J. TESSIER.

MOTION PICTURE PRINTING MACHINE.

APPLICATION FILED AUG. 21, 1914.

1,205,582.

Patented Nov. 21, 1916.

4 SHEETS—SHEET 1.

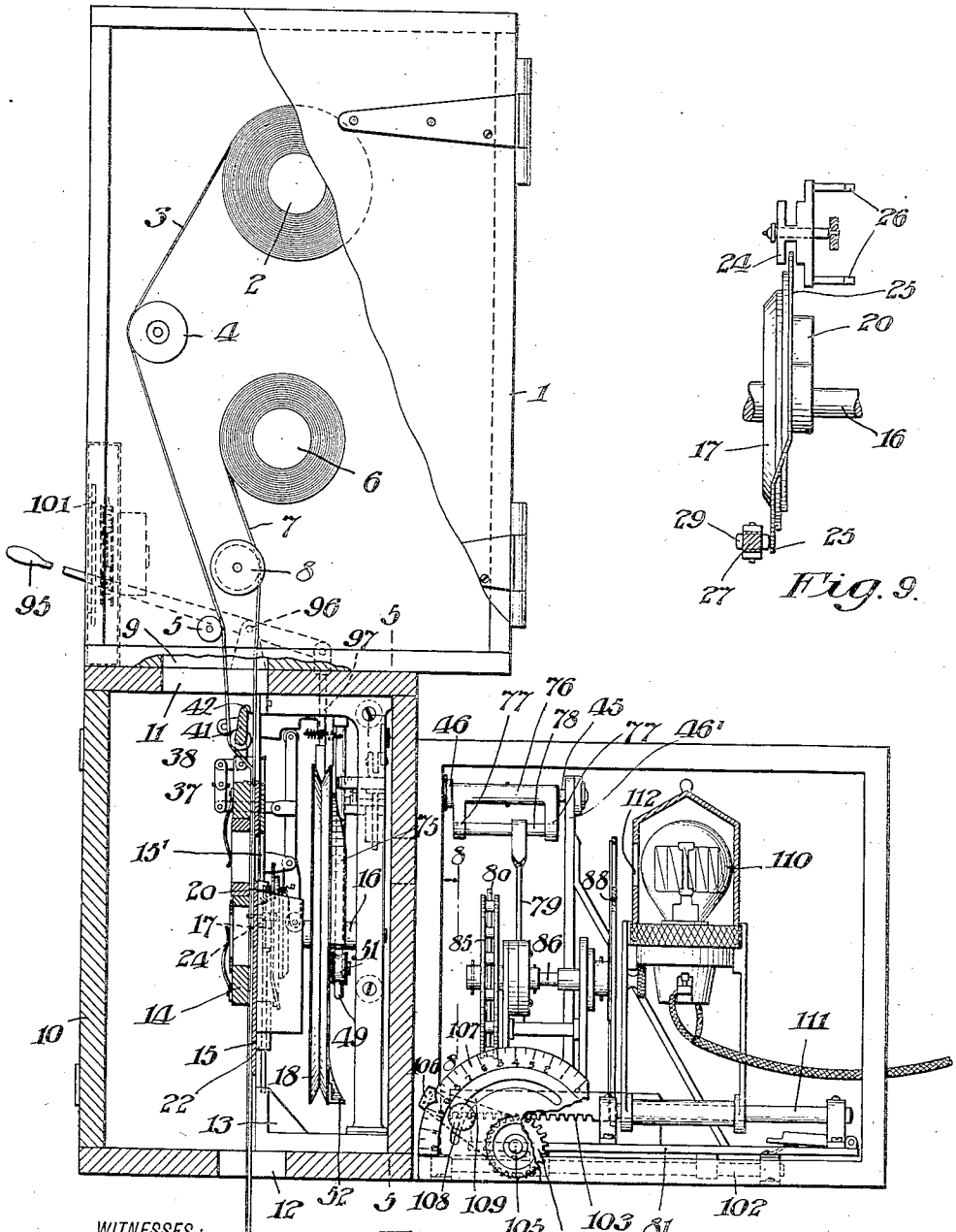


Fig. 9.

Fig. 1.

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4 SHEETS—SHEET 2.

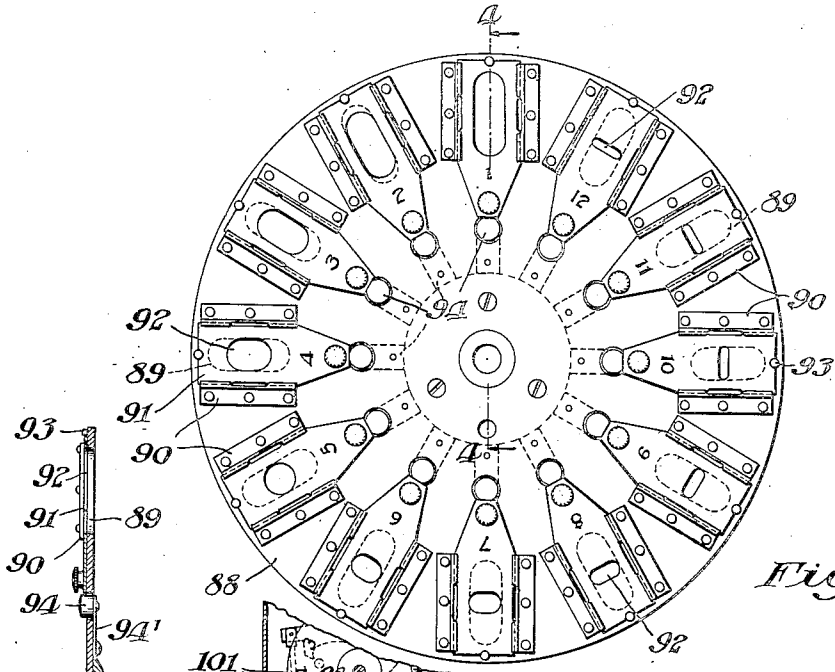


Fig. 3.

Fig. 4.

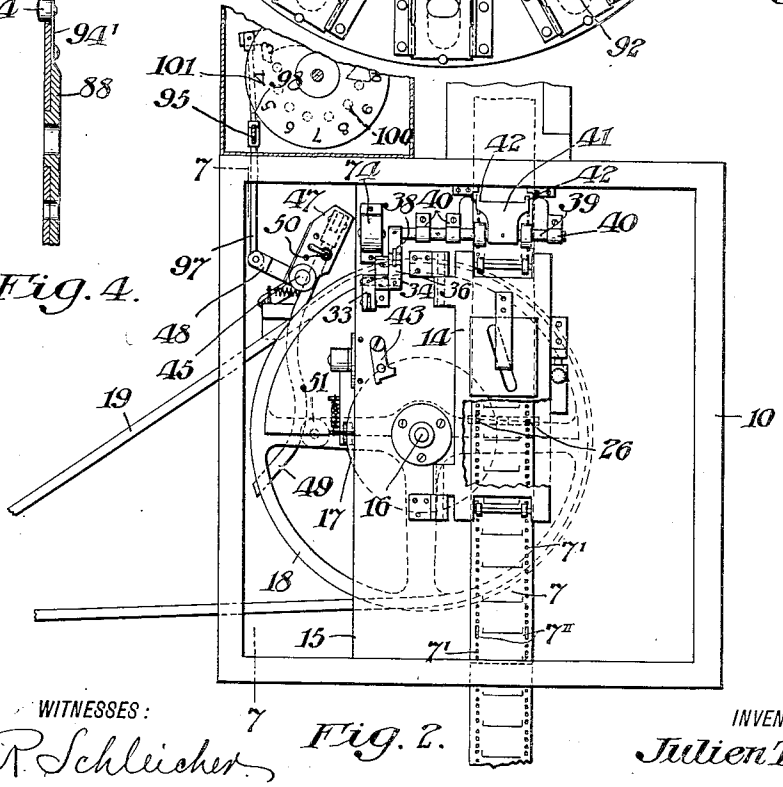


Fig. 2.

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4 SHEETS—SHEET 3.

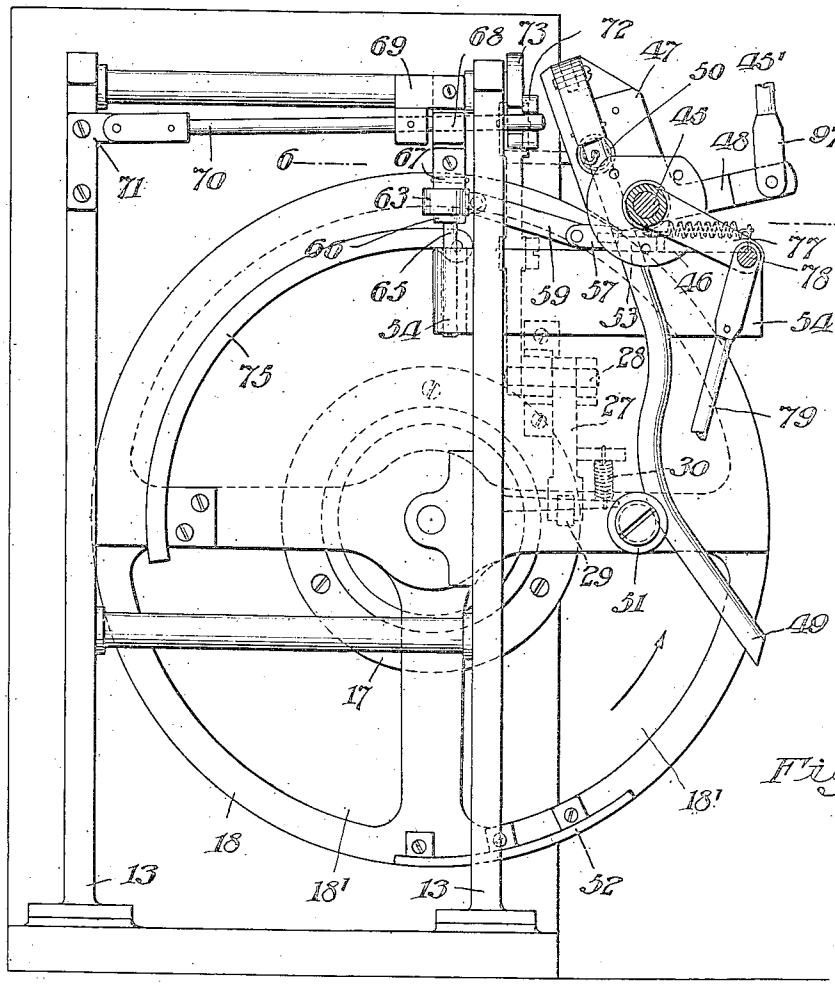


Fig. 5.

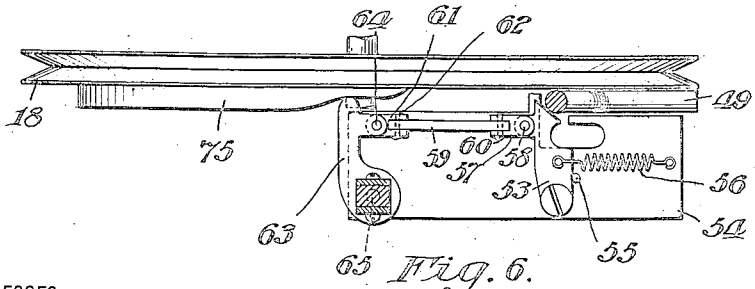


Fig. 6.

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4 SHEETS—SHEET 4.

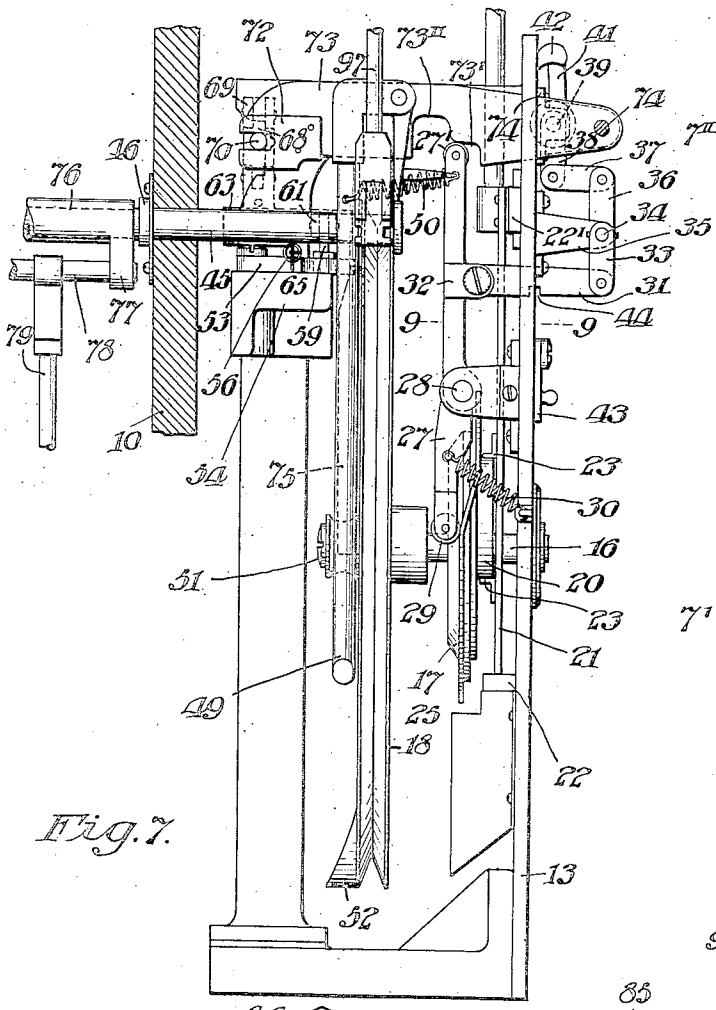


Fig. 7.

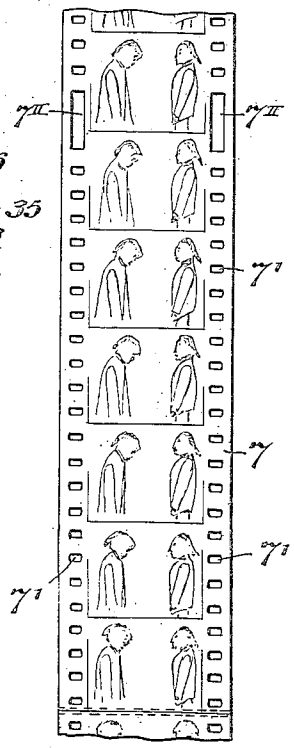


Fig. 10.

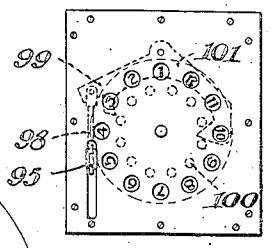


Fig. 11.

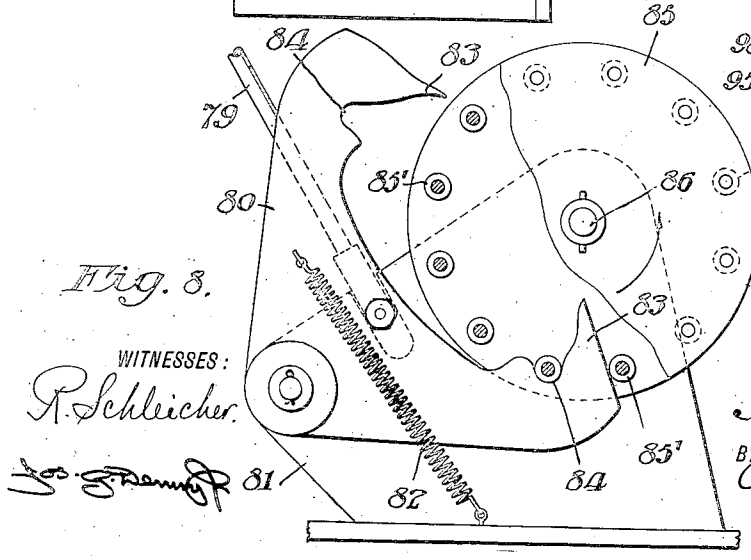


Fig. 8.

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UNITED STATES PATENT OFFICE.

JULIEN TESSIER, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO LUBIN FILM COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

MOTION-PICTURE-PRINTING MACHINE.

1,205,582. Specification of Letters Patent. Patented Nov. 21, 1916.

Application filed August 21, 1914. Serial No. 857,830.

To all whom it may concern:

Be it known that I, JULIEN TESSIER, a citizen of France, residing in the city of Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented certain Improvements in Motion-Picture-Printing Machines, of which the following is a specification.

In motion picture photography, different parts of the same subject are very commonly photographed at different times or under different conditions, so that different sections of the negative film are subjected to different exposures and have different densities which must be corrected or compensated for in printing the positives from the negatives in order to have uniformity in the projected pictures.

It is the leading object of my invention to provide a printing machine which is adapted to be adjusted initially and to be automatically operated so that the light used in printing will be proportioned to the density of the film section and the positive produced will be uniform in character, to the end that printing may be effected with improved results and without the loss of time that has heretofore obtained.

In the accompanying drawings, Figure 1 is a sectional elevation of a printing machine embodying my invention; Fig. 2 is a part sectional front elevation of the same with parts broken away and the front of the cases removed; Fig. 3 is an elevation of the revoluble light disk provided with slides for regulating the amount of light passed for use in printing; Fig. 4 is a broken sectional view taken on the line 4—4 of Fig. 3; Fig. 5 is an enlarged view taken on the line 5—5 of Fig. 1; Fig. 6 is a view of details partly in section taken on the line 6—6 of Fig. 5; Fig. 7 is an enlarged sectional view taken on the line 7—7 of Fig. 2; Fig. 8 is an enlarged sectional view taken on the line 8—8 of Fig. 1; Fig. 9 is a view of a cam wheel and connections from the section line 9—9 of Fig. 7; Fig. 10 is a view of a section of film adapted to be used with my improvements; and Fig. 11 is a view of a dial for indicating the position of the apertured disk for regulating the amount of light used.

The mechanism, as illustrated in the drawings, comprises the case or house 1 which contains the spool 2 for the positive film 3 which is drawn therefrom over the rollers 4 and 5, and the spool 6 for the negative film 7 which is drawn therefrom over the roller 8, the films passing from the rollers through the aperture 9 in the bottom of the case. A case or house 10 supports the case 1, contains a top aperture 11 which registers with the aperture 9 and is provided with a bottom aperture 12, the films being drawn from the spools, over the rollers and through the apertures in the operation of printing.

A frame 13 is contained in the case 10 and has the door 14 hinged on its front plate 15, the films passing between the plate and the closed door in the operation of printing.

An arbor 16 is journaled in the frame and has fixed thereon the wheels 17 and 18, the latter being provided with the light apertures 18′ and driven by a belt 19. As the wheel 17 revolves, a cam 20 thereon reciprocates the yoke 21 which is controlled by the vertical guides 22 and 22′, and provided with the laterally projecting bearings or lugs 23 for engaging the periphery of the cam. A yoke 24 is carried by the yoke 21, engages the peripheral cam 25 of the wheel 17 and carries the pins 26 which engage the perforations 7′ along the edge of the films to feed the latter in a well known manner, the shutter wheel 18 cutting off the light when the films are moving and passing light when they are at rest.

A lever 27 has the fulcrum 28 on the frame and the roller 29 which is pressed against a face of the cam 25 by a spring 30 connecting the lever with the frame. A link 31 is pivoted on the bearing 32 of the lever 27 and connected with an arm 33 fixed on a pin or short shaft 34, which is journaled in a bearing 35 on the plate 15. An arm 36 is fixed on the pin 34 and connected by a link 37 with an arm 38 fixed on a shaft 39 which is journaled in bearings 40 on the plate 15. A shoe 41 is fixed on the shaft 39 and provided with the toes 42 which ride on the edges of the negative film, over the perforations 7′, but drop into the slots 7″ formed in a predetermined manner in the edges of film sections of different densities, the member 41 being rocked by the spring 30 and the intermediate mechanism when the offset section of the cam 25 registers with the roller 29. When it is desired to hold this mechanism out of operation, a dog 43, pivoted on the

plate 15, is engaged in the notch 44 of the link 31.

A shaft 45 is journaled in the bearings 46 and 46′ and has the arms 47 and 48 fixed thereon. An arm 49 is pivoted on the arm 47 and is further connected with a laterally extending projection on the arm 47 by a coiled spring 50, the latter passing through the arm 47.

The wheel 18 is provided with a roller or rolling cam 51, adapted to engage the arm 49 and cause it to rock the arms 47 and 48, and with a cam 52 adapted for throwing the arm 49 away from the roller into engagement with the catch 53 which is pivoted on the bearing 54 and normally held against the stop 55 by the spring 56. A coupling 57 is pivotally connected with the catch 53 by the pin 58 and with the link 59 by a pin 60 disposed transversely to the pin 58; and a coupling 61 is pivotally connected with the link by a pin 62 and with a rocker arm 63 by a pin 64 disposed transversely to the pin 62. The arm 63 is journaled on a pin 65 on which it is held by a collar 66, the pin being movable in the bearing 54 and supported by a knuckle 67. A coupling 68 is pivotally connected with the knuckle 67 and with an angular block 69 which is pivoted on a lever 70. The lever 70 is pivoted at one end on the bearing 71 and at its other end engages a seat 72 on one end of a lever 73, the other end of which is pivoted on the bearing 74.

The lever 73 rests on the roller 27′ on the top of the lever 27, the former lever having the steps 73′ and 73″ which engage the roller 27′ in the different positions of the lever 27.

When the cam 25 rocks the lever 27 against the action of the spring 30, so that the toes 42 are drawn back from the film 3, the step 73′ is engaged by the roller 27′ to hold the levers 73 and 70, together with the members 69, 68 and 63 in their elevated position, so that the cam 75 on the wheel 18 clears the arm 63. When the cam 25 has turned so that its offset section permits the spring 30 to rock the lever 27, the roller 27′ can be swung under the notch 73″, whereupon the levers 73 and 70, together with the members 69, 68, 67 and 63 fall and the arm 63 is held in the path of the cam 75. When the cam 75 engages the arm 63, the latter is rocked and acts through the intermediate parts to draw back the catch 53, whereupon the spring 50 pulls the arm 49 into position to be engaged by the roller 51, which rocks the shaft 45.

A sleeve 76 is fixed on the shaft 45 and is provided with the arms 77 which carry a rod 78. A rod 79 is connected at its top with the rod 78 so as to move along the same, and at its bottom with the rocker 80, which is fulcrumed on the carriage 81. A spring 82 connects the rocker with the carriage and acts to draw the former down, it being elevated by the rod 79. The rocker is provided with the pawls 83 and notches 84 adapted for engaging trundles 85′ of the lantern wheel 85 carried by the spindle 86 which is journaled on the carriage 81, the wheel being revolved step by step by the oscillation of the rocker which locks it in its successive positions.

The spindle 86, which carries the wheel 85, has fixed thereon a disk 88 containing radial slots 89 and guides 90. In these guides are movable slides 91 having radial slots 92 of varying size corresponding to the numbers 1 to 12 thereon, the slides being held in position by studs 93 and 94, the latter supported by springs 94′ so as to be movable away from the slides.

The disk 88, which is adapted to be turned intermittently by the action of the arm or lever 49 through the related mechanism described, is also adapted to be operated by a hand lever 95 having the fulcrum 96 and connected with the arm 48 by a link 97. The lever 95 is connected by a link 98 with a double toothed pawl 99 which acts on the trundles 100 of a dial 101 which carries the numerals 1 to 12 arranged in correspondence with the like numerals on the disk 88.

The carriage 81, movable on ways 102, is moved by a rack 103 thereon which is engaged by a pinion 104 fixed on a journaled shaft 105. The shaft has an indicating arm 106 fixed thereon, movable over a fixed dial 107 and adapted to be fixed thereto by the clamp screw 108 which passes through the slot 109 in the dial. A lamp 110 is mounted on the carriage 81, being movable on the ways 111 thereof relatively to the disk 88. The lamp's light aperture 112 is in line with the disk 88's top aperture, which is at rest in a vertical diameter of the disk, and with the aperture 15′ in the plate 15 over which the films are moved intermittently. It will be understood that the adjustments of the carriage 81 and the lamp 110 permit compensation to be made for variations in the candle power of the light used for printing and that the light apertures of the disk cut off light so that the same shall be proportionate to the densities of the film sections previously arranged and perforated.

The film 7 having been made up by combining sections of different densities, such film is arranged on the spool 6 and drawn therefrom as the blank film 3 is drawn from the spool 2, the two passing between the door 14 and the plate 15, past the light aperture 15′.

In order to initially adjust the mechanism for accommodation to the densities of the negative, the hand lever 95 is operated to turn the dial 101 (through the action of the parts 98 and 99) and the disk 88 (through

the action of the parts 97, 48, 45, 76, 77, 78, 79, 80, 85, and 86) until the numeral displayed at the top of the dial indicates that the desired light aperture of the disk is in line with the lamp aperture 112. The apparatus being thus adjusted, the films hold the toes 42 of the member 41 in their retracted position and the member 41 acts (through the parts 39, 38, 37, 36, 34, 33, and 31) to hold the lever 27 in the position shown in Fig. 7, where the roller 27′ engages the step 73′ and holds in the elevated position the parts 73, 70, 69, 68, 67, and 63. With the mechanism in this position, the arm 49, which has been engaged by the dog 53, is held out of engagement with the roller 51 and the position of the disk 88 is undisturbed by the revolution of the shutter wheel 18. As the wheel 18 revolves, the simultaneously revolving cam 20 reciprocates the yoke 21 vertically and the cam 25 causes the yoke 24 to reciprocate horizontally in the yoke 21, whereby the fingers 26 are caused to engage the perforations 7′ of the films and feed them intermittently across the aperture 15′ while the same is covered by the shutter wheel 18.

When a film section of different density passes under the toes 42, the latter drop into the slots 7″ simultaneously with the registration of the offset part of the cam 25 with the roller 28, whereupon the spring 30 throws the lever 27; the roller 27′ is moved from the step 73′ to a point below the step 73″; the part 73, together with the parts connecting it with the arm 63, drops so that the latter is brought into position to be actuated by the cam 75, and the arm 63 is caused to act through the intermediate mechanism on the latch 53 to release the lever 49. The spring 50 now draws the lever 49 into the path of the roller 51, which causes the lever to rock the arm 47, whereby the disk 88 is turned, as previously described, to present in front of the lamp the next light aperture adapted for passing the light required for the particular density of the film. It will be understood that the slides 91 have been arranged initially in sequence so that each forward step of the disk 88 will present a light aperture corresponding to the density of the negative section which is being transferred to the positive film.

Having described my invention, I claim:

1. In a motion picture machine, driving mechanism, film feeding devices operated by said mechanism, a light regulator, and means controlled by a film carried by said devices whereby said driving mechanism is connected with and operates said regulator intermittently.

2. In a motion picture machine, film feeding devices, a light regulator, a revoluble device, means whereby said revoluble device operates said regulator, and means normally supported by a film carried by said film feeding devices for rendering said first named means inoperative.

3. In a motion picture machine, a light regulator, an actuating device, mechanism comprising a rocking member whereby said device operates said regulator, and means for moving said member into and out of position to be operated upon by said device.

4. A motion picture printing machine provided with a shutter having apertures of different sizes for passing light to intermittently moving films, one of which has sections of different densities and is provided with perforations and mechanism comprising a lever coacting with the film aforesaid having perforations therein for shifting said shutter so as to position an aperture thereof adapted for passing the amount of light desired for printing from a coördinated film section.

5. A motion picture printing machine provided with a shutter having means for passing different amounts of light to intermittently moving films, one of said films having sections of different densities and containing perforations coördinated with said sections, and means with which said perforated film coöperates to shift said shutter and position means for passing the amount of light required by the density of the film section, said means comprising a lever mechanism adapted to contact with said perforated film so that it can be shifted when registering with perforations thereof, a cam for rocking said lever mechanism, a second lever mechanism acting in coördination with said lever mechanism first named to throw a catch, an arm adapted to be held out of operative position by said catch until the latter is thrown, a wheel by which said arm is rocked, and means operated by the arm for adjusting the position of the shutter.

6. A motion picture printing machine provided with a shutter having apertures of different sizes for passing different amounts of light to intermittently moving films, one of which has sections of different densities and contains perforations coördinated with said sections, and means with which said film last named coöperates to shift said shutter and position apertures for passing the amount of light required by the different densities of the different film sections, said means comprising automatically acting mechanism having a part bearing on said perforated film and adapted to enter perforations thereof to coördinate the mechanism's action with the density of a corresponding film section, a catch thrown by said mechanism, an arm automatically thrown when disengaged by throwing the catch, a wheel having a device for causing the arm to rock a shaft and a cam for throw-

ing the arm into engagement with the catch out of the path of the device, and mechanism operated by the shaft for shifting the shutter and positioning the apertures thereof.

7. The combination of a driving shaft, film feeding mechanism operated by said shaft, means for projecting light on a section of film fed by said mechanism, and means operated through said shaft under the control of said film for varying the amount of light projected as the density of said film changes.

8. The combination of film feeding devices, a driving wheel for operating said devices, means for projecting light on a section of film fed by said devices, a shutter having means for regulating the amount of light projected on said film, and means operated by said driving wheel for operating said shutter intermittently.

9. The combination, in a photographic printing mechanism, of a film, mechanism for projecting light on a section of said film, a device for varying the amount of light projected on said film, and means operated under control of said film for operating said device, said means comprising revoluble cam mechanism and an arm movable about transverse axes by cams of said last named mechanism whereby said means are thrown into and out of position for operating said device.

10. The combination, in a photographic printing machine, of a film, mechanism for projecting light on a section of said film, a device for varying the amount of light projected on said film, means comprising a shaft for operating said device, an arm adapted for turning said shaft, a revolving member adapted for rocking said arm to effect the turning of said shaft and a cam for moving said arm out of the path of said member to prevent the operation of said device.

11. The combination, in a photographic printing machine, of a film, mechanism for projecting light on a section of said film, a device for varying the amount of light projected on said film, and means for operating said device to automatically vary the light in a predetermined manner, said means comprising an arm adapted to rock in transverse directions, a revoluble member for rocking said arm to effect the movement of said device, and a revoluble member for rocking said arm to prevent its engagement by said member first named.

12. The combination, in a photographic printing machine, of mechanism for regulating light projected for the printing operation, and means for effecting a controlled operation of said mechanism, said means comprising a revoluble wheel having cams thereon, an arm adapted to be moved by one of said cams to effect an operation of said mechanism and by another of said cams to prevent the operation of said mechanism, a device for engaging and holding said arm out of the path of the cam for effecting its first named movement, and means for disengaging said device at predetermined intervals to permit said arm to be operated by the cam first specified.

13. The combination, in a photographic printing machine, of mechanism for projecting light for the printing operation, means comprising a device having variable apertures for regulating the light projected for said printing operation, a revoluble wheel, an arm adapted to move in transverse directions for moving and avoiding the movement of said means, a part on said wheel for operating said arm to effect the movement of said means, a cam on said wheel for moving said arm out of position for engaging said part to avoid the operation of said means, a catch for holding said arm when thrown by said cam, a second cam on said wheel, and means whereby said second cam is caused to operate said catch at predetermined intervals to release said arm and permit the operation of said means first named thereby.

14. The combination, in a photographic printing machine, of a film, means for feeding said film, means for projecting light on said film, and light regulating means operated by said film, said regulating means comprising a shaft, a device connected with said shaft for turning it, a wheel, a part on said wheel for operating said device to turn said shaft, a catch, a second part on said wheel for throwing said device out of the path of said part first named and into engagement with said catch, mechanism for moving said catch to release said device, a third part on said wheel for operating said mechanism, a cam revoluble with said wheel, and means comprising members controlled by said cam and film whereby said mechanism is moved into and out of position to be engaged by said third part.

15. The combination, in a photographic printing machine, of a film, means for feeding said film, means for projecting light on said film, and light regulating means operated by said film, said regulating means comprising a rock shaft, an arm connected with said shaft, a second arm pivoted to said first arm, a catch, a wheel, a part on said wheel for engaging said second arm to rock said arms and shaft, a second part on said wheel for throwing said second arm out of the path of said first part into engagement with said catch, mechanism connected with said catch for disengaging it, a third part on said wheel for operating said mechanism to withdraw said catch, devices for shifting said mechanism out of and into the path of said third part, a revoluble cam, and means comprising a part operated under control of

said film and a part operated under control of said cam for shifting the position of said devices.

16. The combination, in a photographic printing machine, of a film, means for feeding said film, means for projecting light on said film, and light regulating means operated under control of said film in a predetermined manner, said regulating means comprising a revoluble device having variable light apertures adapted to be adjusted to the densities of different sections of said film, a ratchet mechanism for giving a step by step movement to said device, reciprocatory mechanism for operating said ratchet mechanism, and revolving devices adapted for operating said reciprocatory mechanism.

17. The combination, in a photographic printing machine, of a perforated film, means for feeding said film, means for projecting light on said film, and light regulating means operated in a predetermined manner by said feeding means under control of said film, said light regulating means comprising devices arranged in sequence for passing therethrough light proportional to densities of said film, said devices being movable to change the sequence thereof.

18. The combination, in a photographic printing machine, of a film containing slots arranged in a predetermined manner, means for feeding said film, a shoe adapted to ride on said film and to enter said slots, a revoluble cam, mechanism connecting said shoe and cam whereby said cam withdraws said shoe from said slots, a revoluble wheel having a cam thereon, a rocker arm, means controlled by said mechanism whereby said rocker arm is shifted into and out of the path of said cam, a revoluble device containing variable light apertures for regulating the amount of light passed for printing, means comprising a second cam on said wheel for turning said device, mechanism comprising a third cam on said wheel for throwing said means last named out of position to be operated by said second cam, and means whereby said arm releases said last named mechanism.

19. The combination, in a photographic printing machine, of a carriage, means for moving said carriage, a disk journaled on said carriage, apertured slides carried by said disk, a lamp adapted for projecting light through the apertures of the respective slides when brought into position therefor, a ratchet mechanism carried by said carriage for turning said disk, a rocking mechanism adapted for operating said ratchet mechanism, said rocking mechanism having an actuating member, a wheel having a cam for operating said actuating member, a cam on said wheel for throwing said actuating member away from said cam first named to inoperative position, means for holding said actuating member in said inoperative position, a film, a second wheel provided with a cam and means whereby said last named wheel and said film release said actuating member.

20. The combination, in a photographic printing machine, of a carriage, a lamp carried thereby, a disk journaled on said carriage and having variable light apertures adapted to be brought in range with said lamp, a ratchet mechanism carried by said carriage and adapted to turn said disk, a rack and pinion adapted for moving said carriage, means for indicating the position of said carriage, and means for fixing the position of said carriage.

21. The combination, in a photographic printing machine, of a lamp, a journaled device having variable light apertures adapted to be brought in range with said lamp, indicating mechanism comprising a revoluble device having indicia corresponding to said apertures and means whereby said dial and indicating mechanism are operated together.

22. The combination, in a photographic printing machine, of a lamp, a journaled device having light apertures of different areas adapted to be brought into range with said lamp, a dial having indicia corresponding to said apertures, mechanism connecting said dial and device to effect their synchronous operation, and a handle for operating said device and dial together.

In testimony whereof I have hereunto set my name this 18th day of August, 1914, in the presence of the subscribing witnesses.

J. TESSIER.

Witnesses:
Jos. G. DENNY, Jr.,
K. H. HUSTON.