A. DE BRAYER.

APPARATUS FOR USE IN TAKING CINEMATOGRAPH PICTURES.

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1,319,698. Patented Oct. 28, 1919.

Fig. 1.

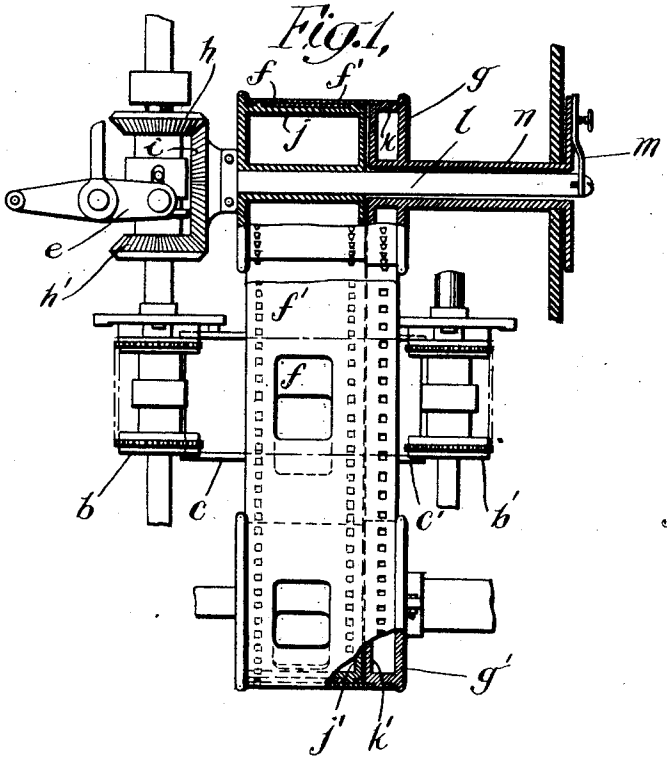


Fig. 2.

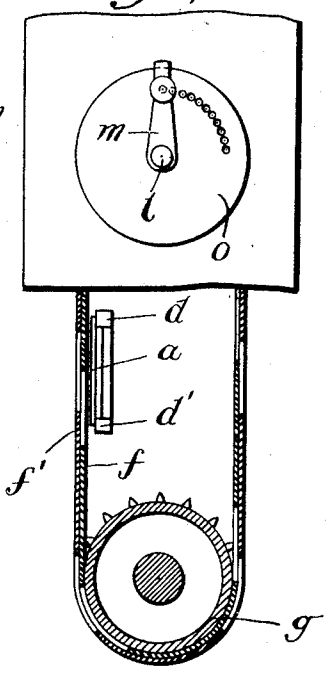


Fig. 3.

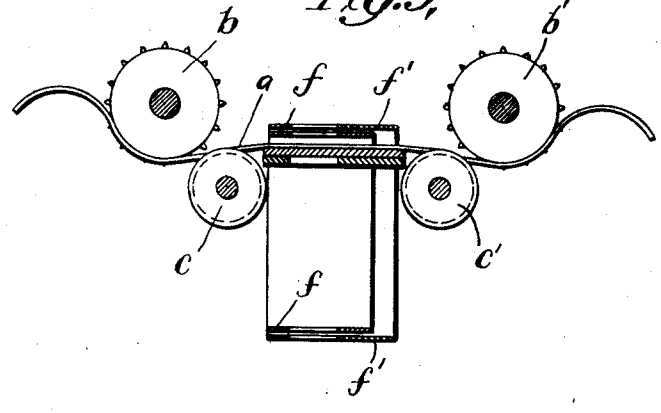
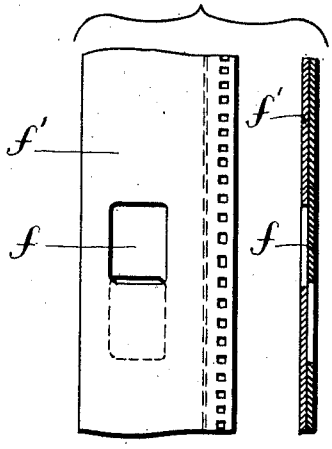


Fig. 4.



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APPARATUS FOR USE IN TAKING CINEMATOGRAPH-PICTURES.

1,319,698. Specification of Letters Patent. Patented Oct. 28, 1919.

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To all whom it may concern:

Be it known that I, ALFRED DE BRAYER, a citizen of the Argentine Republic, and resident of 38 Rue Etienne Marcel, Paris, France, have invented certain new and useful Improvements in Apparatus for Use in Taking Cinematograph-Pictures, of which the following is a specification.

This invention relates to apparatus used for the taking of cinematograph pictures. It is the object of the invention to provide an improved form of obturating device or shutter which shall be adjustable as regards the period and width of exposure, while it is disposed as close as possible to the film surface. This object is attained according to the invention by making the obturator or shutter in the form of a pair of flexible bands superposed the one on the other, and movable simultaneously in the same direction, each band being provided with exposure apertures, and the one band being adjustable over the other for the purpose of varying the areas of the openings. The bands move transversely to the direction of travel of the film, and as close as possible thereto. Owing to this, and to the possibility of regulating the resultant apertures down to very narrow limits, it becomes possible to take pictures of subjects moving at high speeds, and to obtain sharp images, no matter how near the moving subjects may pass to the apparatus.

One form of construction of the apparatus according to this invention is represented by way of example in the accompanying drawing, wherein:—

Figure 1 shows a part sectional and part elevational view of the device.

Fig. 2 is a part sectional side view thereof.

Fig. 3 shows a diagrammatic cross section of the device; and,

Fig. 4 shows front elevational and cross sectional views of shutter bands adjusted to give a very small opening.

In the example illustrated, for taking cinematograph pictures, two toothed cylinders b, b' are used and two guiding drums c, c', the film a being carried over such cylinders and drums, and over a pair of guide plates d, d'. The exposure device or shutter comprises two bands f, f' formed, for example, of thin flexible metal, and carried around pairs of toothed drums g, g', the axes of these drums being at right-angles to those of the toothed cylinders b, b' and guide drums c, c'.

In setting up the apparatus the end of the film a is drawn out of the box or magazine in which it is inclosed, and is passed first over the toothed cylinder b, then over the guide drum c, then over the guide shoes or plates d, d' between which it crosses the exposure area behind the bands f, f'; the film is then carried out around the guide drum c', over the toothed cylinder b', and its end is introduced into the receiving magazine or box into which the film is coiled after exposure. The whole device is then inclosed in a hermetically sealed casing not shown in the drawing, and the apparatus is ready for use.

The exposure device consists essentially of two bands f and f', which may be of metal or any other thin opaque and flexible material; they are superposed one on another around the drums g and g', and are perforated at their edges for engagement by the teeth on these drums. Each band is formed with apertures as indicated, these being of equal widths and at equal distances apart around the bands. These apertures are so disposed that they are equal in size with those of the images to be photographed on the film a, while the opaque or imperforate parts of the bands f, f' are made of a length equal to the width of the images, and in addition of a length equivalent to the periodic movement of the film a. It will be evident that the slowest exposures will be obtained when the edges of the apertures in the two bands f, f' coincide, such exposures being suitable for the taking of pictures of subjects which are only in very slow movement. For taking pictures of subjects in more rapid movement, and even in very rapid movement (for example, the natural movements of actors, horses in a race, automobiles traveling and so forth), it is necessary in order to obtain a clear reproduction of the images, to reduce the period of exposure. This result is attained by displacing one of the bands f, f' forming the shutter device with respect to the other around the guiding cylinders g, g', the result of which is to diminish the length of the openings exposed through the two bands for the passage of light, until the amount of opening may be as little as, or less than a millimeter, as indicated for example in Fig. 4. It will be

evident that in this position of the shutter device the proportions between the resultant aperture and the opaque parts of the shutter with respect to the dimensions of the images on the film are changed owing to the fact that the opaque parts are elongated by an amount equal to the reduction in width of the apertures. The bands f, f' are actuated by driving the drums g, g' through suitable gearing. For example, the bands f, f' may be driven continuously by means of pinions actuated by a handle or crank arranged on the outside of the apparatus (not shown in the drawings). These pinions are driven in such a way that during the passage of the apertures in the bands over the film surface, the film is stationary, and it only commences to make its intermittent forward movement, and completes this movement, while the opaque parts of the shutter device are passing over the exposure area.

With a slot of a millimeter in breadth, and with the shutter device passing over the film as shown, so as to be almost in contact with its sensitized layer, and with a suitable speed of rotation, it is possible to obtain exposures of as little as 1/3000 of a second, or even shorter if necessary.

The number of pictures taken in a second depend evidently on the speed of rotation of the shutter device and the co-regulated forward movement of the film, but when the number of pictures taken per second is made the same with this apparatus as with those usually employed, the pictures taken with this apparatus are very much superior.

In consequence of the arrangement shown in Fig. 1 of the drawings, a lever e acts on two bevel pinions h, h' in the driving mechanism for the shutter device and thrusts one or other into action, and the direction of movement of the shutter can be reversed. The object of this arrangement is to enable better results to be obtained from the exposures in the case of pictures of subjects moving at high speed, when the shutter aperture is moving in a direction opposite to that of the movement of the images of the objects, which avoids elongation or distortion of the subjects depicted. Whatever may be the direction of rotation of the shutter device, the film of course is moved downward at intervals in the usual manner. It is only when the handle of the machine is reversed in rotation that the film is wound back again. The direction of movement of the shutter might of course be reversed in the same way by reversing the direction of rotation of the handle.

The device for changing the size of the exposure opening is fully illustrated in Figs. 1 and 2, from which it can be seen that the driving wheels h and h' mesh with a wheel i adapted to drive the drum g. This drum is composed of two separate drums j and k, one of which, viz., j is mounted on a shaft l which extends out of the casing of the apparatus, being provided with a setting indicator m at its outer extremity. The drum k is mounted on a sleeve like member n which surrounds the right hand portion of shaft l (see Fig. 1) and terminates outside the casing of the apparatus in a flat disk o having a scale to coöperate with the setting indicator m. Drum j has two rows of teeth which engage band f, while drum k whose radius is greater than that of drum j by the thickness of band f, has one row of teeth engaging band f'. It will be obvious that movement of the setting indicator relatively to the disk will move band f relatively to band f'. The drum g' is formed of two drums j' and k', similar to drums j and k in all respects except that the former are not adapted to be held relatively to each other by any means other than the bands themselves.

Having thus described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A shutter device for use in taking cinematograph pictures, comprising in combination with the film guiding elements, a shutter formed of two flexible opaque bands carried together, guide cylinders around which said bands are carried, said cylinders adapted to be driven in such manner as to carry the bands forward simultaneously, each band being formed with apertures at equal distances apart, and the one band being displaceable with respect to the other, whereby the exposure openings may be varied in width, from a maximum corresponding with the size of the pictures to be taken, down to a minimum wherein only a narrow slot remains.

2. A shutter device for use in taking cinematograph pictures, comprising in combination with the film guiding elements, a shutter formed of two flexible opaque bands carried together, guide cylinders around which said bands are carried, said cylinders adapted to be driven in such manner as to carry the bands forward simultaneously, each band being formed with apertures at equal distances apart, and with opaque intervals between the apertures equal in length to the sum of the widths of the images, together with the length through which the bands move during the periodic forward movement of the film between the taking of one picture and the next.

3. A shutter device for use in taking cinematograph pictures, comprising the features of claim 1 in combination with mechanism whereby the direction of rotation of the shutter may be reversed without changing the direction of movement of the film.

4. An apparatus for use in taking cinematograph pictures comprising in combina-

tion with a pair of toothed cylinders and a pair of guide drums over which the film is passed, guide shoes between said guide drums over which the film passes at the place of exposure, a pair of toothed cylinders whose axes are perpendicular to the axes of the cylinders and drums above mentioned, a pair of bands with apertures therein carried around the last mentioned pair of toothed cylinders, and adjustable one with respect to the other thereon, said bands being caused to pass transversely across the film at the place of exposure, and in close juxtaposition thereto, and means for driving the toothed cylinders actuating the film, and the toothed cylinders actuating the bands.

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Witnesses:
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