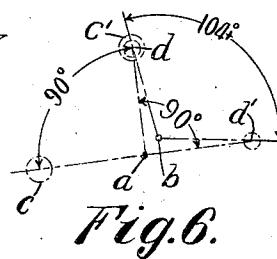
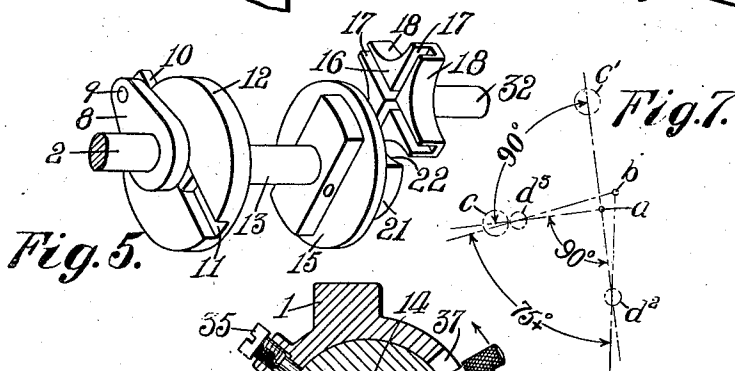
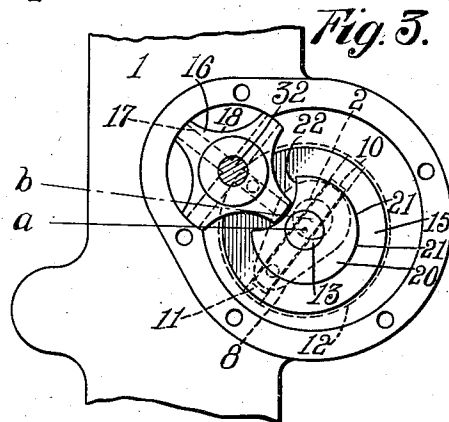
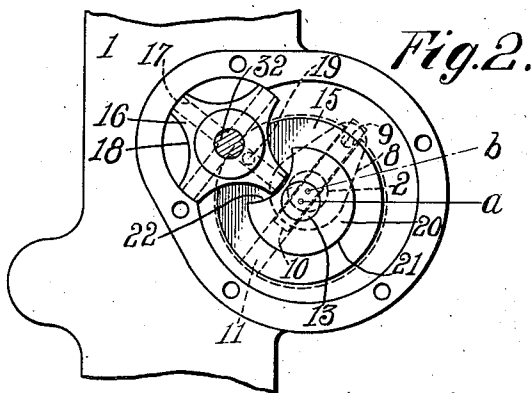
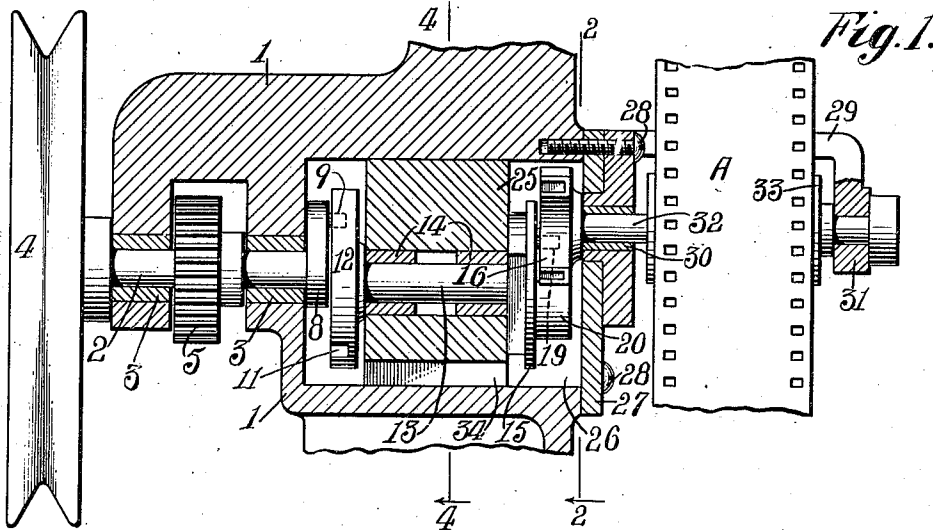


A. F. GALL.
 FILM FEED MECHANISM.
 APPLICATION FILED AUG. 20, 1914.

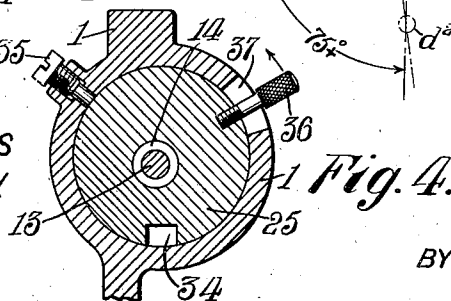
1,174,249.

Patented Mar. 7, 1916.

2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

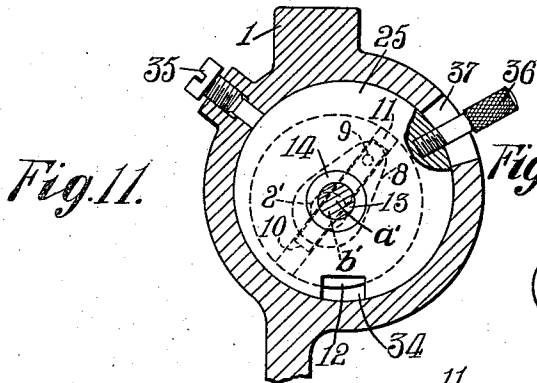


Fig. 11.

Fig. 10.

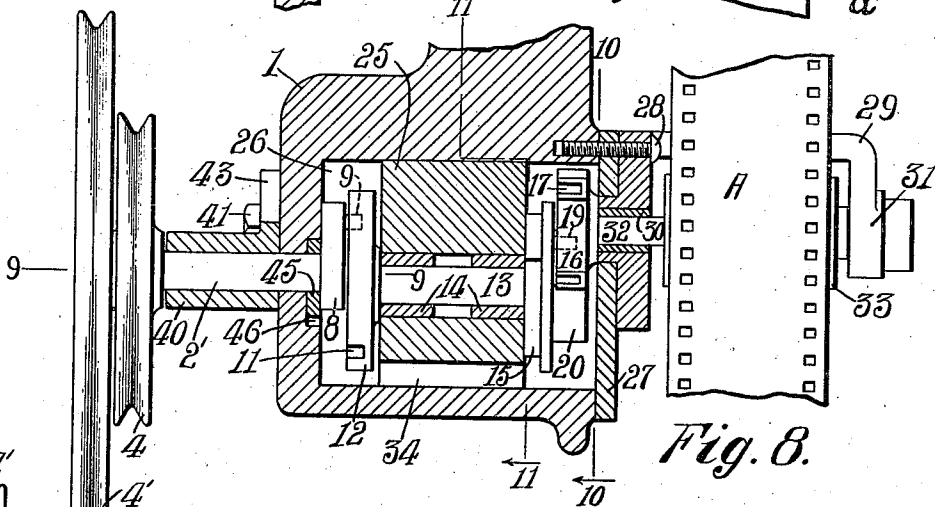
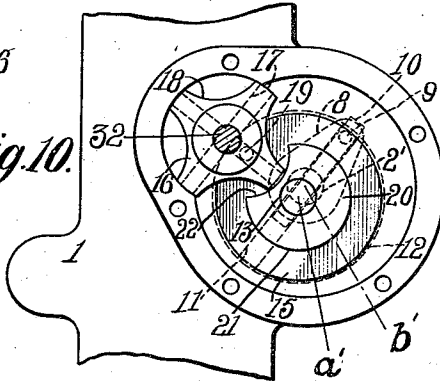


Fig. 8.

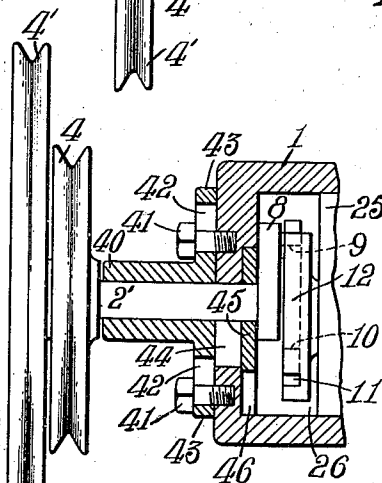


Fig. 9.

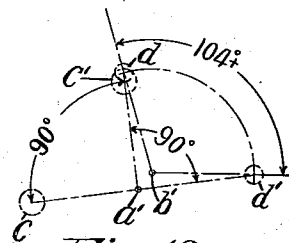


Fig. 12.

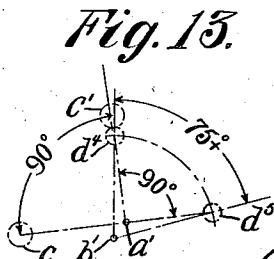


Fig. 13.

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FILM-FEED MECHANISM.

1,174,249.

Specification of Letters Patent.

Patented Mar. 7, 1916.

Application filed August 20, 1914. Serial No. 857,622.

To all whom it may concern:

Be it known that I, ADOLPH F. GALL, a citizen of the United States, and a resident of West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Film-Feed Mechanism, of which the following is a description.

My invention relates to moving picture machines wherein the film is moved intermittently in order to successively bring the pictures or picture spaces thereon in projecting or exposing position, and more particularly to improvements in the intermittent film moving mechanism of such machines.

The principal object of my invention is to provide an improved and at the same time simple and efficient film moving mechanism of this character, which is capable of adjustment to vary the ratio of the period of rest of the film to that of the feeding movement thereof, so as to improve the operation of a motion picture machine in the feeding of the film therethrough under different uses to which the same is liable to be subjected, as, for example, in the production of ordinary "black and white" motion pictures and in the production of motion pictures in colors where it is necessary, in order to secure satisfactory results, to feed the film through the machine and project or take the successive pictures at a rate considerably in excess of that necessary for the proper production of ordinary "black and white" motion pictures.

A further object of my invention is to provide an improved construction of the film driving mechanism whereby the wear and strain on the film during the feeding movements thereof and especially the shocks to which the film is ordinarily subjected at the beginning and end of such movements are minimized.

Other objects of my invention consist in the provision of a simple and efficient adjustment to compensate for wear of certain of the parts of the film moving mechanism and the provisions of a construction whereby an efficient lubrication of certain of the important parts of such mechanism may be obtained.

Still further objects and features of my invention reside in the construction and assemblage of parts and elements hereinafter more fully described and claimed.

In order that my invention may be more clearly understood, attention is directed to the accompanying drawings forming part of this specification, and in which:

Figure 1 is an elevational view, partly in section, of a portion of a motion picture machine with my improved film moving mechanism applied thereto, this mechanism being adjusted with the parts thereof in such relative positions as to obtain a comparatively slow feeding movement of the film; Fig. 2 is a sectional view taken on line 2-2 of Fig. 1; Fig. 3 is a view similar to Fig. 2 but with the film moving mechanism adjusted with the parts thereof in such relative position as to obtain a comparatively fast feeding movement of the film; Fig. 4 is a sectional view taken on line 4-4 of Fig. 1, on a slightly reduced scale; Fig. 5 is a perspective view of the principal parts of my improved film moving mechanism with the parts thereof in the relative positions shown in Figs. 1 and 2; Fig. 6 is an enlarged diagrammatic view illustrating the movement of certain parts of the film moving mechanism, with these parts in the relative positions shown in Figs. 1, 2 and 5; Fig. 7 is a view similar to that of Fig. 6, but with the parts in the relative positions shown in Fig. 3; Fig. 8 is a view similar to Fig. 1 showing a modified form of my invention; Fig. 9 is a fragmentary sectional view, partly in elevation, taken on line 9-9 of Fig. 8; Fig. 10 is a sectional view taken on line 10-10 of Fig. 8; Fig. 11 is a sectional view taken approximately on line 11-11 of Fig. 8 but with the film moving mechanism adjusted to obtain a comparatively fast feeding movement of the film; Fig. 12 is an enlarged diagrammatic view illustrating the movement of certain parts of the film moving mechanism when the latter is adjusted with the parts thereof in the relative positions shown in Figs. 8 and 9; and Fig. 13 is a view similar to Fig. 12, but with the film moving mechanism adjusted with the parts thereof in the relative positions shown in Fig. 11.

In all the views, the same reference characters and numerals are used to denote corresponding parts.

Referring to the drawing, and especially Figs. 1-5 thereof, reference character 1 designates part of the frame of a motion picture machine. A shaft 2 is mounted in suit-

able bearings 3, 3 in frame 1 and has secured to it at one end a belt pulley 4 adapted to be operatively connected to a motor when it is desired to operate the machine by a motor, while a gear wheel 5 is secured to the shaft intermediate its ends, said gear wheel being adapted to mesh with another gear wheel (not shown) provided with a handle to be turned manually if the machine is to be operated by hand. A crank 8, provided with a pin 9, is secured to the other end of shaft 2. The pin 9 is pivotally connected with a block 10 slidably mounted in a groove 11 of a disk 12. This disk 12 is secured to one end of a shaft 13 mounted in bearings 14, 14 carried by a cylindrical block 25 eccentrically thereof. The block 25 is mounted in a cylindrical chamber 26 formed in frame 1 substantially concentric with shaft 2, whereby shaft 13 is supported eccentrically with respect to shaft 2. To the other end of the shaft 13 is secured the driving member 15 of a mechanism commonly known as a Geneva movement. The outer end of chamber 26 is closed by a plate 27 suitably secured, as by screws 28, to the frame 1.

Reference character 29 represents a bracket which is secured, as by means of one or more of the screws 28 to the plate 27; and this bracket is provided with a pair of spaced aligned bearings 30 and 31 the axes of which are substantially parallel to shafts 2 and 13. That portion of bracket 29 provided with the inner bearing 30 has a projection extending through and fitting closely in an aperture provided therefor in plate 27. A shaft 32 is journaled in bearings 30 and 31 of bracket 29, and to the inner end of this shaft in chamber 26 is secured the driven member or "star-wheel" 16 of the Geneva movement. Between the bearings 30 and 31 shaft 32 has secured thereto a sprocket wheel 33 the teeth of which engage the perforations in the edge portions of film A to move the latter through the machine. The star wheel 16 is provided with a suitable number of radial grooves or slots 17 and the periphery of the wheel between the ends of the slots is formed with concave locking surfaces 18. The driving member 15 of the Geneva movement is provided with the usual pin 19, which coacts with the slots 17 of star wheel 16 to impart intermittent rotary movement to the latter, and with the usual locking cam 20, the surface 21 of which is adapted to coact with the locking surfaces 18 of the star wheel to lock the latter stationary between successive movements thereof by pin 19. The periphery of cam 20 is provided adjacent the pin 19 with a recess 22 to permit the rotary movement of the star wheel by pin 19. The grooves or slots 17 in the star wheel are preferably four in number and are spaced 90° apart, whereby on each rotation of shaft 13, shaft 32 will,

by means of the Geneva movement, be rotated through a quarter of a revolution and the film A moved a distance equal to one picture space, in a manner well known. Movement of the star wheel, and consequently feeding movement of the film by the sprocket 33, takes place only during the engagement of the pin 19 with one of the slots 17 of the star wheel, or during one quarter of each revolution of the shaft 13, the star wheel being held stationary, by the coaction of the locking cam 20 and the locking surfaces 18 of the star wheel, and the film consequently being at rest, during the remaining three quarters of each revolution of shaft 13. It will be apparent, therefore, that if shaft 13 moved at a uniform angular speed the ratio of the feeding movement of the film to the period of rest thereof would be as 1 to 3, as is the case in a majority of the motion picture machines now used. Shaft 13, however, is driven from shaft 2 by means of the connection 8, 9, 10, 11 and 12, and as these shafts are eccentrically disposed and as shaft 2, during the operation of the machine, rotates at a substantially uniform speed, it will be apparent that the speed imparted to shaft 13 will, during one half of each rotation thereof, gradually and uniformly increase from a minimum point to a maximum point and, during the other half of each rotation, will gradually and uniformly fall off or decrease from the maximum point to the minimum point. Consequently, shaft 13 during a part of each rotation thereof, must move faster, and, during another part of each rotation, slower than shaft 2. The distance of pin 9 from the axis of shaft 13 constantly changes during the rotation of shafts 2 and 13, this pin being nearest such axis, in the position shown in Fig. 3, when the speed of shaft 13 reaches its maximum, and farthest therefrom, in the position shown in Fig. 2, when the speed of shaft 13 falls to its minimum.

The mechanism shown in Fig. 1 is constructed to enable it to be adjusted so that the movements of the star wheel 16, and therefore the feeding movements of the film, will occur either during the fastest 90° movements of shaft 13 or during the slowest 90° movements thereof, when shaft 2 is rotated at a uniform speed; Fig. 3 illustrating the adjustment of the parts of the mechanism, which will be referred to as the "fast" adjustment, when the film is moved during the fastest 90° movement of shaft 13, and Figs. 1, 2 and 5 illustrating the adjustment of the parts of the mechanism, which will be referred to as the "slow" adjustment, when the film is moved during the slowest 90° movement of shaft 13. To change this mechanism from one of these adjustments to the other, it is merely necessary, after removing plate 27 to move shaft 13 away

from shaft 2 to disengage the block 10 and the slot 11 in disk 12, to then turn these shafts relatively to each other through 180° , and to finally move the shafts toward each other and reengage the block 10 and the slot 11. Or this may be effected in any manner by which the pin 19 will be turned through 180° about the axis of shaft 13 and relative to the point of engagement between shafts 2 and 13, as, for example, by loosening disk 15, turning the same 180° on shaft 13, and then securing the disk to this shaft.

In the "slow" adjustment of the mechanism, pin 19 will have moved star wheel 16 from a position of rest through one half of the angular movement imparted thereto on each rotation of shaft 13, or 45° , when the latter reaches its slowest speed; pin 19 then being at the limit of its inward movement in one of the slots 17 of the star wheel 16 and pin 9 being in its farthest position from the axis of shaft 13, as clearly shown in Fig. 2. In the "fast" adjustment of the mechanism, pin 19 will have moved star wheel 16 from a position of rest through one half the angular movement imparted thereto on each rotation of shaft 13, when the latter reaches its maximum speed; pin 19 then being at the limit of its inward movement in one of the slots 17 of the star wheel 16 and pin 9 being in its nearest position to the axis of shaft 13, as shown in Fig. 3. In either case, it is apparent that the time of movement of the star wheel 16 through one quarter of a revolution to accomplish one feeding movement of the film, and consequently the ratio of the period of movement of the film to the period of rest thereof, will depend directly on the angle through which shaft 2 must be moved in order to effect such movement of the star wheel 16, and that, in turn, this angle will depend on the eccentricity of shafts 2 and 13 and the distance of pin 9 from the axis of shaft 2. I preferably construct and arrange the mechanism, however, so that when the same is in "slow" adjustment a quarter turn of the star wheel 16 will be effected by a movement of shaft 2 through an angle of approximately 104° , and when in its "fast" adjustment a quarter turn of the star wheel will be effected by a movement of shaft 2 through an angle of approximately 75° . Consequently when the mechanism is in its "slow" adjustment, the ratio of the period of movement to the period of rest of the film will be as 104° to 256° , or approximately 1 to $2\frac{1}{2}$, while when the same is in its "fast" adjustment, this ratio will be as 75° to 285° , or approximately 1 to 4. In the present construction, pin 19 is spaced 90° from pin 9 about the axis of shaft 13 in all adjustments of the mechanism.

For an understanding of the manner in which the angular movements of shaft 13

necessary to effect the 90° movements of the star wheel 16 for the "slow" and "fast" adjustments of the mechanism may be determined, attention is directed to Figs. 6 and 7 in conjunction with Figs. 2 and 3 respectively; it being assumed for the purposes of illustration, that shafts 2 and 13, as viewed in Figs. 2 and 3, rotate in a clockwise direction.

In Fig. 6, illustrating the movements of certain parts of the mechanism when adjusted as shown in Fig. 2, a represents the center or axis of shaft 13 and b the center or axis of shaft 2. Reference character c represents the position of pin 19 at the moment of engaging one of the grooves 17 of the star wheel, while c' represents the position of said pin as it leaves the groove after having imparted one quarter of a revolution to the star wheel and after having, itself, turned through an angle of 90° about the axis a of shaft 13. In the meantime, the pin 9, which, with the mechanism adjusted as shown in Fig. 2, will be 90° in advance of the pin 19, will move from d to d' , or 90° with respect to the axis a of shaft 13. But the angular movement of the pin 9 about the axis b of shaft 2, and consequently that of the shaft 2, will be measured by the angle bound by the lines joining d and d' with b , or in other words, will be represented by the angle $d b d'$, which is found to be substantially 104° .

In Fig. 7, illustrating the movements of certain parts of the mechanism when adjusted as shown in Fig. 3, a and b represent the axes of shafts 13 and 2 respectively. Reference character c represents the position of pin 19 at the moment of engaging one of the grooves 17 of the star wheel, while c' represents the position of said pin as it leaves the groove after having imparted one quarter of a revolution to the star wheel and after having, itself, moved through an angle of 90° about the axis of shaft 13. In the meantime the pin 9, which, with the mechanism adjusted as shown in Fig. 3, will be 90° behind the pin 19, will move from d^2 to d^3 , or 90° with respect to the axis a of shaft 13. But the angular movement of the pin 9 about the axis b of shaft 2, and consequently that of the shaft 2, will be represented by the angle $d^2 b d^3$, which is approximately 75° .

Referring especially to Fig. 1, the chamber 26 in frame 1 is filled with a suitable lubricant, and in order to provide for the proper circulation thereof, to secure efficient lubrication of the devices connecting shafts 2 and 13 and 13 and 32, which devices are respectively disposed in the opposite end portions of chamber 26 beyond the ends of block 25, the latter is provided with a groove 34 establishing communication between such end portions of the chamber.

The block or member 25 as clearly shown in Fig. 4 is securely held in position in chamber 26 by means of a set screw 35 and has secured thereto a rod or bolt 36 which extends through a slot 37 in the side wall of the chamber. Owing to the fact that shaft 13 is journaled eccentrically in member 25, a slight turning movement of the latter in chamber 26 would effect an adjustment of the relative positions of the star wheel 16 and its driving member 15 to compensate for wear therebetween. This adjustment may be readily effected, after loosening the set screw 35 by moving the bolt 36 in slot 37 in the proper direction.

In the modification illustrated in Figs. 8-11, the dimensions, arrangements and construction of the parts are, in the main, the same as in the form of my invention disclosed in Figs. 1-5. Instead, however, of the shaft 13 being driven from a shaft journaled in a fixed position in the frame 1, the same is driven from a shaft 2' adjustably mounted for lateral movement with respect thereto. The adjustable mounting for shaft 2' consists of a flanged bearing 40 in which the shaft is journaled, and which is secured to that portion of the frame 1 forming the end wall of chamber 26, by means of bolts 41 extending through slots 42 in the flanges 43 of the bearing and threaded into the said end wall. Reference character 44 represents a slot in the end wall of chamber 26 through which the shaft 2' extends. This slot 44 is of sufficient length to permit the bearing 40 to be shifted, after loosening the bolts 41, to the extent provided for by slots 42. The shaft 2' passes through an aperture in a plate 45, which plate is slidably mounted in an elongated recess 46 on the inside of the end wall of the chamber 26 and this plate will be moved with the shaft when the latter is shifted with the bearing 40. The plate 45 is of sufficient length to always cover the slot 44, and consequently prevents the escape of lubricant from the chamber 26 and the entrance of dirt and the like thereinto. In addition to the pulley 4 another pulley 4' is secured to the outer end of shaft 2', to adapt the latter to be connected to and driven at two different speeds, one twice as great as the other, from a motor running at a uniform speed. When bearing 40 is shifted to the position shown in Fig. 9, in which the bolts 41 abut against one end of slots 42, shaft 2' will be disposed to one side of shaft 13 and the construction of the mechanism shown in Figs. 8-11 is such that at this time the eccentricity of these two shafts, or the distance between the axes thereof will be equal to the eccentricity of shafts 2 and 13 in Figs. 1-5, and the relative positions of the parts of the mechanism will be the same as in Figs. 1, 2 and 5 and as shown in Figs. 8 and 10. Accordingly, the mechanism

will be in "slow" adjustment corresponding exactly to the "slow" adjustment of the construction of Figs. 1-5, and each of the intermittent movements of the star wheel 16 and the film will be effected during the slowest 90° movement of shaft 13, and during a movement of shaft 2' through an angle of 104°. Fig. 12, which is the same as Fig. 6, taken in conjunction with Fig. 10 serves to show how the latter angle may be determined.

In Figs. 10 and 12 reference characters a' and b' represent the axes of shafts 13 and 2' respectively. In Fig. 12 angle $d b' d'$, represents the angle through which the pin 9 moves about the axis b' of shaft 2', and consequently the angle through which the latter shaft turns, as the pin 19 moves from c , representing the position of this pin at the moment of engaging one of the grooves 17 of the star wheel, through an angle of 90° about the axis a' of shaft 13 to c' , representing the position thereof as it leaves the groove after having imparted one quarter of a revolution to the star wheel, and while pin 9 moves from d to d' through an angle of 90° with respect to the axis a' of shaft 13. This angle $d b' d'$ will be found to be approximately 104°.

The length and disposition of slots 42 are such that in shifting bearing 40 from the position shown in Fig. 9 to the position in which bolts 41 engage the other ends of these slots, the shaft 2' will be first moved toward the axis of shaft 13 until the axes of these shafts coincide, and then away from the axis of shaft 13, until the same is finally at the same distance from the latter as in this figure, but on the other side thereof. The parts of the mechanism being in the positions shown in Figs. 8, 9 and 10 at the beginning of such shifting movement of the shaft 2', at the end thereof the crank 8, pin 9 and block 10 will be in the positions indicated in Fig. 11, but the positions of the remaining parts will be unchanged. The mechanism will now be in "fast" adjustment, for although the movements of the star wheel, and accordingly the feeding movements of the film, will be effected during the same 90° movements of shaft 13 as in the "slow" adjustment, these movements will now be the fastest instead of the slowest 90° movements of this shaft, as pin 9 instead of being at a maximum distance from the axis of shaft 13, which coincides with the point of minimum speed of the latter, when the star wheel 16 has been turned by pin 19 through one half of one of its movements, will be at a minimum distance therefrom, which coincides with the point of maximum speed of this shaft.

In the "fast" adjustment of the mechanism shown in Figs. 8 to 11, the pin 9 is 90° in advance of the pin 19 with respect to the

axis of shaft 13, instead of 90° behind the same, as in the mechanism of Figs. 1 to 5. Accordingly, Fig. 13 will clearly represent the angular movements of shafts 2' and 13 during one 90° movement of the star wheel for the "fast" adjustment of the mechanism of Figs. 8 to 11. In this figure, a' and b' represent the axes of shaft 13 and 2' respectively. Reference character c represents the position of pin 19 at the moment of engaging one of the grooves 17 of the star wheel, while c' represents the position of said pin as it leaves the groove after having imparted a 90° movement to the star wheel and after having itself, together with shaft 13, turned through 90° about the axis a' . During this movement of pin 19, the pin 9 will move from d^4 to d^5 , or 90° with respect to the axis a' of shaft 13; but the angular movement of the pin 9 about the axis b' of shaft 2', and consequently that of shaft 2', will be represented by the angle $d^4 b' d^5$, which is substantially 75°.

The ratios of the period of movement of the film to the period of rest thereof for the "slow" and "fast" adjustments of the mechanism shown in Figs. 8 to 11, will, of course, be the same, as for the "slow" and "fast" adjustments of the mechanism shown in Figs. 1 to 5 viz. substantially 1: 2½ and 1: 4 respectively. With the mechanism of Figs. 8 to 11, any desired ratio between these limits may be obtained by adjusting the bearing 40 with the shaft 2 to the proper position between the limits defined by the ends of slots 42 and bolts 41, and securing the same in such position.

It has been found desirable in the motion picture art to make the ratio of the period of rest of the film, during which the pictures are projected or taken, to the period of movement of the film, during which the pictures or picture spaces are shifted, as great as possible. When the period of rest is prolonged, in projecting the pictures, a less intense light is necessary and consequently a weaker current may be employed and the danger of setting fire to the film is lessened, while in taking pictures, the lens employed need not be so fast and the amount of light necessary for obtaining good exposures will be lessened.

With the mechanism above described, in "fast" adjustment the ratio of the period of rest to the period of movement obtained is considerably greater than that obtained by the ordinary Geneva movement. This ratio has been found very satisfactory in the taking or projecting of ordinary "black and white" pictures where the film is usually moved at a speed of about 16 pictures or picture spaces a second. Moreover, when the film is moved at this rate by the mechanism described herein in "fast" adjustment, the wear and strain on the film will be

greatly reduced. This is because of the fact that the velocity of pin 19 progressively increases during the first half of any movement of the star wheel 16, and decreases or falls off during the last half, due to the variable speed imparted to the shaft 13. Consequently, the pin 19 will "pick up" the star wheel 16 and disengage therefrom in a more gradual manner, and the teeth of the sprocket 33 and the edges of the perforations in the film will not be brought into engagement in so violent a manner at the beginning and end of the feeding movements of the film.

In the production of motion pictures in colors, where it is necessary to move the film at a rate much greater than in the case of the production of ordinary "black and white" motion pictures, for example, at the rate of 32 pictures or picture spaces a second instead of 16 a second, the wear and strain imposed on the film by the film moving mechanism when operated at the necessary speed is, of course, greatly increased. This wear and strain, however, may be reduced by employing my improved film moving mechanism in the "slow" adjustment thereof, whereby the ratio of the period of rest of the film to the period of movement thereof will be decreased and the period of movement of the film will be increased.

While I have described the preferred embodiments of my invention, it is to be understood that the same are subject to many changes and modifications in the size, form, number and arrangement of parts without any departure from the spirit of the invention.

Having now described my invention, what I claim as new therein and desire to protect by Letters Patent is as follows:—

1. In a moving picture machine, the combination of means adapted to engage and move a film, a driven shaft, a connection between said means and said driven shaft comprising an intermittent movement, a driving shaft, and means connecting said shafts whereby when said driving shaft rotates at a uniform speed a variable angular speed will be imparted to the driven shaft, the connection between said shafts being adjustable to secure different angular speeds of the driven shaft when the driving shaft rotates at a uniform speed, substantially as described.

2. In a moving picture machine, the combination of means adapted to engage and move a film, a driving shaft, a driven shaft eccentric to the driving shaft and operatively connected to said film engaging and moving means, and a driving connection between said shafts, said connection being adjustable to vary the relative angular movement of said shafts, substantially as described.

3. In a moving picture machine, the combination of means adapted to engage and move a film, an intermittent movement operatively connected therewith, and means for operating said movement comprising a driven shaft operatively connected with said movement, a driving shaft eccentric to the driven shaft, and a driving connection between said shafts comprising a member rigidly secured to one of the shafts and having a pivotal and sliding engagement with the other shaft, whereby the intermittent movement is actuated in each revolution of the driven shaft during a period including one extreme of the variable movement of the latter, substantially as described.

4. In a moving picture machine, the combination of means for engaging and moving a film, mechanism for imparting intermittent movement to said means, and means for actuating said mechanism comprising a pair of eccentrically disposed shafts and a connection between said shafts, said connection comprising a member rigidly fastened to one of said shafts but pivotally and slidably engaged with the other shaft and being adjustable to effect a variation in the speed of said intermittent movement, substantially as described.

5. In a moving picture machine, the combination of means for engaging and moving a film, mechanism for imparting intermittent movement to said means, and means for actuating said mechanism comprising a driving shaft, a driven shaft, and a connection between said shafts, said connection being adjustable to effect changes in the ratio of the period of motion to the period of rest of said intermittent movement, substantially as described.

6. In a moving picture machine, film operating mechanism comprising an element for engaging and moving the film, and actuating means for said element comprising a continuously rotatable driving member and driven mechanism between said member and said element for imparting intermittent movement to the latter, said driving member and driven mechanism being adjustably connected, whereby, for a given rate of rotation of the driving member, the ratio of the period of movement of said element to the period of rest thereof may be varied, substantially as described.

7. In a moving picture machine, film operating mechanism comprising a rotatable member, means actuated thereby for intermittently moving a film, a crank for driving said member and rotatable about an axis normally eccentric to the axis of rotation of said member, said crank having a pivotal and sliding connection with said member whereby the film moving means is actuated in each revolution of said member during a period including one extreme of the variable

movement of the latter, substantially as described.

8. In a moving picture machine, film operating mechanism comprising a rotatable slotted member, means actuated thereby for intermittently moving a film, a shaft provided with a crank for driving said member, and a block slidably mounted in the slot of said member and pivotally connected to said crank, said shaft being adjustable to vary the eccentricity of the axis thereof and the axis of rotation of the slotted member, substantially as described.

9. In a moving picture machine, the combination of a sprocket for engaging and moving a film, a continuously rotatable driving shaft, a driven shaft, and an operative connection between said driven shaft and said sprocket for imparting intermittent movement to the latter, said driving and driven shafts being adjustably connected, whereby, for a given rate of rotation of the driving shaft, the ratio of the period of movement of said sprocket to the period of rest thereof may be varied, substantially as described.

10. In a moving picture machine, the combination of a member for engaging and moving a film, means for operating said member comprising an intermittently actuated device, and continuously operable means comprising a shaft for imparting intermittent movement to such device and for holding the same stationary between successive movements thereof, a fixed casing, and a body adjustably mounted for turning movement in said casing and provided with an eccentric bearing in which said shaft is mounted, substantially as described.

11. In a moving picture machine, film operating mechanism comprising means for engaging and moving a film, and a member having an operative connection with said means for imparting intermittent movement thereto, said member being mounted on the frame of the machine for adjustment to compensate for wear in said connection, substantially as described.

12. In a moving picture machine, the combination of means for engaging and moving a film, a driving member, a driven member, a casing, a body mounted in said casing and spaced from the ends thereof, said driven member being mounted in said body, and operative connections between said members and between said driven member and said film engaging and moving means, said connections being respectively disposed in said casing beyond the ends of said body, and said body being provided with means establishing communication between the opposite end portions of the casing to permit lubricant contained in the casing to circulate between said end portions thereof, substantially as described.

13. In a moving picture machine, means for moving a film, comprising an intermittently actuated member and a continuously operable member for imparting intermittent movement to such actuated member and for holding the latter stationary between successive movements thereof, and a bearing in which said continuously operable member is mounted, said bearing being adjustable to compensate for wear of said members, substantially as described.

14. In a moving picture machine, film engaging and moving means, driving means, a casing, operative connecting mechanism for said means disposed in said casing and comprising a shaft, and a bearing for said shaft mounted in said casing and spaced from the ends thereof, said bearing being provided with means establishing communication between the opposite end portions of the casing to permit lubricant contained in the casing to circulate therein, substantially as described.

15. In a moving picture machine, the combination of means adapted to move a film intermittently, driving mechanism, and a connection operatively connecting said driving mechanism and said film moving means, said connection including means adjustable to vary the relative periods of rest and movement of the film, substantially as described.

16. In a moving picture machine, the combination of means adapted to move a film, driving mechanism, and a connection operatively connecting said driving mechanism and said film moving means, said connection including means adjustable to vary the relative movements of the film and said driving mechanism, substantially as described.

This specification signed and witnessed this 7th day of May 1914.

ADOLPH F. GALL.

Witnesses:

WILLIAM A. HARDY,
MARY J. LAIDLAW.