S. KAMOWSKI.

MOTION PICTURE APPARATUS.

APPLICATION FILED APR. 11, 1917.

1,258,226.

Patented Mar. 5, 1918.

3 SHEETS—SHEET 1.

Fig. 1.

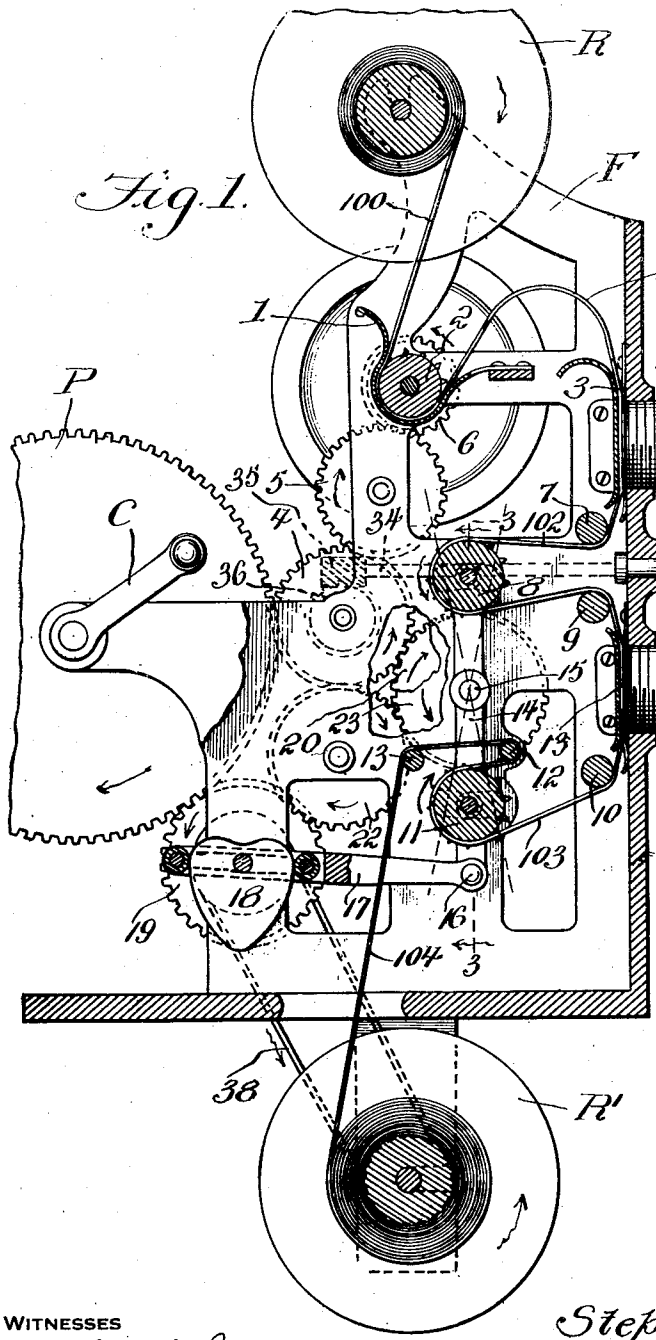
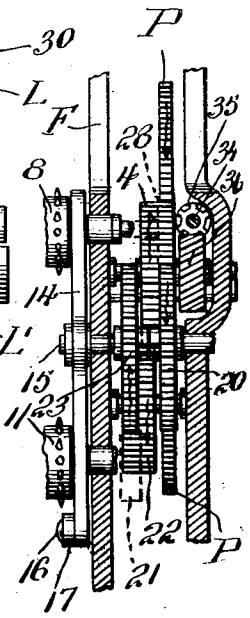


Fig. 3.



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3 SHEETS—SHEET 2.

Fig. 2.

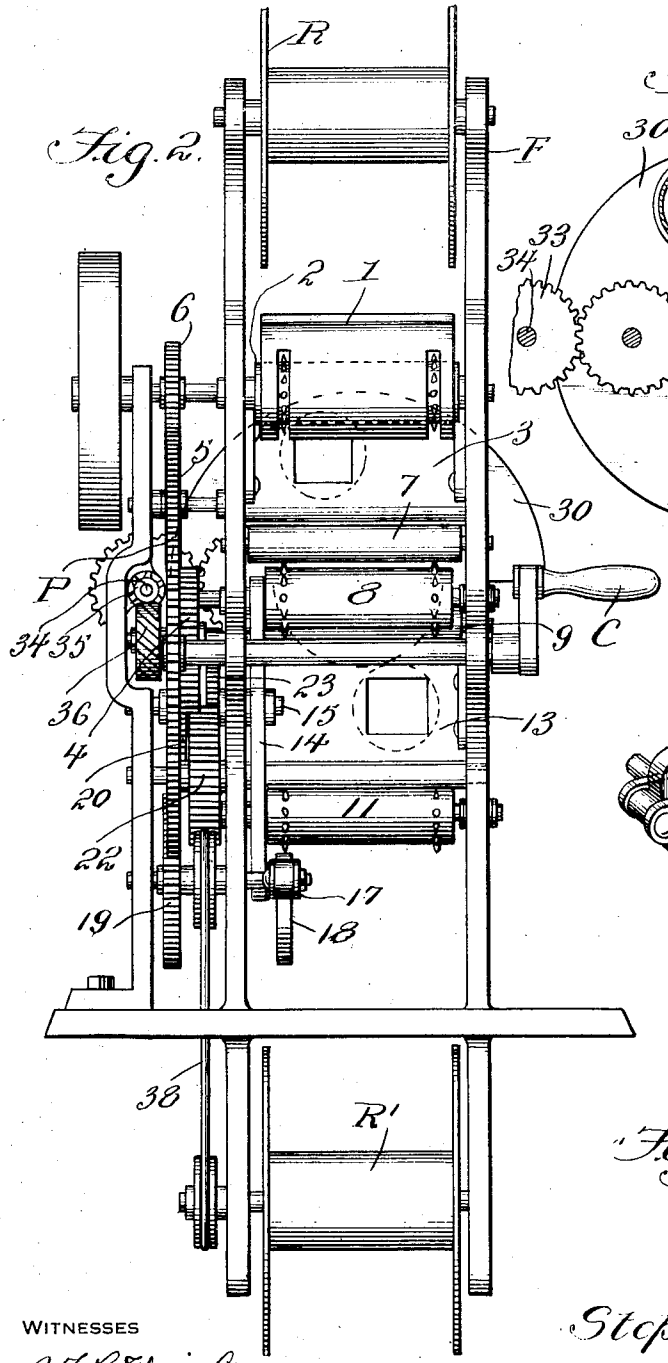


Fig. 4.

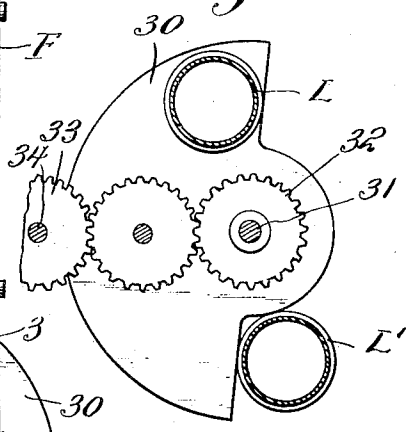
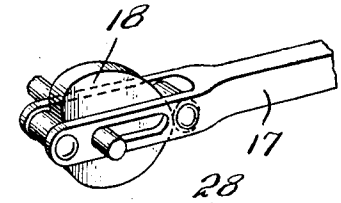


Fig. 5.



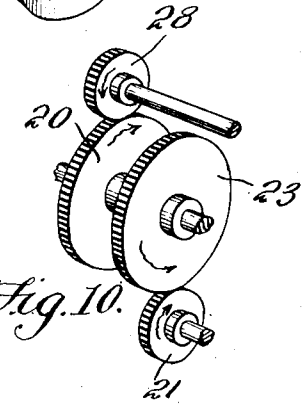


Fig. 10.

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3 SHEETS—SHEET 3.

Fig. 8.

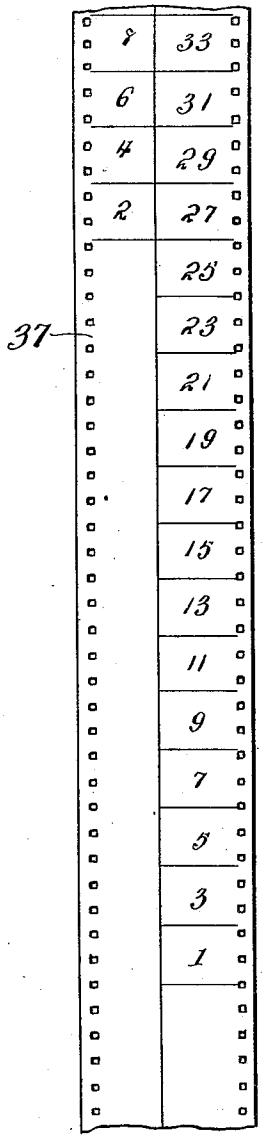


Fig. 9.

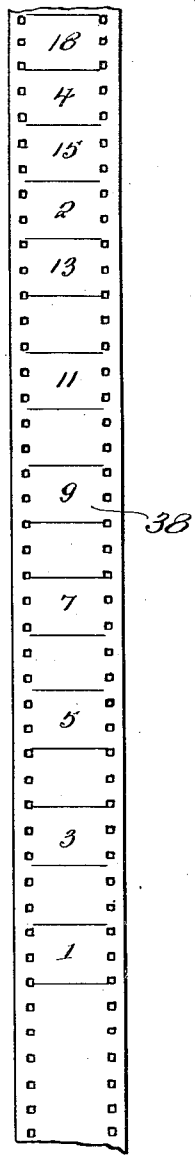


Fig. 6.

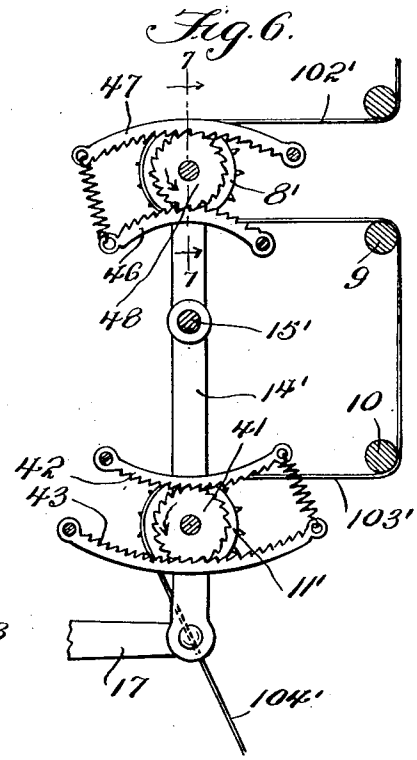
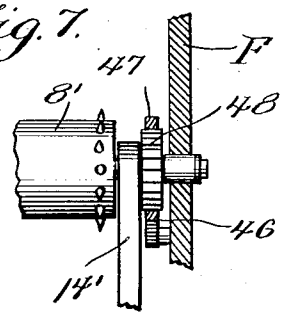


Fig. 7.



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MOTION-PICTURE APPARATUS.

1,258,226. Specification of Letters Patent. Patented Mar. 5, 1918.

Application filed April 11, 1917. Serial No. 161,233.

To all whom it may concern:

Be it known that I, STEPHEN KAMOWSKI, a citizen of the United States, residing at Nanticoke, in the county of Luzerne and State of Pennsylvania, have invented new and useful Improvements in Motion-Picture Apparatus, of which the following is a specification.

This invention relates to motion picture apparatus, and more especially to those of the multiplex or duplex type; and the object of the same is, broadly, to prevent flickering when a special double film is used or when a special single film is employed.

This object is carried out by mechanism which involves special features of improvement, all as hereinafter more fully described and claimed and as shown in the drawings wherein:—

Figure 1 is a side view, partly broken away, and Fig. 2 is a rear view of this machine complete.

Figs. 3 and 4 are sectional details on the lines 3—3 and 4—4 of Fig. 1 respectively.

Fig. 5 is a perspective detail of the cam.

Fig. 6 is a fragmentary detail in side elevation showing a slight modification, and Fig. 7 is a section on the line 7—7 of Fig. 6.

Fig. 8 is an elevation of a portion of the double film and Fig. 9 of a single film which may be used in my machine.

Fig. 10 is a perspective detail of the counter-gears on the shaft, and the other gears connecting therewith.

All the mechanism of this apparatus is mounted within a frame, broadly designated herein by the reference letter F, the power wheel P may be driven by a crank C or other means not necessary to amplify, the upper and lower reels are lettered R and R′ and the upper and lower lenses L and L′ and the source of light is omitted. The film as usual leads from the upper or feed reel R through the machine, past the lenses and behind the shutter, and is wound on the lower or winding reel R′, and the movement of this film is controlled by sprockets driven from the source of power which in the present case is the gear wheel P. It is broadly the purpose of the present invention to feed the film in such manner past the two lenses that when the shutter uncovers one lens the film opposite thereto is stationary, whereas, the film opposite the other and at this time the covered lens is moving quickly forward, and yet the rotary motion of the two reels is constant so that there is no jerk on the film and no injury thereto. As a result a certain looseness or loop of the film must accumulate above the tension of the upper lens when the film is not moving past the same, and this is permissible because there is space within the framework at this point, but there is hardly space for the accumulation of a similar loop within the lower portion of the framework, and accordingly my mechanism takes up this loop so that the film is well guided to the lower reel R′.

Coming now to the details of the present invention, the film 100 is led from the upper reel first under a tension spring 1 and around a sprocket 2, and thence to the tension spring 3 behind the upper lens L, and between these springs it has an opportunity to make the loop 101 as explained below. The power wheel P is connected through gears 4 and 5 with a gear 6 on the shaft of the sprocket 2 for rotating the latter in the direction of the arrow so that the film 100 is drawn constantly from the reel R. After passing down by the upper lens L, the film passes around a roller 7 and is given a bight 102 around a sprocket 8, thence it passes over another roller 9, between a tension spring 13 and the lower lens L′, over a roller 10, and is given a second bight 103 around a sprocket 11, thence it is carried forward over a roller 12, and backward over a roller 13′, and finally downward in a stretch 104 and onto the lower reel R′. My mechanism is such that the film where it makes the bights 102 and 103 offset its looseness where it makes the loop 101, as will be explained below. A rock lever 14 is pivoted at 15 in the frame F and supports the shafts of said sprockets, and the lower end of this lever is pivoted at 16 to a pushrod or pitman 17 which is actuated by a cam 18 whose shaft has a gear 19 driven from the power wheel P; and the result is that the sprockets are moved simultaneously and oppositely as the crossed dotted lines in Fig. 1 indicate.

For rotating the sprockets, the gear 4 (which is quite wide on its periphery) meshes with a counter-gear 20 which in turn engages a gear 28 on the shaft of the upper sprocket 8 to drive the latter in the direction of the arrow thereon, and the wide gear 4 also meshes with an idle gear 22 which in turn meshes with a second counter-gear 23 loose on the same shaft that supports the counter-gear 20, and this gear 23 drives a

gear 21 on the shaft of the lower sprocket 11 in the direction of the arrow on the latter. In Figs. 1, 2 and 3 the construction is such that the sprockets are simultaneously rotated at the same rate of speed, while they are swung to and fro for a purpose yet to be explained. The shutter 30 is exactly one-half a disk, its hub having a weight on the cut-away side to balance the other half as seen in Fig. 4, and its shaft 31 has a gear 32 intermeshing with another gear 33 on a shutter drive shaft 34 journaled in bearings in the frame F and provided with a helical gear 35 which is driven by a pin gear 36 fast on the shaft of the wide gear 4. The lenses L and L′ are not directly above each other, as will be seen from Figs. 2 and 4, and the double film 37 shown in Fig. 8 has its first picture numbered 1 disposed on one-half and its second picture numbered 2 disposed on the other half some distance in rear of the first, then the third picture numbered 3 is on the first-mentioned half adjacent that numbered 1, and so on—the pictures being in staggered relation to each other and stepped a distance which equals the length of the film from the upper lens L through the bights 102 and over the roller 9 to the lower lens L′.

With this construction, the operation of my machine is as follows:—The uppermost or initial sprocket 2 draws the film 100 from the reel R at a constant speed, but obviously it can be moved past the upper lens only when the shutter 30 closes this lens, whereas it must not move at all when the shutter exposes this lens. If we assume that this lens exposes pictures bearing even numbers in Fig. 8, then the lower lens L′ will expose pictures bearing odd numbers in the same view, and after number 1 is exposed, immediately number 2 is exposed, and then number 3, and so on. When the rocking mechanism 17, 18 swings the upper end of the rock lever 14 forward, the upper sprocket 8 moves toward the roller 7 while it is rotated reversely at just a proper speed to cause it to travel within the bight 102 of the film so that the latter is not drawn at all through the tension 3; or in other words, the picture opposite the lens L is stationary while the open side or cut-away portion of the disk exposes this lens. Meanwhile the lower arm of the rock lever 14 is swinging to the rear and this movement together with its rotation draws on the bight 103 of the film so as to take up the looseness between the sprocket 8 and the roller 9 and to draw said looseness down through the tension 13 and under the roller 10; or in other words the stretch of film behind the lens L′ (which is now covered by the shutter) is moved quickly forward one step, or advanced so that picture number 1 is replaced by picture number 3 on the film 37 while picture number 2 is being exposed. When the rock lever 14 swings in the opposite direction, the reverse action takes place. In other words at this time, while the lower lens L′ is uncovered, the film forward of the tension 13 is stationary and the rearward movement of the upper sprocket 8 draws on the bight 102 so that the loop 101 is taken up and picture number 2 is replaced by picture number 4 at the same time that picture number 3 is being exposed. It follows that the picture being exposed is absolutely stationary for an instant while the cut-away side of the shutter passes the lens, and the alternate or intervening picture on the other half of the film 37 is being moved quickly across the other lens which at this time is covered by the solid half 30 of the shutter; and yet there is no jerking on the film 100 where it passes off the upper reel, and it is fed constantly and reliably to the lower reel R′ which latter may be driven by any suitable means such as the belt 38 for instance.

In the modified form of my invention illustrated in Figs. 6 and 7 a single film 39 is used as shown in Fig. 9, but picture number 2 is disposed a distance in rear of picture number 1 equal to the same distance on the film 37, and the intervening even-numbered pictures are alternated with the odd-numbered pictures as therein shown. In Fig. 6 the bight 102′ leads around the upper sprocket 8′, thence over rollers 9 and 10, around the lower sprocket 11′ and directly as at 104′ to the lower reel—the construction being much the same as that above described excepting that the rollers 12 and 13′ are obviously omitted. The rocking mechanism 17, 18 of Fig. 5 is here substantially duplicated. The rock lever 14′ supports the shafts of the two sprockets, but its pivot 15′ is not midway between those shafts. The reason is because the lower bight 103′ of the film here passes over the lower roller 11′ instead of under it as shown in Fig. 1, and it is essential that when the upper sprocket moves inward and the lower sprocket moves outward they shall respectively accumulate and take up equal stretches of the film because they rotate in opposite directions. In this modified construction the upper roller has on its shaft a ratchet wheel 48 whose teeth engage long pawl-arms 47 and 46 disposed respectively above and below the wheel and spring-pressed toward it as shown, and the lower ratchet wheel 41 is also disposed between similar pawl-arms 42 and 43, all arms being curved so that as the rock lever swings and the ratchet wheels move to and fro, they will be turned in the proper direction. This detail of construction obviates the necessity for the specific sprocket-driving mechanism shown in Fig. 3, but the results are the same and the uses and operation of the device are identical with those above described. Obvi-

ously when a single film 39 is employed, the lenses L and L′ will be disposed directly above each other and the stepped disposition of the various pictures along the film will be such as to carry out the operation set forth above. It is quite possible that the broad principle of my invention could be successfully accomplished by other mechanisms, but these types are considered sufficient to give a clear understanding of the idea.

What is claimed as new is:—

1. In a moving picture apparatus, the combination with two lenses, a shutter uncovering them alternately, and a film having its pictures stepped so as to be successively exposed through the lenses; of a constantly rotating sprocket feeding the film through a loop to the upper lens, superimposed sockets beneath the upper lens and around which bights of the film are led, gears on the shafts of said sprockets, counter gears respectively in mesh therewith, and means for driving said counter-gears constantly in opposite directions, for the purpose set forth.

2. In a moving picture apparatus, the combination with two lenses, a shutter uncovering them alternately, and a film having its pictures stepped so as to be successively exposed through the lenses; of a constantly rotating sprocket feeding the film through a loop to the upper lens, a tension adjacent the latter, a pair of sprockets around which bights of the film are led, a tension adjacent the lower lens over which the film between its bights is led, a rock lever supporting said pair of sprockets, a pitman connected with said rock lever, and cam mechanism driven by the power wheel of the apparatus for actuating said pitman in timed relation with the movements of said shutter.

3. In a moving picture apparatus, the combination with two lenses, a shutter uncovering them alternately, and a film having its pictures stepped so as to be successively exposed through the lenses; of a constantly rotating sprocket feeding the film through a loop to the upper lens, a tension adjacent the latter, superimposed spaced sprockets around which bights of said film are passed beneath the upper lens, a tension adjacent the lower lens over which the film is passed between its bights, a rock lever supporting said sprockets and pivoted between them, means for swinging said lever, and means for positively driving said sprockets at the same speed that the lever is rocked, for the purpose set forth.

4. In a moving picture apparatus, the combination with two lenses, a shutter uncovering them alternately, and a film having its pictures stepped so as to be successively exposed through the lenses; of a constantly rotating sprocket feeding the film through a loop to the upper lens, a tension adjacent the latter, superimposed sprockets beneath the upper lens and around which bights of the film are led, a tension adjacent the lower lens over which the film is led between said bights, gears on the shafts of said sprockets out of line with each other, counter gears concentrically mounted between said other gears and respectively in mesh therewith, and means for driving said counter-gears simultaneously in opposite directions at the same speed, for the purpose set forth.

5. In a moving picture apparatus, the combination with two lenses, means for uncovering them alternately, and a film having its pictures stepped so as to be successively exposed through the lenses; of a constantly rotating sprocket feeding the film through a loop to the upper lens, a tension adjacent the latter, superimposed sprockets beneath the upper lens and around which bights of the film are led, a tension adjacent the lower lens over which the film is led between said bights, gears on the shafts of said sprockets out of line with each other, counter-gears concentrically mounted between said other gears and respectively in mesh therewith, a wide gear driven from the power wheel of the apparatus and in mesh with one of said counter-gears, and an idle gear meshing with the wide gear and the other counter-gear for rotating the latter oppositely to and at the same speed as the first-named counter-gear, for the purpose set forth.

In testimony whereof I affix my signature.

STEPHEN KAMOWSKI.