

G. DIETZ.
MOVING PICTURE PROJECTING APPARATUS.
APPLICATION FILED APR. 29, 1910.

1,017,250.

Patented Feb. 13, 1912.

4 SHEETS—SHEET 1.

Fig. 2

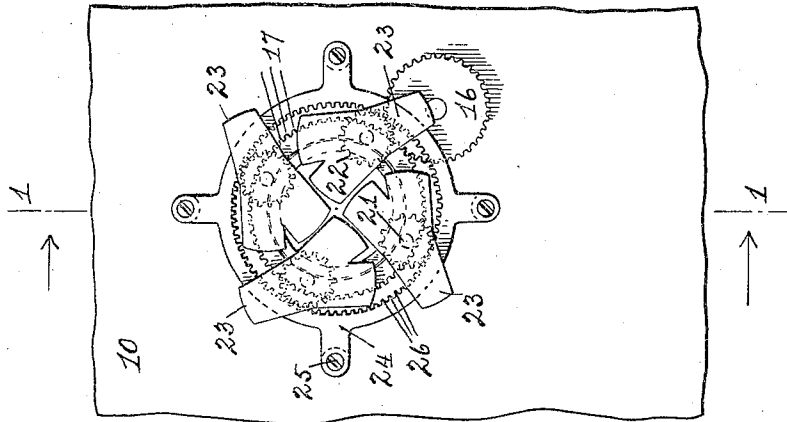
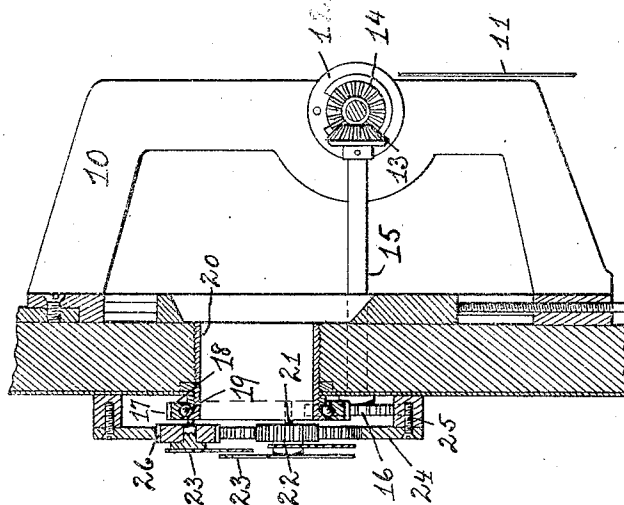


Fig. 1

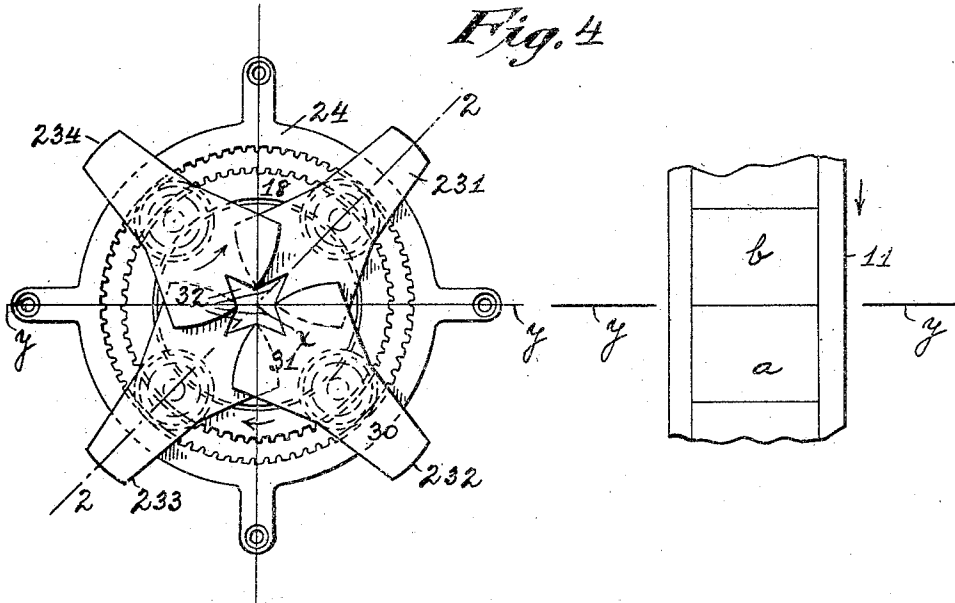


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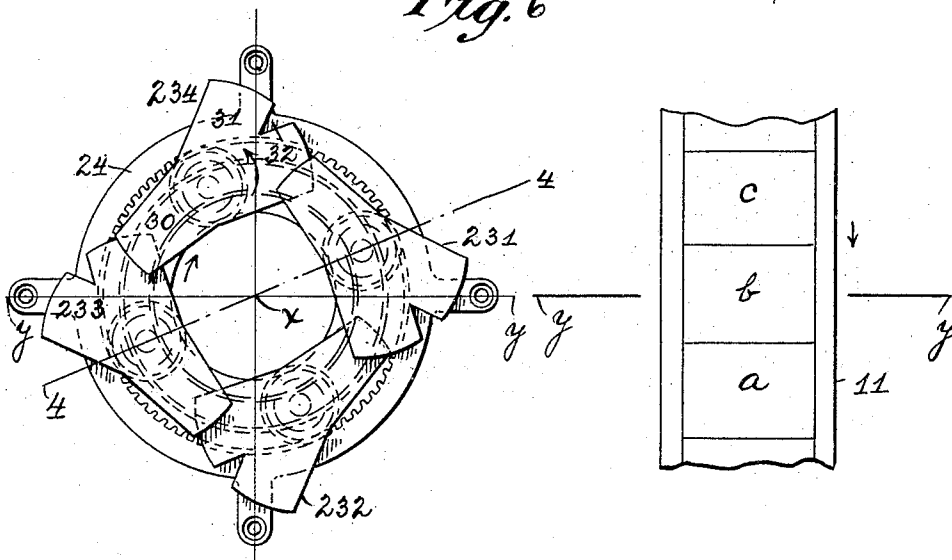
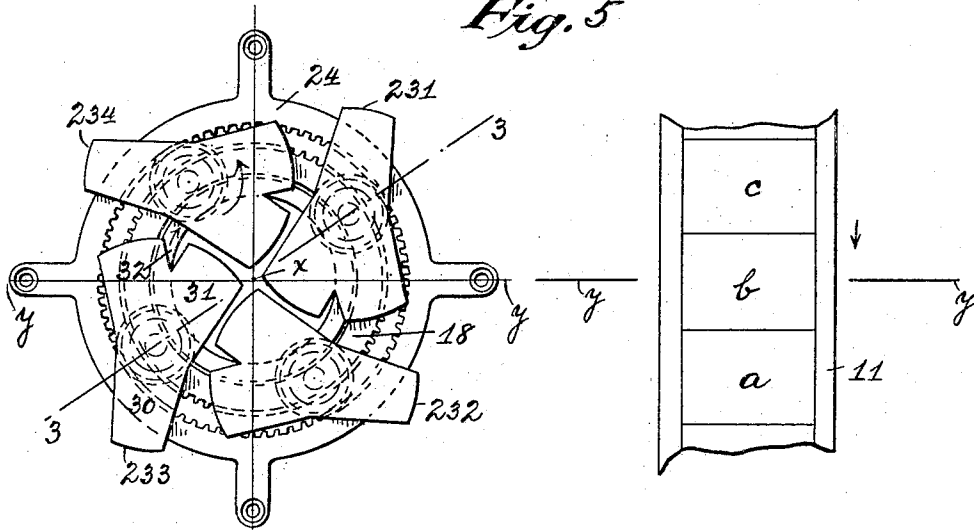
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4 SHEETS—SHEET 3.



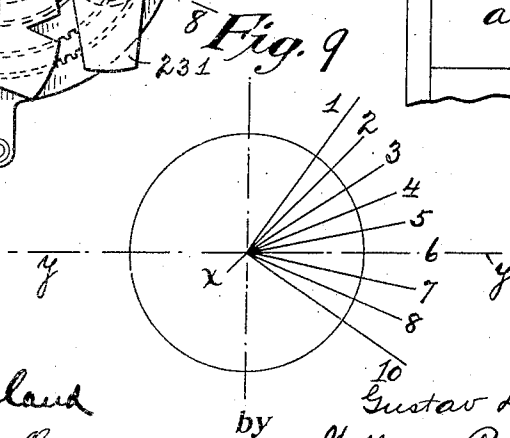
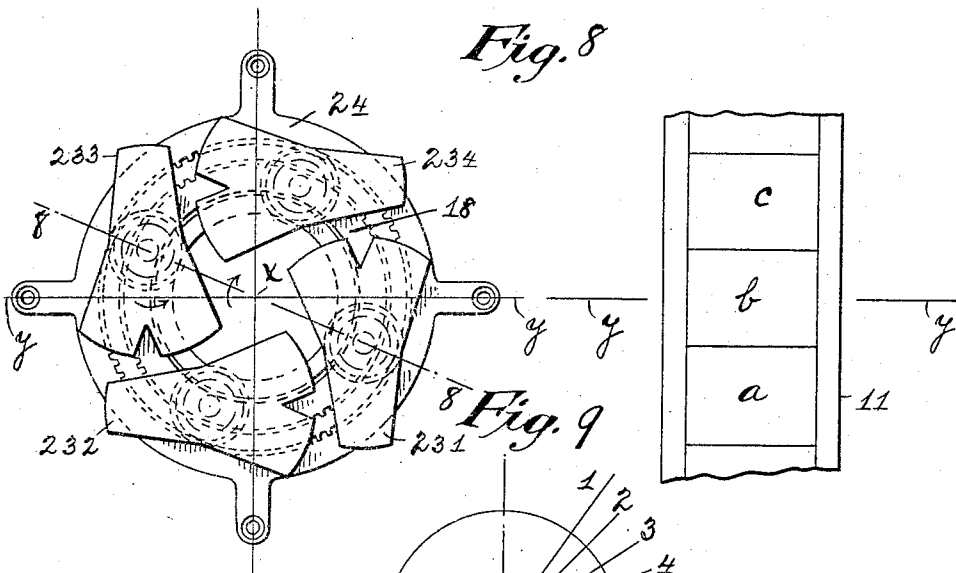
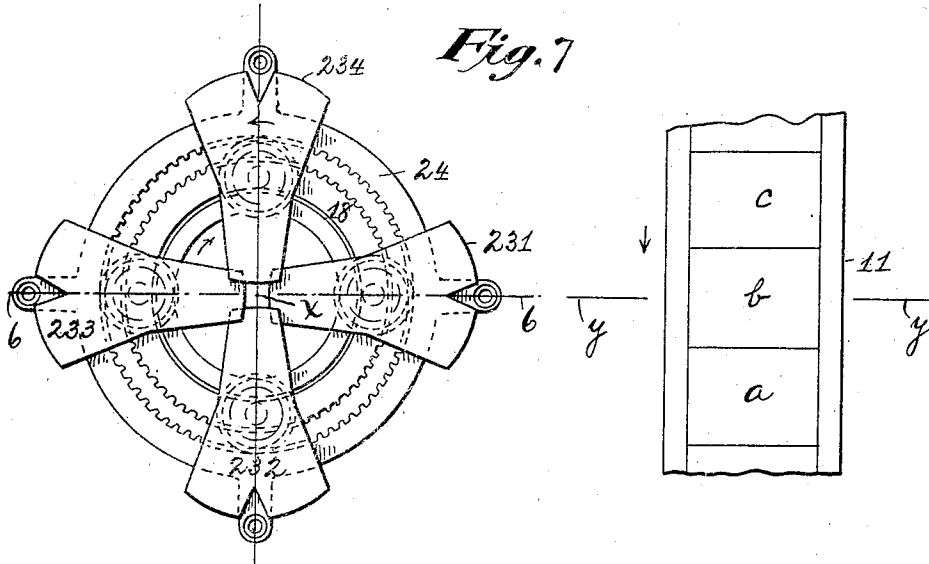
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UNITED STATES PATENT OFFICE.

GUSTAV DIETZ, OF YONKERS, NEW YORK.

MOVING-PICTURE-PROJECTING APPARATUS.

1,017,250.

Specification of Letters Patent.

Patented Feb. 13, 1912.

Application filed April 29, 1910. Serial No 558,356.

To all whom it may concern:

Be it known that I, GUSTAV DIETZ, a citizen of the United States, residing at Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Moving-Picture-Projecting Apparatus, of which the following is a specification.

This invention relates to a dimming device designed to be used on moving picture projecting apparatus.

The object of the invention is to provide means for neutralizing the disagreeable flicker which obtains when the rapid intermittent projections of successive views are thrown upon a screen. To a certain extent, this flicker is diminished by the continuously rotating fly shutters which, in the present state of the art, are commonly interposed between the lens system and the screen, but when such device is used a flicker still persists and it is the purpose of this invention to remove this by providing means whereby the light projecting from the lens is never completely cut off but is only dimmed and further whereby a strong light flash is developed while the film is moving at its greatest speed.

To gain the result of flickerless light action on the screen, the mechanism as described in my application #558,098 for patent for photographic shutter, filed Apr. 28, 1910, is utilized to give the best results. With this movement the action of the blades over the lens opening is the quickest and causes a quick covering and uncovering of the opening, whereby, with the blades shaped as hereinafter described, a very large number of variations of the amount of light are produced during each movement of the screen and as a consequence a lesser contrast between succeeding varying quantities of admitted light, whereby the vibrations are in such quick succession as to fail to affect the eye of the observer.

In the drawings, Figure 1 is a side elevation and partial vertical section of a portion of a moving picture projecting apparatus embodying the invention; Fig. 2 is a front view of the same. Fig. 3 is a front view of the positions of the dimming blades when the least amount of light is permitted to pass through them and the film starts to move; Fig. 4 is a similar view of such positions when a flash of light is passing at the middle of the movement of the film; Fig.

5 is a similar view of such positions during the end of the movement of the film, only a small amount of light being permitted to pass; Fig. 6 is a similar view of such positions when the next succeeding image on the film is at rest and the fullest amount of light is permitted to pass; Fig. 7 is a similar view of such positions when the smaller ends of the blades are all turned toward the center and a small amount of light only is permitted to pass, the film being at rest as in Fig. 6; Fig. 8 is a similar view of such positions as the light aperture is diminishing, the film yet remaining at rest and Fig. 9 is a diagram of the successive positions in its circular path of the center of one of the dimming blade pinions.

In the drawings, 10 represents a portion of the frame of a moving picture projecting apparatus of any usual form, 11 represents a vertically downwardly moving film of the usual type comprising a transparent ribbon on which are reprinted the views *a b c* to be successively projected upon the screen located to the far left of the apparatus. The screen is not shown and neither is the source of light from which the rays pass through the film as these elements are well known to those skilled in the art and form no part of the invention.

The mechanism whereby an intermittent motion is communicated to the film is indicated at 12; and 13 is a beveled gear meshing with a gear 14 forming part of such mechanism, and given thereby a continuous rotary motion which is communicated to a shaft 15 mounted to turn in bearings formed in the frame 10 and to the outer end of which is mounted a driving pinion 16 adapted to mesh with the teeth 17 of an annular carrier 18 mounted to rotate on ball bearings indicated at 19 and running in a raceway formed in the edge of a cylindrical drum or casing 20.

In the annular carrier 18 are apertures spaced apart at regular intervals forming journal bearing surfaces in which are adapted to rotate pivots 21 of outwardly projecting pinions 22 to the outer faces of which are secured dimming blades 23.

A stationary annulus 24 is secured to the frame 10 by screws 25, or in any other convenient manner. The inner periphery of this annulus is provided with teeth 26 adapted to mesh with the teeth of the pinions 22, so that as the annular carrier 18 is moved, and the

pinions 22 are moved with it, the engagement of such pinions with the teeth 26 of the stationary gear 24 causes the pinions to be rotated and consequently causes the rotation of the dimming blades secured thereto.

The dimming blades 23 are of peculiar form. They are formed essentially of two parts, a narrow wing and a wide wing. The narrow wing 30 is arranged at one side of the center of rotation, its sides gradually approaching each other and terminating in a circular arc. The wide wing 31 is of dove-tailed shape with flaring sides terminating in a circular arc with a central recess or cut-out indicated at 32 and is arranged at the opposite side of the center of rotation. The wide wing is in effect composed of two smaller wings arranged at an acute angle and overlapping except at their extremities.

As a continuous rotary motion is imparted to the driving pinion 16 and annular carrier 18, the pinions 21 are carried around in a circular path concentric with the lens axis which is also coincident with the longitudinal axis of the drum 20 and with the center of each successive image of the film when it is brought to rest after its intermittent motion.

Designating this central point as x and the horizontal plane passing through it as $y-y$, there is shown in Figs. 3 to 8 inclusive, the different relative positions of the dimming blades and film images when the apparatus described is employed comprising four blades moving over the paths described. In these Figs. 3 to 8 the different blades are designated 231, 232, 233 and 234.

In Fig. 2 there are radii designated from 1 to 10 showing, with respect to the central plane $y-y$, the successive positions of the center of the pinion of the blade 231 as it is moved in the annular carrier 18 and simultaneously rotated.

In Fig. 3 it will be noticed that the blade 231 has its pinion center in the radial plane 1-1 which is at the same angle with the plane $y-y$ as the radius 1 in Fig. 9. The center of the pinion of the blade 233 is also in this same plane. At the same time the centers of the pinions of the blades 232 and 234 must necessarily be in the plane of the radius 10 of Fig. 9. When the blades are in this position the picture or image a on the film 11 is at rest and the least amount of light is permitted to pass through the center x coinciding with the lens axis. That is, the blades have dimmed the picture on the screen by shutting off the light to a great extent but not completely.

In Fig. 4, the rotation of the annular carrier 18 has moved the blade 231 to such a position that its pinion center is in the radial plane 2-2 and the pinion centers of each of the other blades have been advanced through the same angle or arc. The blades

have each been rotated so that the centers of their wide wings are in opposing relations. This brings the indentations or cut-outs in opposing relations and allows a flash or increase of light to pass to the screen. But in the meantime the film moving mechanism has been operated and has moved the view a downward so that the border line between it and the next view b is on a level with the central plane $y-y$ and, just as the blades reach their central positions, the film is moving at its greatest speed and this border line is in its central position. The flash of light through the star shaped opening thus formed between the blades serves effectually to disguise the movement of the film and the transition on the screen from the picture a to the picture b , because the flash is too quick to allow the movement of the film to be perceived.

While the film is moving from the position shown in Fig. 4 to that shown in Fig. 5, the pinion of the blade 231 has moved from the radial plane 2-2 to the radial plane 3-3 and the blades have revolved into the positions shown in Fig. 5. In other words, after the film has passed its center of movement and is coming to rest opposite the center of the view b the blades have moved to dim the light but to even and distribute it by allowing it to pass between the edges of the blade as well as at the central point x . The film moving mechanism then brings the picture b to rest opposite the plane $y-y$, and when this occurs, as shown in Fig. 6, the pinion center of the blade 231 has been moved to the radial plane 4-4 and the dimming blades have been rotated so that there is between them the greatest amount of space possible and practically the full amount of light is allowed to pass to impress upon the eye the picture formed on the screen.

The apparatus is so constructed that the film 11 remains at rest until the series of blades are brought to their initial positions, so that while this occurs the center of the pinion 231 must advance from the radial plane 4-4 through the radial planes 5, 6, 7 and 8 to 10. During such movement however the blades continue to revolve causing a dimming of the light when they arrive at the middle of the film rest period and this pinion 231 is at the plane 6-6 (see Fig. 7) and causing the admission of the light when the pinion is at the plane 8-8 (see Fig. 8) and the eye is perceiving the picture b almost fully illuminated just as it is about to be moved. By this construction there is secured all of the advantages of the usual anti-flicker shutter which alternately completely excludes and completely admits the light with the added advantage that the transitions from full to a lesser illumination are never abrupt, but are gradual, and with

the further advantage that the transition from one picture to another is disguised by a flash or increase of light; and the fullest illumination, lasting a relatively long time, is secured when each picture is completely at rest and accurately positioned at the center of the lens system. The flash produced moreover is automatically secured at the proper time during the dimming operation and without varying the intensity of the light illuminating the back of the film.

Because of the fact that when the described device is employed the light is never completely excluded from the screen but is only dimmed, this device has been called a "dimmer" rather than a "shutter" which completely shuts off all illumination at some time during the film exposure.

It will be understood that wide variations may be made in the details of the apparatus embodying the invention without departing from its essential principles, and that the number of blades and their size, shape and relative positions may likewise be varied.

What I claim as new is:—

1. In an apparatus of the character described a series of blades, and means for rotating them in unison, the radius of each blade being shorter than the distance between its axis and the axial line of the lens.

2. In an apparatus of the character described a series of blades, mounted in symmetrical positions in a circle around the axial line of the lens and means for rotating them in unison, the radius of each blade being shorter than the distance between its axis and the axial line of the lens.

3. In an apparatus of the character described, a series of blades arranged in pairs in opposing positions and means for rotating the blades of each pair in unison, the radius of each blade being shorter than the distance between its axis and the axial line of the lens.

4. In an apparatus of the character described a series of blades arranged in pairs in opposing positions and means for rotating the blades of each pair in unison, the blades of each pair being arranged to cause their center lines to be in line with the center of the lens at the same time, the radius of each blade being shorter than the distance between its axis and the axial line of the lens.

5. In an apparatus of the character described a series of blades mounted in symmetrical positions in a circle around the axial line of the lens and arranged in pairs in opposing positions and means for rotating the blades of each pair in unison, the radius of each blade being shorter than the distance between its axis and the axial line of the lens.

6. In an apparatus of the character de-

scribed, a series of blades, mounted on pivots symmetrically arranged around the axial line of the lens, and means for rotating said blades in unison, the blades being shaped to overlap each other during the rotation and always to permit of the direct passage of some light therethrough.

7. In an apparatus of the character described, a series of blades arranged in symmetrical positions around a common center coincident with the lens axis, and means for moving them in unison, each blade having a wide wing and a narrow wing and so placed that when the longitudinal axes of opposite blades are in line the blades do not overlap.

8. In an apparatus of the character described, a series of blades arranged in symmetrical positions around a common center coincident with the lens axis, and means for moving them in unison, each blade having a wide wing and a narrow wing and so placed that when the longitudinal axes of opposite blades are in line the blades do not touch each other.

9. In an apparatus of the character described, a series of blades arranged in symmetrical positions around a common center coincident with the lens axis, and means for moving them in unison, each blade having a wide wing and a narrow wing and so placed that when the longitudinal axes of opposite blades are in line the blades do not touch each other, one wing of each blade having a recess.

10. In an apparatus of the character described, a series of blades arranged in symmetrical positions in pairs around a common center coincident with the lens axis and means for moving them in unison, each blade having a wide wing and a narrow wing and each so placed with respect to the opposite blade of the series that when their longitudinal axes are in line their wings do not touch.

11. In an apparatus of the character described, a series of blades arranged in symmetrical positions in pairs around a common center coincident with the lens axis, and means for moving them in unison, each blade having a wide wing and a narrow wing and each so placed with respect to the opposite blade of the series that when their longitudinal axes are in line their wings do not touch, the wide wing of each blade being centrally recessed at its extremity.

12. In an apparatus of the character described, a series of blades arranged in symmetrical positions in pairs around a common center coincident with the lens axis, and means for moving them in unison, each blade having a wide wing and a narrow wing and each so placed with respect to the opposite blade of the series that when their longitudinal axes are in line their wings do

not touch, the wide wing of each blade being centrally recessed at its extremity, whereby when the narrow wings are turned toward the common center there is a small amount of light permitted to pass and when the wide wings are so turned there is a larger amount of light permitted to pass.

13. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously moving opaque blades shaped to vary the amount of light passing from the film but never to cut it off completely and means for moving the blades in unison.

14. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously rotating blades shaped to vary the amount of light passing from the film but never to cut it off completely, and means for rotating the blades in unison.

15. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously rotating opaque blades shaped to vary the amount of light passing from the film but never to cut it off completely, and means for rotating the blades in unison.

16. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously moving dimming blades shaped to partially shut off the light passing from the film and to permit a flash to pass during the film movement to disguise said movement, and means for moving the blades in unison.

17. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously moving dimming blades shaped to partially shut off the light passing from the film and to permit a flash to pass at about the middle of the film movement to disguise said movement, and means for moving the blades in unison.

18. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously moving dimming blades shaped to partially shut off the light passing from the film during the greater part of the film exposure and to permit a greater amount of light to pass at about the center of the film movement to disguise said movement, and means for moving the blades in unison.

19. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously moving dimming blades each having a wide wing and a narrow wing and means for moving the blades in unison and bringing the wide wings into opposing relation when the film is moving.

20. In an apparatus of the kind de-

scribed comprising an intermittently moving film, a series of continuously moving dimming blades each having a wide wing and a narrow wing and means for moving the blades in unison and bringing the narrow wings into opposing relation when the film is at rest.

21. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously moving dimming blades each having a wide wing and a narrow wing and means for moving the blades in unison and bringing the wide wings into opposing relation when the film is moving and the narrow wings into opposing relation when the film is at rest.

22. In an apparatus of the kind described comprising an intermittently moving film, a series of continuously moving dimming blades each having a wide wing and a narrow wing and means for bringing the wide wings into opposing relation when the film is moving, each wide wing having a cut out to permit the passage of more light at that time to disguise said movement, and means for moving the blades in unison.

23. In an apparatus of the kind described comprising an intermittently moving film, a series of movable dimming blades and means for moving them in unison, each blade provided with wings whereby when the film is at rest and one set of wings are in opposing relation a small amount of light is admitted and when the film is moving and another set of wings are in such relation a greater amount of light is admitted to disguise the movement of the film.

24. In an apparatus of the kind described comprising an intermittently moving film, a series of movable dimming blades and means for moving them in unison, each blade provided with wings whereby when the film is at rest and one set of wings are in opposing relation a small amount of light is admitted and when the film is moving and another set of wings are in such relation a flash of light is admitted to disguise the movement of the film.

25. A dimming blade for a projecting apparatus comprising two wings one on each side of the center of rotation of the blade, one wing gradually increasing and the other wing gradually decreasing in width from said center.

26. A dimming blade for a projecting apparatus comprising two wings one on each side of the center of rotation of the blade, one wing gradually increasing and the other wing gradually decreasing in width from said center, both wings being bounded by circular arcs having their centers in the center of rotation of the blade.

27. A dimming blade for projecting apparatus comprising two wings one on each side of the center of rotation of the blade,

one wing gradually increasing and the other wing gradually decreasing in width from said center, the wider wing being recessed centrally at its outer edge.

5 28. A dimming blade for a projecting apparatus comprising two wings one on each side of the center of rotation of the blade, one wing gradually increasing and the other wing gradually decreasing in width from
10 said center, the larger wing having a centrally placed V-shaped recess at its outer edge.

29. A dimming blade for a projecting apparatus comprising two wings one on each
15 side of the center of rotation of the blade, one wing gradually increasing and the other wing gradually decreasing in width from said center, both wings being bounded by circular arcs having their centers in the center of rotation of the blade, the wider wing
20 being recessed centrally at its outer edge.

30. A dimming blade for a projecting apparatus comprising two wings one on each side of the center of rotation of the blade
25 one wing gradually increasing and the other wing gradually decreasing in width from said center, both wings being bounded by circular arcs having their centers in the center of rotation of the blade, the larger wing
30 having a centrally placed V-shaped recess at its outer edge.

31. A series of dimming blades, each secured to a rotatable pinion, means for moving the series bodily in a curved path, and
35 means for simultaneously rotating each pinion at a uniform rate of speed, each blade having a wide wing and a narrow wing and each blade having its longitudinal axis substantially at a right angle to that of its
40 neighbors.

32. A series of dimming blades, each secured to a rotatable pinion, means for mov-

ing the series bodily in a curved path, and means for simultaneously rotating each pinion at a uniform rate of speed, each blade
45 having a wide wing and a narrow wing the wide wing being recessed at its outer end.

33. A series of dimming blades, each secured to a rotatable pinion, means for moving the series bodily in a curved path, and
50 means for simultaneously rotating each pinion at a uniform rate of speed, each blade having a wide wing and a narrow wing and each blade having its longitudinal axis substantially at a right angle to that of its
55 neighbors, the wide wing being centrally recessed at its outer end.

34. In an apparatus of the kind described, means for dimming but not totally excluding the light from the screen in combination
60 with means for producing a flash of light upon the screen during the movement of the film to disguise the movement.

35. In an apparatus of the kind described, means for dimming but not totally excluding the light from the screen in combination
65 with means for interrupting the dimming by a flash upon the screen during the movement of the film to disguise said movement.

36. In an apparatus of the kind described, comprising an intermittently moving film, means for varying the amount of light passing to the screen including means for diminishing it without excluding it totally and
70 further means for suddenly increasing it while most diminished to disguise the movement of the film.

In testimony whereof I affix my signature in presence of two witnesses.

GUSTAV DIETZ.

Witnesses:

CHAS. G. KELLER,
E. L. PEEBLER.