May 31, 1938. L. J. ANDRES 2,118,999

TALKING PICTURE MACHINE

Filed March 21, 1934 7 Sheets-Sheet 1

Fig. 1.

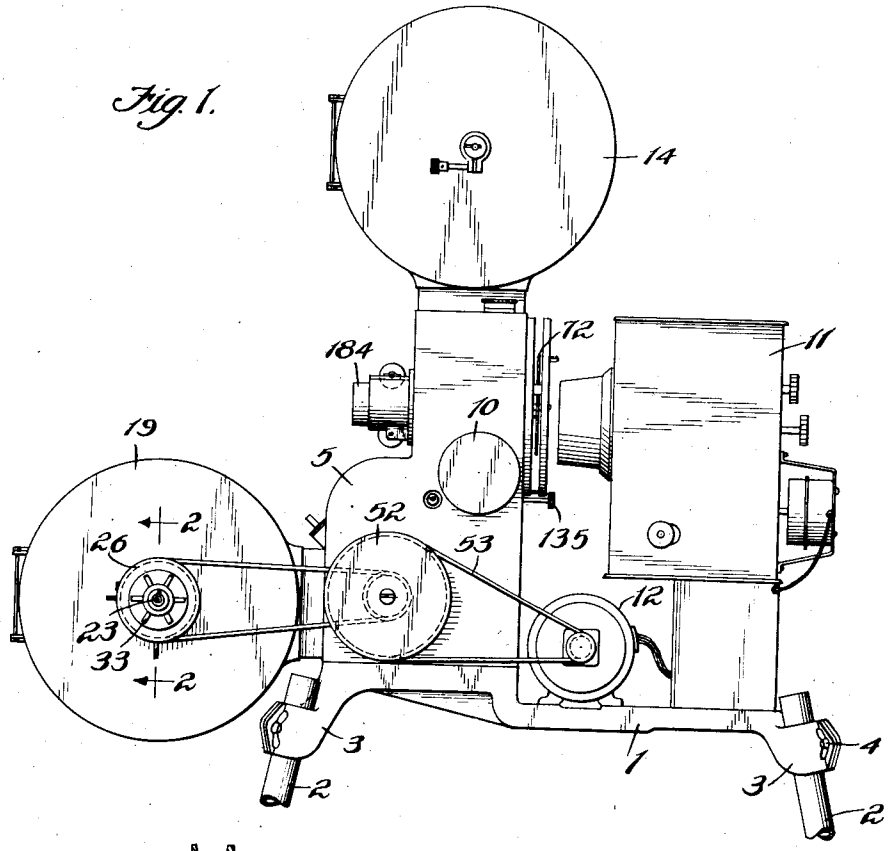
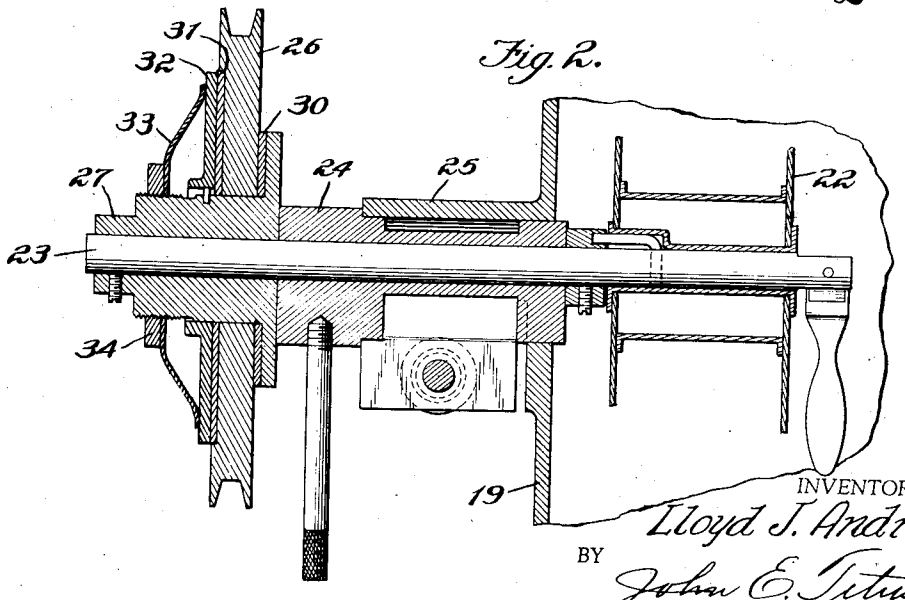


Fig. 2.



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May 31, 1938. L. J. ANDRES 2,118,999

TALKING PICTURE MACHINE

Filed March 21, 1934 7 Sheets-Sheet 2

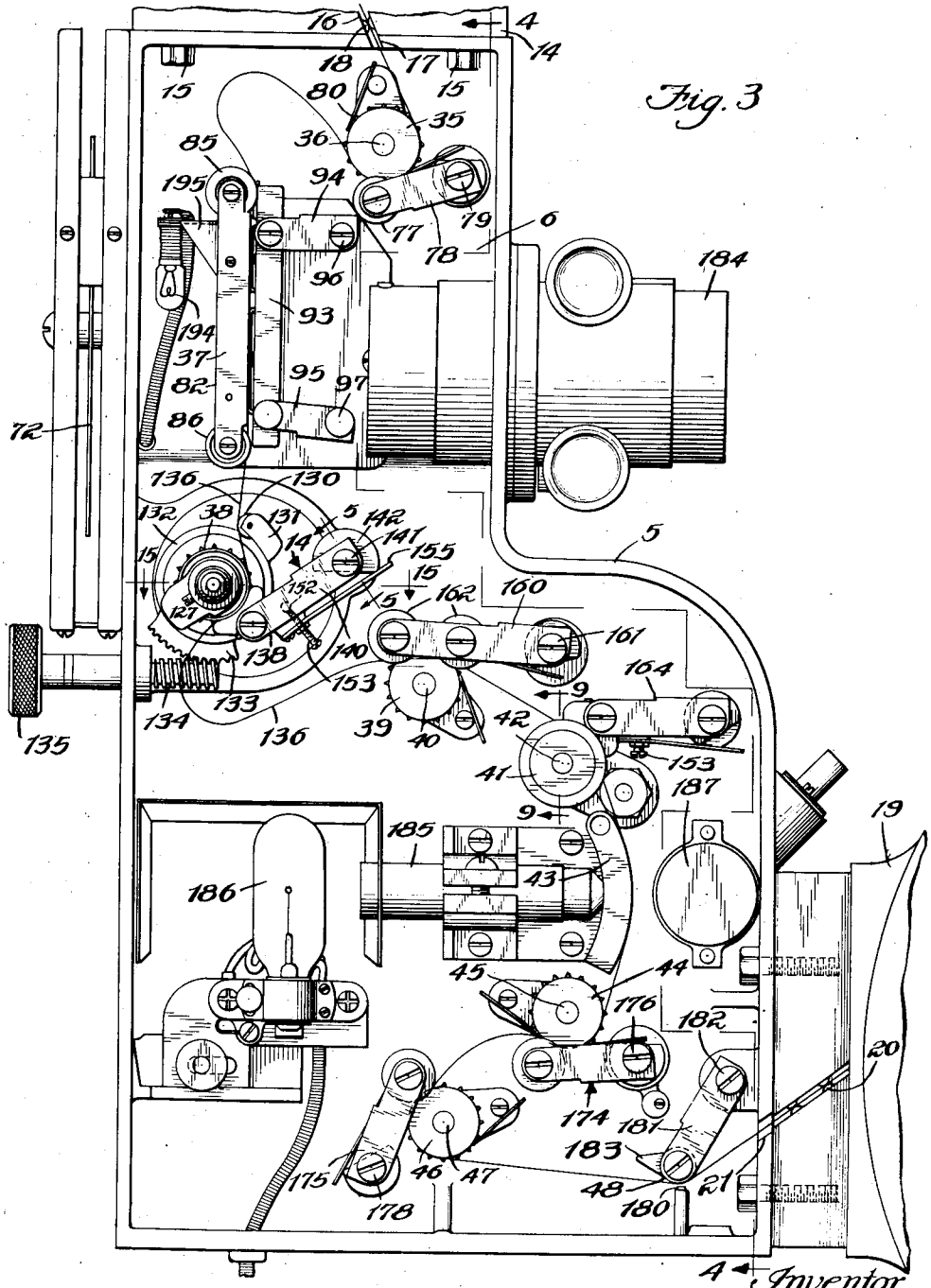


Fig. 3

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May 31, 1938. L. J. ANDRES 2,118,999

TALKING PICTURE MACHINE

Filed March 21, 1934 7 Sheets-Sheet 3

Fig. 4.

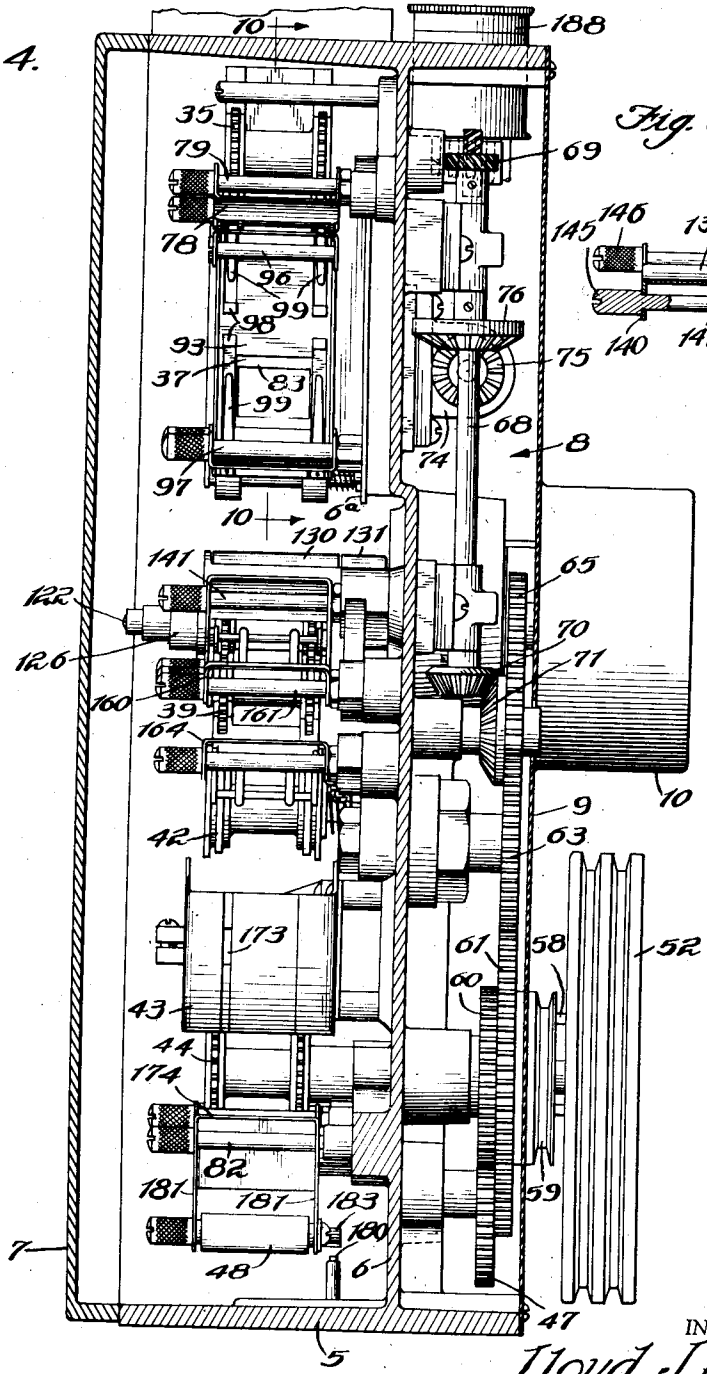
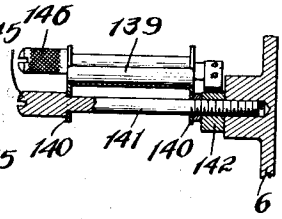


Fig. 5.



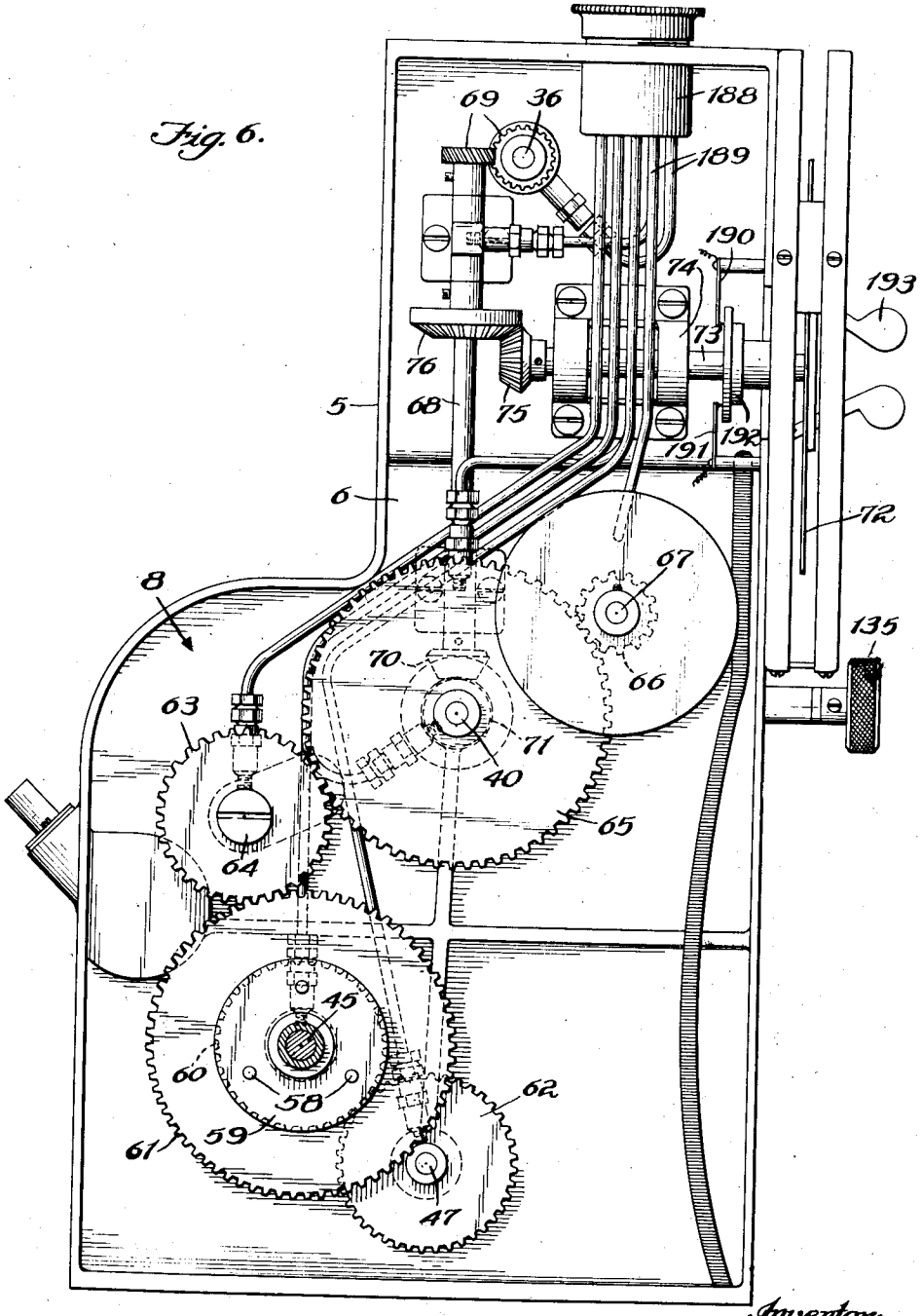
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TALKING PICTURE MACHINE

Filed March 21, 1934 7 Sheets-Sheet 4

Fig. 6.



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May 31, 1938. L. J. ANDRES 2,118,999

TALKING PICTURE MACHINE

Filed March 21, 1934 7 Sheets-Sheet 5

Fig. 7.

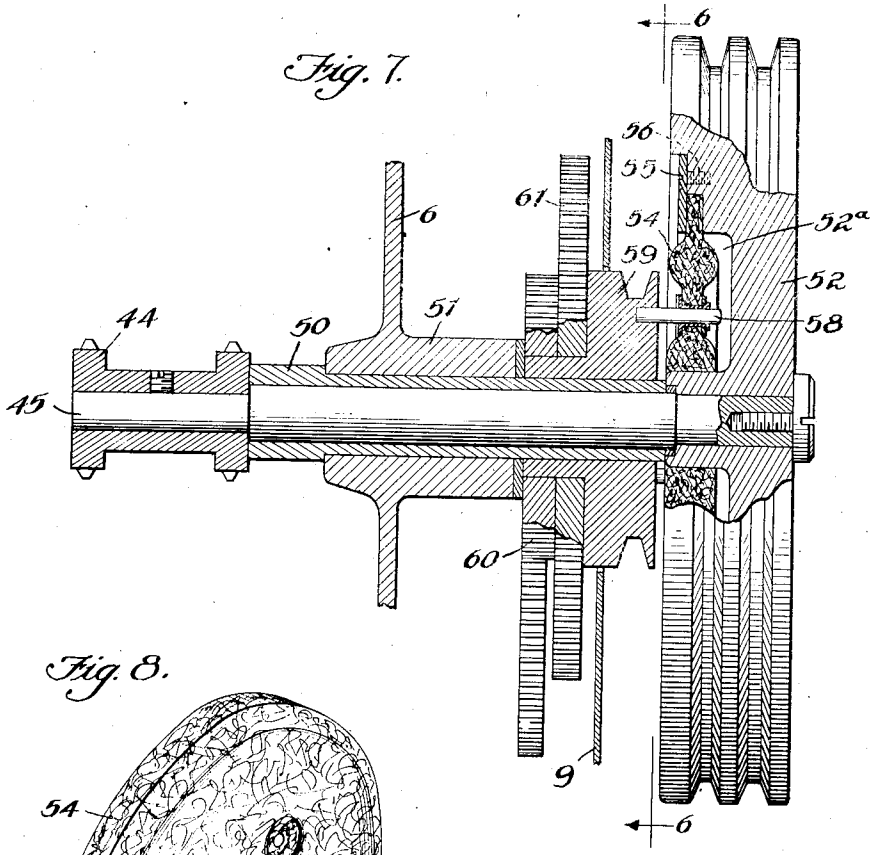


Fig. 8.

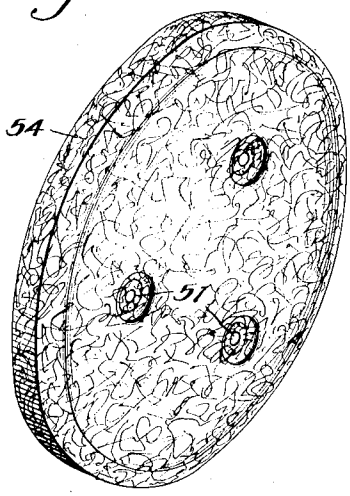
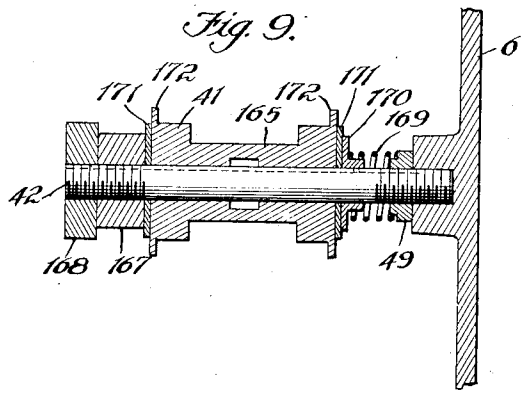


Fig. 9.



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May 31, 1938. L. J. ANDRES 2,118,999

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Filed March 21, 1934 7 Sheets-Sheet 6

Fig. 10.

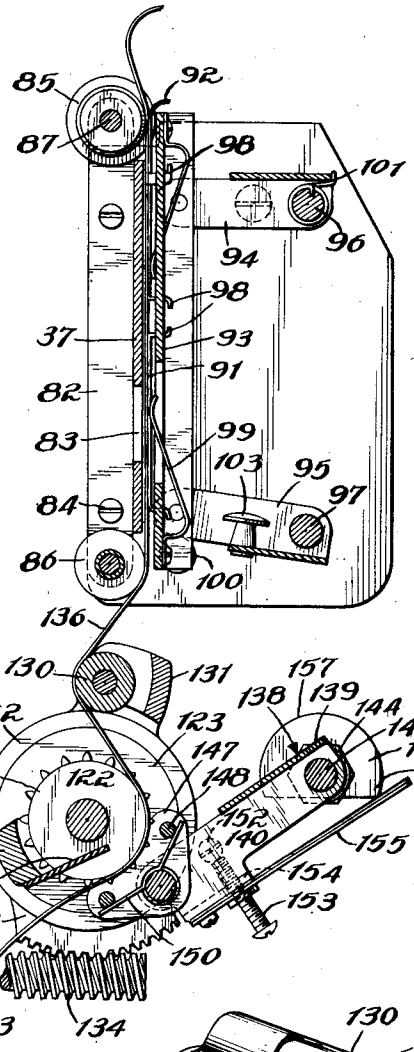


Fig. 11.

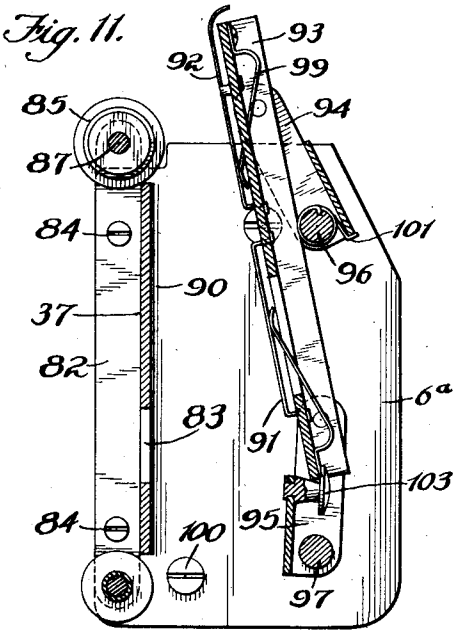


Fig. 12.

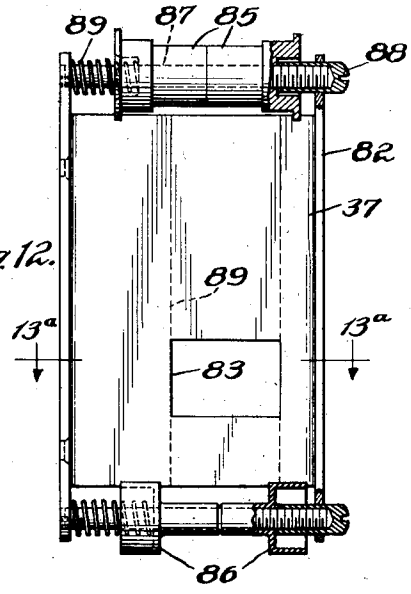


Fig. 13.

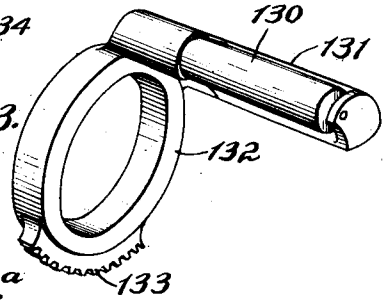
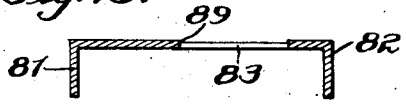


Fig. 13a.



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May 31, 1938. L. J. ANDRES 2,118,999

TALKING PICTURE MACHINE

Filed March 21, 1934 7 Sheets-Sheet 7

Fig. 16

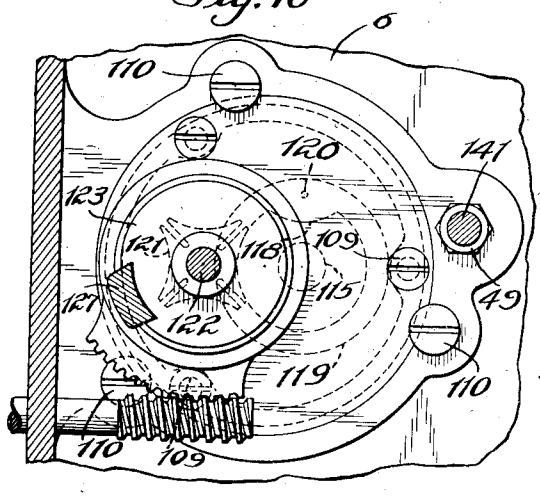


Fig. 14.

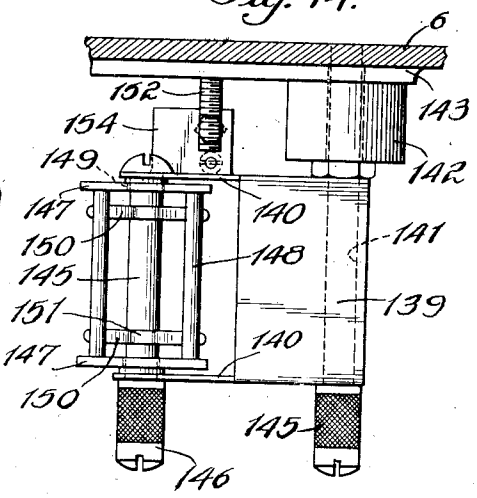
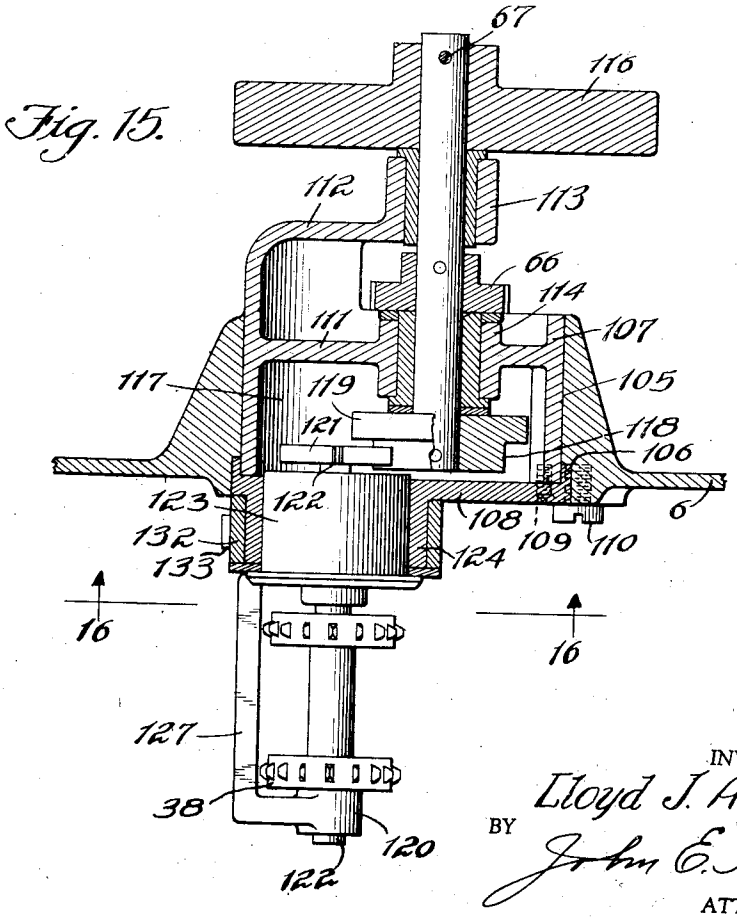


Fig. 15.



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UNITED STATES PATENT OFFICE

2,118,999

TALKING PICTURE MACHINE

Lloyd J. Andres, Grand Rapids, Mich., assignor to Automatic Instrument Company, a corporation of Michigan

Application March 21, 1934, Serial No. 716,595

5 Claims. (Cl. 88—17)

This invention relates to improvements in motion picture machine, and more particularly to sound picture projectors.

Objects of the invention are to provide a portable sound-projector for handling full size film, which can be readily assembled and disassembled for transportation from place to place; to provide such a machine which is simple in construction so that it can be manufactured at a low cost; and to provide a machine which is simple and easy to operate with perfect safety.

Another object is to provide means for automatically stopping the machine when the film breaks or runs out. Further objects are to provide a machine which can be threaded very quickly and easily without poking the film through various restricted passages, and to provide a roller film gate of a construction which can be opened wide with one motion, and which is then automatically held in open position a distance from the roller or surface with which it cooperates so that the film track is unobstructed for threading, inspection, and cleaning.

Further objects are to provide a gate for the projector aperture plate which will guide the film smoothly with little friction, and hold it perfectly flat in close contact so that the focusing is sharp over all of the picture; also the gate of this invention does not confine the film too closely, and leaves space on either side of the film for ventilation. It opens wide for cleaning off the dirt which collects on the guiding surfaces, locks open automatically, and closes accurately with always the same pressure on the film.

Another object is to provide an accurate and readily adjustable, micromatic, self locking means for framing or registering the film with the aperture.

Another object is to obtain a smooth, non-oscillating drive for moving the sound track of the film past the light ribbon. In a projector constructed in accordance with this invention, the driving motor is belted directly to the sound take-off drive shaft, and then this shaft is connected through trains of gears to the intermittent drive and other mechanism. The gears, especially if they become worn through use, set up vibrations in the meshing of the teeth, and the load on the intermittent is applied for only one-fourth of each revolution, which of course tends to cause violent oscillations in the rotation of the shafts, even where fly wheels are incorporated in the driving train. Accordingly, I provide means for filtering out the vibrations and preventing them from affecting rotation of the sound drive shaft so that the sound is not distorted.

Further objects and advantages will become apparent in the following description, taken with reference to the accompanying drawings, in which an illustrative embodiment of this invention is shown incorporated in a sound and picture projector, although, obviously, many features of the invention may be used in other types and kinds of motion picture machines.

Fig. 1 is an elevation of the projector, looking from the rear side of the machine, that is, the side away from the operator.

Fig. 2 is a detail section of the take-off reel mounting and drive, and is taken on the line 2—2 of Fig. 1.

Fig. 3 is an elevation of the projector, looking from the operator's, or front, side of the machine, with cover removed, parts broken away, and portions of the film reel containers shown in section.

Fig. 4 is a section looking from the front of the projector, and is taken substantially on the irregular line 4—4 of Fig. 3, to show the film driving mechanism.

Fig. 5 is a section showing the manner of mounting the sprocket and roller gates, and is taken on the line 5—5 of Fig. 3.

Fig. 6 is a view of the rear side of the projector, with the cover plate removed and the primary or sound drive shaft shown in section on the line 6—6 of Fig. 7.

Fig. 7 is a vertical section showing the details of the mounting of the sound drive shaft.

Fig. 8 is a perspective view of the felt vibration filter disc which is shown in section in Fig. 7.

Fig. 9 is a section illustrating the mounting of the friction rollers which tension the film as it is pulled over the sound aperture plate. This view is taken on the line 9—9 of Fig. 3.

Fig. 10 is a section on the line 10—10 of Fig. 4, showing the film guiding and actuating mechanism of the picture projector mechanism.

Fig. 11 is a similar view showing the aperture gate open.

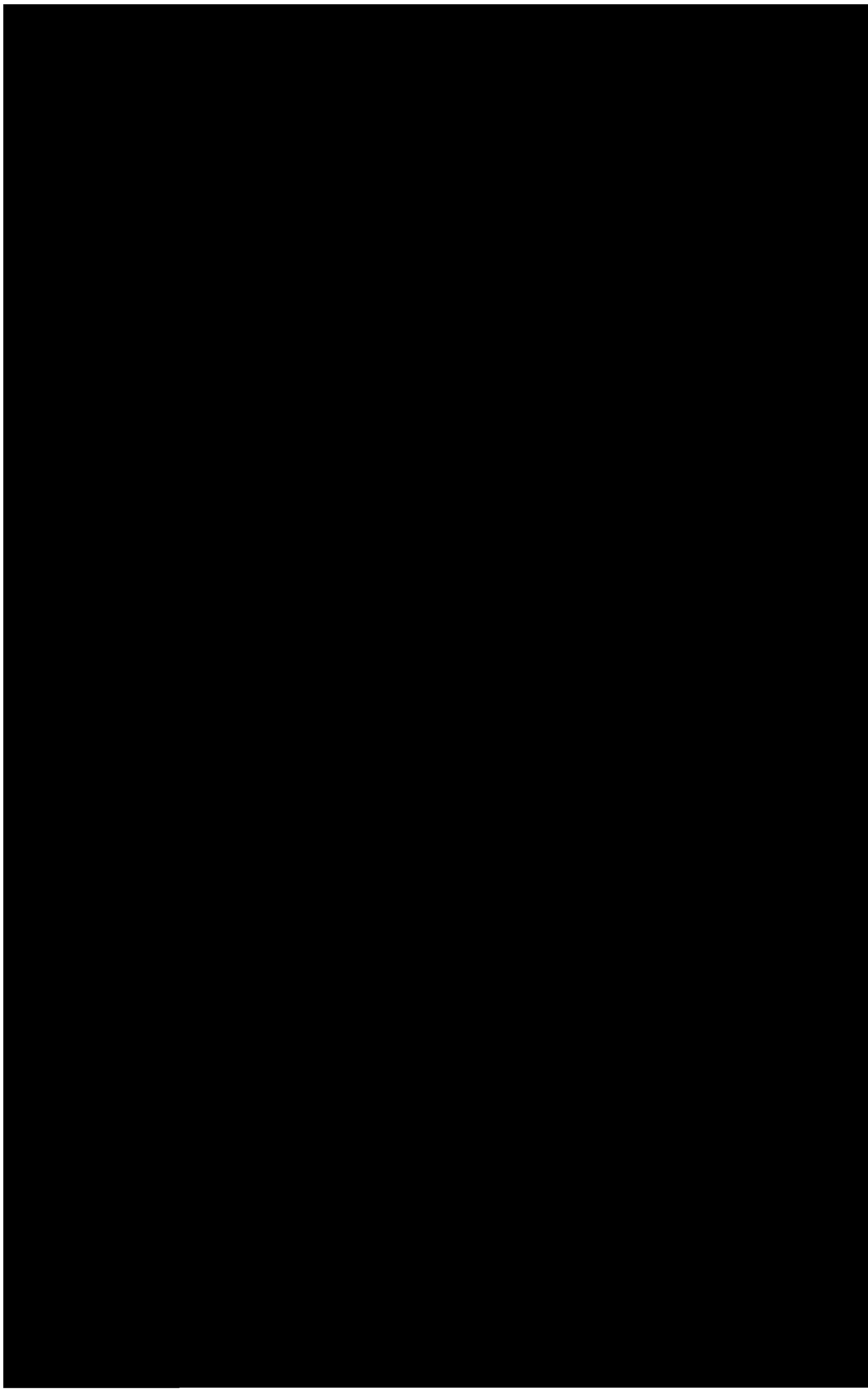
Fig. 12 is a rear elevation of the aperture plate, looking from the left side of Fig. 10.

Fig. 13 is a perspective view of the framer bracket.

Fig. 13*a* is a cross section on line 13*a*—13*a* of Fig. 12.

Fig. 14 is a detail view looking down at the roller gate, as indicated by the arrow 14 of Fig. 3.

Fig. 15 is a detail plan section of the intermit-



The aperture plate 37 is formed of sheet metal with lateral flanges 81 and 82, and having a light aperture 83. The plate 37 is fixedly mounted on a base plate 6a, fixed to the wall 6, by screws 84, which extend through the base flange 81, and thread into the base plate; and the flanges project beyond the ends of the plate for supporting a pair of flanged rollers 85, at the upper end, and a pair of plain rollers 86 at the lower end.

A small shaft 87 is threaded into the flange 81, which extends loosely through the rollers 85, and a cap 88 is threaded onto the out end of the shaft, which is supported in the outer flange 82, and provides an abutment for positioning the adjacent flanged roller. A spring 89 is provided between the other roller and the flange 81 to press the roller together and against the inner end of the cap 88.

Thus by adjusting the cap on the threaded end of the shaft 87, these rollers may be positioned laterally to guide the film in registration with the sides of the light aperture 83. For the sake of convenience in manufacture, the mounting of the lower rollers is the same, although no lateral adjustment is required.

For avoiding frictional heating and scraping the surface of the film, a shallow relief groove 89 is cut in the surface of the plate 37, underneath the mid portion of the film, and the rollers 85 and 86 are substantially flush with the guiding surfaces 90 which are under the margins of the film.

The margins of the film strip are pressed lightly against the guiding surfaces of the plate by two pairs of elongated guide shoes 91 and 92; one pair, 91, being at either side of the aperture 83, and the other pair, 92, being extended out over the rollers 85, as shown in Fig. 10. The shoes are loosely mounted in a gate frame comprising a slotted and apertured plate 93, which is pivoted on the ends of lever members 94 and 95. The lever members are of sheet metal formed to provide integrally connected arms, and are respectively mounted on posts 96 and 97, which are fixedly mounted in the base plate 6a, in parallel relation with the light aperture plate 37.

Upturned hook portions 98 are provided on the shoes which project through and hook over the back surface of the gate plate 93; and the shoes are pressed into contact with the margins of the film by spring fingers 99, which are anchored to the back surface of the plate 93.

The closing movement of the gate is limited by a post 100, which positions the plate 93 in spaced parallel relation with the film, and accordingly the film is only contacted at the sides and there is space for ventilation on both faces of the film.

A spring 101, coiled around the post 96, tends to rotate the lever 94 into closing position; but when the gate is thrown up, it is locked in open position by the lever 95, which is longer than the upper lever 94; and a headed post 103 is fixedly mounted on the web of the lever 95. The levers 94 and 95 and the plate 93 move into angular relation, as shown in Fig. 11, and the lower edge of the plate 93 strikes the head of the post 102, so that said parts are locked against the action of the spring 101.

Proceeding to the intermittent drive mechanism, particularly illustrated in Figs. 10, 15, and 16, a circular aperture 105, having a shoulder 106, is provided in the housing wall 6 for receiving a cylindrical Geneva mechanism casing 107, which has a cover member 108 abutting against said shoulder. The cover is fixedly secured to the casing by screws 109, and the casing is clamped in position by fillister head screws 110 which thread into the portion of the wall 6 surrounding the casing, and grip the cover.

Extending inwardly from the bottom 111 of the cup 107 is an integral arm 112 which supports an outboard bearing 113, which is in alignment with a bearing 114 formed in and at one side of the center of the bottom wall 111; and the Geneva cam shaft 67 is rotatably mounted in the bearings with the drive pinion 66 pinned thereto in the space between the bearings. On the projecting end of the shaft 67 is fixedly mounted a small fly wheel 116; and on the portion of the shaft which projects into the oil chamber 117, formed in the casing, is pinned a Geneva cam 118 and flange 119, to which a drive pin 120 is fixed.

The cam and pin engage and intermittently rotate and lock a Geneva wheel 121, which has a shaft 122 projecting through and rotatably supported in a housing member 123 which is fixedly secured in a hub 124 provided eccentrically in the cover member 108.

By this construction the Geneva wheel may be adjusted into close relation with the cam 118 to give the proper clearance and to compensate for wear, the holes 125 in the cover, for the screws 109, being suitably elongated to permit shifting the cover in making the adjustment.

Also the casing 107 may be rotatably adjusted, by loosening the screws 110, to closely mesh the pinion 66 with the gear 65.

The film sprocket wheels 38 are fixedly mounted on the shaft 122, and the outer end of the shaft is supported in a bearing 126, carried by an arm 127, which is integral with the bearing housing 123.

For adjustably framing the pictures on the film to register with the projector aperture 83 in the plate 37, I provide a roller 130, which is carried on a lever arm 131, which is integral with the ring 132, rotatably mounted on the exterior of the hub 124. The ring 132 has a gear segment 133, formed thereon, which meshes in a worm 134, rotatably mounted in the side wall of the projector housing, as shown in Fig. 3; and a knurled thumb wheel 135 is provided on the outside of the projector housing for rotating the worm 134 and causing the roller to draw a loop 136 in the film between the intermittent wheels 38 and the guide roller 86 on the lower end of the aperture plate. Obviously in this manner the film may quickly and accurately be framed.

The roller also serves to wrap the film around the wheels 38, and the film is held in contact with a portion of the circumference of the wheels by a quick, wide opening, and self locking gate 138, shown in midsection in Fig. 10, in plan in Fig. 14, and in axial section by Fig. 5.

The gate 138 comprises a sheet metal frame 139 formed to provide a pair of integrally connected arms 140, which are pivotally mounted on a post 141, disposed a short distance from the film.

The post extends through a cam 142 and threads into a boss 143 formed in the wall 6, as shown in Fig. 5; and a check nut 144 is threaded on the post for adjustably clamping the cam in position against the end of the boss, and locking the post as well. The outer end of the post has a knurled and slotted head, and the frame 139 is confined between the head of the post and the lock nut.

In the outer ends of the arms 140, a grooved shaft 145 is secured by means of a knurled nut

146, see Fig. 14, threaded on the end of the shaft, and on the shaft is loosely supported a cradle like pressure member frame comprising spaced arcuate shoe plates 147 connected by two rods 148. The apertures 149 for the shaft 145 in the plates are enlarged to permit transverse movement of the plates on the shaft, and a pair of bowed springs 150 are provided which bend around in the grooves 151, of the shaft, and hook under the rods 148 at their ends.

The movement of the frame towards the sprocket wheels is limited by a post 152, threaded into the wall 6, and an adjusting screw 153 is threaded through a projection 154 of the frame for contacting with the post. In closed position the frame is urged into contact with the stop post 152 by a leaf spring member 155 which is anchored to the projection 154 and bears against a point 156 at the end of the circular portion 157 of the cam. Thus the pressure of the shoes, which are spaced so that they bear against the margins of the film at the outer sides of the teeth on the sprocket wheels, is determined entirely by the flexure of the bow springs 150, which can be regulated as desired by the screw 153. Accordingly the pressure on the film may be very light to prevent the film from jumping off from the sprocket teeth, and the parts resting on the film are of low inertia so that there is little danger of tearing the film when there is a tendency for it to jump away from the wheels.

The film is prevented from sticking on the sprocket teeth by a stripper blade 158, which is mounted on the arm 127 to project between the wheels. When the gate is swung away from the film to open, the spring 155 moves around into contact with the circular portion 157 of the cam 142. Therefore, the spring becomes ineffective for exerting torque on the frame. The frame will remain wherever it is left in the open position, and may be closed by pressing it lightly to move the spring over the point of the cam.

The film is held in contact with the upper portion of the circumference of the hold-back sprockets 39 by a gate 160, rotatably mounted on a post 161, threaded into the wall 6; and the construction and arrangement thereof is the same as for the gate 138, except that two spaced rollers 162 are provided for pressing the film against the wheels, and no closing stop is required. These sprocket wheels 39 maintain a varying loop 163 in film for preventing tension on the film below the intermittent drive gears, which would tend to pull the front edges of the driving apertures in the margins of the film away from the leading faces of the tooth sprockets.

The friction rollers 41 tension the film evenly over the plate 43 against the pull from the continuously driven wheels 44; and the resistance of the rollers to the movement of the film, under pressure from a spring pressed gate 164, similar to the gate 138, is governed by the construction shown in Fig. 9. The rollers are integrally formed on a sleeve 165 which is rotatably mounted on the fixed shaft 72. A collar 167 and a lock nut 168 are threaded on the outer end of the shaft, and a spring 169 is provided for pressing the sleeve against the collar 167. The spring 169 is compressed between the lock nut 49 and a disc 170; and friction discs 171 are provided between the ends of the sleeve and the disc and collar so that an even resistance is maintained.

The rollers are provided with flanges 172 for guiding the film, laterally, over the surface of the plate 43 to register the sound track on the film with the aperture 173 in the plate 43.

The sound drive sprockets 44 and the hold-back sprockets 46 are each provided with spring pressed single roller gates 174 and 175, rotatably mounted, respectively, on posts 176 and 177 fixedly mounted in the wall 6.

The roller 48 is for operating safety stop mechanism, not shown herein, but which is actuated, as will be easily understood, by depressing a plunger 180. The roller is supported in the ends of a pair of interconnected arms 181, in a construction similar to the frame 139, described above, and the arms are rotatably mounted on a post 182, fixedly mounted in the housing wall 6. The length of the arms is such that the arms are supported in angular position by the roller riding on the film when the film is under tension and being pulled out of the housing. Accordingly, when the tension on the film is lost, through breakage or otherwise, the frame will swing downward so that a projection 183, provided on one of the arms, strikes and depresses the plunger, which may be arranged to operate such safety mechanism as may be desired.

The picture projector light beam may be provided by a suitable lamp mounted in the lamp housing 11, and the beam is projected through the portion of the film exposed by the aperture 33 and into an optical projector lens tube 184, the beam being periodically interrupted by the shutter 72 in a suitable manner for forming the moving pictures.

For reproducing the sound from the line of markings on the sound track, an optical tube 185, of well known construction, is fixedly mounted on the division wall 5, in alignment with the sound aperture 173.

The light from a lamp 186, mounted on the division wall behind the tube 185, is gathered into a ribbon beam which passed through the portion of the sound track exposed by the aperture 173, and into a photoelectric lamp 187, mounted on the wall, which generates the electrical impulses for actuating sound producing apparatus in the usual manner.

As shown in Fig. 6, I provide means for lubricating the several revolving shafts comprising a reservoir 188, mounted in the top wall of the housing, which is individually connected to the bearings by pipes 189.

I also provide a safety switch comprising spring contact fingers 190 and 191, mounted on the housing wall, and a sleeve 192 which is slidably mounted on the propeller shaft 73, the sleeve being actuated by fly-weights 193, which are mounted on the shutter 72, so that the connection between the contact fingers is made or broken according to the rotation of the shutter and the general operation of the machine.

I also provide a threading lamp 194, which is mounted on a bracket 195, affixed to the plate 37.

Manifestly a machine is provided which is very simple to operate, and in which the handling of the film in threading the machine is very simple and expedient. The framing of the pictures is accomplished by a very simple, accurate, and easily manipulated mechanism, and the film gates effectively guide the film with light pressure and little danger of breaking or damaging the film.

By filtering out the vibrations of the intermittent and other driving mechanism, these mechanisms may be driven from the sound sprocket shaft without causing fluctuations in the sound.

The machine occupies a minimum amount of space, and can be readily disassembled for transportation.

While I have illustrated and described but one embodiment of my invention, it is to be understood that many alterations, additions, or omissions may be made without departing from the spirit of the invention, as defined in the claims which I make, as follows:

I claim:

1. In a motion picture machine, a fixedly mounted vertical aperture plate, two posts mounted in spaced parallel relation with the aperture plate, a double lever pivoted on each post, a gate plate having marginal flanges pivotally connected to the outer ends of the arms of the levers, a stop contacted by the lower lever to position the gate plate when closed in spaced parallel relation with the aperture plate, a spring coiled around the upper post for rotating the upper lever towards the aperture plate, the lower lever being longer than the upper lever so that levers move out of parallel relation when the gate plate is swung back away from the film, and a stop mounted on the lower lever so that the gate is self locking in open position.

2. In a motion picture machine, a film gate comprising two pivotally mounted levers, a frame pivotally mounted on the outer ends of the levers, pressure shoes resiliently mounted on the frame for pressing against the film, said levers being disposed one above the other and the lower lever being longer than the upper lever so that the levers move in substsantially parallel relation when the frame is moved into closed position and move into angular relation when the frame is swung up into open position, and a stop carried by the lower lever and engaged by the frame for limiting the opening movement.

3. In a motion picture machine, a fixedly mounted aperture plate, two posts fixedly mounted in spaced parallel relation with the aperture plate, a lever pivotally mounted on each, a gate frame pivotally connected to the outer ends of the lever so that the gate is supported in close parallel relation with aperture plate, one lever being shorter than the other and having a projection engaged by the adjacent edge of the gate frame so that the gate is self locking in position when swung away from the aperture plate.

4. In a motion picture machine, means for maintaining the film in contact with a guiding surface comprising a frame having upper and lower pivoting levers, a spring in connection with one of the levers tending to press the frame toward the said surface, a stop for limiting the movement of the frame towards the surface, and spring pressed shoes loosely mounted at both sides of the frame for pressing the film against said surface, the shoes having hooked ends for limiting their movement away from the plate and the springs being each secured at one end to the plate and the other end engaging the intermediate portion of its corresponding shoe.

5. In a motion picture machine, a fixed aperture plate, pivoting levers above and below the aperture of the plate, a frame pivotally connected to the levers to swing close to the aperture plate, a spring in connection with the upper levers to rotate the frame toward the plate when moving in that direction, and the spring rotating the lower end of the frame inwardly in self locking position when the frame is raised and swung away from the film.

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