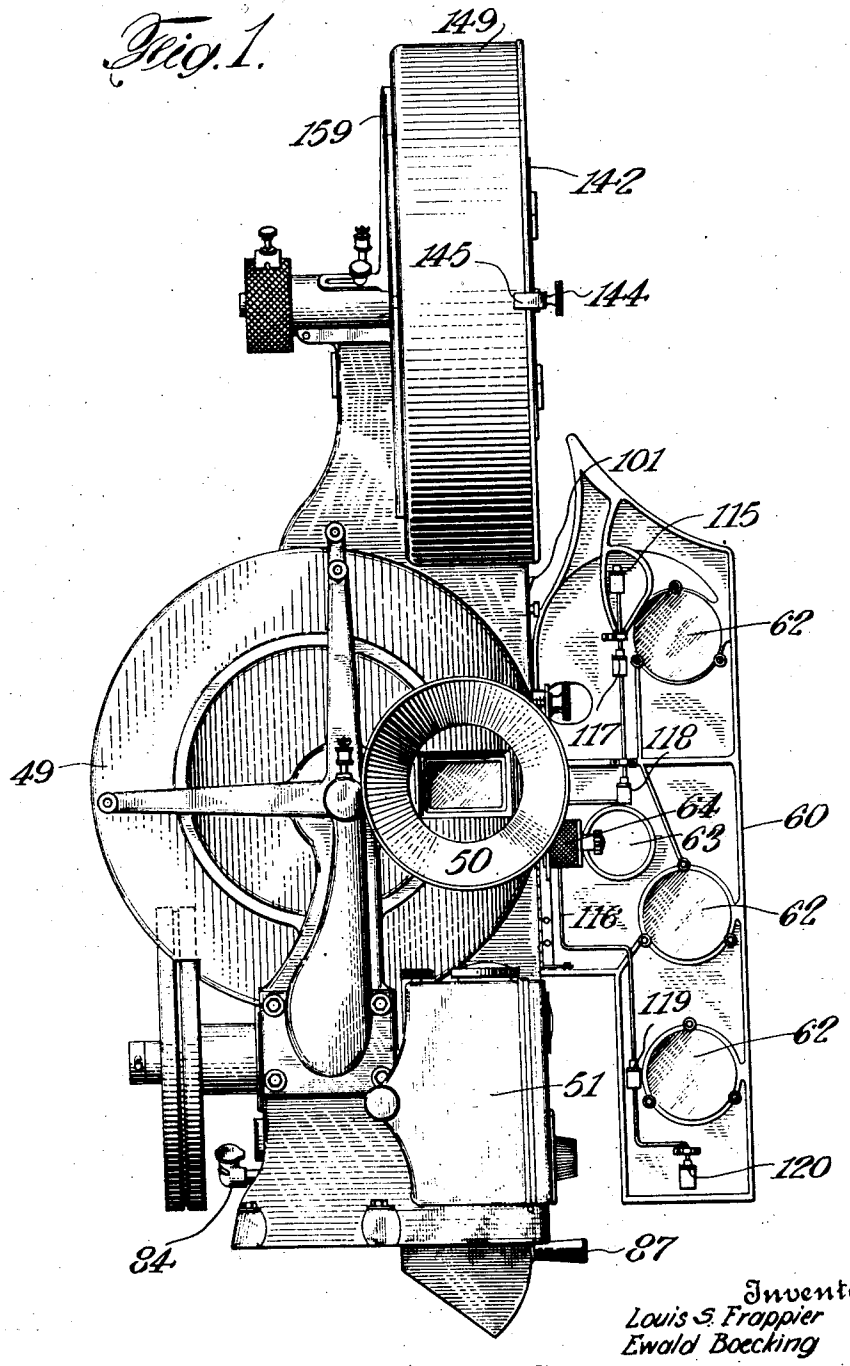
May 15, 1934. L. S. FRAPPIER ET AL 1,958,475

MOTION PICTURE PROJECTION MACHINE

Filed June 29, 1929 11 Sheets-Sheet 1

Fig. 1.



Inventors
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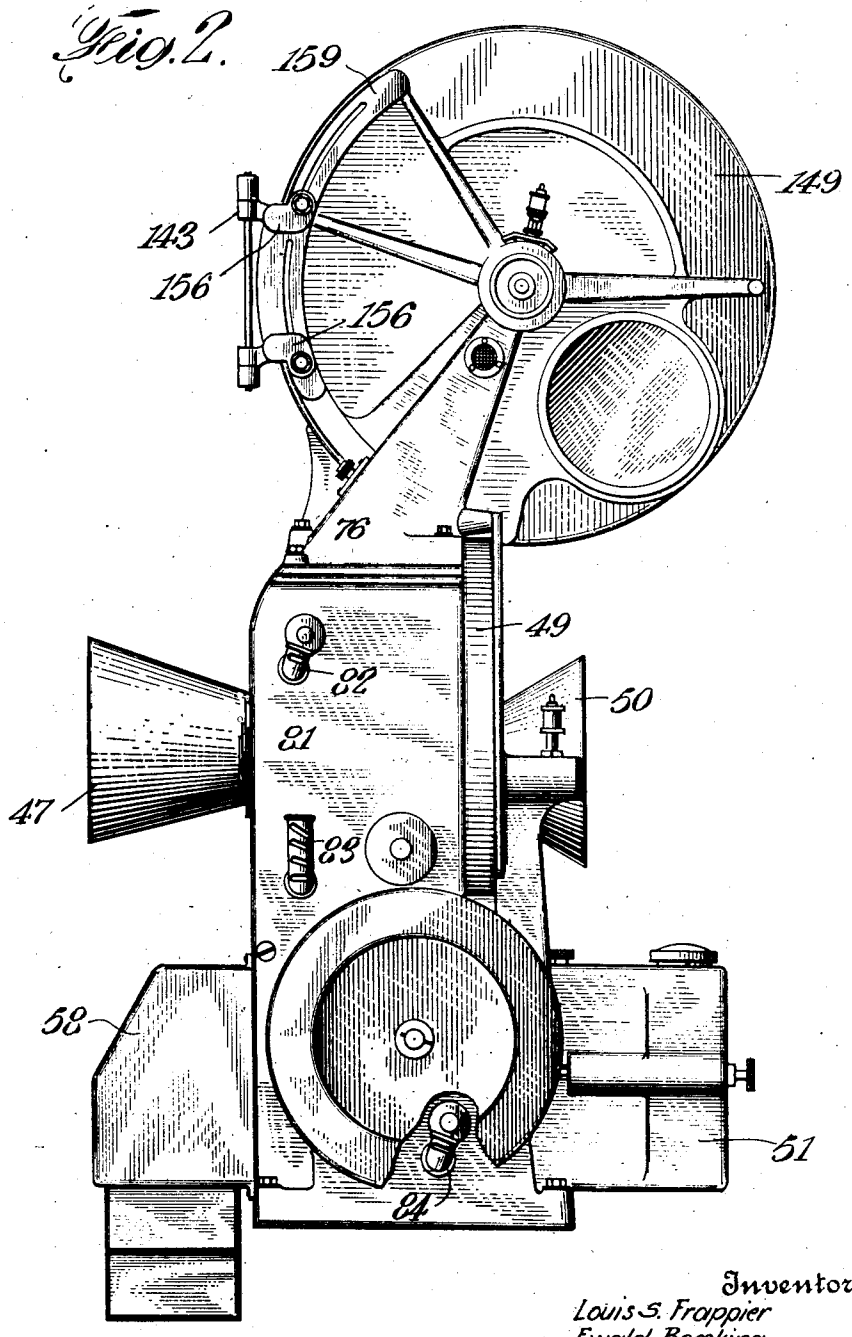
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MOTION PICTURE PROJECTION MACHINE

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Fig. 2.



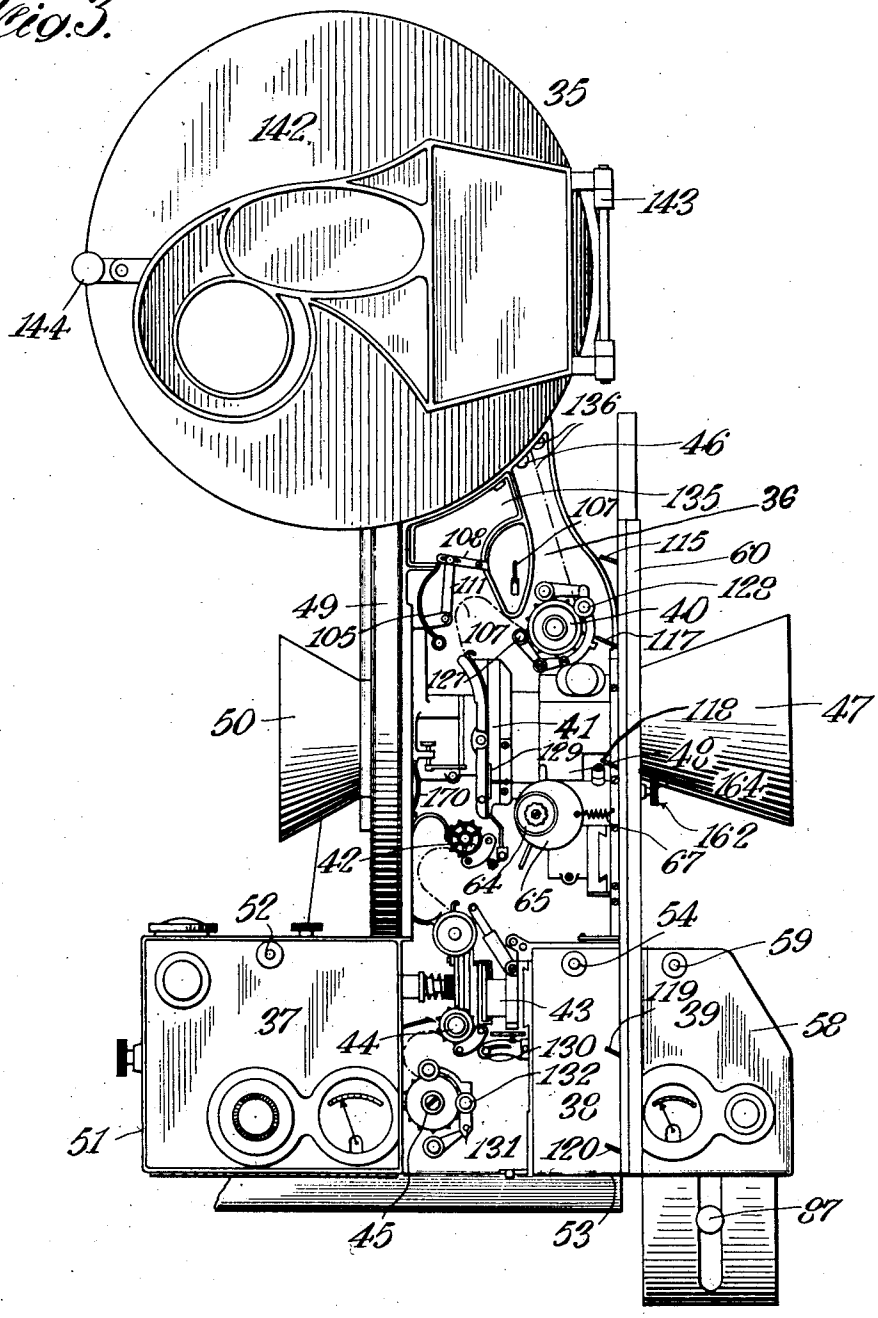
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May 15, 1934. L. S. FRAPPIER ET AL 1,958,475

MOTION PICTURE PROJECTION MACHINE

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Fig. 3.



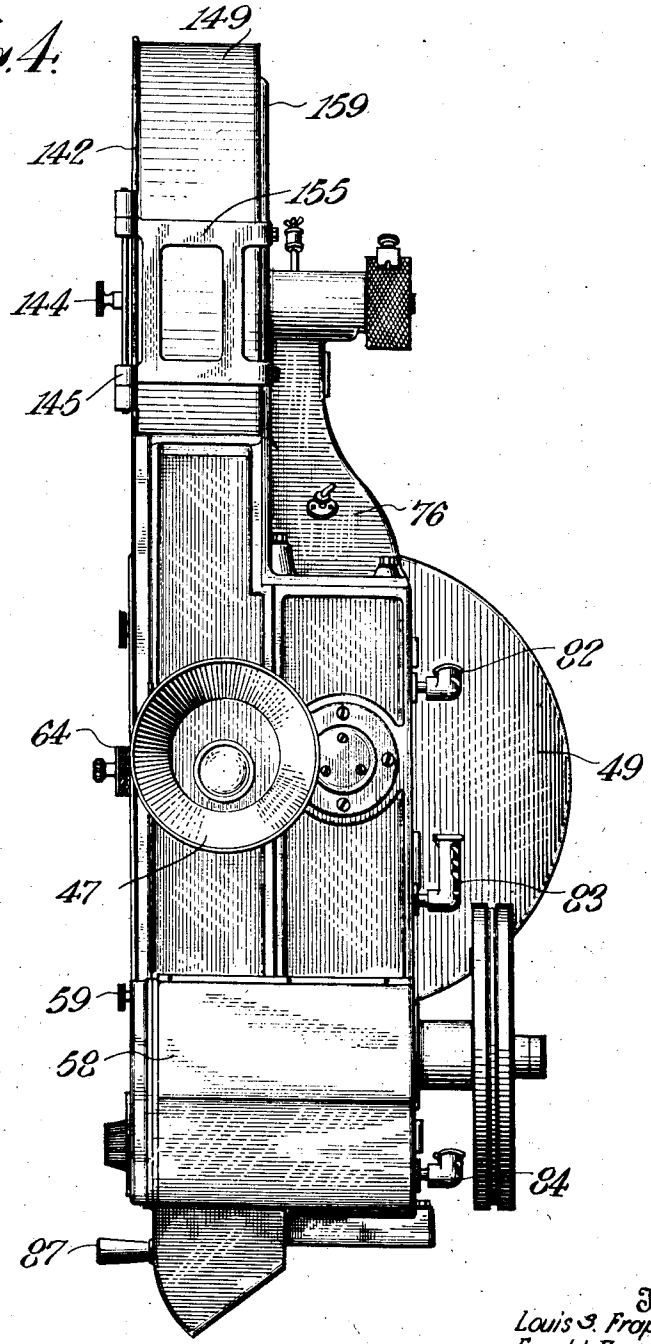
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MOTION PICTURE PROJECTION MACHINE

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Fig. 4.



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MOTION PICTURE PROJECTION MACHINE

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Fig. 5.

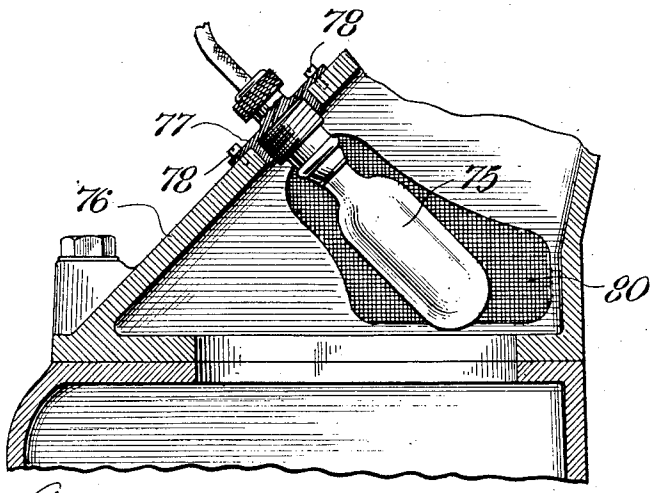


Fig. 6.

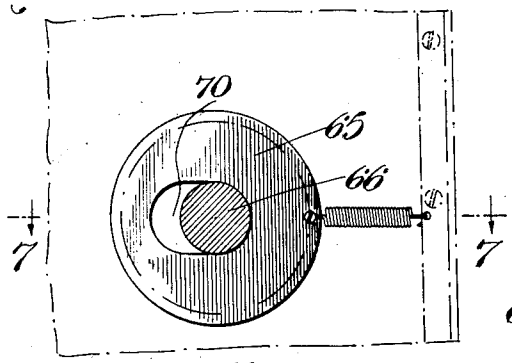


Fig. 8.

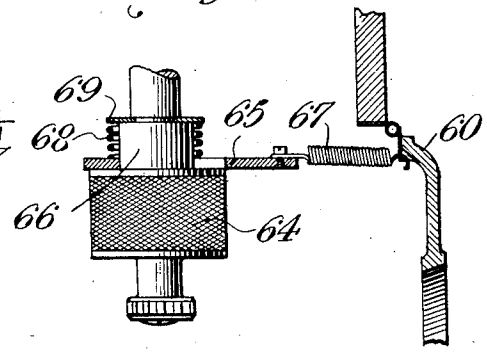
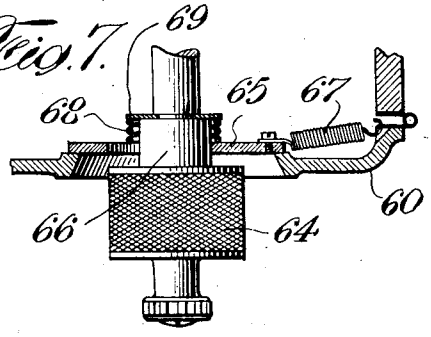


Fig. 7.



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MOTION PICTURE PROJECTION MACHINE

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Fig. 9.

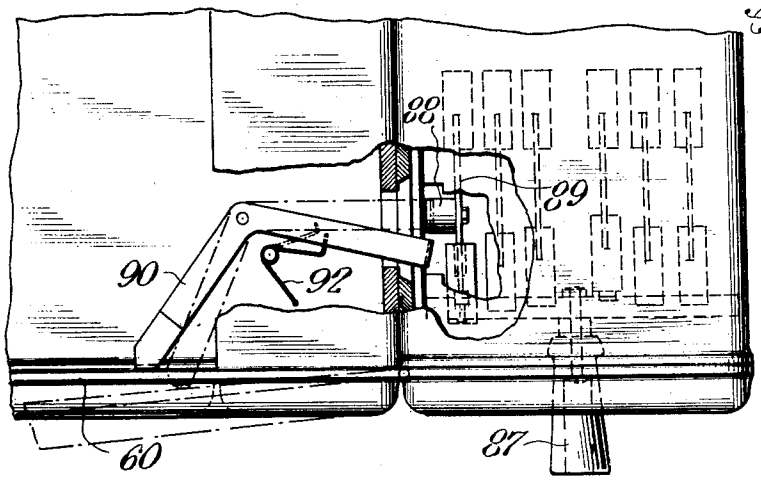


Fig. 10.

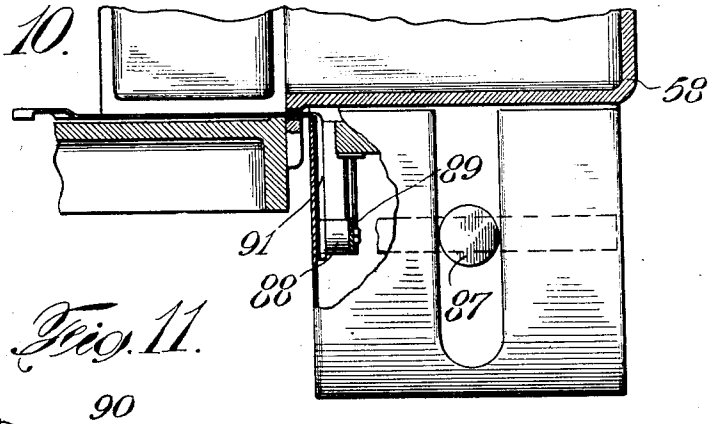
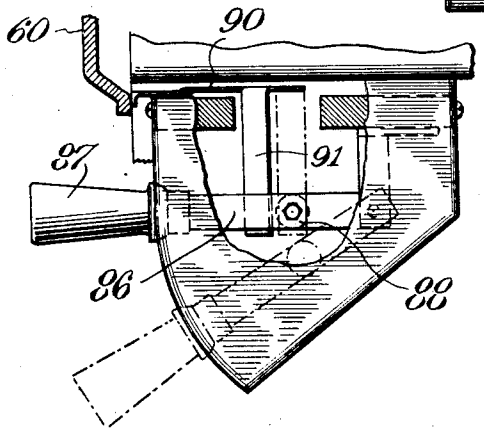


Fig. 11.



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MOTION PICTURE PROJECTION MACHINE

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Fig. 12.

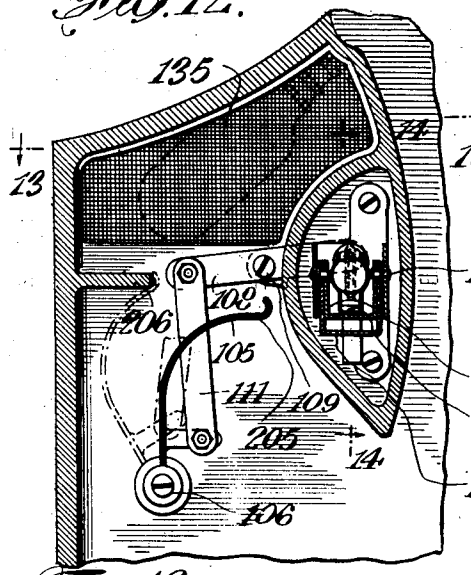


Fig. 13.

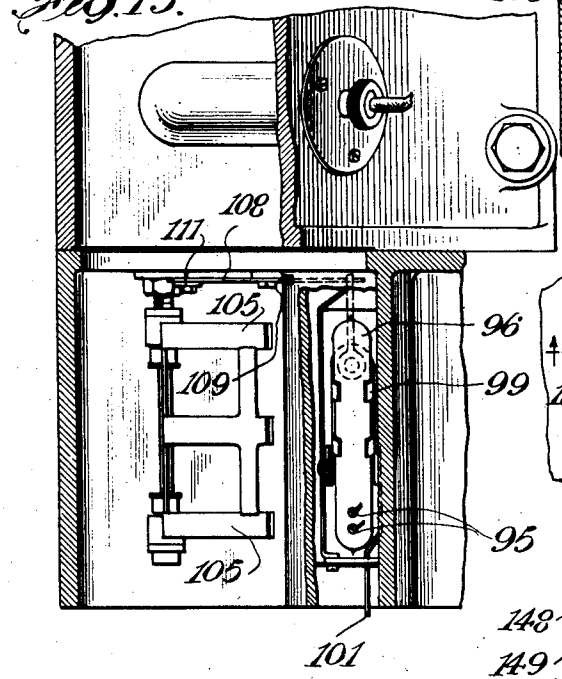


Fig. 14.

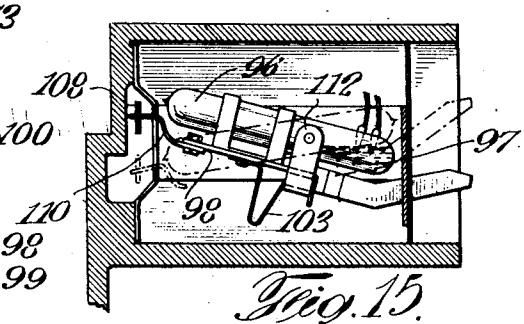


Fig. 15.

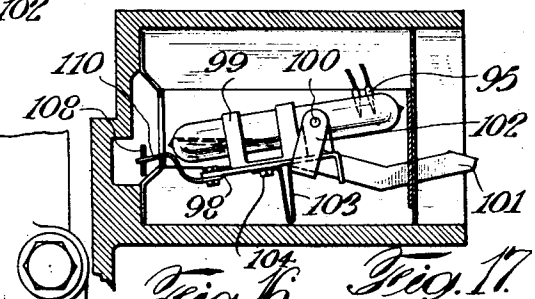
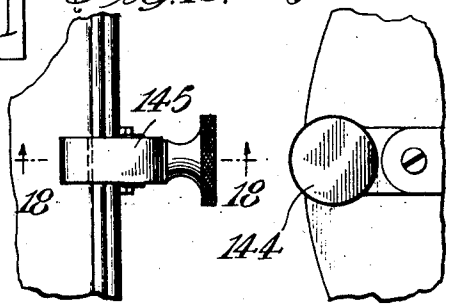


Fig. 16.

Fig. 17.



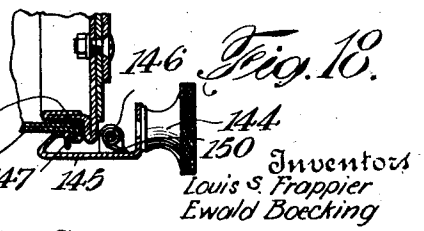


Fig. 18.

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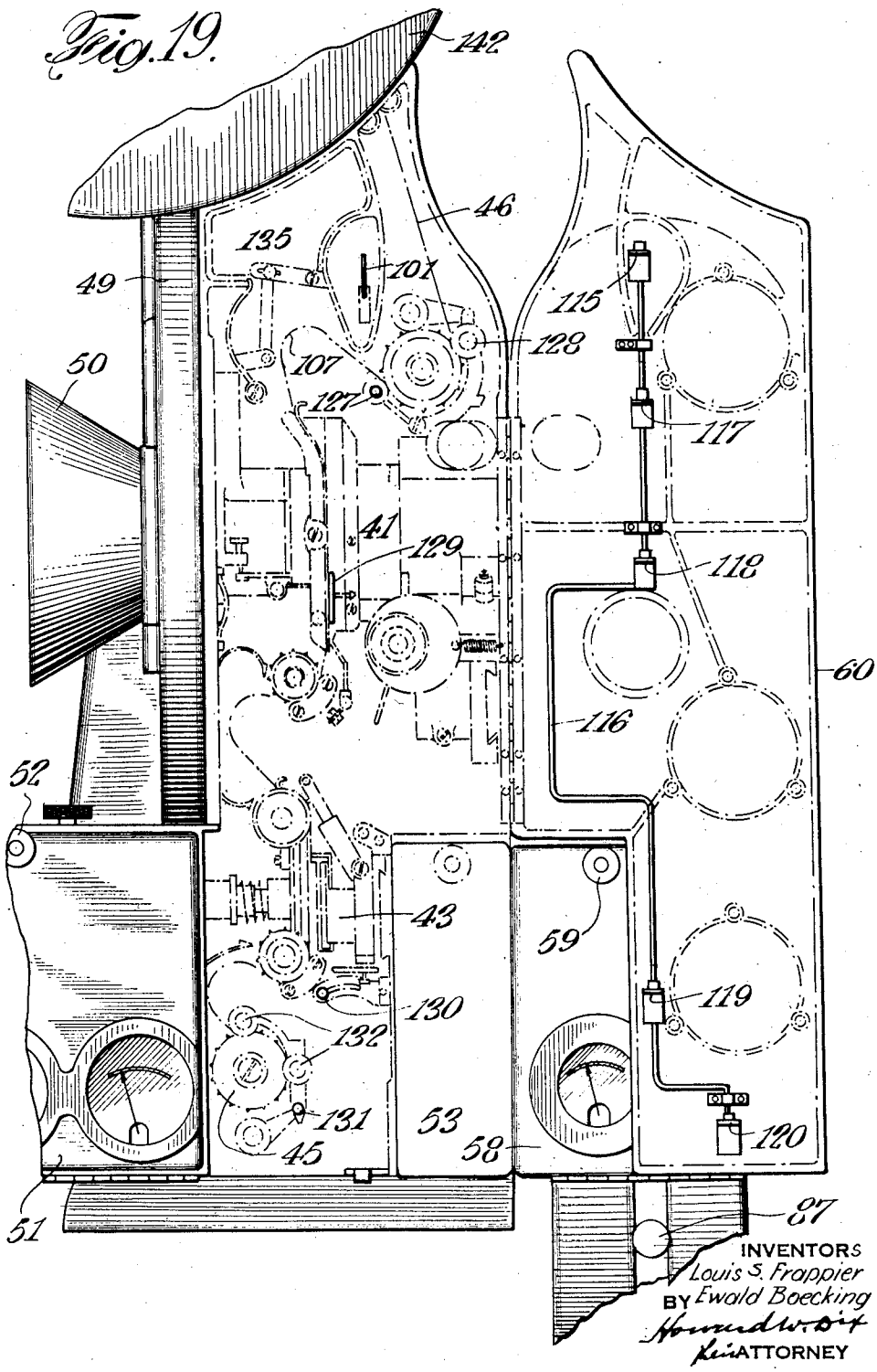
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MOTION PICTURE PROJECTION MACHINE

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Fig. 19.



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MOTION PICTURE PROJECTION MACHINE

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Fig. 20.

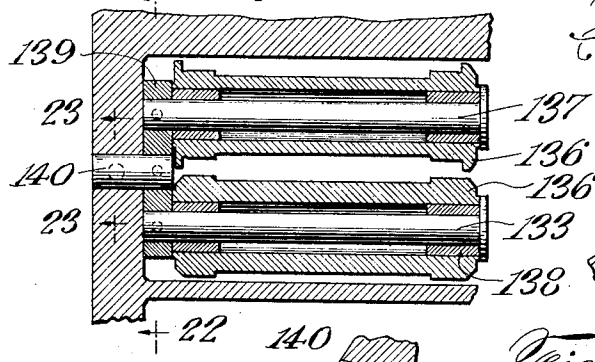


Fig. 21.

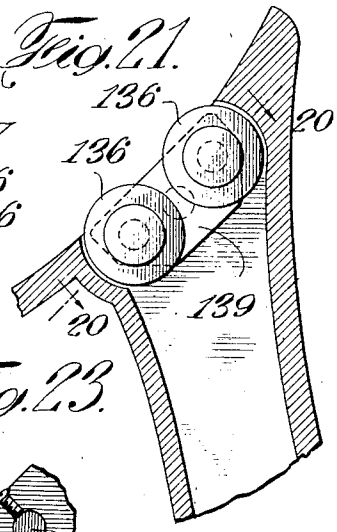


Fig. 22.

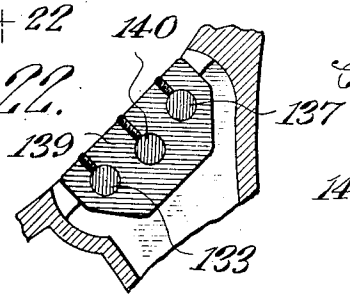


Fig. 23.

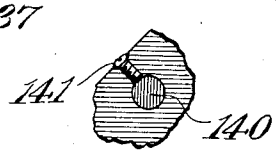


Fig. 24.

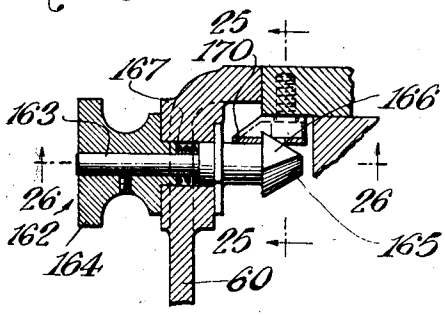


Fig. 25.

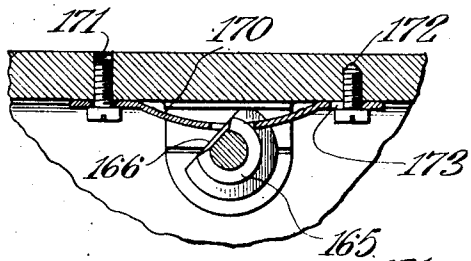
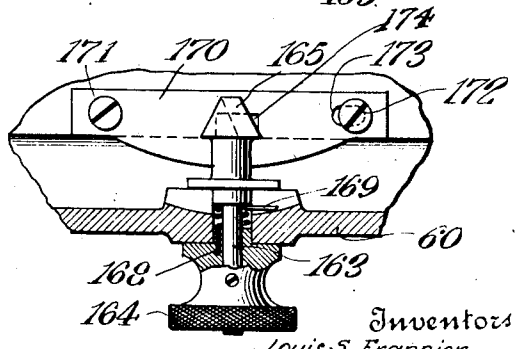


Fig. 26.



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Fig. 27.

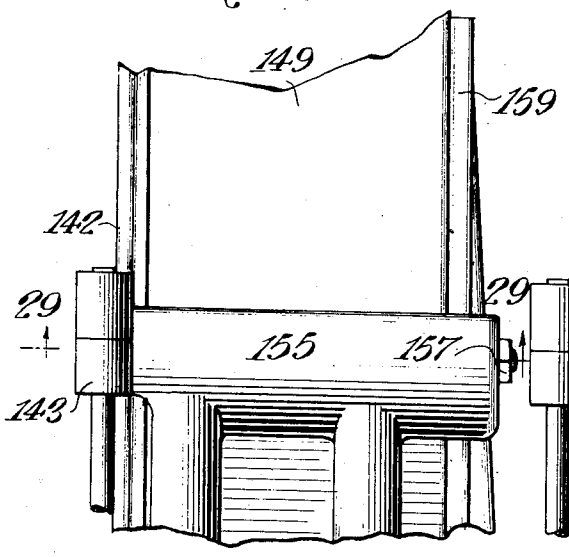


Fig. 28.

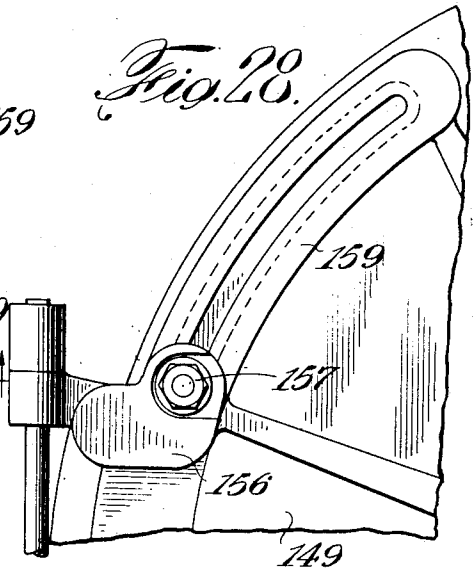


Fig. 29.

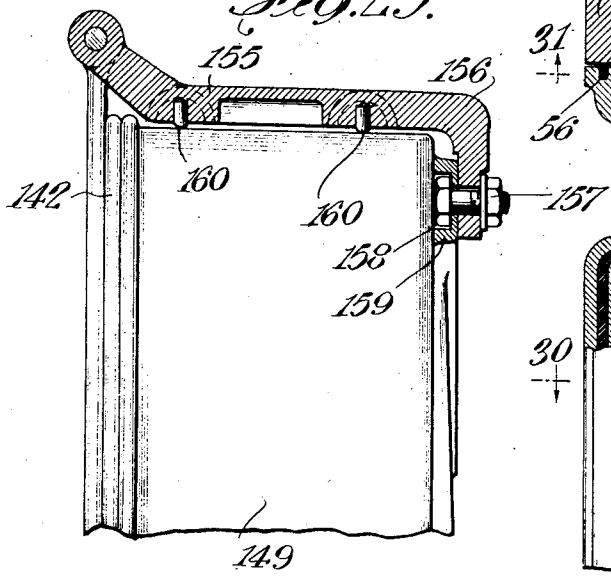


Fig. 30.

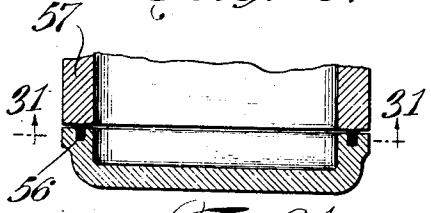
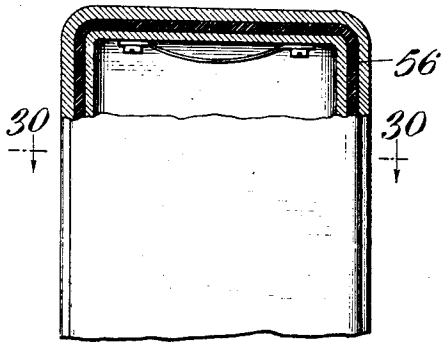


Fig. 31.



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Fig. 32.

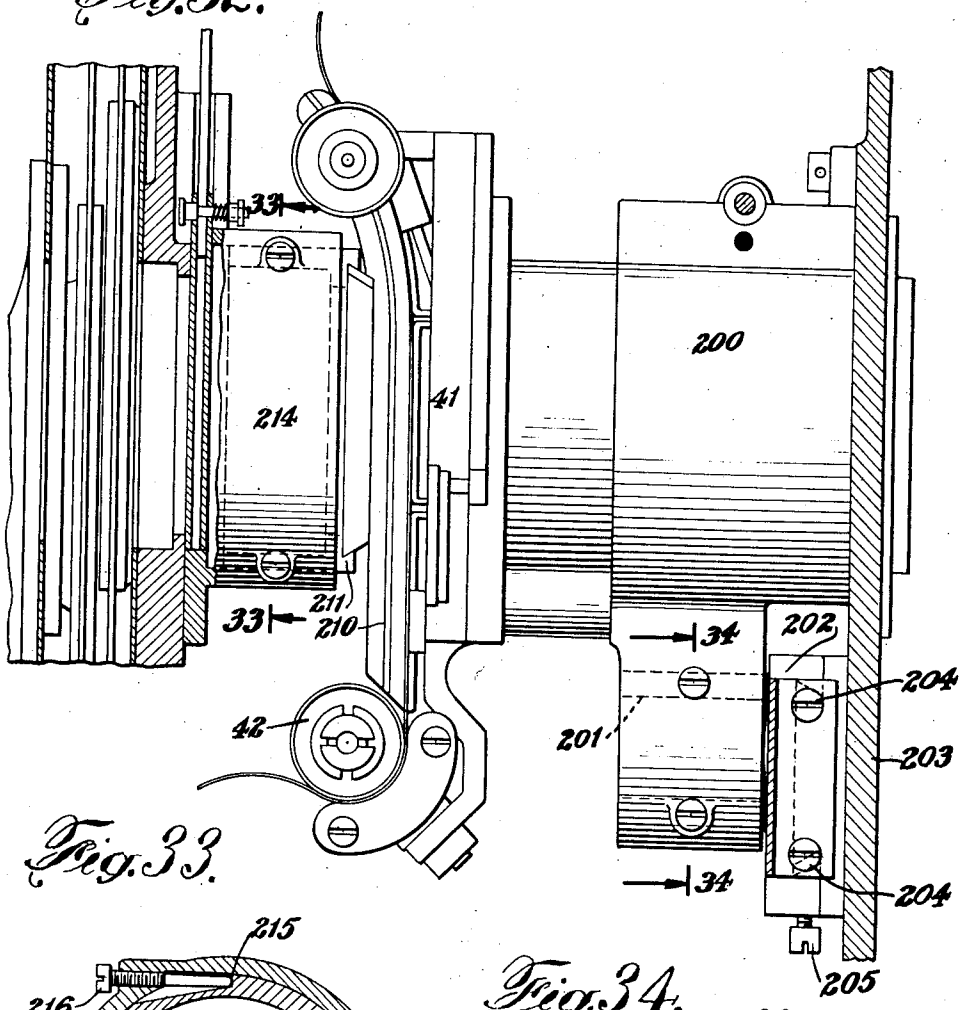


Fig. 33.

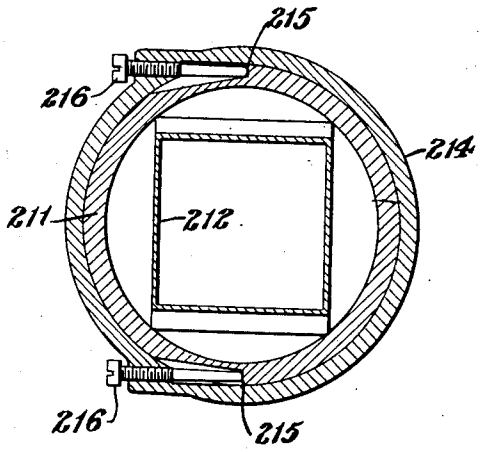
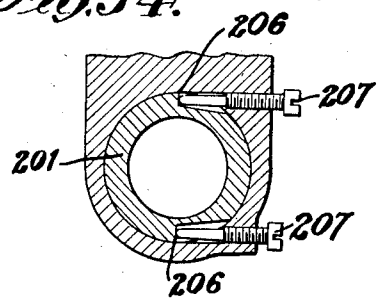


Fig. 34.



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Patented May 15, 1934 1,958,475

UNITED STATES PATENT OFFICE

1,958,475

MOTION PICTURE PROJECTION MACHINE

Louis Simon Frappier and Ewald Boecking, Brooklyn, N. Y., assignors to International Projector Corporation, New York, N. Y., a corporation of Delaware

Application June 29, 1929, Serial No. 374,676

6 Claims. (Cl. 88—17)

This invention relates to motion picture projection machines, and more particularly to a new and improved projection head for a machine capable of simultaneously projecting pictures and reproducing a sound record.

The invention provides a projection head for a machine of the above character which is divided into a plurality of independent compartments, each of the compartments being provided with a separate door or closure. These compartments may comprise a film compartment containing the operating mechanism of the projection head, a sound compartment, photo-electric cell compartment and amplifier compartment. Inasmuch as adjustments in the mechanism of the various apparatus may be required at different times, independent means are provided for opening and closing each of the compartments without interfering with the operation of the others thereof.

The invention further provides automatic switches for disconnecting the driving motor and the amplifier when the door to the film compartment is open, and for automatically stopping the driving motor in response to breakage of the film.

The invention also comprises various other details of construction which will be hereinafter set forth.

An object of the invention is to provide a projection head for a talking motion picture projector which is capable of operating with a minimum amount of interruption and which is provided with safety mechanism for preventing operation when the parts are disarranged.

Another object of the invention is to provide a safety device for preventing accidental operation of the machine when the door of the film compartment is open, and for preventing injury to the operator from contact with the moving parts.

Various other objects and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawings.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 is a rear elevation of the projection head showing the door to the film compartment in open position;

Fig. 2 is a side elevation thereof;

Fig. 3 is a side elevation with the door in open position;

Fig. 4 is a front elevation thereof;

Fig. 5 is a sectional view showing the light for the film compartment;

Fig. 6 is a detail view of the shield for the framing handle;

Fig. 7 is a section taken on the line 7—7 of Fig. 6 showing the door in closed position;

Fig. 8 is a similar section showing the door in open position;

Fig. 9 is a plan view partly broken away of the interlock for the amplifier switch;

Fig. 10 is a side elevation thereof;

Fig. 11 is a front elevation of the switch;

Fig. 12 is a detail view of the film compartment in the projection head;

Fig. 13 is a sectional view showing the film compartment and film operated switch;

Fig. 14 is a detail view of the film operated switch in closed position;

Fig. 15 is a detail view of the film operated switch in open position;

Fig. 16 is a front elevation of the latch for the upper film magazine;

Fig. 17 is a side elevation thereof;

Fig. 18 is a section taken on the line 18—18 of Fig. 16;

Fig. 19 is a side elevation of the projection head showing the interlock mechanism for the operating switch;

Fig. 20 is a section taken on the line 20—20 of Fig. 21;

Fig. 21 is a sectional view showing the guide rollers for feeding the film from the upper film magazine;

Fig. 22 is a section taken on the line 22—22 of Fig. 20;

Fig. 23 is a section taken on the line 23—23 of Fig. 20;

Fig. 24 is a sectional view of the latch for the projection head door;

Fig. 25 is a section taken on the line 25—25 of Fig. 24;

Fig. 26 is a section taken on the line 26—26 of Fig. 24;

Fig. 27 is a detailed view of the hinge for the upper film magazine door;

Fig. 28 is a side elevation thereof;

Fig. 29 is a section taken on the line 29—29 of Fig. 27;

Fig. 30 is a section taken on the line 30—30 of Fig. 31 showing the closure for the photo-electric cell compartment;

Fig. 31 is a section taken on the line 31—31 of Fig. 30;

Fig. 32 is an enlarged detail of the film gate and aperture plate and supporting mechanism therefor;

Fig. 33 is a section taken on the line 33—33 of Fig. 32; and

Fig. 34 is a section taken on the line 34—34 of Fig. 32.

Like reference characters denote like parts in the several figures of the drawings.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring to the drawings more in detail, the invention is shown as applied to a projection machine comprising an upper film magazine 35 (Fig. 3) and projection head having a film compartment 36, sound telescope compartment 37, photo-electric cell compartment 38 and amplifier compartment 39. The film compartment contains feed sprocket 40, upper film gate 41, intermittent sprocket 42, lower film gate 43, continuous sprocket 44 and feed sprocket 45, over which a film 46 is passed in the order named.

Light shield 47 is secured to the front of the projection head in alignment with lens tube 48. Shutter housing 49 is located at the rear of the film compartment and enclosed a shutter mechanism (not shown) by means of which the light is intermittently applied to the film. Shield 50 is positioned around the aperture in shutter housing 49 and forms a finger guard to prevent injury to the operator.

The sound telescope compartment 37 may contain a source of light for the sound record and a telescope for projecting said light on the sound record of the film and other associated apparatus. Said compartment is provided with a door 51 which is hingedly secured about the lower portion thereof and locked by means of latch 52. Photo-electric cell compartment 38 may contain a photo-electric cell and suitable mounting mechanism therefor, and is provided with a separate door 53 provided with a latch member 54. Said door is also provided with a light seal comprising an insert 56 (Figs. 30 and 31) of flexible material which cooperates with casing 57 for completely sealing the photo-electric cell compartment against outside light when the door is in closed position.

The amplifier compartment 39 may contain an amplifying mechanism for amplifying the current produced by the photo-electric cell in response to light variations on the film and applying said current to a distant loud speaker. Said compartment may be closed by a door 58 having a latch 59. Film compartment 36 is closed by a door 60 (Fig. 1) which may be provided with suitable openings 62 through which the mechanism may be viewed. Said openings may be closed by glass or other transparent means. An opening 63 is also provided to permit the projection of the framing handle 64 when the door is in closed position. Opening 63 is normally closed by shield 65 (Figs. 6, 7 and 8) which is mounted over framing shaft 66 and attached to door 60 by means of a resilient link 67. Shield 65 is normally held against said door by means of spring 68 seated around said shaft between shield 65 and collar 69. When the door is in open position the movement of shield 65 is limited by framing handle 64. Shield 65 serves to form a complete closure for the film compartment when the door is in closed position. When the door is opened, however, said shield is pulled toward the hinged side of the door through a distance determined by the elongated opening 70 whereby access to the mechanism within the film compartment is unimpeded. When the door is again closed spring 67 acts as a compression link and forces said shield over to its original position as shown in Fig. 7.

A projection head light 75 (Fig. 5) is mounted within casting 76 (Fig. 2) on which the upper film magazine is supported. Said lamp is held in said casting by means of a socket 77 which may be of any convenient form and is secured thereto by screws 78. Opening 80 (Figs. 3 and 5) is formed in the wall of the film compartment adjacent light 75 to permit the rays of said light to enter said compartment and illuminate the various parts thereof. Said opening may be covered by a glass or other transparent means to prevent the film from contacting with light 75.

Gear compartment 81 (Fig. 2) is provided on the projection head adjacent the film compartment. This gear compartment may be oiled by any suitable means and is divided vertically into a plurality of sections each of which may be separately oiled. Gages 82, 83 and 84 are mounted in said sections to provide means for determining the oil level therein. Inasmuch as the projection head is frequently operated in a tilted position it is desirable to provide means for determining the oil level with respect to the gears in said compartment regardless of the angle of operation. For this purpose gage 83 is provided with a plurality of non-parallel slots. Said slots are so arranged that the oil level is indicated by choosing the slot which is parallel to the floor at the operating angle of the projection head. For example, if the head is tilted at an angle of some 30° the upper slot in gage 83 would determine the true level of the oil in the corresponding section. Gages 82 and 84 may be similarly constructed but have been shown as provided with a single slot and set at the angle at which the machine is to be operated.

In the example illustrated the gears in the upper and lower compartments have been assumed to be so arranged that the amount of oil supplied thereto is practically independent of the angle of the projection head. For this reason the middle section only is provided with a compound gage 83.

A knife switch 86 (Figs. 3, 9, 10 and 11) having a handle 87 is mounted below the amplifier compartment 39 and may be electrically connected in the amplifier circuit for controlling the operation thereof. Said knife switch is provided with a stop 88 of insulating material which may be secured to a blade 89 thereof in any convenient manner. Bell crank lever 90 is pivotally secured in the lower portion of the film compartment and is provided with a downwardly extending section 91 which is adapted to contact with stop 88 in certain positions thereof. Lever 90 is extended forwardly of the film compartment and is adapted to contact with door 60 when said door is in closed position. Spring 92 is utilized for normally holding said lever in a position to contact with stop 88 and door 60, as shown in dotted lines in Fig. 9. Consequently when the door is opened the lever will be rotated in response to spring 92 thereby bringing section 91 into alignment with stop 88. Section 91 will accordingly contact with said stop as shown in the dotted position in Fig. 11, and prevent switch 86 from being closed.

When door 60 is closed, however, lever 90 is moved about its pivot bringing section 91 out of alignment with stop 88 whereby switch 86 may be closed as desired.

The operating motor for the projection head may be controlled by a mercury switch, illustrated in Figs. 12 to 15 as including a pair of contacts 95 secured in a tube 96 containing a portion of mercury 97. Said tube is secured in a bracket 98 having U-shaped members 99 which contact with the sides of said tube and hold the same in position. Bracket 98 is pivotally supported from pivot 100. Lever 101 is also supported from said pivot 100 as by yoke 102. Spring 103 is secured to bracket 98 by screw 104 and bears against lever 101 for normally holding the same in alignment with said bracket as shown in Fig. 14. Said spring, however, permits independent movement of said bracket and said lever to the position shown in Fig. 15.

For controlling the position of bracket 98 there is provided a film operated lever 105 which is pivotally mounted to the frame of the projection head as by pivot 106. Said lever 105 is positioned to contact with the film 46 when upper loop 107 (Fig. 3) becomes enlarged for any reason, such as the interruption of the feeding of the film due to breakage. Lever 105 is provided with a flange 205 which contacts with web 206 on the projection head for limiting the movement thereof. The lever then forms a guide for directing the film into magazine 135. Lever 108 is pivoted as at 109 and secured to bracket 98 by means of projecting member 110. Lever 108 and lever 105 are interconnected by link 111, the arrangement being such that a counter-clockwise movement of lever 105 (Fig. 12) depresses extending member 110 and causes pivotal movement of bracket 98 about pivot 100 thereby bringing tube 96 into the position shown in Fig. 15 and whereby contacts 95 are broken.

Lever 101 is adapted to contact with lug 115 carried on rod 116 which is slidably secured to the inside of door 60 (Fig. 19). Lugs 117, 118, 119 and 120 are also secured to rod 116 and determine the vertical position thereof. Lug 117 is adapted to contact with handle 127 which controls the position of the pad rollers 128 cooperating with feed sprocket 40. Lug 118 is positioned to contact with handle 129 formed on upper film gate 41. Lugs 119 and 120 contact with handles 130 and 131 by means of which film gate 43 and pad rollers 132 respectively, are controlled. Said pad rollers 132 cooperate with feed sprocket 45 for holding the film in contact therewith. The particular construction of pad roller arms and film gates forms no part of the present invention and are not described in detail. Handles 127, 129, 130 and 131 are so positioned that when the pad rollers and film gates are in open position they contact with corresponding lugs 117 to 120 and hold rod 116 in raised position. In this case lug 115 permits lever 101 to come into raised position thereby pivotally moving tube 96 and opening the switch. When the pad rollers and film gates are in closed position handles 127, 129, 130 and 131 are brought out of engagement with corresponding lugs 117 and 120 and allow rod 116 to come into its lower position thereby bringing lug 115 into engagement with lever 101. Said lever is thus brought into its lower position as shown in Fig. 14 and the switch to the driving apparatus is closed.

It is noted that the switch above described is normally in open position and is only brought into closed position when the pad rollers and the film gates are in operating position and door 60 is closed. If door 60 is open or either of the pad rollers or the film gates are in open position the lever 101 will be brought into raised position and the driving motor will not start.

After the apparatus is operating, if the film should break, the upper loop 107 becomes enlarged and contacts with lever 105, causing pivotal movement of said lever and operating the switch as above described. A sufficiently large magazine 135 (Figs. 3 and 19) is provided at the upper portion of the film compartment to care for the amount of film which will be run into said compartment before the mechanism is automatically brought to rest. This magazine in combination with the automatic film operated switch prevents the film from becoming damaged when the feed is interrupted.

Guide rollers 136 (Figs. 20 to 23) are provided in the upper portion of the film compartment for directing the film from the upper magazine on to the feed sprocket 40. Said rollers are mounted on rods 137 by oilless bearings 138. Said bearings may be formed of any suitable material such as "bearium" metal. Rods 137 are pinned in yoke 139 which is secured in the frame of the projection head as by pin 140. Pin 140 permits the yoke 139 to be angularly adjusted to bring rollers 136 into the desired position after which it may be secured by set screw 141.

Upper film magazine 35 is provided with a door 142 which is hinged by hinge 143 and is provided with a latch 144. Said latch as shown in Figs. 16 to 18 comprises a member 145 which is pivotally secured to said door as at 146 and is provided with an inturned flange 147 which bears against flange 148 formed on the casing 149 of the film magazine. Spring 150 is secured about the pivot 146 and normally holds latch 144 in closed position. This latch member provides means for securing door 142 in closed position without interfering with the operation of the film. It is to be noted that no portion of the latch mechanism extends inside of the casing and furthermore the latch may operate on any portion of the periphery of the casing.

Hinge 143 is supported on a bracket 155 (Figs. 4, 27, 28 and 29). Said bracket has an inturned flange 156 through which bolts 157 are threaded. Said bolts are provided with heads 158 which slide in suitable channels in member 159 which forms a part of the casing of the film magazine. Pins 160 are secured in bracket 155 and bear against the outer surface of the film magazine to permit a sliding movement thereon. It is to be noted that the position of hinge 143 may be varied by loosening bolts 157 after which bracket 155 may slide about the periphery of the film magazine. It is accordingly possible to so position hinge 143 that door 143 opens in a horizontal position irrespective of the angular position of the projection head. Latch 144 will cooperate with flange 148 of the casing 149 regardless of the angular position of said door.

Door 60 may be held in closed position by latch 162 (Fig. 3) which is shown more in detail in Figs. 24, 25 and 26. Said latch comprises a rotatable shaft 163 which is secured in said door in any suitable manner and is provided with an operating handle 164. On the inner end of said shaft is provided a cone 165 having a flattened surface 166. Spring 167 is mounted around shaft 163 for normally holding the latch in engaged position. One end 168 of said spring is held in a

suitable aperture in handle 164. The other end 169 is held in a groove in door 60. Spring member 170 is secured to the inside of the casing of the projection head by screws 171 and 172, in a position to engage with the cone 165 when the door is in closed position. An elongated slot 173 may be formed in spring 170 adjacent screw 172 to permit the necessary movement of said spring when the door is being closed. Spring 170 may be provided with an aperture 174 to engage cone 165.

The above described latch mechanism is normally held so that cone 165 engages spring 170. It may be released, however, by turning said cone to bring flattened surface 166 into alignment with said spring. When pressure on handle 164 is released spring 167 will again rotate cone 165 into engaging position. When the door is closed the cone surface will contact with spring 170 forcing said spring outwardly to permit passage of said cone after which it will again assume engaging position. Latches 52, 54 and 59 may be formed in a similar manner if desired.

Referring to Figs. 32 to 34, the upper film gate 41 is shown as slidably supported in a housing 200 which is pivotally secured for movement about pin 201, said pin forming a part of bracket 202 which is secured to frame 203 in any convenient manner. Bracket 202 may be slidably secured to frame 203 by dovetail 204 if desired and held in adjusted position by set screw 205.

Pin 201 is formed with a pair of shoulders 206 which engage screws 207 threaded into housing 200. The pivotal position of said housing with respect to pin 201 is controlled by suitably adjusting screws 207. For causing pivotal movement of housing 200 one of the screws 207 is released and the other of said screws is tightened against its cooperating shoulder 206. In this manner, by releasing one screw and tightening the opposite screw, a minute adjustment may be made and the housing may be brought into proper alignment.

Aperture plate 210 is supported from light tube 211 in any convenient manner. A cooling member 212 may be included within light tube 211 for extracting the heat of the projection light from the aperture plate. Tube 211 is rotatably secured in housing 214 and is provided with a pair of shoulders 215 which engage screws 216. Screws 216 are threaded in housing 214 and provide for rotatably adjusting light tube 211 with respect thereto, adjustments being similar to that described in connection with screws 207.

Only so much of the aperture and film gate have been described as is necessary to an understanding of the present invention. One type which may be employed is described more in detail in the copending application of Frappier & Boecking, for improvements in Projection machine, Serial No. 303,162, filed August 31, 1928.

It is to be noted that in the above described mechanism the various operating compartments of the projection head are provided with separate closure members which may be operated independently. Furthermore, the machine cannot be operated while the door to the film compartment is open nor while either the pad rollers or the film gates are in open position. The switch of the amplifier cannot be initially closed while the door to the film compartment is open and the machine is automatically stopped in response to breakage in the film.

An adjustable hinge on the door for the upper film magazine permits the door to be swung into horizontal position whereby a maximum clearance between the door and the wall of the projection room may be obtained. The latch for the film magazine is formed entirely on the outside thereof and is capable of operating regardless of the angular position of the door. The latches for the doors to the various operating compartments are formed with the spring entirely concealed and present a neat and compact appearance.

The adjustment described for the aperture plate and the film gate permits these elements to be accurately aligned with the projection rays by the expenditure of a minimum amount of time and labor. Furthermore, the adjustment when once obtained is rigidly maintained due to the interlocking action of the adjusting screws 216 and 207.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In a projection head having pad roller arms and film gates, a switch for controlling driving apparatus, a door for closing said projection head, a lever carried by said door for holding said switch in closed position when said door is closed and members on said pad roller arm and said film gates adapted to prevent said lever from operating when said pad roller arms or said film gates are not in normal running position.

2. In combination with a projection head, a switch comprising a tube containing mercury and a pair of electric contacts, a pivoted bracket supporting said tube, a pivoted lever and means interconnecting said lever and said bracket, said means being adapted to cause movement of said lever in one direction to cause corresponding movement of said bracket and also to permit independent movement of said bracket in said direction, said projection head having film operating mechanism and a door, said film operating mechanism controlling the position of said bracket and said door controlling the position of said lever.

3. In combination with a projection head, a switch comprising a tube containing mercury and a pair of electric contacts, a pivoted bracket supporting said tube, a pivoted lever and means interconnecting said lever and said bracket, said means being adapted to cause movement of said lever in one direction to cause corresponding movement of said bracket and also to permit independent movement of said bracket in said direction, said projection head having film operating mechanism and a door, said film operating means for controlling the position of said bracket, said door controlling the position of said lever, and means controlled by the film operating mechanism when in non-operating position for rendering said door control inoperative.

4. In a projection head, a framing knob, a door for closing said head and having an aperture through which said knob extends when said door is closed, a disk mounted on the framing shaft forming a closure for said aperture when said door is in closed position, and a link interconnecting said disk and said door, said link being adapted to cause lateral movement of said disk when said door is opened so as to provide ready access to said projection head.

5. In a projection head having a pad roller arm

for operating a driving motor, and means cooperating with said pad roller arm and said film gate for closing said switch only when said pad roller arm and said film gate are in operating position.

6. In a projection head having a pair of pad roller arms and a pair of film gates independently and a film gate independently movable, a switch movable, a switch for operating a driving motor, and means cooperating with said pad roller arms and said film gates for closing said switch only when said pad roller arms and said film gates are in operating position.

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