C. M. SLOMAN.

MOVING PICTURE MACHINE.

APPLICATION FILED JUNE 29, 1918.

1,283,577.

Patented Nov. 5, 1918.

6 SHEETS—SHEET 1.

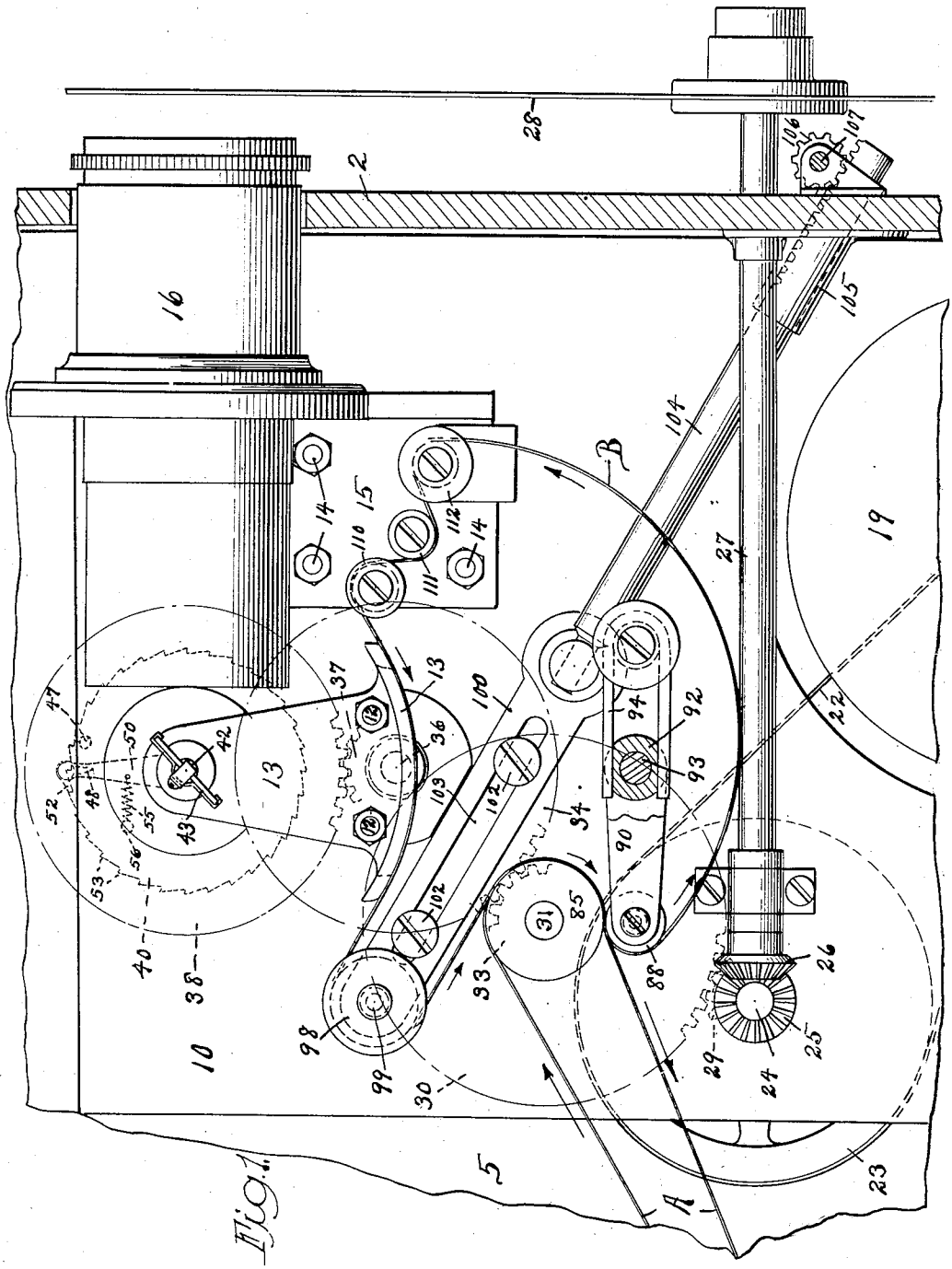

Fig. 1.

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6 SHEETS—SHEET 2.

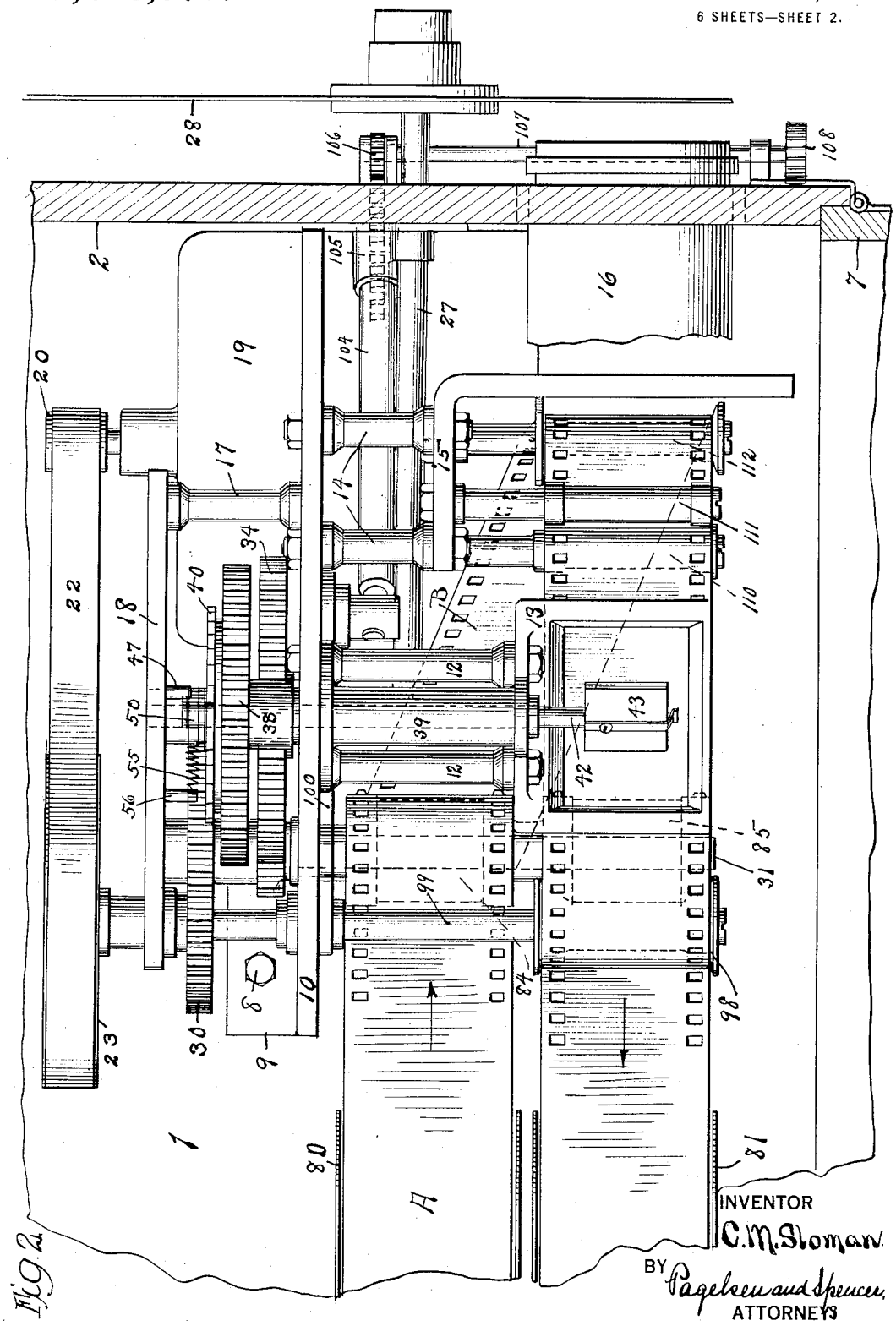

Fig. 2.

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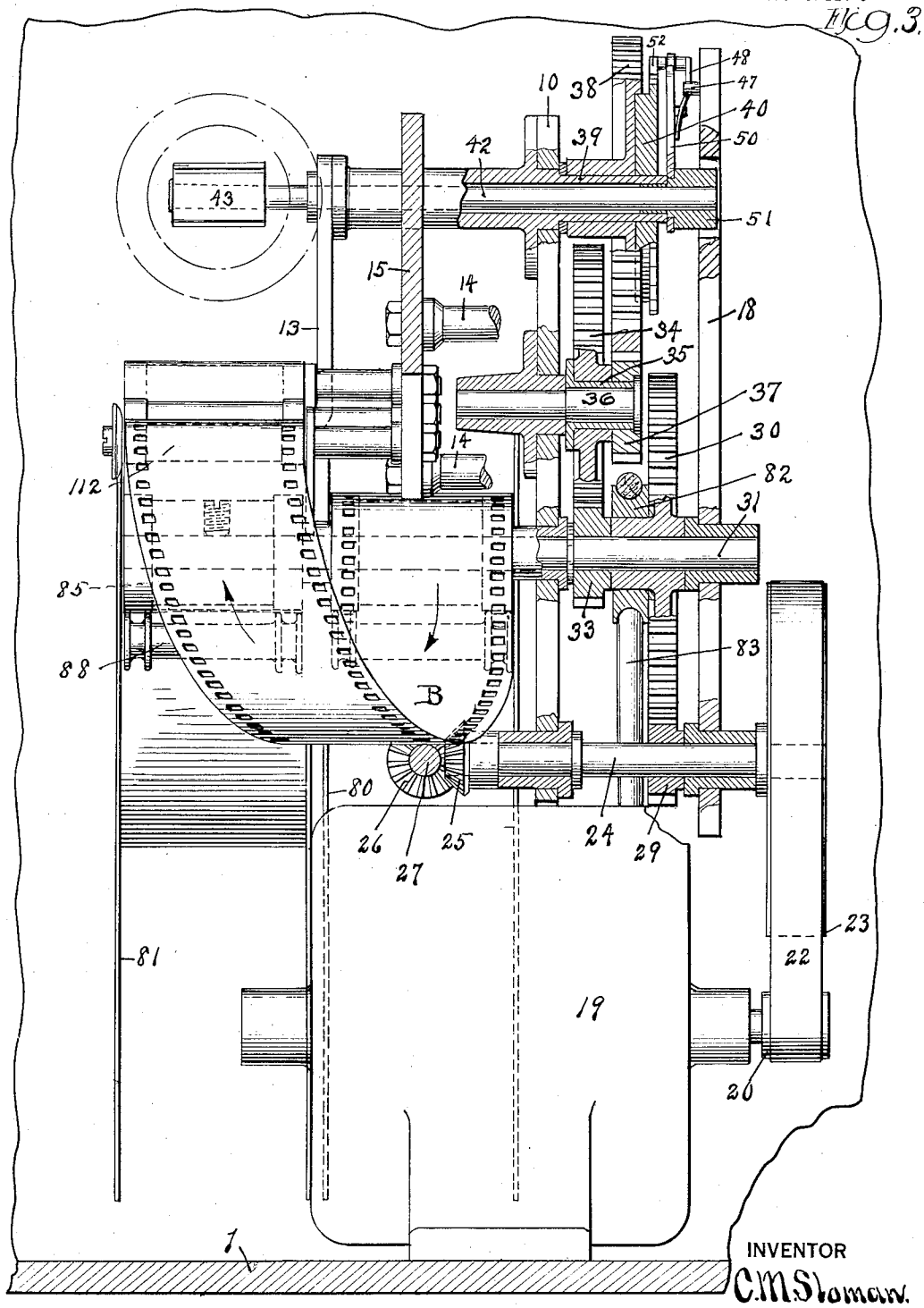
3 SHEETS—SHEET 3.

Fig. 3.



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6 SHEETS—SHEET 4.

Fig. 4.

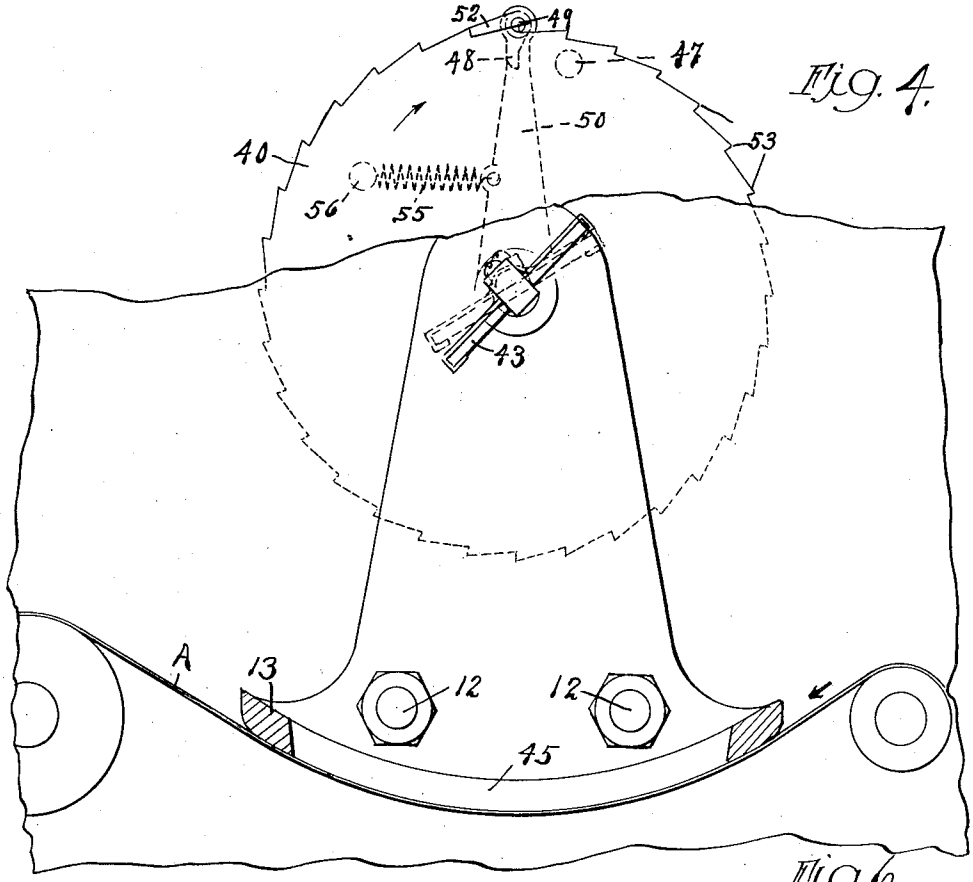


Fig. 7.

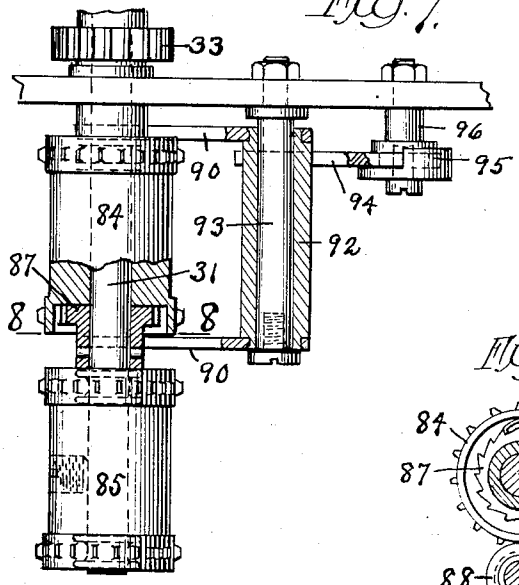


Fig. 6.

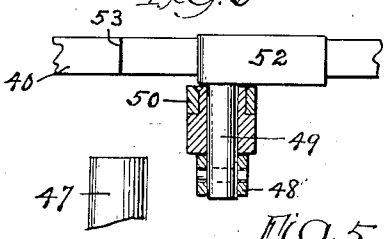


Fig. 5.

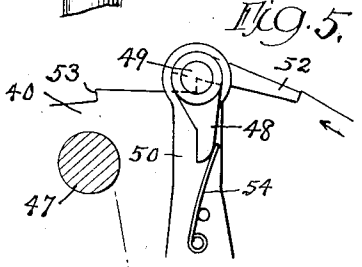
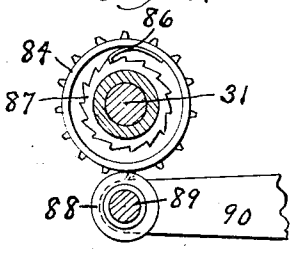


Fig. 8.



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6 SHEETS—SHEET 5.

Fig. 9.

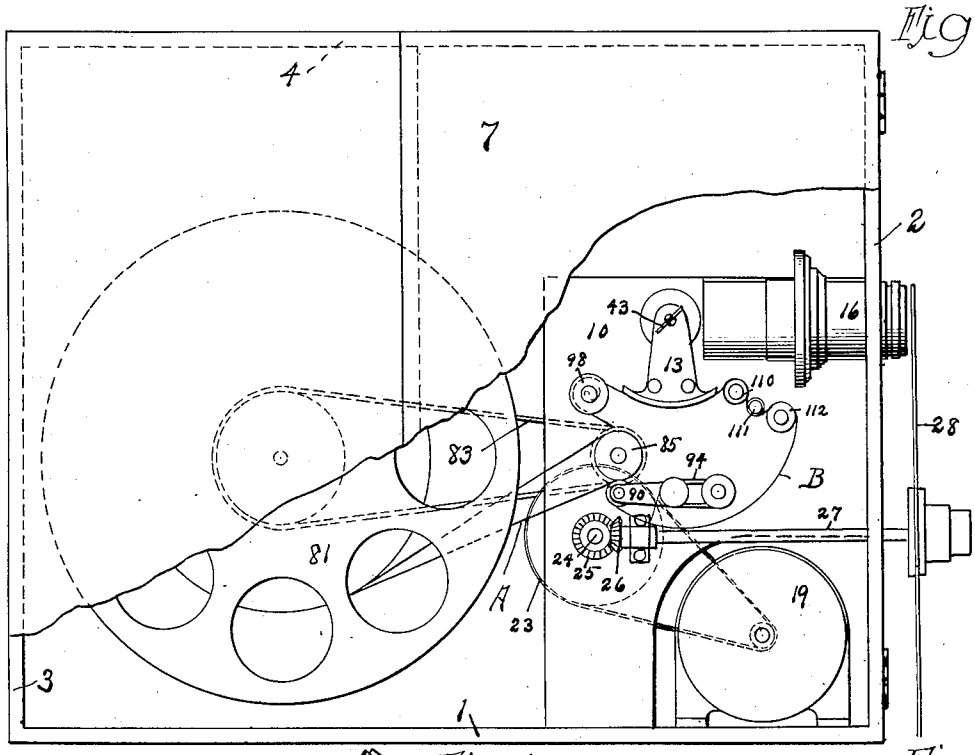


Fig. 10

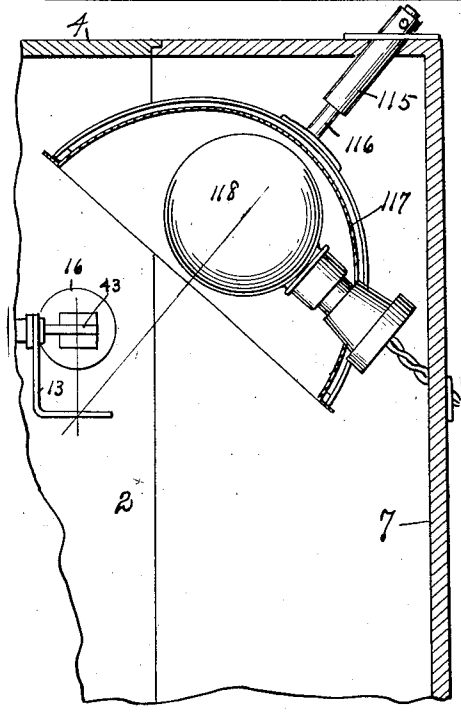
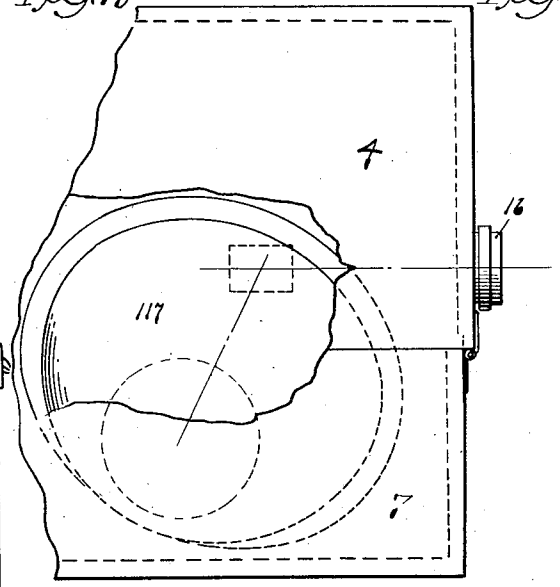


Fig. 11.



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6 SHEETS—SHEET 6.

Fig. 12.

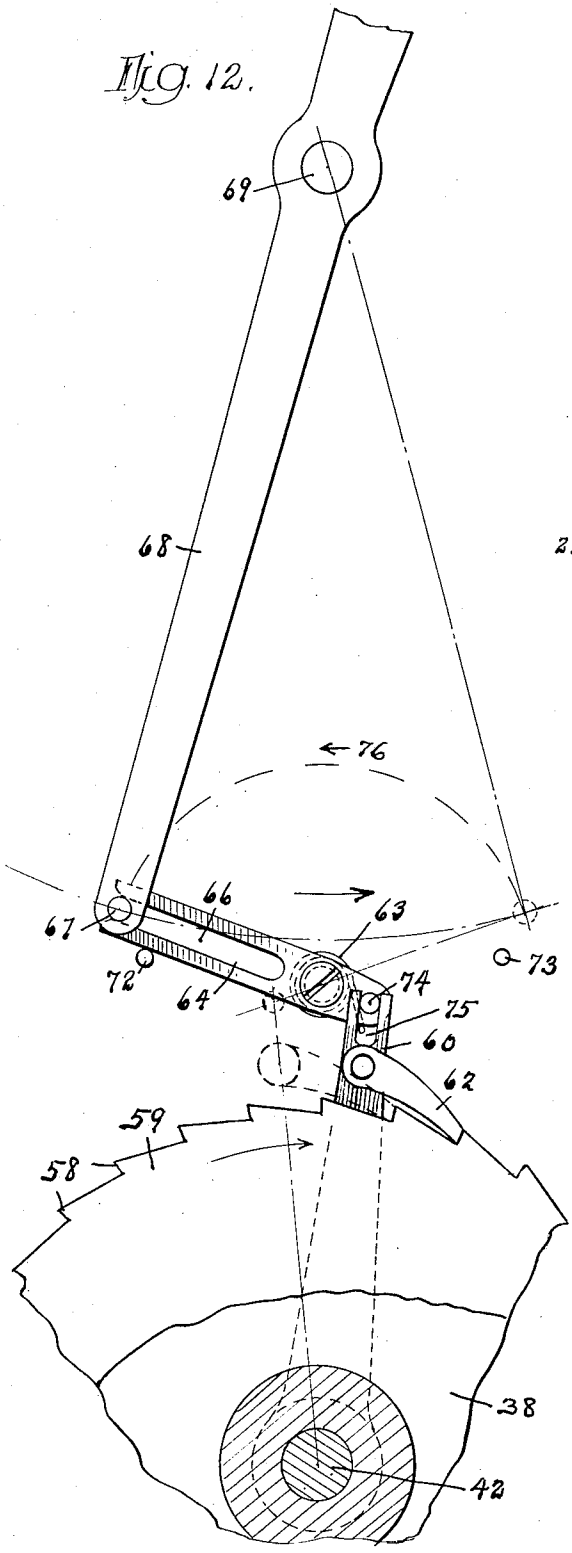


Fig. 14.

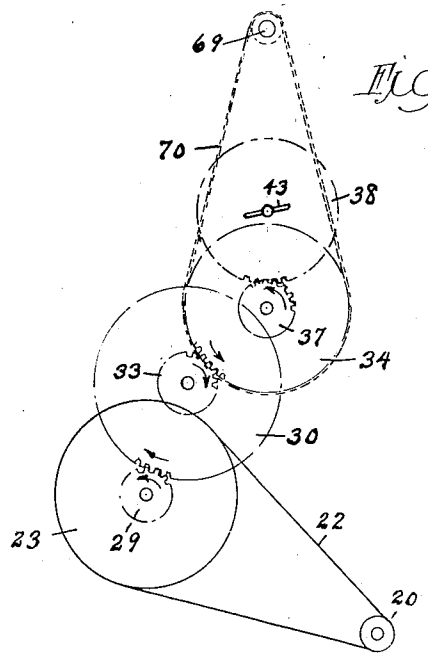
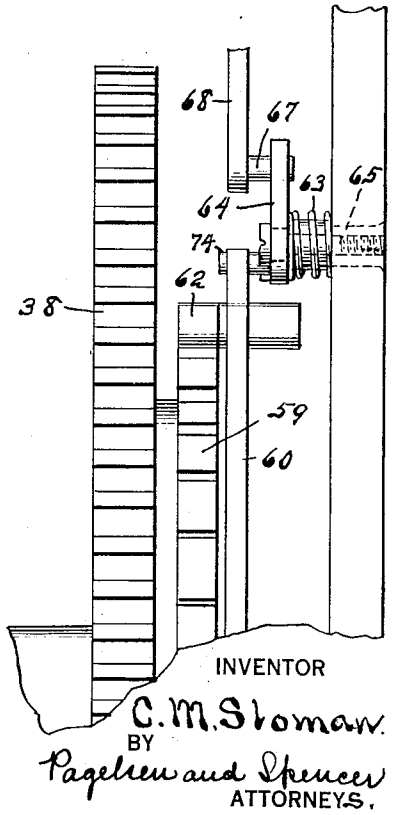


Fig. 13



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UNITED STATES PATENT OFFICE.

CHERI M. SLOMAN, OF DETROIT, MICHIGAN.

MOVING-PICTURE MACHINE.

1,283,577. Specification of Letters Patent. Patented Nov. 5, 1918.

Application filed June 29, 1918. Serial No. 242,659.

To all whom it may concern:

Be it known that I, CHERI M. SLOMAN, a citizen of the United States, and residing at Detroit, in the county of Wayne and State of Michigan, have invented a new and Improved Moving-Picture Machine, of which the following is a specification.

My invention relates to motion picture machines in which the picture tape or band is moved continuously and uniformly through an arcuate path, in which a reflector is mounted in the center of the arcuate path, and in which means are provided for turning the mirror in the direction of movement of the band during the greater portion of each cycle of operation of the machine and for returning the mirror in the opposite direction during the remainder of the cycle; and the object of this invention is to provide novel mechanism for producing this movement of the mirror which shall cause the mirror to move through one half the angular distance traveled by the tape during the period it is reflecting; a further object of this invention is to provide means for changing the direction of movement of the mirror without any jarring of the mechanism supporting it.

This invention consists in mechanism for moving a picture tape through an arcuate path from a supply to a rewind reel, an oscillating mirror mounted with its axis in the central line of the path in such a manner that the rays of light from the tape will be reflected through proper lenses, a constantly and uniformly running controlling member coaxial with the mirror, a lens to receive the rays of light from the mirror, and means for connecting the mirror to the controlling member to cause the mirror to turn therewith on their mutual axis and for disconnecting the mirror therefrom just before the end of each cycle of the machine. It also consists of means for returning the mirror to normal position so that it may be re-connected to its controlling member at the beginning of another cycle of the machine. It also consists in forming the controlling member of the mirror with a circumferential row of teeth, connecting an arm to the mirror, which arm has a pawl on its outer end to engage each of these teeth in succession so that the mirror, arm and controlling member may move together about a common axis. It also consists in providing a rotor which makes a complete rotation with each cycle of the machine, and a pivoted lever actuated thereby to engage the arm on which the pawl is mounted and return it to a starting position where the pawl may engage another tooth on the controlling member for the mirror. It further consists in the details of construction illustrated in the accompanying drawings and particularly pointed out in the claims.

In the accompanying drawing, Figure 1 is a side elevation of the driving and guiding mechanism for the picture tape 1. Fig. 2 is a plan of the mechanism of this improved picture machine. Fig. 3 is a front elevation of the same, parts of the supporting plates being broken away to show the character of the gears. Fig. 4 is an elevation on a large scale of the controlling mechanism of the mirror and of the guide for the tape. Fig. 5 is an elevation of the pawl that connects the lever actuating arm to the controlling wheel therefor. Fig. 6 is a part plan part section thereof. Fig. 7 is a plan of a pair of tape-driving rollers. Fig. 8 is a section on the line 8—8 of Fig. 7. Fig. 9 is a diagrammatic elevation of the improved picture machine. Fig. 10 is a central section of the electric lamp and its mirror. Fig. 11 is a plan thereof. Fig. 12 is a side and Fig. 13 a front elevation of another form of mirror actuating device. Fig. 14 is a diagram showing the driving gear-train therefor.

Similar reference characters refer to like parts throughout the several views.

The case shown in the drawing consists of a bottom 1, front 2, back 3, top 4, sides 5 and 6, and door 7. Secured to the bottom by means of screws 8 passing through its foot 9 (Fig. 2) is a main supporting plate 10 on which the various moving parts are mounted. This plate 10 carries a pair of posts 12 to support the tape guide 13, through posts 14 to support the angle plate 15 which carries the lens case 16 and several idlers, and posts 17 which carry the plate 18 in which journals for the outer ends of various shafts are mounted. An electric motor 19 is secured to the bottom 1 and has a pulley 20 on which is a belt 22 that extends around the pulley 23 on the main shaft 24.

A bevel pinion 25 on the main shaft meshes with a pinion 26 on the shutter shaft 27 which extends forward through the front 2 and carries the shutter 28. The main shaft also carries a pinion 29 (Fig. 3) that meshes with a gear 30 on the winding-roll

shaft 31. This roll shaft carries a pinion 33 that meshes with an idler gear 34 on a sleeve 35 loosely mounted on the pin 36, on which sleeve is also secured a pinion 37 that meshes with a gear 38 loosely mounted on the sleeve 39 to which gear is connected the ratchet wheel 40 which controls the mirror. The sleeve 39 extends through the plates 10 and 15 and in it the shaft 42 is rotatable.

On the inner end of this shaft is secured a mirror 43 which receives the rays of light from that portion of the tape A that is visible through the opening 45 in the guide 13, and reflects it through the lens. This mirror turns in the same direction as the tape moves, at one half the angular velocity of the tape. During preferably about eleven twelfths of the time the tape moves the width of one picture and then moves back to the beginning position during the other one twelfth of the cycle of the machine. It will be understood, however, that these proportions may be varied as desired.

Referring to Figs. 1, 3, 4, 5, and 6, a post 47 will be noticed extending inwardly from the plate 18 in the path of the arm 48 secured to a pin 49 mounted in the upper end of the arm 50 which is secured to a hub 51 attached to the shaft 42. The pin 49 also carries a pawl 52 which is held in engagement with the teeth 53 of the ratchet wheel 40 by any desired means, a spring 54 being shown.

The wheel 40 turns uniformly and constantly on the axis of the mirror 43 at such a speed that a tooth 53 passes a given point at each cycle of the machine, that is, for each picture on the tape. The angular spacing of these teeth is substantially equal to the angular travel of the mirror. The ratchet wheel 40, arm 49 and mirror 43 move together and the arm 49 finally engages the post 47 which will cause the pawl 52 to be lifted out on engagement with one tooth 53, but until such disengagement, the parts move together. At the instant of disengagement, the spring 55, which extends from the arm 49 to the post 56 carried by the plate 18, will swing back the arm 49 and the mirror until the pawl 52 engages the next tooth 53, which is the position shown in Fig. 4. This simple device can be constructed accurately as it depends entirely upon correct spacing of the teeth 53. A slight variation in diameter of the wheel 40 or in the length of the arm 49 or of the other parts of the device is immaterial.

Where the slight jar, caused by the spring 55 pulling the pawl 52 against the next tooth 53, is objectionable, as it sometimes is when the projected pictures on the screen are greatly magnified, the mechanism shown in Figs. 12, 13 and 14 may be employed. As indicated in Fig. 14, the gears 29, 30, 33, 34, 37 and 38 and the shafts therefor are the same as above described. Instead of the teeth 53 on the ratchet wheel 40 having their shoulders facing the front of the machine, the teeth 58 on the ratchet wheel 59 face the rear of the machine. While the wheel 40 actuates the arm 49 and thereby causes the arm to move with it, the arm 60 and pawl 62 are caused to move with the wheel 59 by means of a spring 63 which turns the lever 64 about its axis 65. This lever 64 has a slot 66 into which the pin 67 on the rotor 68 engages. The rotor is mounted on a shaft 69 and may be rotated in any desired manner, one rotation for each tooth 58 on the wheel 59. As indicated in Fig. 13, a pair of chain wheels and a chain 70 may be employed to drive the rotor 68.

The operation of this device is as follows. (See Fig. 12). The ratchet wheel 59 turns at constant speed through the angular distance of one tooth for each picture on the tape and the rotor 68 makes one complete rotation for each picture. Just before the end of the cycle the parts are in the position shown in Fig. 12, with the lever 64 resting on the post 72, and the mirror has reached the end of its "projecting" movement. At this instant the pin 67 enters the slot 66 and swings the lever 64 about its pivot until it rests against the post 73 at which position the pin 67 passes out of the slot 66. This movement of the lever causes the arm 60 to swing to the left, the pin 74 of the lever sliding in the slot 75 in the arm and it also causes the spring 63 to be wound up and the pawl 62 to be carried back one tooth to the position shown in dotted lines. The lever being released, the spring 63 causes the arm to return slowly in the direction of the arrow 76 to the position shown in solid lines, the speed of this movement being controlled by the wheel 59 against one of whose teeth the pawl 62 is pressed by the spring 63.

In this as in the former case, the arm on the mirror shaft moves with and is controlled by a co-axially mounted ratchet wheel which turns at a constant speed. But because of the easy movement of the pin 67 into and out of the slot 66 in the lever 64, there is no sudden stopping or starting of the lever 60 and of the mirror.

An opaque portion of the shutter 28 is across the lens during this return movement of the mirror and the shutter will also preferably be formed with a second opaque section directly opposite the first in order to repeat the obscuration of the light so often that the eye will not detect the changes.

The tape A is wound from a supply reel 80 and after passing through the guide 13 is wound onto the frictionally driven rewind reel 81 which is driven in any well known manner, a small pulley 82 and belt 83 (Fig. 3) being provided. The tape is wound from the reel 80 by a small toothed roller 84 on the shaft 31 and the rate of the

rewind is controlled by the toothed roller 85 secured to the same shaft 31. The number of teeth being the same, the movement of the tape must be constant. The roller 84 is loose on the shaft 31 (Figs. 7 and 8) but it carries a detent 86 that engages the teeth of the ratchet wheel 87 which is secured to the shaft 31. The length of the loop B of the tape (Fig. 1) may therefore be varied by adjusting the roller 84 relative to the ratchet wheel 87.

The tape is held up against the roller 84 by means of a small straight roller 88 whose shaft 89 is carried by the two arms 90 secured to the sleeve 92 on the pin 93. One end of this sleeve is flattened and extends between the two ends of the U-shaped spring 94 that is held by a button 95 carried by a post 96.

The roller 85 (Fig. 1) pulls the tape around a roller 98 journaled on pin 99 mounted on the end of a slidable support 100, held in position by screws 102 extending through the slot 103. Any desired means to move this support may be employed, that shown being a rod 104 connected to this support and extending through the sleeve 105 at the front of the case, the rod being formed with rack-teeth engaged by the small pinion 106 on the shaft 107 which shaft may be turned by means of the button 108. (Fig. 2). By sliding the support 100 and the roller 98, the tape is moved relative to the guide 13 and mirror 43 so as to properly position the images on the screen. The rollers 110, 111 and 112 around which the tape passes hold the tape tightly against the bottom of the guide 13.

The door 7 carries a tube 115 in which the stem 116 is adjustably mounted and this stem supports the elliptical mirror 117 in whose focus the lamp 118 is mounted. The other focus of the ellipsoid of which the surface of the mirror is a portion is at the surface of the tape within the opening 45 of the guide 13. This construction provides an intense concentrated light for the film.

The details and proportions of this device may all be modified without departing from the spirit of my invention.

I claim:—

1. In a moving picture machine, the combination of an arcuate guide for the tape, a lens, a mirror and a supporting shaft thereof co-axial with the axis of the tape guide, an arm secured to said shaft, a controlling member mounted co-axially with said shaft, means for actuating said controlling member and said tape at uniform speeds, and means for connecting and disconnecting said arm and the controlling member.

2. In a moving picture machine, a guide for the picture tape, a lens, a mirror for reflecting the pictures on the tape through the lens, a shaft supporting the mirror, a controlling member mounted co-axially with said shaft and means to drive said member constantly and uniformly in the same direction, means to cause the mirror shaft to turn with said controlling member, and means to turn said shaft in the opposite direction.

3. In a moving picture machine, the combination of a lens and a mirror, a shaft on which said mirror is mounted, a controlling member constantly rotating co-axially with said shaft in the same direction, means to connect said shaft to said controlling member to cause the mirror to turn therewith, and means to disconnect said mirror therefrom so that the controlling member and mirror may move independently.

4. In a moving picture machine, the combination of a mirror, a shaft on which said mirror is mounted, a ratchet wheel constantly running in the same direction co-axially with said shaft, an arm on said shaft and a pawl on the arm to engage a tooth of the ratchet wheel, and means for causing the arm and mirror to move in the opposite direction so that the pawl may engage the next tooth of the ratchet wheel.

5. In a moving picture machine, the combination of a mirror, a shaft on which said mirror is mounted, a ratchet wheel constantly running in the same direction and mounted co-axially with said shaft, an arm on said shaft and a pawl on the arm to engage a tooth on the ratchet wheel, a rotatable lever pivoted adjacent said wheel and engaging said arm, a spring to turn the lever and cause the arm and mirror to turn with said wheel, and a rotor pivoted adjacent the lever and adapted to engage it to turn the lever and mirror in the opposite direction.

6. In a moving picture machine, the combination of a controlling member rotating constantly and uniformly in the same direction, a mirror mounted to oscillate co-axially therewith, means to cause the mirror to turn with said controlling member, and means to turn the mirror in the opposite direction.

CHERI M. SLOMAN.