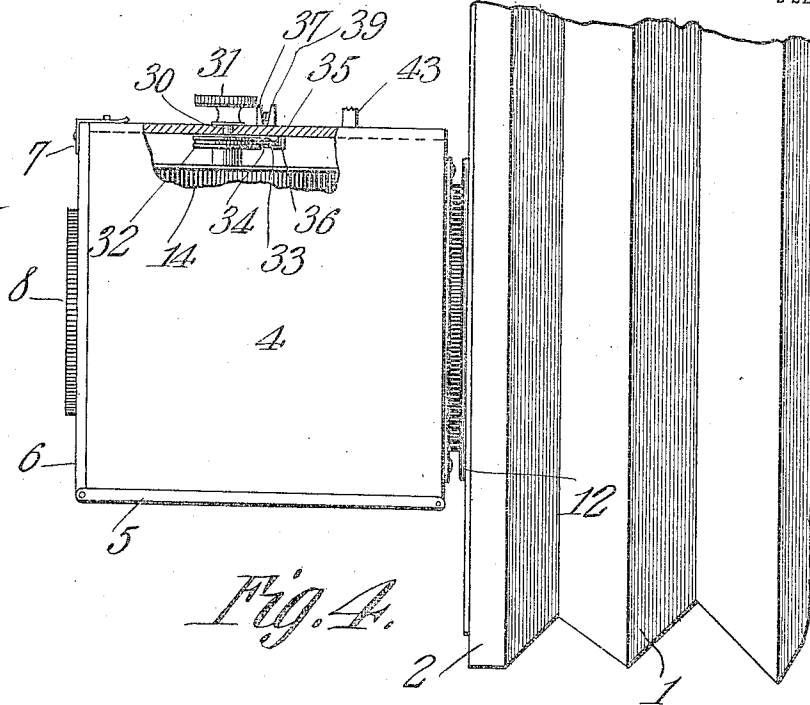


Fig. 4.

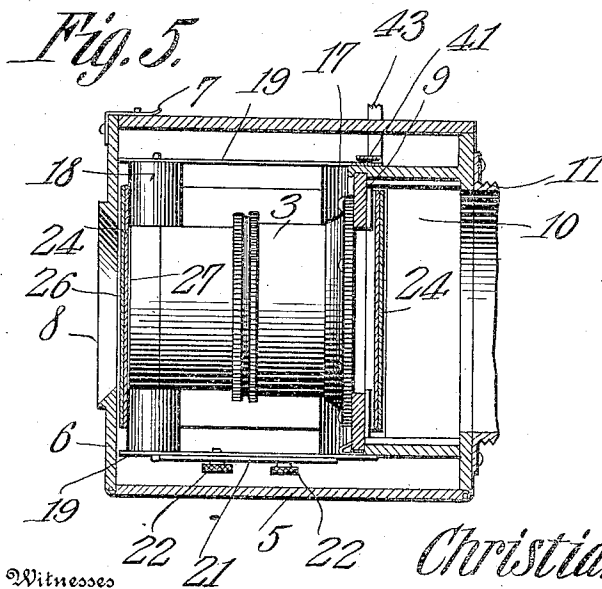


Fig. 5.

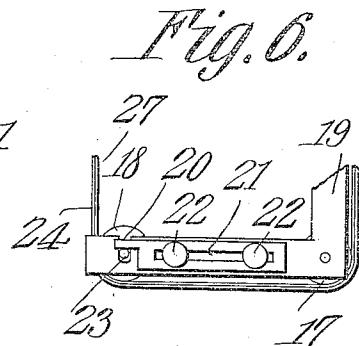


Fig. 6.

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CHRISTIAN F. J. NISS, OF CHICAGO, ILLINOIS.

PHOTOGRAPHIC SHUTTER.

940,714.

Specification of Letters Patent.

Patented Nov. 23, 1909.

Application filed October 19, 1908. Serial No. 458,415.

To all whom it may concern:

Be it known that I, CHRISTIAN F. J. NISS, a subject of the King of Denmark, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Photographic Shutter, of which the following is a specification.

This invention has reference to photographic shutters and more particularly of the type known as curtain shutters.

The object of the present invention is to provide a shutter of the curtain type in which the speed materially exceeds that of curtain shutters of prior types.

As ordinarily made a curtain shutter consists of an opaque web arranged to traverse the light beam either before or after entering the lens, the web being provided with an opening as wide as the effective opening of the lens in a direction at right angles to the direction of travel of the web and usually adjustable as to width in the direction of travel of the web, the width of the opening or slit in the last named direction determining the higher speeds or shorter exposures of the sensitive plates. Sometimes the curtain shutters are arranged close to the sensitive surface of the plate when they are known as focal-plane shutters, but the present invention relates more particularly to those shutters which are used immediately adjacent to the lens. It is to be understood however that the invention is not necessarily limited to use in connection with the lens only, but by suitable modification may be used in the vicinity of the sensitive film.

In accordance with the present invention, the opaque web is employed similar to the curtain shutters of prior construction, but the opaque web is made in two coating parts each of which is provided with a slit or openings which may be made large or small as desired and these two openings are made to pass in opposite directions transverse to the longitudinal axis of the lens, one in front of the lens and the other behind the same and both in close relation to the said lens.

In accordance with the present invention the web is made continuous and is passed about an actuating roller which latter is caused to rotate by a spring put under tension at the will of the operator and in order that the size of the opening may be adjusted at will the web is made up of two members each in the form of an endless band and one

interior to the other and in close relation thereto and these two bands are capable of relative longitudinal adjustment so that the openings therethrough may be made large or small in effective size. Provision is also made by the present invention for the placing of the shutter in such relation to the camera box or to the plate that the direction of movement of the openings or slits, and especially the outer opening or slit may be the same as the direction of movement of the object to be photographed, or if desired in the reverse direction.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawing forming a part of this specification, in which drawing Figure 1 is a plan view of the shutter as applied to a camera front. Fig. 2 is a similar view with the top removed and some parts broken away. Fig. 3 is a perspective view of the curtain with the two parts thereof in displaced relation. Fig. 4 is a side elevation of the shutter as applied to a camera front. Fig. 5 is a longitudinal vertical section through the structure shown in Fig. 4 with the camera front omitted. Fig. 6 is a detail view showing a means for locking one of the rollers in place.

Referring to the drawings there is shown a camera bellows 1 terminating in the usual front board 2, and there is also shown a photographic lens 3 which may be taken as of any ordinary or approved construction.

The working parts of the shutter are inclosed in a suitable box or case 4, and the bottom 5 of this box is hinged to the back thereof while the front 6 of the box is hinged to the bottom 5, the usual clips 7 being used to hold the front 6 and bottom 5 in place. The front 6 is provided with an opening 8 in line with the front of the lens 3.

The lens 3 is made fast to the lens board 9 in the usual manner and this lens board 9 is removably secured in the front of a supplemental chamber 10 in the manner usually employed for fastening lens boards to the fronts of camera boxes.

Secured to the back of the box 4 is a sleeve or barrel 11 which is externally screw-threaded and receives a clamp ring 12 designed to engage the front 2 of the camera body while the sleeve or barrel 11 extends through the usual opening in the front of the camera

body, that is through the front board 2 and another clamp ring 13 applied to the sleeve 11 serves to clamp the barrel 11 firmly to the front board 2 but in such manner that the said barrel may be turned on its central longitudinal axis for a purpose which will hereinafter appear.

Within the box 4 at one side of the lens there is mounted a drum or roller 14 having near each end radially projecting pins 15 and also near one end other pins 16 the purpose of which will hereinafter appear.

On the side of the lens remote from the roller 14 are other two spaced rollers 17 and 18 smaller than the roller 14 and mounted in suitable brackets 19. The rollers 17 and 18 are spaced apart in a direction parallel with the optical axis of the lens and the roller 18 has one of its journals mounted in a recess 20 formed in the corresponding end of the bracket 19 and a sliding plate 21 is mounted on the bracket and is under the control of suitable clamp screws 22 so that the plate may be adjusted longitudinally and then clamped in place. One end of the plate 21 is provided with a finger 23 arranged to traverse the slot 20 so as to engage and hold the corresponding journal of the roller 18 in the slot or recess 20 when so desired. The finger 23 may be moved out of the path of the journal of the roller 18 so that the latter may be removed from the corresponding bracket 19 for a purpose which will presently appear.

The rollers 14, 17 and 18 form the support for a curtain 24 in the form of a continuous web of proper width. The curtain web 24 is carried about the roller 14 and past the front of the lens then about the rollers 18 and 17 in order and then back of the lens through the chamber 10 which may have its ends open for the passage of said web or curtain. The curtain is provided along one portion at the top and bottom with perforations 25 and the cloth about these perforations may be protected by suitable eyelets, it being customary to make the curtain or web of rubber cloth both because of its flexibility and its opacity. The perforations 25 are entered by the pins 15 on the roller 14 and these pins cause the curtain to participate in any movement of the said roller 14. Since the extent of travel of the curtain need only be slightly greater than the diameter of the lens, and since the roller 14 is, or may be, of a diameter substantially the length of the lens, it follows that but a few pins and perforations are needed.

The curtain or web 24 is made up of two members 26 and 27 one interior to the other and each provided with openings 28 and 29, the openings 28 of each web matching the openings 28 of the other web, and the same being true with the openings 29. The location of the openings 28 and 29 is such that

the openings 28 are located in the run of the curtain or web at the front of the lens, and the openings 29 are in the run of the curtain or web at the back of the lens.

One of the journals 30 of the roller or drum 14 is continued upward through the top of the box 4 and there carries a manipulating button or thumb wheel 31 while between the top of the roller 14 and the under side of the top of the box 4 the journal 30 carries a winding drum 32 to which is made fast a strand 33 which latter in turn is secured to a spring 34 shown in the drawings as a helical spring. The other end of this spring 34 is made fast to a slide 35 capable of movement along guides 36 on the under face of the top of the box and this slide carries a pin 37 projecting up through a slot 38 in the top of the box. The pin 37 carries a snap member 39, or the pin itself may be made elastic so as to engage in spaced recesses 40 along one side of the slot 38. The structure just described constitutes a convenient means for locking the slide in any desired position along the slot 38 so that the spring 34 may be put under a greater or less tension as desired by the operator. It will be understood of course that any other suitable means for the purpose may be employed.

Fast on the fixed portion of the structure, say on top of the walls of the chamber 10, there is pivoted a lever 41 having one end 42 in the path of the pins 16 projecting from the drum 14. The other end 43 of the lever 41 is bent to project up through the top of the box 4 through a slot 44 therein provided for the purpose and the extent of projection is sufficient for the easy movement of the lever by the finger of the operator. A spring 45 engaging the lever 41 serves to constrain it to a position where its end 42 will be in the path of the pins 16.

When it is desired to expose a photographic plate with the shutter described the roller or drum 14 is first turned in a direction to put the spring 34 under the maximum tension for the exposure desired, the degree of tension being adjustable by moving the slide 35 so that the catch 39 is in the desired one of the notches 40 for the speed wanted.

When the drum 14 has been turned by proper manipulation of the thumb piece or button 31 the said roller or drum 14 is retained in the set position by means of the engagement of one of the pins 16 with the end 42 of the lever 41. Under these circumstances the openings 28 through the curtain are, in the particular structure shown, and in the position of parts shown in Fig. 2, to the left of the front of the lens as viewed in said figure, while the openings 29 are to the right of the rear of the lens as viewed in said figure, and both openings are

so located that no light will pass through the lens and reach the photographic plate. If now the lever 41 be moved in a direction to carry the head 42 out of the path of the pin 16 with which it is in engagement when the shutter is set for operation, the roller 14 will be released to the action of the spring 34 and will be caused to rotate thereby and the engagement of the pins 15 in the perforations 25 will cause participation in this movement of the curtain or web 24 and the openings 28 and 29 are then carried in opposite directions across the front and back of the lens respectively.

The two pins 16 may be so spaced that when the roller 14 is released by moving the head 42 out of the path of one pin it may be then engaged by the other pin. The spacing of the pins 16 may be such that the second pin in order of active rotation of the roller 14 will by engagement with the head 42 hold the roller in a position where the openings 28 and 29 are in the optical axis of the lens in which case the structure is set for time exposures.

If it be desired to change the effective size of the openings 28 and 29 then the slide 21 is moved so that the finger 23 is out of the path of the pintle or journal of the roller 18 and the latter may be lifted from its support thus loosening up the web or curtain 24. Now the two members of the curtain may be moved one on the other until the openings 28 and 29, if initially fully coincident may be moved one relative to the other so that the effective opening is narrowed to the desired extent, or if the initial position be some intermediate position then the opening may be made larger or smaller as desired. Then by replacing the roller 18 and locking the same in place the curtain is again stretched to its original tautness.

By means of the connecting clamp rings 12 and 13 the shutter is so attached to the front board 2 of the camera body that it may be turned about an axis coincident with the optical axis of the lens. By this means the direction of movement of the curtain may be made the same as the direction of movement of the object to be photographed, whether that direction be horizontal, or vertical, or at any angle to either.

Focal plane shutters are provided with adjustable slits which admit of a wide range of speeds of exposure with the same speed of the curtain and the speed of the latter may also be varied within limits, but in the case of the focal plane shutter the exposure opening must pass along the full length of the plate, and in the larger sizes of plates in common use this distance is considerable. While with the focal plane shutter, the extent of exposure is substantially that of the slit or opening in the curtain, structural limitations prevent a greater speed of ex-

posure than about one one-thousandth of a second.

It has been proposed to use curtain shutters in connection with lenses either in front of or behind the lens or between the lens system, but such shutters as heretofore constructed do not prevent a diffusion of light over the plate and the consequent cutting down of the speed of exposure even though, because of the small size of the curtain and its lightness its actual speed may be great as compared with the speed of the curtain of the focal plane structure.

With the present invention a beam of light is admitted to the lens through the slit in the curtain, and this beam of light if unaffected other than by the lens would spread out to a marked extent over the plate located in the focus of the lens, and therefore the actual surface exposed to the action of light would be much greater than is the case with the focal plane shutter. Therefore even though the actual speed of the shutter be greater than is the case with the focal plane shutter, the time that any portion of the plate is exposed to the light is materially greater than in the case of the focal plane shutter. With the present invention however this objectionable feature is eliminated by the use of the second opening back of the lens moving in a direction opposite to that of the first opening and so cutting off marginal rays of light and restricting the beam of light reaching the plate to a narrow band which sweeps across the same with a speed depending on the size of the plate, the distance of the same from the lens, and the actual speed of the curtain.

By using narrow slits in the curtain and setting the same at high actual speed, an exposure approaching one twenty-five-hundredth part of a second has been obtained and photographs taken at such high speed have been successfully recorded on ultra-sensitive plates.

Because of the lightness and simplicity of the oppositely acting curtain shutter of the present invention it is possible to obtain exposures of too great a rapidity to be recorded on photo-sensitive plates of even the most sensitive character now obtainable.

What is claimed is:—

1. A photographic shutter having openings for the passage of light movable across the optical axis of the lens simultaneously in opposite directions, said openings being adjustable as to their effective size for the passage of light therethrough.

2. A photographic shutter having spaced openings for the passage of light movable across the lens simultaneously in opposite directions, said openings being adjustable simultaneously as to their effective size for the passage of light therethrough.

3. A photographic shutter having spaced openings for the passage of light separated

in the direction of the optical axis of a lens and movable across said optical axis simultaneously in opposite directions, said shutter having two members adjustable one on the other to determine the size of the free openings through the shutter.

4. A photographic shutter having openings for the passage of light, one opening being movable across the optical axis of a lens in front of the latter and another opening being movable across the optical axis of the lens behind the latter, the movement of the openings across the optical axis of the lens being simultaneous and in opposite directions.

5. A photographic shutter having openings for the passage of light spaced apart in the direction of the optical axis of the photographic lens, and means for adjusting the effective size of the openings.

6. A photographic shutter having openings for the passage of light movable across the optical axis of a lens simultaneously in opposite directions, said openings being adjustable as to width in the direction of movement.

7. A photographic shutter having an endless curtain with oppositely directed runs, in each of which there is formed an opening for the passage of light, the said openings coacting, and means for simultaneously adjusting the size of the openings to the same extent.

8. A photographic shutter having an endless curtain with oppositely directed runs in each of which there is formed an opening for the passage of light, the said openings coacting, and means for supporting the curtain with the runs on opposite ends of a photographic lens.

9. A photographic shutter having an endless curtain with oppositely directed runs through each of which there is formed an opening for the passage of light, the said openings coacting and being adjustable as to width in the direction of travel of the curtain.

10. A photographic shutter having an endless curtain formed of two members movable longitudinally one on the other and each having two openings matching the openings on the other, the said curtain having the matching openings in its two members located in oppositely directed runs.

11. A photographic shutter having an endless curtain formed of two members one within the other and movable longitudinally one on the other said members each having two separated openings with the openings in one member matching the openings in the other member, a spring actuated driving roller engaging said curtain and other supporting and guiding rollers for the curtain one of which rollers is removable.

12. A photographic curtain shutter adjustable about the optical axis of the photo-

graphic lens, and means for locking the shutter in adjusted positions.

13. A photographic shutter comprising a suitable carrier, an endless curtain therein having opposite runs with coacting passages for light therethrough, means for supporting a lens between the runs of the curtain, and means for attaching the shutter to the front of a camera body.

14. A photographic shutter having an endless curtain formed of two members movable longitudinally one on the other and each having two openings matching the openings of the other, with the matching openings located in oppositely directed runs, and a power actuated roller around which both members are passed and about which they are relatively adjustable to determine the size of the free openings through the curtain.

15. A photographic shutter having an endless curtain formed of two members having relative adjustments one on the other and each having two openings matching the openings of the other with the matching openings located in oppositely directed runs, means for causing the simultaneous movement of the two members of the curtain and means for permitting the relative adjustment of the two members of the curtain in the direction of the length thereof.

16. A photographic shutter having an endless curtain formed of two members each having two openings matching the openings of the other with the matching openings located in oppositely directed runs and each member of the curtain having a series of perforations, and a power actuated roller around which both members are passed, said roller having radially projecting pins engaging the series of perforations in the two members of the curtain.

17. In a photographic shutter having an endless curtain formed of two members each having two openings matching the openings of the other with the matching openings located in oppositely directed runs and each member being provided with a series of perforations, a roller having projecting pins adapted to extend through both series of perforations in the two members of the curtain and to thereby hold the two members in relatively adjusted positions, and means for holding the curtain members to the said roller and for permitting the release of the said members from the said roller for relative longitudinal adjustment one on the other.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

CHRISTIAN F. J. NISS.

Witnesses:

ANNA A. ROETTER,
N. P. OSTED.