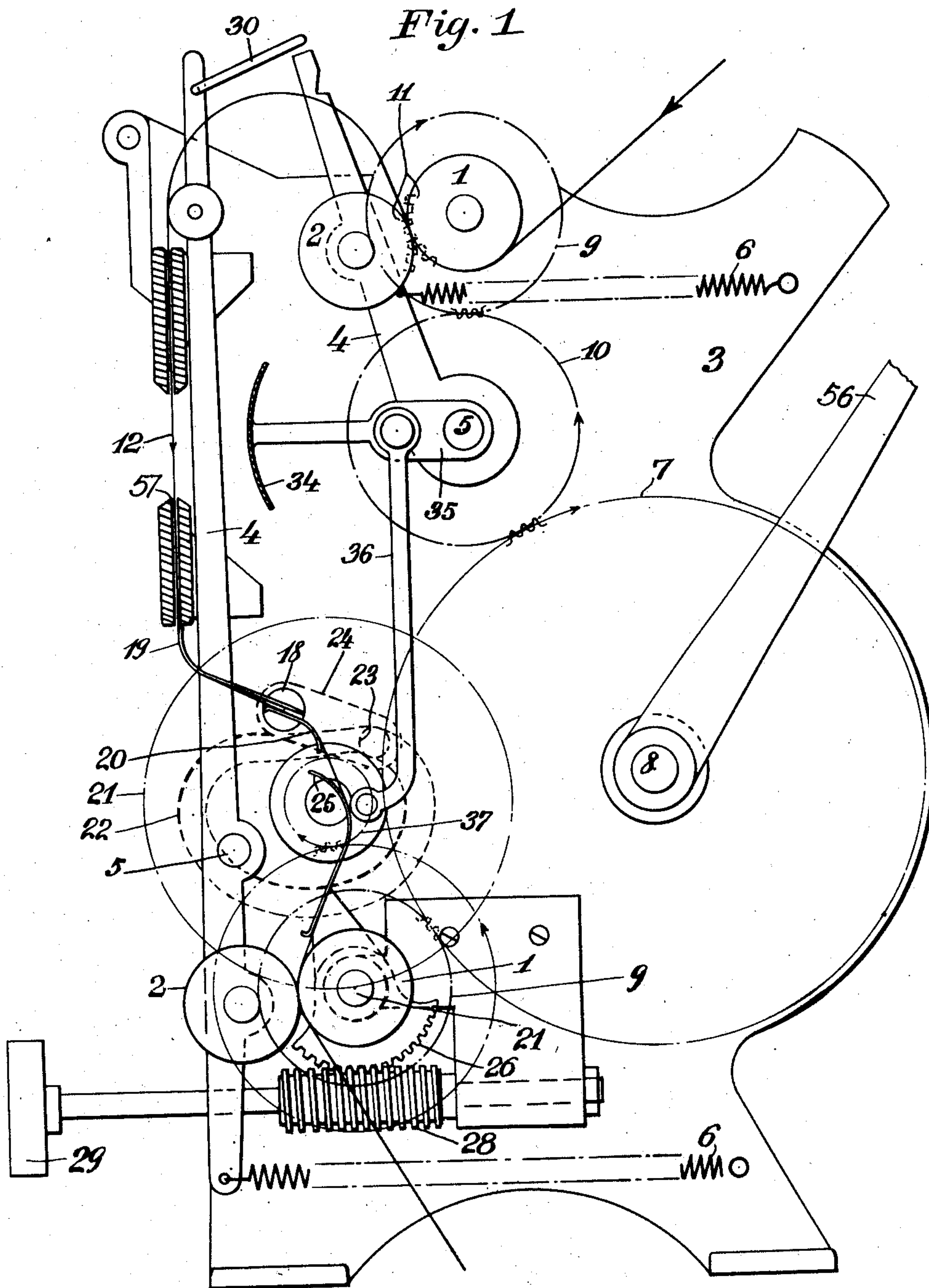


APPLICATION FILED JULY 8, 1910.

2 SHEETS--SHEET 1.

983,021.



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MOVING PICTURE MACHINE.
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983,021.

Patented Jan. 31, 1911.

2 SHEETS—SHEET 2.

Fig. 3

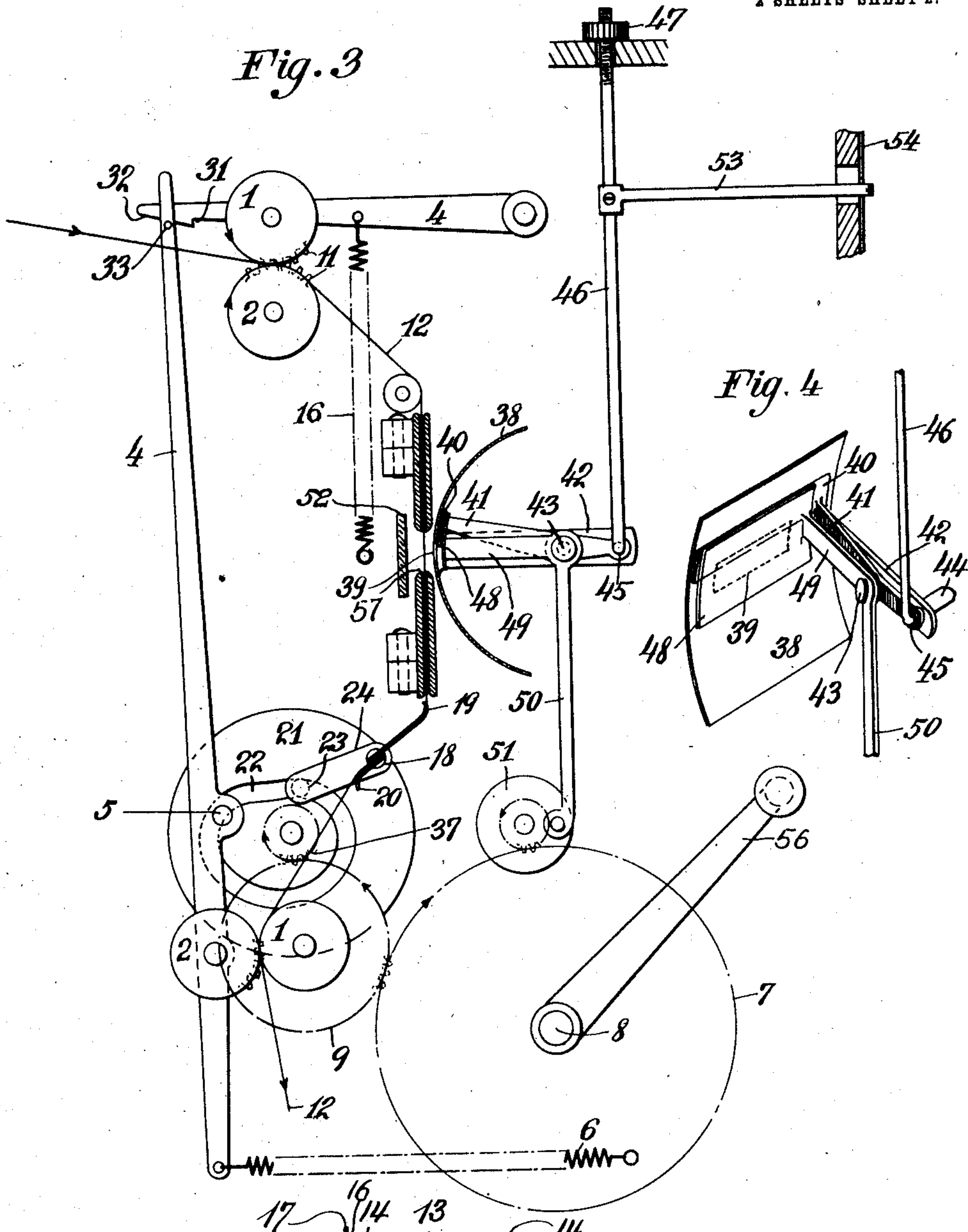


Fig. 4

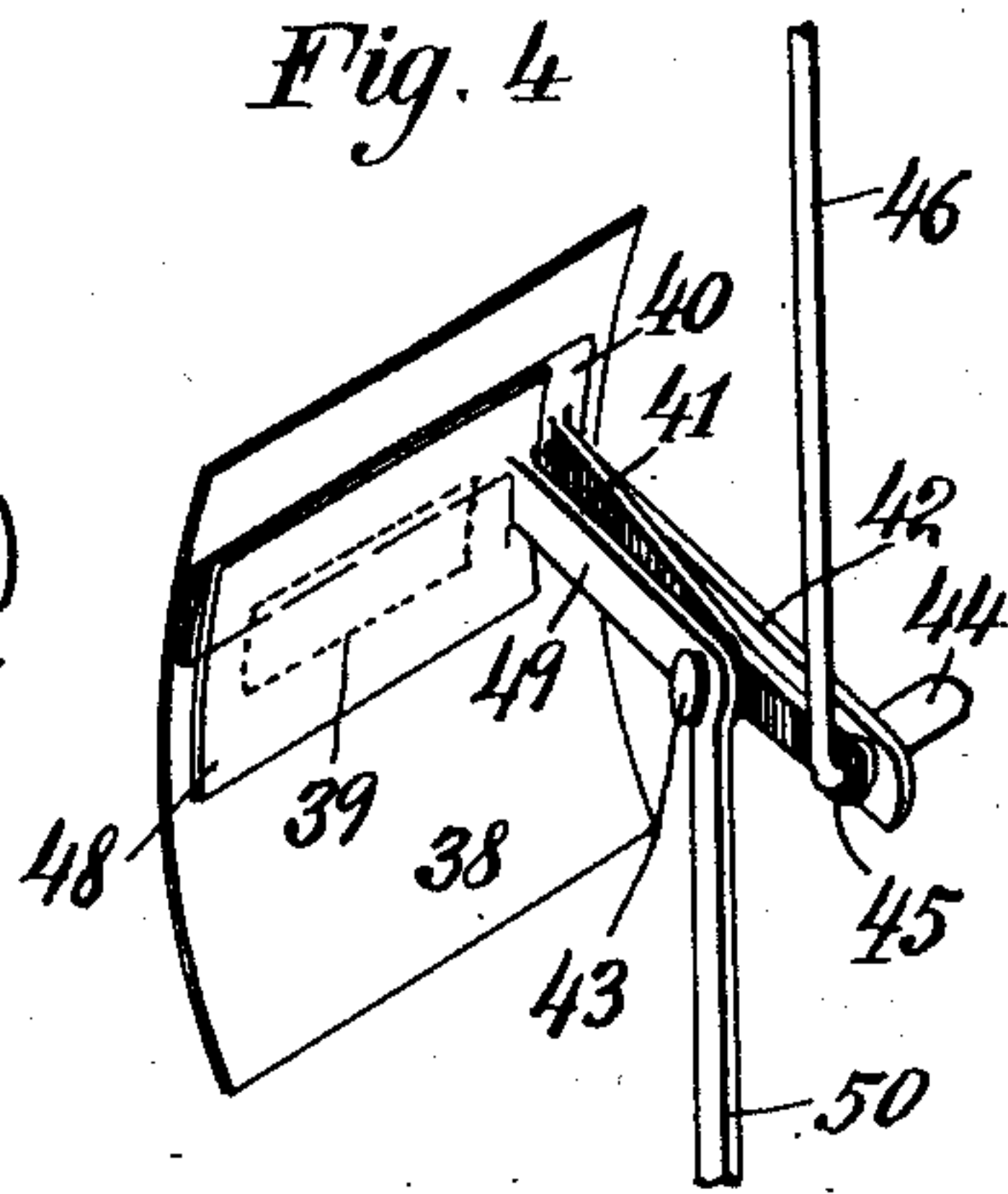
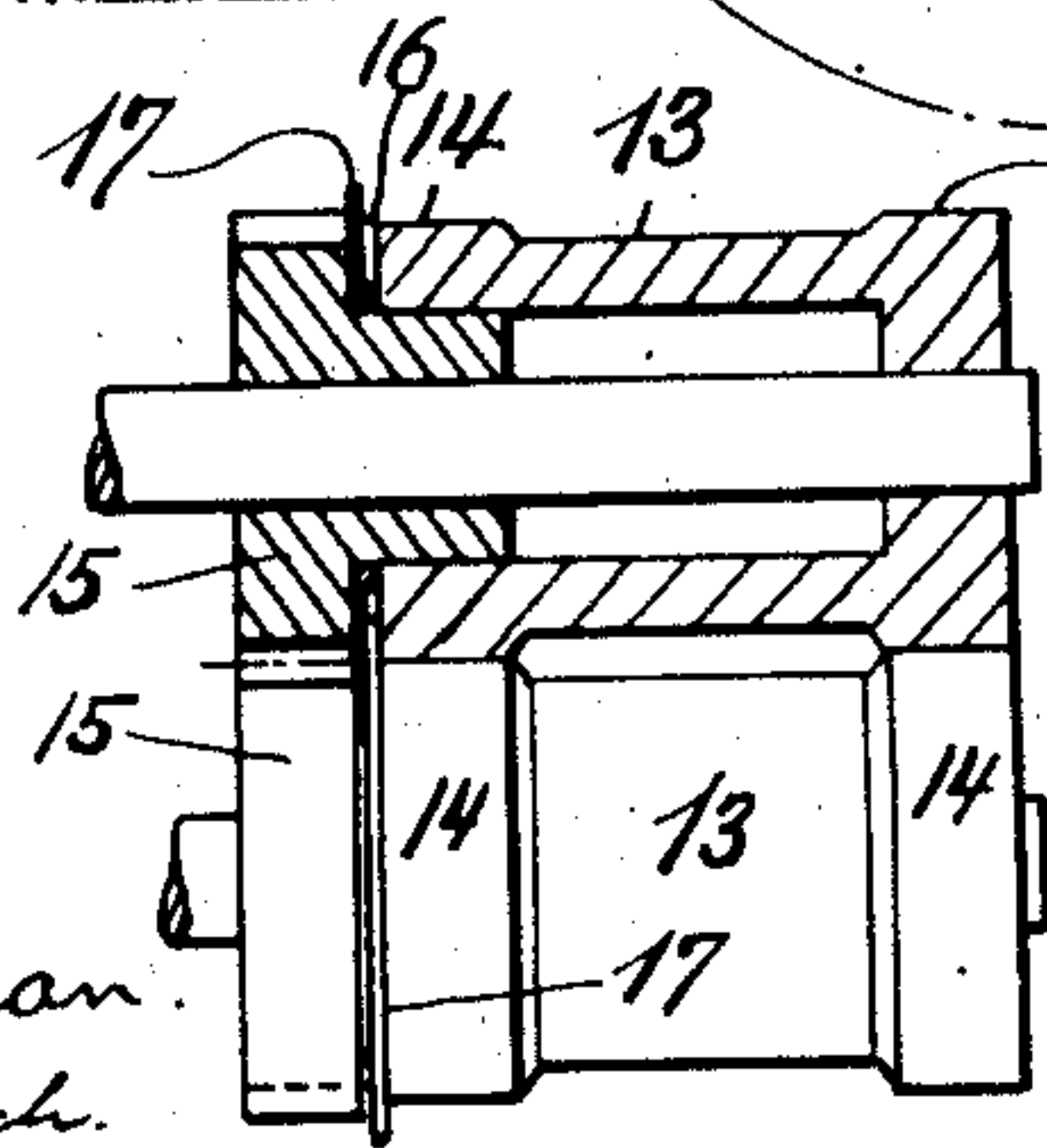


Fig. 2



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UNITED STATES PATENT OFFICE.

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MOVING-PICTURE MACHINE.

983,021.

Specification of Letters Patent.

Patented Jan. 31, 1911.

Application filed July 6, 1910. Serial No. 570,543.

To all whom it may concern:

Be it known that I, GEORGE W. BINGHAM, a citizen of the United States, and a resident of the borough of Brooklyn, New York city, in the county of Kings and State of New York, have invented certain new and useful Improvements in Moving-Picture Machines, of which the following is a specification.

The present invention relates to improvements in moving-picture machines, generally, and in particular to the means for feeding the film.

In practically all the moving picture machines in use at the present time the film is fed through the machine by sprocket wheels provided with spurs or teeth which engage in corresponding perforations in the strip of film. In addition to this so-called feeding movement, the film is given an intermittent advancing movement past the exposure opening of the machine. This intermittent advancing movement is usually communicated to the film by means of another sprocket, which, by means of a Geneva gear, or like mechanism is caused to be intermittently rotated. In most cases, then, the whole, and in all cases, the greater part, of the strain of pulling the film through the machine is borne by the perforations in the film, and as the perforations wear down, the pictures on the film will fail to properly register with the exposure opening, and the value of the film will be lessened or entirely destroyed. The film thus becomes useless and is said to be worn out, when as a matter of fact only the perforated portions of the film may be worn while the actual pictures on the film may still be perfectly good. Heretofore, then, the life of the film has been limited merely to the period of usefulness of the perforations in the film. The wear on the face of the film is very slight, so, on account of this limitation the actual value and useful life of the film has been far below what it should be.

The principal object of this invention is to do away with the necessity for perforating the film, and to feed the film by engagement only with the surface thereof.

In the carrying out of the invention I employ smooth-faced continuously rotating rolls between which the film is gripped, and which by reason of this gripping action, impart a positive feeding motion to the film.

It has been proposed, heretofore, to feed

the film by means of rolls of yielding and non-yielding material respectively, between which the film is passed, one of the rolls being positively driven and the other roll deriving its motion simply from its frictional contact with the driven roll. (See Patent No. 600,113). Such a structure is not practical nor successful for the reason that as one of the rolls simply drags on the other, there is always a certain amount of slippage so that the film is not accurately fed forward,—in other words, it is not uniformly and positively driven,—as a result of which the pictures on the film appear more or less irregularly and fail to properly register with the exposure opening of the machine. The reason for this irregular and uncertain feeding of the film can probably be best understood when it is considered that there is a propelling force brought to bear on one face of the film (the side next the driven roll) and a drag is exerted on the opposite face of the film (the side which is in contact with the loose roll). In my invention I have overcome these various faults and objections by driving the rolls positively and at uniform rates of speed, so that the film will be firmly gripped between the two rolls and will be fed forward positively with no slippage or irregularity of action. Also, preferably, the rolls are made of equal diameter and of non-yielding material so that they shall be absolutely positive and regular in action. The rolls are preferably held together by a yielding or spring pressure so as to allow for any splices or joints in the film and to permit separation of the rolls for the purpose of first inserting the film therebetween. The rolls are arranged in pairs as above described and may be disposed either above or below the exposure opening, or both above and below said opening.

With my improved film feeding means, I preferably employ means for intermittently advancing the film which shall, in the act of advancing the film, engage only the face or surface of the film. This means may conveniently consist of an oscillating tubular member through which the film is passed.

The invention may be applied equally as well to the camera for taking the pictures as to the projector for exhibiting the pictures. In this connection, another feature of my invention consists of an improved form of shutter for use in the camera. This shutter

is provided with a light aperture therein and I have provided means for adjusting the size of the light aperture to suit different conditions, this means being operable while the machine is in operation as well as when the shutter is at rest.

Various other objects and features of the invention will appear as the specification proceeds.

In the accompanying drawings there is illustrated a preferred embodiment of the invention but it will be understood that various changes and modifications may be made therein without departing from the spirit and scope of the invention.

In the drawings: Figure 1 is a side elevation of the feeding mechanism of a moving picture machine, in the form of a projector, embodying my invention. The parts carrying the exposure opening are indicated in section in this view. Fig. 2 is a detail sectional view of one of the feed rolls. Fig. 3, is a more or less diagrammatic view of the invention as embodied in a camera. Fig. 4, is a detached view in perspective of my improved adjustable shutter.

Like reference characters are used to designate like parts throughout the several views.

The film feeding rolls are designated 1 and 2, and preferably one of the rolls (1) is relatively stationary and may therefore be carried by the frame 3 of the machine, while the other roll (2) is movably mounted with respect to the first and may conveniently be carried by a pivoted lever 4, which swings on a center 5. The rolls are preferably held in yielding face-to-face engagement by suitable means such as the spring 6, connected at one end to the lever 4, and having its other end anchored to the frame of the machine.

The feed rolls are constantly rotated by any suitable gearing. In the present instance (see Fig. 1) this gearing consists of a main drive gear 7, on the drive shaft 8, and a driven gear 9, carried by one of the rolls. This main drive gear may be motor-driven or may be manually operated as by means of the crank handle 56, shown in Figs. 1 and 3. The main drive gear may mesh direct with the gear 9 on the feed roll, as shown in the lower portion of Fig. 1, or where necessary, an idler 10, may be interposed between the driving and driven gears, as shown in the upper portion of this view. The feed rolls thus rotate continuously and they are geared so as to rotate in unison, as by means of intermeshing gears 11 carried by the respective rolls. To further insure absolute uniformity in the movement of the rolls, they are preferably of equal diameter, as shown.

In order to protect the face of the film as much as possible from wear, the rolls are

preferably recessed (see Fig. 2) as at 13, between their ends so as to leave the smooth annular rim portions 14 at the ends thereof which engage the edge portions of the film. In this way the film is gripped only at the edge portions thereof so that no wear comes on the central picture-carrying portion of the film. In order that the feed rolls may be as light as possible they are preferably bored out from one end as shown in the sectional view, Fig. 2, and the end of the bore is then closed by a plug 15, which may, as shown, be provided with gear teeth to serve as one of the intermeshing gears between the rolls. An annular space 16, is preferably provided between the end of the feed roll and the gear to receive a guard 17, which prevents edgewise movement of the film. The feed rolls, as thus arranged in pairs, are disposed wherever necessary in the machine. Usually, as shown in the drawings, there is provided a pair of feed rolls located above or in advance of the exposure opening 57, which act to withdraw the film from the film support (not shown) and another pair of feed rolls located below the exposure opening which act as a take-up device to take up the film as it is intermittently advanced past the exposure opening.

Any suitable means may be used for intermittently advancing the film past the exposure opening. This means consists preferably of a tubular member through which the film is passed and which is mounted so as to oscillate in such a way as to intermittently advance the film. In the present case I have illustrated a form of this so-called tubular member which is very simple in construction. As shown most clearly in Fig. 1, this tubular member, in the present instance, consists preferably of a supporting member 18 which is pivotally mounted so as to be capable of an oscillatory motion, and the spaced guides 19 and 20 carried thereby and which extend in opposite directions from the said supporting member. The film passes down underneath the upper of the so-called guides, in between the guides, and over the upper face of the other guide. This tubular film advancing member is oscillated by any suitable means and in the present instance this means consists of a cam member 21 having a cam slot 22 therein which is engaged by the cam roll 23 on the end of the arm 24 which arm is connected to the member 18.

For the purpose of framing the pictures on the film with respect to the exposure opening, a suitable framing device may be provided. This so-called framing device consists preferably, as shown in the present instance, of an adjustable guiding member 25 over which the film passes after issuing from the tubular film advancing member. This guiding member is preferably adjusted

by being mounted to rock on the center 26, it having, for purposes of adjustment, a segment 27 which is operated by a worm 28 and finger-hold 29.

5 When the film is being threaded through the machine preparatory to taking or exhibiting the pictures, the feed rolls must be separated to permit the insertion of the film therebetween. Means are therefore preferably provided for holding the rolls in this separated position, and this means may be interconnected so as to hold all the various sets of feed rolls in separated position. For this reason the ends of the levers 4 which carry the movable feed rolls may be brought together on converging lines, as shown in Figs. 1 and 3, and be provided at said converging ends with means for locking the levers together to thereby hold the respective feed rolls separated. This locking means may be in the form of some sort of a latch, which, as shown in Fig. 1, may simply consist of a pivoted link 30 carried by one of the levers which, when the levers are pinched together, will drop down over the end of the other of the levers to hold said levers with the rolls in separated position. The latch shown in Fig. 3 is of slightly different form. Here one of the levers 4 is provided with a hook part 31 and an inclined way 32 leading up to said hook part, while the other of said levers is provided with a pin 33 which rides over the inclined way 32 into engagement with the hook on the end of the lever. In the case of the projector shown in Fig. 1, the shutter may consist simply of a blade 34 carried by a pivoted arm 35 which is operated by a crank connection 36 from the crank disk 37. This kind of a shutter is not so well adapted to a camera, however, and I find that better results are obtained if the exposure is made by passing a beam of light progressively across the face of the negative, rather than by exposing the whole face of the negative at once. In the case of a camera, therefore, I preferably provide a special form of shutter consisting of a main shutter blade 38 having a slot or light aperture 39 therein and a supplementary shutter for opening and closing the light aperture in the main shutter blade. In addition to this supplementary shutter I provide means for adjusting the size of the light aperture. This special form of shutter mechanism is clearly illustrated in Figs. 3 and 4. Here the means for regulating the size of the light aperture is, as shown, preferably in the form of an aperture closing blade 40 carried by a lever 41, which lever is pivotally carried on the main shutter arm 42 on the center 43. The main shutter arm is carried on the pivot 44. In order to allow of the adjustment of the light aperture in the shutter irrespective of the position of the shutter and irrespective

of whether the shutter is operating or not, the lever which carries the aperture closing blade is preferably extended to a point in line with the pivot center 44 of the main shutter blade and at this point, 45, there is connected with said lever, a suitable connection 46 which may be adjusted by suitable means such as the thumb nut 47. It will be obvious from this that inasmuch as the center of connection with the lever carrying the aperture closing blade is in line with the center of movement of the main shutter blade, the size of the light aperture may be adjusted at will, and at any time, whether the machine is running or not. The supplementary shutter blade already referred to is shown at 48, this blade being carried by a lever 49 which may, if desired, form an elbow or a continuation of the crank rod 50, which crank rod serves to impart oscillation to the shutter from the crank disk 51. The pivot 43 upon which the lever 41 is mounted may conveniently act as the wrist pin to which the connecting rod 50 is connected.

For the purpose of observing the action of the shutter and the relative size of the light aperture therein, the camera box (not shown) containing the mechanism illustrated in Fig. 3, may be provided with a suitable sight opening closed by a piece of ruby glass 52. The disposition of this ruby glass is only diagrammatically illustrated in Fig. 3, since the whole figure is more or less diagrammatic in its nature. The relative size of the light aperture in the shutter blade may be shown by some sort of an indicator, this indicator being moved proportionately as the size of the light aperture is increased or diminished. An indicator of this sort is illustrated in Fig. 3 and, as shown in this view, it may consist simply of a pointer arm 53, either carried by or connected with the means for adjusting the light aperture and registering upon a suitable scale 54. An indicator of this sort will show at all times the relative size of the light aperture in the shutter.

Inasmuch as the means for intermittently advancing the film makes engagement only with the face of the film, it will be evident that by the simple act of spreading or separating the film feeding rolls, the film may be freely pulled through the machine in either direction, either backward or forward. While my machine is designed to handle imperforate films, it will be obvious that perforated films may be handled just as well, and in fact one of the advantages of my invention consists in that perforated films which have been worn to such an extent as to become valueless in the ordinary type of machine, may be exhibited in my machine equally as well as a new film could be used.

What is claimed is:

1. In a moving picture machine provided with an exposure opening, means engaging the face of the film to intermittently advance the same past the exposure opening, and film feeding means comprising smooth-faced rolls arranged in pairs above and below the exposure opening, said rolls adapted to grip the film passing between them and being geared so as to rotate in unison.
2. In a moving picture machine provided with an exposure opening, means for intermittently advancing the film past said exposure opening, and a take-up device located below the exposure opening and embodying a pair of smooth-faced continuously rotating rolls held in yielding engagement with each other between which the film is gripped, said rolls being geared to rotate in unison.
3. In a moving picture machine, film feeding means comprising a pair of smooth-faced continuously rotating rolls held in yielding engagement with each other so as to grip the film passed therebetween, and means for rotating said rolls in unison.
4. In a moving picture machine, film feeding means comprising smooth-faced continuously rotating rolls arranged in pairs above and below the exposure opening, and means, for holding the rolls of the respective pairs in yielding engagement.
5. In a moving picture machine provided with an exposure opening, means for intermittently advancing the film past said exposure opening, and film feeding means comprising smooth-faced continuously rotating rolls arranged in pairs above and below the exposure opening, means for rotating the rolls of each pair in unison, and means for holding the respective rolls of each pair in yielding engagement.
6. In a moving picture machine provided with an exposure opening, means engaging only the face of the film to intermittently advance the film past the exposure opening, and film feeding means comprising smooth-faced continuously rotating rolls arranged in pairs above and below the exposure opening, the rolls of the respective pairs being geared so as to rotate in unison.
7. In a moving picture machine provided with an exposure opening, means engaging only the face of the film to intermittently advance the film past the exposure opening, film feeding means comprising smooth-faced continuously rotating rolls arranged in pairs above and below the exposure opening, the rolls of the respective pairs being geared so as to rotate in unison, and means for holding the rolls of the respective pairs in yielding engagement.
8. In a moving picture machine, film feeding means comprising smooth-faced continuously rotating rolls, means for holding said rolls in yielding engagement, and means for separating the rolls to permit insertion of the film.
9. In a moving picture machine, film feeding means comprising a plurality of smooth-faced continuously rotating rolls arranged in pairs, means for holding the rolls of the respective pairs in yielding engagement, and means for separating the rolls of the respective pairs to permit insertion of the film therebetween.
10. In a moving picture machine, film feeding means comprising a pair of smooth-faced continuously rotating rolls, means for holding said rolls in yielding engagement, means for separating the rolls to permit insertion of the film therebetween, and a latch for holding said rolls in the separated position.
11. In a moving picture machine, film feeding means comprising a plurality of smooth-faced continuously rotating rolls arranged in pairs, means for holding the rolls of the respective pairs in yielding engagement, means for separating the rolls of the respective pairs to permit insertion of the film therebetween, and a latch for holding the rolls in separated position.
12. Film feeding means for moving picture machines comprising a relatively stationary smooth-faced continuously rotating roll, and a second smooth-faced roll having a movement toward and away from the relatively stationary roll and having a gearing connection therewith so as to rotate in unison with said relatively stationary roll.
13. Film feeding means for moving picture machines comprising a relatively stationary smooth-faced roll, a pivoted lever, a smooth-faced roll carried by said lever, a spring engaging the lever to hold the roll carried thereby normally in engagement with the relatively stationary roll, and means for imparting continuous and uniform rotation to the two rolls.
14. Film feeding means for a moving picture machine consisting of a relatively stationary smooth-faced roll, means for continuously rotating said roll, a gear carried by said roll, a pivoted lever and a smooth-faced roll carried thereby, a spring connected with said lever to normally hold the roll carried thereby in yielding engagement with the relatively stationary roll, and a gear carried by the relatively movable roll adapted for engagement with the gear of the relatively stationary roll.
15. Film feeding means for moving picture machines comprising continuously rotating rolls having smooth-faced annular rims on their end portions, and means for holding said rolls with the smooth-faced annular portions thereof in yielding engagement.
16. Film feeding means for moving picture machines comprising smooth-faced rolls

having an annular recessed portion between the ends thereof, means for holding said smooth-faced rolls in yielding engagement, and means for imparting a continuous rotation to said rolls.

17. Film feeding means for moving picture machines comprising smooth-faced rolls, means normally holding said rolls with the smooth faces thereof in engagement, gears carried by said rolls separated from the ends of the rolls by an intervening space, and a guard entered in the space between the ends of the rolls and the gears carried thereby.

18. In a moving picture machine, a film feeding roll bored out from one end thereof, and a plug entered in the bore in the open end of the roll, said plug being provided with gear teeth.

19. Film advancing means for moving picture machines comprising a supporting member mounted for oscillation, and a pair

of spaced guides carried by said supporting member between which guides the film is adapted to be passed, said guides extending from opposite sides of the supporting member in opposite directions from said member.

20. Film feeding means for moving picture machines comprising relatively stationary rolls, pivoted levers and rolls carried thereby to cooperate with the relatively stationary rolls, said levers having operating ends arranged on converging lines whereby the levers may be operated simultaneously to separate the rolls on the levers from the relatively stationary rolls.

Signed at New York city, in the county of New York and State of New York this 28 day of June A. D. 1910.

GEORGE W. BINGHAM.

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