March 23, 1926. 1,577,986

M. SAN

MOTION PICTURE PRINTING MACHINE

Filed April 22, 1922 2 Sheets-Sheet 1

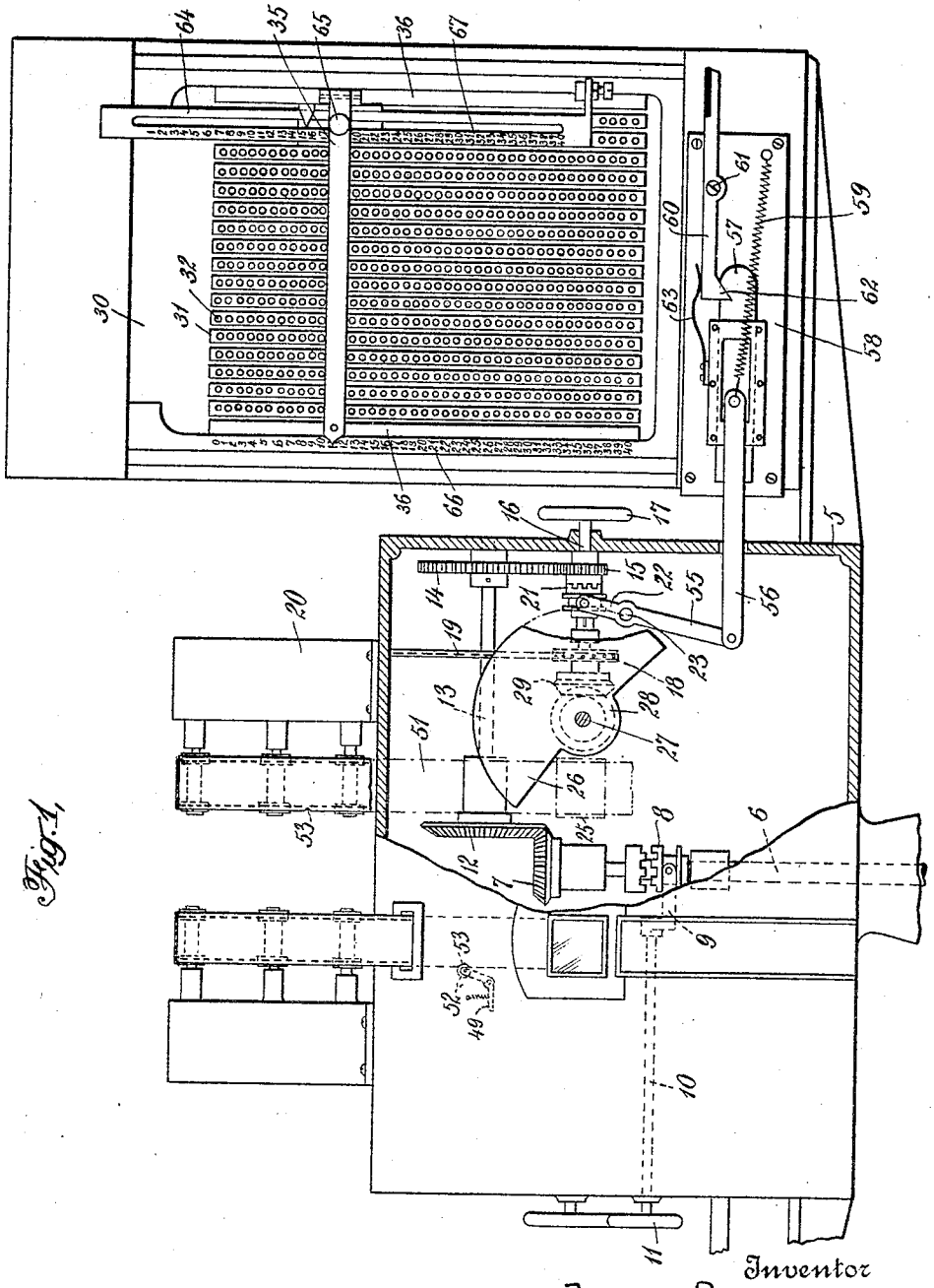


Fig. 1.

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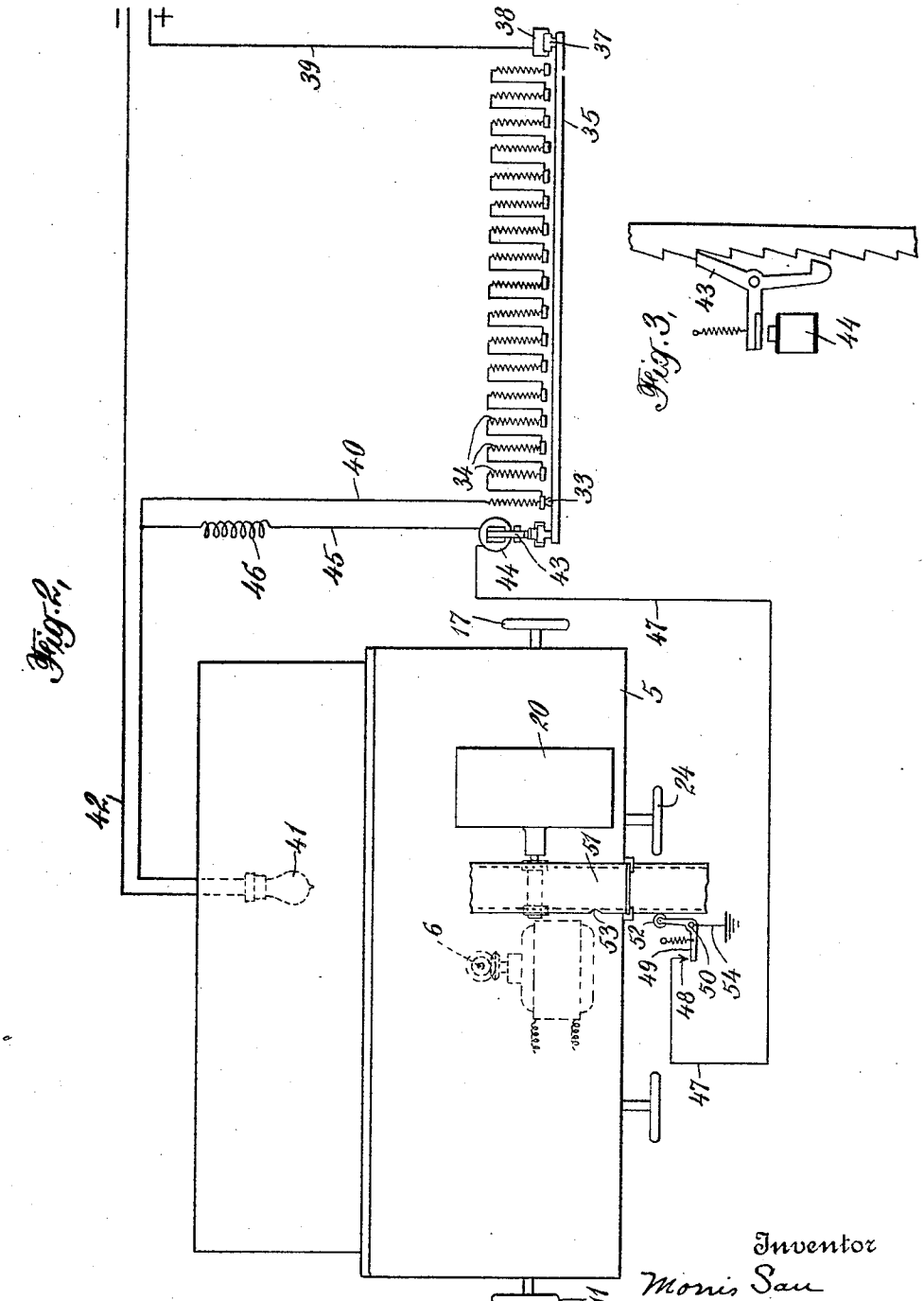


Fig. 2.

Fig. 3.

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Patented Mar. 23, 1926. 1,577,986

UNITED STATES PATENT OFFICE.

MORRIS SAN, OF WEEHAWKEN, NEW JERSEY.

MOTION-PICTURE-PRINTING MACHINE.

Application filed April 22, 1922. Serial No. 555,943.

To all whom it may concern:

Be it known that I, MORRIS SAN, a citizen of the United States, residing at Weehawken, in the county of Hudson, State of New Jersey, have invented certain new and useful Improvements in Motion-Picture-Printing Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to motion picture printing machines, and particularly to a device which will automatically stop the machine when the negative film passing therethrough is exhausted.

Printing machines for motion picture films are in common use and comprise generally means for advancing the negative and positive films in contact, thereby exposing the successive pictures to light from a source such as an incandenscent electric lamp for the purpose of transferring the image to the positive film. Such machines are provided with clutch mechanism whereby the operation of the machine is controlled, the clutch mechanism being manually operated to start and stop the machine. It is also usual to provide a rheostat controlling the intensity of the light furnished by the incandescent lamp, the rheostat being in turn controlled by notches in the negative film, which permit suitable contact mechanism to close a circuit to an electro-magnet which releases a contact bar from time to time and permits it to establish a new relation of the resistance elements in the rheostat.

In printing machines of the character described, the positive and negative films are threaded through the machine by the operator, and the mechanism is started by manually throwing in the clutch. Thereafter the machine continues to operate continuously to intermittently or continuously advance the film. The intensity of the light is varied from time to time, depending upon the density of the negative. When the negative is exhausted, the machine continues in operation to advance the positive film alone until the operator manually throws the clutch to disconnect the driving power. It frequently happens that when the operator's attention has been distracted, the machine will continue in operation for some time and will expose a considerable quantity of positive film to the light after the negative has been exhausted. This film is, of course, wasted, and since the film is relatively expensive, the losses thus resulting are a considerable factor in the cost of operation of printing machines.

It is the object of the present invention to avoid such losses as described and to provide means for automatically stopping the film-advancing mechanism when the negative film is exhausted.

Further objects and advantages of the invention will be apparent as it is better understood by reference to the following specification and accompanying drawing, in which—

Fig. 1 is an elevation, partially in section, of a printing machine embodying the invention;

Fig. 2 is a diagrammatic illustration of the electrical circuits of the printing machine; and

Fig. 3 is a diagrammatic detail illustrating a portion of the mechanism for controlling the contact bar of the rheostat.

That portion of the mechanism which is old and well known will be described first in order that the relation of the invention thereto may be readily understood. Referring to the drawing, 5 indicates the housing of the printing machine which provides a substantially light-tight case for the mechanism. A shaft 6 is connected to any suitable source of power and drives a beveled pinion 7. A clutch 8, controlled by a fork 9 through a shaft 10 and a hand-wheel 11, forms the principal connection between the source of power and the mechanism of the printing machine. A beveled gear 12 meshing with the pinion 7 drives a shaft 13 to which a gear 14 is secured. The gear 14 meshes with a pinion 15 which is loose on a shaft 16 having a hand-wheel 17 thereon.

A pulley 18 is connected by a belt 19 to the intermittent mechanism 20 of the usual type used in motion picture projectors (not illustrated in detail herein). The purpose of the hand-wheel 17 is to permit the manual actuation of the intermittent mechanism in threading or otherwise adjusting the film. A clutch 21 is splined to the shaft 16 and is connected by a fork 22 to a shaft 23 projecting through the front of the housing 5 and provided with a hand-wheel 24 whereby the clutch may be thrown into operative position. When the clutch is thus actuated, the intermittent mechanism is connected to the source of power, and accordingly causes the film to advance through the machine past a window 25 behind which the source of illumination is disposed. A shutter 26 of the usual type employed in motion picture projectors is secured to a shaft 27 and is actuated through beveled pinions 28 and 29 secured to the shafts 27 and 16 respectively. By this shutter the light is cut off from the film during the period in which it is advanced between the exposure of the successive pictures.

The rheostat is disposed in a suitable casing 30 and includes a plurality of vertical bars 31, each provided with a plurality of openings 32 adapted to receive pins 33. The bars 31 are each connected to a resistance 34, the several resistances being connected in series as illustrated diagrammatically in Fig. 2. A sliding contact bar 35 is supported on the front of the casing 30 in suitable guideways 36 at the opposite sides of the casing, and is provided with a contact shoe 37 engaging a contact bar 38. The contact bar 38 is connected by a conductor 39 to a source of power, and, depending upon its position and the selective positions of the pins 33, the contact bar 35 will throw into the circuit one or more of the resistances 34. The resistances are connected by a conductor 40 to an incandescent lamp 41, the circuit to which is completed by a conductor 42 leading to the source of current. Thus, depending upon the position of the bar 35, the amount of current passing through the lamp is regulated to produce a light of the desired intensity. The bar is slidable vertically in its guideways and is controlled by an escapement 43 actuated by an electro-magnet 44. The electro-magnet 44 is connected by a conductor 45 through a choke coil 46 to the conductor 40 and by a conductor 47 to a contact 48. An arm 49 pivoted at 50 adjacent the edge of the negative film 51 is provided with a roller 52 which is adapted to drop into a notch 53 in the edge of the negative film. The notch 53 indicates a desired change in the intensity of the light, and a plurality of these notches are applied to the film in preparation for its use in the printing machine. As each notch 53 passes the roller 52, the arm 49 is permitted to engage the contact 48. The arm 49 may be grounded by a conductor 54, and consequently, upon engagement with the contact 48, a circuit is closed through the electro-magnet 44 which actuates the escapement and permits the bar 35 to drop a distance equal to the distance between the openings 32 in the bars 31. By proper positioning of the pins 32 any desired combination of the resistances 34 may be obtained, and consequently light of the desired intensity may be supplied to the film.

As hereinbefore stated, my improvement relates to means for automatically stopping the printing machine. For this purpose I provide an arm 55 on the shaft 23 and connect it by a link 56 to a notched bar 57 slidable in a suitable guideway 58 secured to the base of the rheostat 30. A spring 59 normally holds the notched bar 57 in position to maintain the clutch 21 open. A latch 60 is pivoted at 61 on the front of the rheostat casing and is provided with a projecting toe 62 which is adapted to engage the notch in the bar 57. A spring 63 biases the latch toward the bar 57. When the clutch is thrown in manually by operating the hand-wheel 24, the toe of the latch engages the notch and thereafter holds the clutch until the latch is released.

To release the latch a bar 64 is adjustably supported on the contact bar 35 by means of a thumb screw 65 so that it may be adjusted vertically to permit its end to engage the tail of the latch 60 when the contact bar 35 has passed the last pin 33 in the rheostat. The bar 64 must, of course, be set to the desired position, depending upon the positions of the pins, and corresponding scales 66 and 67 are provided on the face of the rheostat and on the bar 64 respectively to facilitate the adjustment. When the end of the negative film passes the roller 52, the latter will be permitted to engage the contact 48, closing the circuit to the electro-magnet which will release the contact bar 35. The bar drops by gravity from its position in engagement with the last pin in the rheostat and the end of the bar 64 engages the latch 60, thus releasing the bar 57 which is drawn by the spring 59 to the right, viewing Fig. 1. The connection with the clutch 21 causes the withdrawal of the clutch so that the machine is automatically stopped as soon as the negative film is exhausted.

From the foregoing it will be observed that I have provided a simple and inexpensive device which may be readily applied to printing apparatus now in use and which insures stopping of the mechanism when the negative film is exhausted, and consequently prevents waste of positive film by exposure thereof out of contact with the negative. A material saving in the cost of operation of

printing machines is effected by the device herein described, and moreover, it permits a single operator to adjust and control a considerable number of machines, thus reducing the labor cost of producing prints from motion picture negatives.

It is to be understood that the printing machine and rheostat are diagrammatically illustrated and the details thereof are not described, these details being well known in the art and forming no part of the present invention. The invention resides in the combination with any printing and controlling mechanism of means for automatically disconnecting the driving and film-advancing mechanism when the negative film is exhausted.

Obviously the invention may be varied in details of construction and arrangement of the parts without departing therefrom or sacrificing any of the advantages thereof.

I claim:

1. In a motion picture printing machine, the combination of means for advancing positive and negative film through the machine, illuminating means for exposing the positive film, means for automatically stopping the film-advancing means when the film is exhausted and electrically controlled means progressively advancing as the film passes through the machine to vary the intensity of the illuminating means and to release the stopping means.

2. In a motion picture printing machine, the combination of means for advancing positive and negative film through the machine, driving means therefor, a clutch between the advancing and driving means, means for automatically releasing the clutch when the film is exhausted, illuminating means for exposing the positive film and electrically controlled means progressively advancing as the film passes through the machine to vary the intensity of the illuminating means and to actuate the clutch-releasing means.

3. In a motion picture printing machine, the combination of means for advancing positive and negative film through the machine, driving means therefor, means for manually connecting the film-advancing and driving means, means for automatically disconnecting the film-advancing and driving means when the film is exhausted, illuminating means for exposing the positive film and electrically controlled means progressively advancing as the film passes through the machine to vary the intensity of the illuminating means and to release the disconnecting means.

4. In a motion picture printing machine, the combination of means for advancing film through the machine, driving means therefor, a clutch between the film-advancing and driving means, means for manually actuating the clutch, means including a latch for holding the clutch in operative position and electrically controlled means progressively advancing as the film passes through the machine to release the latch when the film is exhausted.

5. In a motion picture printing machine, the combination of means for advancing film through the machine, driving means therefor, a clutch between the film-advancing and driving means, means for manually actuating the clutch, means including a latch for holding the clutch in operative position, and means for releasing the latch, the last mentioned means being adjustable to actuate the latch when the film is exhausted, and including a shiftable contact bar, electrical means permitting the bar to advance, said electrical means being controlled by the film.

6. In a motion picture printing machine, the combination of means for advancing positive and negative film through the machine, illuminating means for exposing the positive film, means controlled by the negative film for varying the intensity of the illuminating means, and means controlled by the last mentioned means for automatically stopping the film-advancing means when the negative film is exhausted.

7. In a motion picture printing machine, the combination of means for advancing positive and negative film through the machine, illuminating means for exposing the positive film, a rheostat controlled by the negative film for varying the intensity of the illuminating means, including a movable contact bar, and means for automatically stopping the film-advancing means, said last mentioned means being controlled by the position of the contact bar.

8. In a motion picture printing machine, the combination of means for advancing positive and negative film through the machine, illuminating means for exposing the positive film, a rheostat controlled by the negative film for varying the intensity of the illuminating means, including a movable contact bar, and means for automatically stopping the film-advancing means, including a clutch, a notched bar connected to the clutch, a spring tending to release the clutch and a latch adapted to engage the notched bar, said last-mentioned means being controlled by the position of the contact bar.

9. In a motion picture printing machine, the combination of means for advancing film through the machine, driving means therefor, a clutch between the film-advancing and driving means, means for manually actuating the clutch, and means for releasing the clutch, including a notched bar connected thereto, a spring connected to the bar, a latch adapted to engage the bar and to hold the clutch in operative position

against the tension of the spring, and means for releasing the latch when the film is exhausted.

10. In a motion picture printing machine, the combination of means for advancing film through the machine, driving means therefor, a clutch between the film-advancing and driving means, means for manually actuating the clutch, means for releasing the clutch, including a notched bar connected thereto, a spring connected to the bar, a latch adapted to engage the bar and to hold the clutch in operative position against the tension of the spring, and adjustable means for releasing the latch when the film is exhausted.

In testimony whereof I affix my signature.

MORRIS SAN.