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COMPLETE SPECIFICATION

Improvements in Optical Projectors for Producing Moving Pictures

I, GUSTAV BOEHME, a German National trading as the firm Markes & Co., Kommanditgesellschaft, a German Company, of 61, Wiesenstrasse, Lüdenscheid, Westfalen, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to an optical projector for producing moving pictures according to the principle of a two phase movement.

Projectors of this kind already known usually employ a film provided with two corresponding rows of pictures which are taken in two different phases of movement. This film is fed through the projector slowly and continuously past two lens systems which are each co-ordinated with one picture row for projections on the same screen. When both lens systems are permitted to project successively and in an alternating manner, there is produced upon the screen the impression of an animated picture.

It has previously been proposed that the alternating function of the two lens systems should be effected by a rotary switch adapted to switch two lamps on and off alternately so that the two moving phases of one picture are projected alternately. It is obvious that the switching action of an electric switching device takes only an extremely short period of time with the result that the change from one moving phase to the other, i.e. the change of picture, is effected so rapidly that the animated movement is unnatural; for example, it would not be possible for a person to move a limb at the speed exhibited on the screen. Furthermore, with this system every picture change is necessarily followed by a disproportionate long period of time without motion. Therefore with this known system the animated pictures appear very disjointed and unnatural.

[*Price* 2/8]

In another prior proposal the alternating function of the two lens systems was effected by a reciprocating shutter.

According to the present invention there is provided an optical projector of the type described in which the alternating function of the two lens systems is effected by a shutter which is capable of continuous rotation and is actuated in such a rhythm that the movements appear in natural speed whilst the motionless period between two picture changes corresponds at the most to twice the duration of a picture change.

A preferred embodiment of the invention is described with reference to the accompanying, more or less diagrammatic drawings in which:—

Fig. 1 shows the construction of the projector which includes a base 1, rear lens carrier 2 with condenser lenses 3a and 3b, two light sources such as bulbs 4a and 4b, film 5, rotary shutter 6 with its bearing 7, front lens carrier 8 with objective lenses 9a and 9b, and a cover 10.

Fig. 2 is a side view of the rotary shutter drawn to an enlarged scale as compared with Fig. 1 and of which 11 is a radial shutter plate and 12 a tangential shutter plate.

Fig. 3 is a rear view of Fig. 2. The width B of the tangential shutter plate 12 is larger than the diameter of the beam projected by the lens system whilst its height H corresponds exactly with the distance between the two rows of pictures. In order to obtain a smooth or gradual change of picture the upper and lower edges of shutter plate 12 are slightly inclined.

The rotary shutter 6 effects the picture change during which both bulbs 4a and 4b are in continuous operation. In Fig. 1 the rotary shutter 6 is shown just at the commencement of a picture change. The shutter is driven by a shaft from a clockwork or other motor which simultaneously operates the feed of the film and revolves at a moderate speed in any desired direction. In revolving, the shutter partially covers the upper lens system and uncovers the lower lens system in the same proportion. As soon as the shutter reaches the position indicated by dashes, it completes the picture change and the upper lens system remains masked until the shutter reaches the position indicated by dots and dashes, whereupon the next picture change will commence on the opposite side. In the position indicated by dots the masking function has passed from the tangential plate 12 to the radial plate 11.

Fig. 4 is a diagram showing the cyle of operation of the rotary shutter during one revolution. Angle $\alpha = 60°$ and corresponds to the duration of one picture change whilst angle $\beta = 120°$ and corresponds to the duration of the following motionless period. Hence these two phases are in the proportion of 1:2.

The arrangement and operation of the rotary shutter is such as to cause a smooth change over from one moving phase to another, similar to the preformance of a cinema-apparatus.

Fig. 5 shows a series of pictures corresponding to some intermediary moving phases *a*—*g* of a simple image during a picture change and from which it will be appreciated how the image which may, for example, represent a leg, gradually passes from a knee (phases *b*—*d*) to the opposite walking position.

The particular arrangement and disposition of the parts of a projector according to this invention facilitates production as the rotary shutter 6 may be driven by any simple mechanical device and may be easily located in the interior of the casing 10 between the two lens carriers 2 and 8.

What I claim is:—

1. An optical projector for producing moving pictures, embodying a film adapted to be fed through the projector slowly and continuously and provided with two corresponding rows of pictures which are taken in two different phases of movement, and two lens systems adapted to be permitted to project successively and in an alternating manner, each lens system being co-ordinated with one of the rows of pictures so that the two phases of movement are projected successively and produce the impression of a moving picture on a screen, in which the alternating function of the two lens systems is effected by a shutter which is capable of continuous rotation and is actuated in such a rhythm that the movements appear in natural speed whilst the motionless period between two picture changes corresponds at the most to twice the duration of a picture change.

2. An optical projector for producing moving pictures as claimed in claim 1, in which the shutter is formed as a rotary T-shaped body providing radially and tangentially disposed masking plates and having an axis about which it rotates, said axis lying in the plane of the radial plate parallel to, but at the end of said radial plate remote from the tangential plate, and in which the masking function of the shutter is effected alternately either by the radial plate or by the tangential plate according to the position of the shutter.

3. An optical projector for producing moving pictures as claimed in claim 2, in which the upper and lower edges of the tangential plate are slightly inclined.

4. An optical projector for producing moving pictures as claimed in any of the preceding claims in which the rotary shutter and its bearing are located in the interior of a casing for the projector and between a first carrer bearing condenser lenses and a second carrier bearing corresponding objective lenses and in which the rotary shutter is adapted to be driven by a shaft of a clockwork motor feeding the film.

5. An optical projector for producing moving pictures as particularly described with reference to and as illustated in the accompanying drawings.

Dated this 31st day of October, 1950.

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686,203 COMPLETE SPECIFICATION
1 SHEET

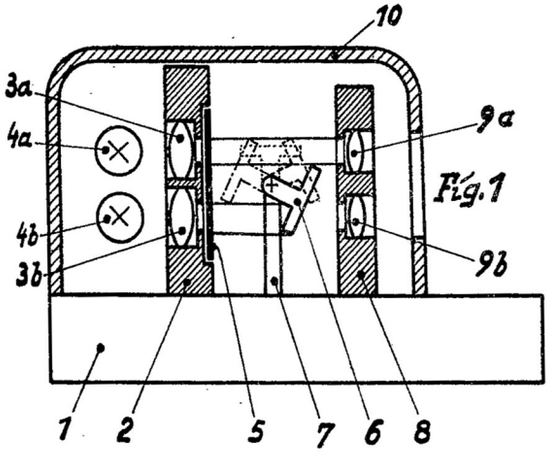

Fig. 1

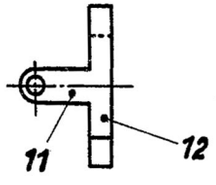

Fig. 2

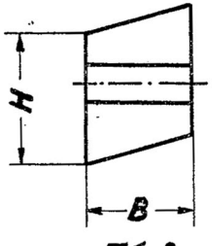

Fig. 3

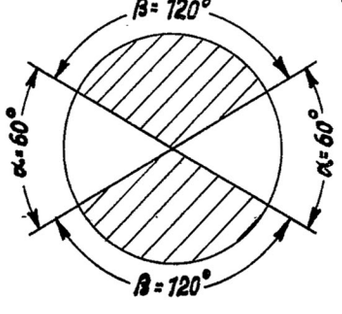

Fig. 4

Fig. 5

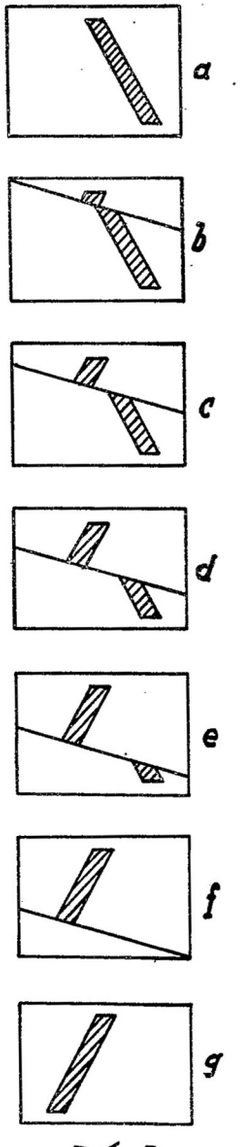

Fig. 5