

May 2, 1933.

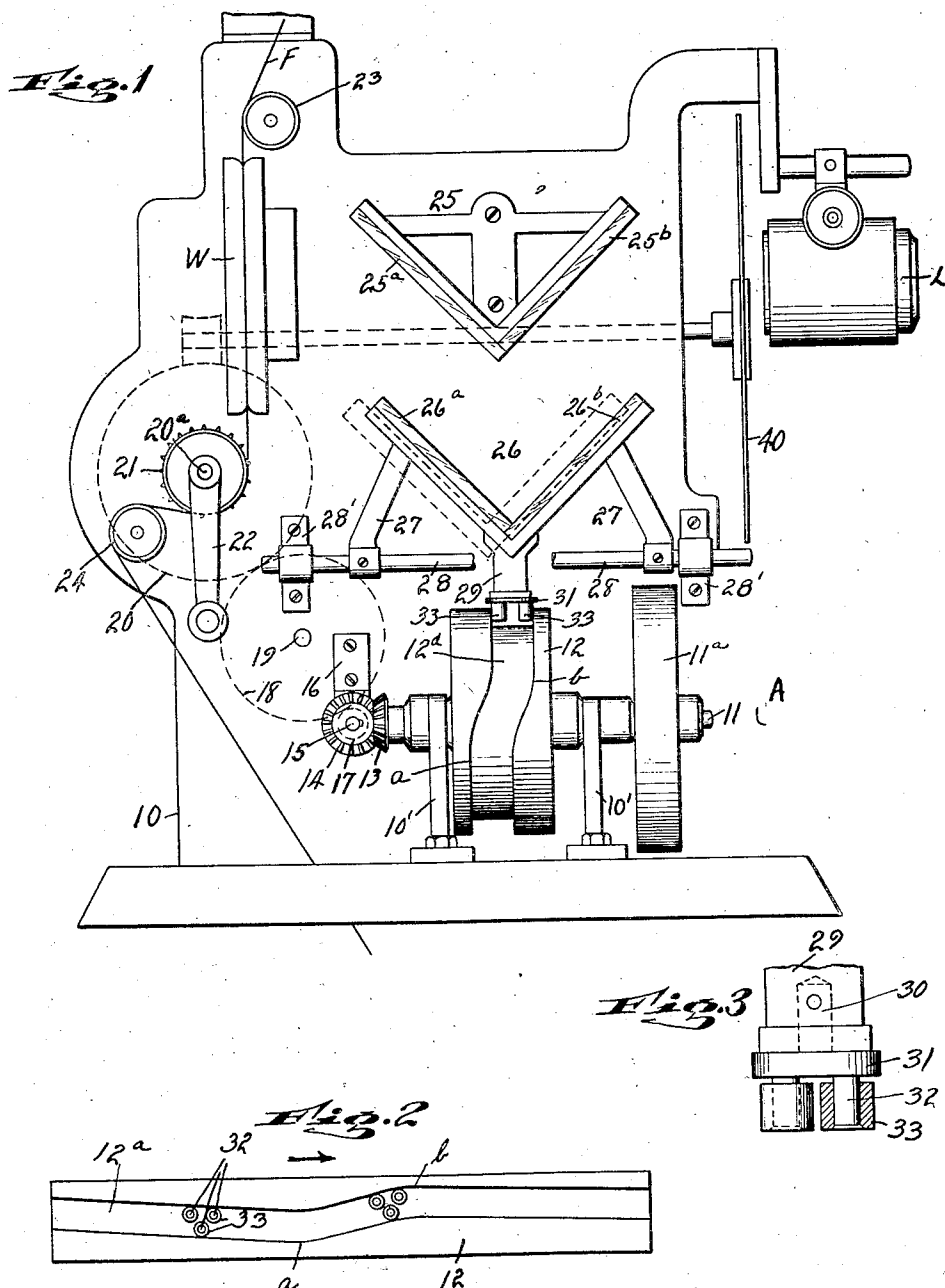
F. SEUFERT

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CINEMATOGRAPHIC APPARATUS

Filed Jan. 27, 1931

2 Sheets-Sheet. 1



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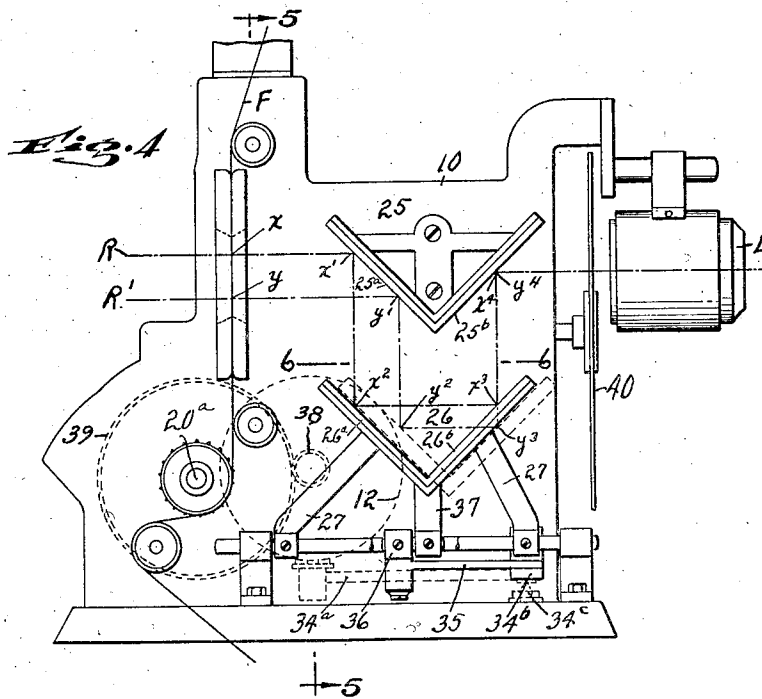
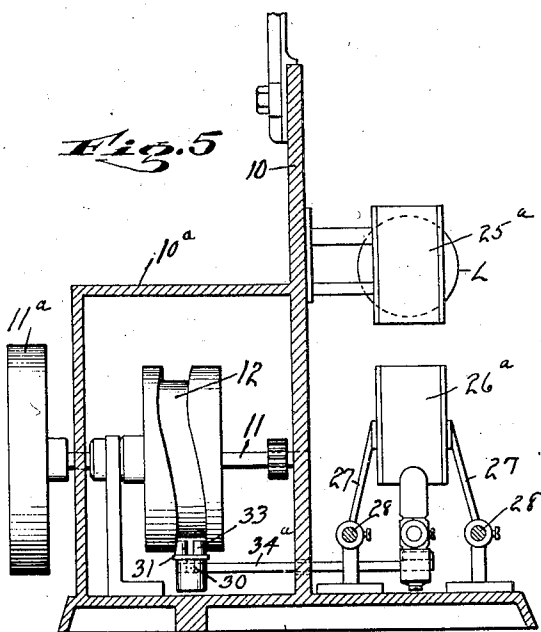
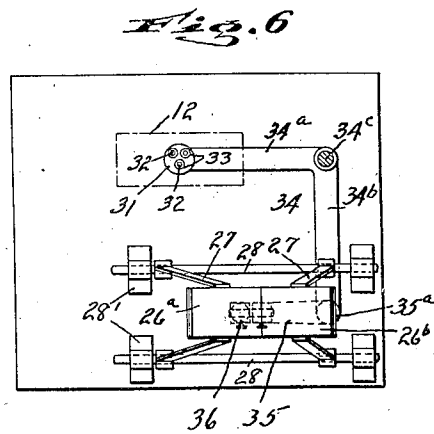
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UNITED STATES PATENT OFFICE

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CINEMATOGRAPHIC APPARATUS

Application filed January 27, 1931, Serial No. 511,510, and in Germany February 4, 1930.

The present invention relates to cinematographic apparatus.

Apparatus of this kind in which the optical equilization of the image feed is effected by fixed and movable mirrors are well known. With the hitherto used constructions however, the movement of the mirrors is not positive and as a result of the image projected on the screen trembles.

This invention has for its object to remove this drawback and secure a non-trembling, non-flickering image projected upon the screen despite the movement of the film.

With this and other objects in view, my invention comprises the novel combination construction and arrangement of elements to be hereinafter more fully described, shown and defined in the appended claims.

In the accompanying drawings which forms part of this specification and in which similar reference characters denote corresponding parts:—

Fig. 1 is a side elevational view partly in section of one embodiment of my invention;

Fig. 2 is a development of the cam track shown in Fig. 1;

Fig. 3 is a detailed view partly in section of the cam follower;

Fig. 4 is a side elevational view partly in section of a modified form of construction of my invention;

Fig. 5 is a section along line 5—5 of Fig. 4 seen in the direction of the arrows; and

Fig. 6 is a partial section along line 6—6 of Fig. 4 also seen in the direction of the arrows.

Referring to the drawings 10 denotes a housing in which is journaled in suitable supports 10 a shaft 11 carrying a fly-wheel 11^a and on which is keyed a cam body 12. Said cam body is formed on its circumference with an annular closed groove 12^a cut out as follows:—

Standing at the point *a* on the left hand side of the body the groove progresses grad-

ually toward the right hand side of said body until it reaches the point *b* which is 300° from point *a*. A sharply sloping portion of the groove connects the points *a* and *b* in the remaining 60° of the complete revolution of said body.

In this manner if a cam follower is positioned at point *a* and the cam body rotated in the direction of the arrow *A*, the said follower for 300° of the revolution of said body will progress gradually from left to right and in the remaining 60° will be quickly returned to original position.

Suitably keyed to shaft 11 is a bevel gear 13 which meshes with a bevel gear 14 which latter is keyed to a shaft 15 journaled in a suitable support 16 in said housing. Keyed on said shaft 15 is a worm 17 which meshes with a worm gear 18 supported on a shaft 19 and said gear 18 in turn meshes with a worm gear 20 keyed on the shaft 20^a which latter has also fixed thereto the film feeding sprocket 21 and a driving handle 22.

The film *F* coming from a reel (not shown) passes over a roller 23, between the guides of a window *W*, then under the sprocket 21, over a roller 24 and then to a winding up reel (not shown).

Light rays coming from a source (not shown) pass through said film which is in front of a fixed V-shaped mirror 25 and the image on said film is transmitted to one leg 25^a of said mirror. The two legs 25^a, 25^b of said fixed mirror are arranged at a right angle to one another and at an angle of 45° to the horizontal.

Mounted below the fixed mirror is a second V-shaped mirror 26 whose legs 26^a and 26^b are parallel to the legs 25^a and 25^b respectively of the fixed mirror 25. This second mirror is mounted by means of arms 27 longitudinally slidable horizontal rods 28 borne in brackets 28^a.

Projecting downwardly from the apex of said mirror 26 is a member 29 carrying means

for engaging the aforementioned cam groove 12^a. Said means may be constructed as follows:—

Projecting from the lower end of a stem 30
5 fixed in the member 29 is a rotatable disk 31 carrying three pins 32 on which are mounted rollers 33. The pins 32 are arranged in triangular formation concentric about the center of rotation of said disk 31 as shown in
10 Fig. 2 and so spaced, that always two of said rollers will tangentially engage one edge of said cam groove 12^a and the other, tangentially engage the opposite edge of said groove 12^a.

If therefore the cam body 12 is rotated the
15 mirror 26 will slowly move from the left hand position (dotted lines) to the right hand position (full line) in 300° of a complete revolution of said body and then quickly return to the initial position in the last 60°.

20 The speed of movement of the mirror 26 must be exactly equal to the speed of the feed of the film F so that the projection of the image onto the screen through the lens L be rendered steady. This speed is controlled by
25 the cam groove 12^a and the driving means therefor.

If desired the shutter 40 may be geared to gear 20 and rotated in synchronism with the other apparatus, being so timed as to cut off
30 the light from lens L during the return movement of the mirror 26.

In the modification shown in Figs. 4—6 the construction is essentially the same as in the first named modification. But in place of a
35 direct coupling between cam 12 and the mirror 26 I provide a linkage. Here the cam follower 30, 31, 32, 33 which is identical with that of the first named modification, is formed on the end of an arm 34^a of a double armed
40 lever 34. The said lever is pivoted at 34^a and the second arm 34^b thereof pivotally engages at 35^a a link bar 35. Said link bar pivotally engages a stud 36 provided on downwardly projecting member 37 attached to the movable
45 mirror 26. The cam 12 is supported on the shaft 11 rotatably borne in a separate compartment 10^a of the housing 10. Said cam is driven by means of a gear 38 and a gear 39 on the sprocket drum shaft 20^a.

50 The principal of operation is the same as before except that the intermediary linkage between the cam follower and the movable mirror enables a rearrangement of the elements to eliminate unnecessary gearing and
55 cheapen the construction without impairing the effectiveness of the device.

It is obvious that the mirrors may be replaced by prisms if desired.

The mode of operation is as follows:—

60 If for instance a ray of light R strikes the film F at a point x , and is transmitted to the leg 25^a of the fixed mirror 25 it strikes the latter at x' and is reflected to the leg 26^a striking the latter at x'' . Thence it is reflected to leg
65 26^b striking the latter at x''' and thence to leg

25^b striking the latter at x'''' and is reflected thereby through lens L onto the screen (not shown).

If the film moves from point x to point y the ray of light that passes through point x 70 would now pass through point y . This ray R' owing to the simultaneous displacement of mirror 26 now strikes leg 25^a at y' is reflected to leg 26^a at y'' , thence to leg 26^b at y''' , thence to leg 26^b to y'''' which coincides with x'''' so that it will be reflected through the lens L 75 on same line as before.

It will be seen that this will occur only if the displacement of the mirror 26 is in synchronism with the feed of the film so that the image will remain stationary despite the motion of the film. 80

The synchronism is best obtained by rendering the displacement of the mirrors positive through my novel cam construction and 85 follower means.

My device may be modified in many other ways and I do not wish to be limited to the details shown and described.

What I claim is:—

90 1. In a cinematographic apparatus having an image feed and equalization means for said image feed, a cylinder having a cam groove for controlling said means, a cam groove follower comprising a set of at least 95 three rollers arranged in triangular fashion on a rotatable support and concentrically with respect to the axis of rotation of said support, the spacing between said rollers being so admeasured that at least two rollers will 100 tangentially bear against one side of said groove and at least one against the opposite side of said groove, said groove being so shaped as to control the speed of the movement of said equalization means to be always equal 105 to the speed of said image feed.

2. In a cinematographic apparatus as per claim 1, in which said support for said rollers comprises a disk rotatable upon a central axis and is formed with pins parallel to said 110 axis and rotatably bearing said rollers.

In testimony whereof I affix my signature.
FRIEDRICH SEUFERT.

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