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SHUTTER AND FEED MECHANISM FOR KINETOGRAPHS.

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Fig.1.

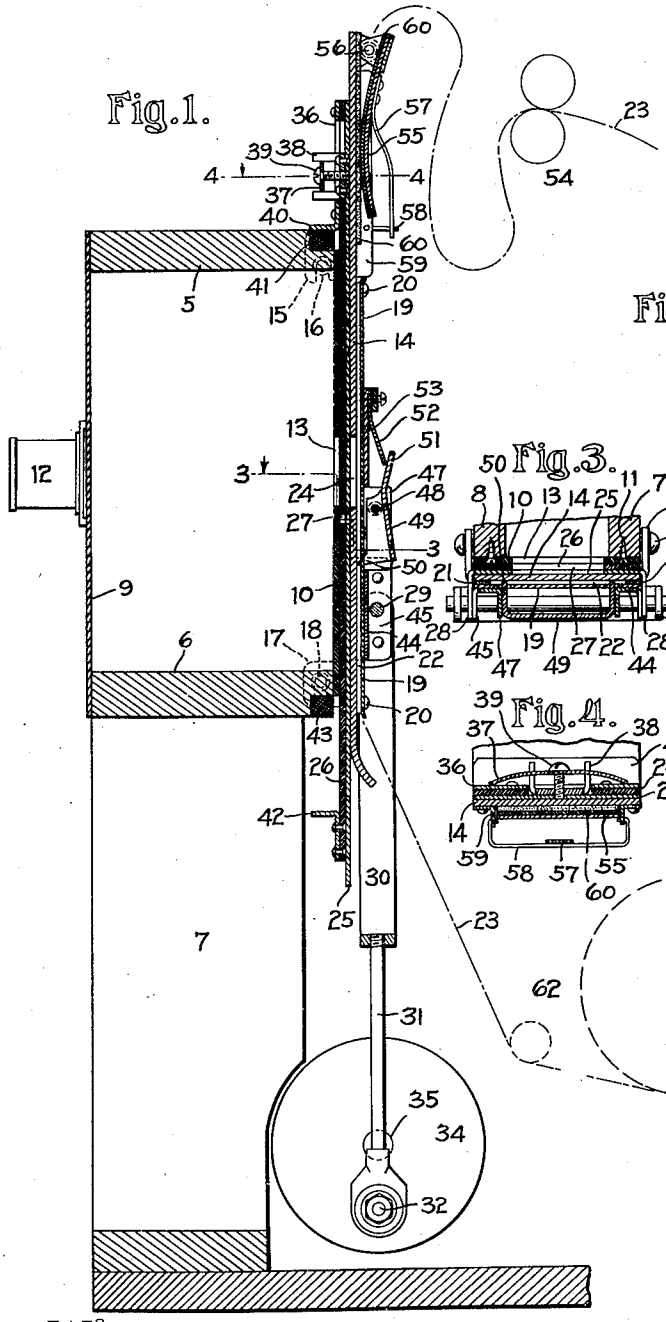


Fig.2.

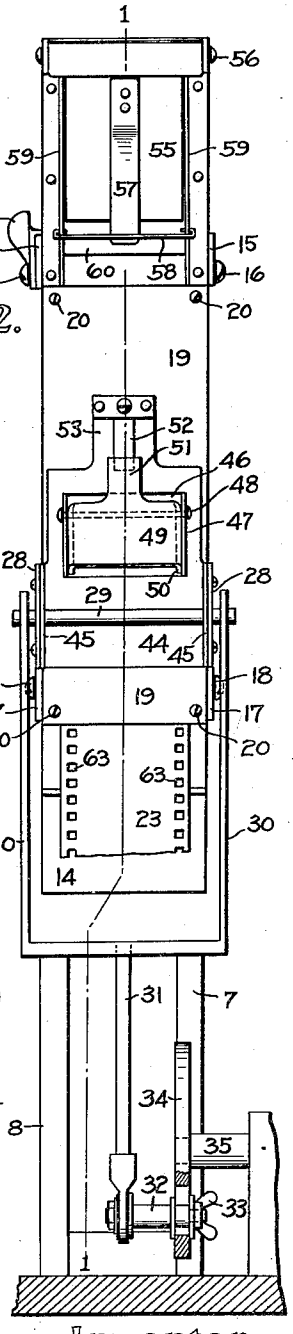


Fig.3.

Fig.4.

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SHUTTER AND FEED MECHANISM FOR KINETOGRAPHS.

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To all whom it may concern:

Be it known that I, WILLIAM L. HUDSON, a citizen of the United States, and resident of Ellisburg, in the county of Jefferson and State of New York, have invented certain new and useful Improvements in Shutter and Feed Mechanism for Kinetographs, of which the following is a specification.

This invention relates to shutter-mechanism and feed-mechanism for kinetographs, particularly that which is employed in the exposure of the sensitized film, as distinguished from the reproduction of the pictures.

One object of the invention is to provide a kinetograph with a shutter of the focal-plane type which shall be simple in construction and reliable in operation, and by which the kinetograph is adapted to take pictures of rapidly moving objects. To this end I employ a construction comprising two parallel, sliding shutter-plates, having narrow exposure-apertures or slits which are brought successively into and out of registration with each other, on alternate movements of the shutter-plates, by a novel and simple mechanism hereinafter described.

Another object of the invention is to combine with the shutter-mechanism a film-feeding device of the type in which the perforated margins of the film are engaged by a dog or pawl acting, during movement in one direction, to feed the film and, during movement in the opposite direction, to pass idly across the film, this feeding-mechanism being so combined with the shutter-mechanism as to be simultaneously actuated therewith, whereby a simple construction and positive operation are attained.

Other objects and features of the invention will be set forth in connection with the following description of the preferred embodiment of the invention.

In the accompanying drawings the invention is illustrated as employed in connection with a kinetograph of any ordinary or suitable form, only so much of the instrument being shown as is necessary for an understanding of the invention.

Figure 1 is a vertical fore-and-aft section of a portion of the machine, embodying the present invention, on the line 1—1 in Fig. 2; Fig. 2 is a rear-elevation of the parts shown in Fig. 1; Fig. 3 is a section on the line 3—3 in Fig. 1, looking downwardly; and Fig. 4 is a section on the line 4—4 in Fig. 1, also looking downwardly.

The camera of the illustrated machine is formed by a box or casing having upper and lower walls 5 and 6, respectively, a front-wall 9, and a rear-wall 10. The sides of the camera or casing are formed by members 7 and 8, which are extended downwardly to constitute supports for the camera. The front-wall 9 is provided with the usual lens-mount 12, while the rear-wall 10 is provided with an aperture 13 of a size corresponding to the portion of the film-strip which is to be exposed for each of the successive views upon the strip.

Parallel to, and at a short distance in the rear of, the rear-wall 10 is a base-plate 14, upon which are mounted various portions of the shutter-mechanism and the feed-mechanism. This plate is provided, in its upper portion, with integral rearwardly-bent lugs 17, as shown particularly in Fig. 3, these lugs being notched from beneath so as to normally engage screws 16 projecting from the side-members 7 and 8, to removably secure the base-plate in position. The lower portion of the base-plate is provided with similar lugs 17, which engage similar screws 18 in the side-members. By means of a latch 61 (Fig. 2) of any ordinary or suitable form, the base-plate is normally retained against accidental removal from the screws.

At a short distance in the rear of the base-plate a thin back-plate 19 is fixed to the base-plate by means of screws 20 threaded into the latter, the back-plate being spaced from the base-plate by narrow marginal strips 21 (Fig. 3), so as to produce between the plates a narrow passage 22, through which the film 23 passes vertically and downwardly during the feed-movement.

The shutter-mechanism comprises two shutter-plates 25 and 26, which lie close against each other and slide vertically in the space between the back-wall 10 and the base-plate 14. These shutter-plates are both provided with narrow slits or exposure-apertures 27, as shown particularly in Fig. 1.

To actuate the shutter-plates the rear-plate 25 is provided with rearwardly-bent lateral flanges 28, in which a pivot-rod 29 is fixed. The ends of this pivot-rod serve as journals for the upper ends of a yoke 30, to the lower end of which is fixed a connect-

ing-rod 31. This connecting-rod extends downwardly to a crank-pin 32, which is adjustably fixed, by means of a thumb-nut 33, in a radial slot formed in a crank-disk 34. The crank-disk is fixed to a shaft 35, which may be rotated by any suitable means (not shown) to operate the mechanism. By the action of the crank mechanism the rear shutter-plate 25 is vertically reciprocated, thus causing its exposure-aperture 27 to traverse the apertures 13 and 24, and thus momentarily expose the portion of the film lying behind these apertures.

The front shutter-plate 26 is employed in order that an exposure of the film may be produced only when the shutter-mechanism is moving upwardly, and while the feed-mechanism is inoperative, the film being at this moment stationary. Accordingly, the front shutter-plate is arranged to have a movement partially coinciding with that of the rear shutter-plate, and partially independent thereof, whereby the exposure-aperture in the front plate is caused, upon the upward movement of the shutter-plates, to register with the aperture in the rear plate, while being out of registration therewith during the return or downward stroke. This relation between the shutter-plates is produced by means of frictional connections between them. As shown particularly in Figs. 1 and 4, the upper end of the front shutter-plate has a thin plate 36 riveted thereto, and this plate is frictionally engaged by the ends of a leaf-spring 37, which is loosely embraced between four fingers 38. These fingers are fixed to the rear shutter-plate, as shown in Fig. 4, and project forwardly through a suitable opening in the plates 26 and 36. A screw 39, passing through the spring and threaded into the plate 25, holds the spring in operative position, and serves also as means for adjusting its pressure against the plate 36.

The spring 37 acts to hold the shutter-plates frictionally together, and also as a frictional drag upon the plate 36, so that the front shutter-plate tends always to move with the rear shutter-plate. The lower extremity of the plate 36 is provided, however, with a forwardly-bent flange 40 adapted to engage a cushion 41 of suitable resilient material, which is mounted on the top-wall 5 of the camera. Accordingly, near the end of the down-stroke of the shutter-plates, this flange acts to arrest the movement of the front-plate, while the rear-plate continues to move downwardly so as to cause the relative lost motion between the plates which brings them into the position of Fig. 1, with their exposure-apertures in registration. Upon the succeeding up-stroke of the rear-plate the front-plate is carried with it, thus producing an exposure. Near the upper extremity of this up-stroke, however, a second flange 42, which is fixed to the lower end of the front shutter-plate, engages a cushion 43 on the bottom wall 6 of the camera, thus arresting the movement of the front shutter-plate, while the rear-plate continues to move upwardly through a sufficient distance to move the exposure-apertures 27 out of registration with each other. Upon the succeeding downward stroke, accordingly, the shutter-plates move together, but do not produce an exposure.

The feed-mechanism is connected with and actuated by the rear shutter-plate. This feed-mechanism comprises a feed-plate 44, which has rearwardly-extending flanges 45 on its lateral margins, lying between and screwed to the flanges 28 on the back-plate. The feed-plate is thus supported and reciprocated vertically in the rear of the back-plate 19. In its upper portion it is provided with an opening 46 having lateral marginal flanges 47 between which a rod 48 extends. Upon this rod is pivoted a feed-dog 49 having two lateral, beveled feed-points 50. These feed-points are so located as to correspond in position with the lateral rows of perforations 63 in the film-strip, as shown in Fig. 2, and they work freely through vertical slots in the back-plate, as shown in Fig. 3. An upwardly-projecting arm 51 on the feed-dog is forced rearwardly by a flat spring 52, which is fixed to an upward projection 53 at the upper end of the feed-plate, and this spring acts to force the feed-points 50 constantly against the film-strip. During the downward movement of the feed-mechanism, accordingly, the feed points, by their engagement with the perforations 63, cause the film-strip to be moved downwardly through a space corresponding to a single exposure. During the up-stroke of the feed-mechanism the beveled form of the feed-points permits them to be swung rearwardly through the resistance of the film to upward movement, so as to disengage the perforations and ride over the intermediate unperforated portions of the film-margins.

The film-strip 23, which is indicated diagrammatically in Fig. 1, is supplied from any ordinary or suitable magazine (not shown), by pull-off mechanism indicated diagrammatically at 54 (Fig. 1). To maintain the necessary tension upon the strip, it first passes through a frictional tension-device comprising a plate 55 which is pivoted, at 56, upon the upper end of the base-plate 14. A spring 57, fixed to the tension-plate 55, normally engages a bail 58 which is pivoted on flanges 59 projecting rearwardly from the base-plate. These flanges also constitute marginal guides for the film-strip. The friction-plate and rear-surface of the base-plate are provided with pads of any suitable frictional material 60, and the spring 57 acts to maintain a constant pres-

sure between these pads and the strip. When a new film is to be threaded through the shutter-mechanism the bail 58 may be disengaged from the spring 57, to permit the friction-plate to be swung away from the base-plate.

The film, after emerging from the lower end of the film-passage 22, may be conveyed to the ordinary film-magazine (not shown) by means of suitable take-up devices, indicated diagrammatically at 62 in Fig. 1.

It will be obvious that the construction and the relative operation of the feed-mechanism and the shutter-mechanism are such that the film is fed, during the downward movement of the shutter-plates, at a time when no exposure of the film occurs, while the film remains stationary during the upward stroke of the film-plates, and while being exposed. By connecting the feed-mechanism and the two shutter-plates together in the manner above described, I am enabled to employ a simple crank-mechanism and frictional-device for causing the operative movements of all of these parts, thus producing a mechanism of very simple construction in which the weight and complexity of the moving parts is reduced to a minimum.

I claim:—

1. In a kinetograph, the combination of a focal-plane shutter comprising two parallel shutter-plates provided with exposure-apertures adapted to register with each other in the production of an exposure, means for guiding a film-strip immediately behind the shutter-plates, means for reciprocating the shutter-plates, first in one direction with their apertures in registration to produce an exposure, and then in the opposite direction with their apertures out of registration, and a film feeding-device adapted to engage the film, said device being operatively connected with one of the shutter-plates so as to be actuated in unison therewith, and to feed the film during the movement of the shutter-plates in which their apertures are not in registration.

2. In a kinetograph, the combination of a focal-plane shutter, two parallel shutter-plates provided with exposure-apertures adapted to register with each other in the production of an exposure, means for guiding a film-strip immediately behind the rear shutter-plate, means for imparting a reciprocating movement to the rear shutter-plate, frictional connections between the two shutter-plates whereby the front shutter-plate is normally actuated in unison with the rear-plate, means for arresting the movement of the front shutter-plate before the ends of the reciprocating movement of the rear-plate to cause a relative movement of the plates by which their exposure-apertures are brought alternately into and out of registration, a film-feeding device located in the rear of the rear shutter-plate and adapted to engage the film-strip from the rear, and connections between said device and the rear shutter-plate whereby said device is reciprocated in unison with said plate.

3. A focal-plane shutter for kinetographs comprising two parallel shutter-plates provided with exposure-apertures adapted to register with each other in the production of an exposure, means for guiding a film-strip immediately behind the rear shutter-plate, means for reciprocating one of the shutter-plates positively, frictional connections between the shutter-plates whereby they are normally caused to move in unison, and coöperating abutments upon the shutter-plate which is not positively actuated as aforesaid and upon a fixed part of the apparatus, said abutments being arranged to operate, near the ends of the operative movements of the actuating-mechanism, to arrest the movement of the frictionally-actuated plate and cause a relative movement of the shutter-plates by which the exposure-apertures of the plates are brought into and out of registration, respectively, at the ends of the respective operative movements of the actuating-mechanism.

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