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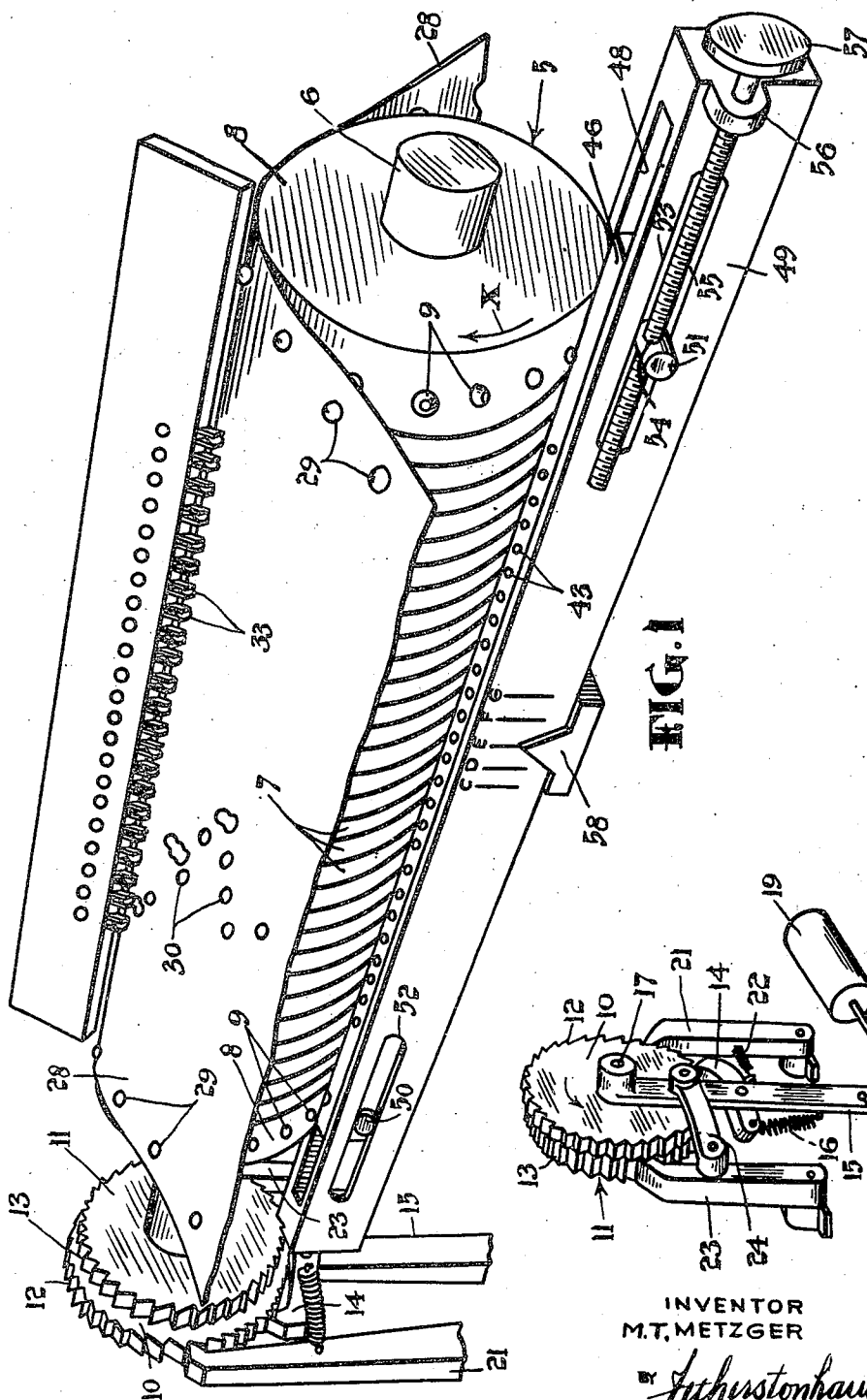
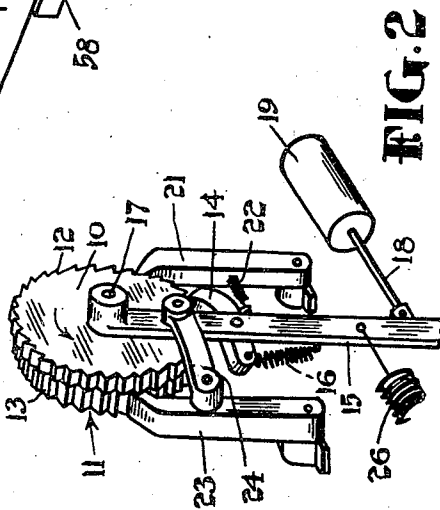
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LIGHT CONTROLLING MECHANISM FOR FILM PRINTING MACHINES

Filed Feb. 14, 1945

3 Sheets-Sheet 1



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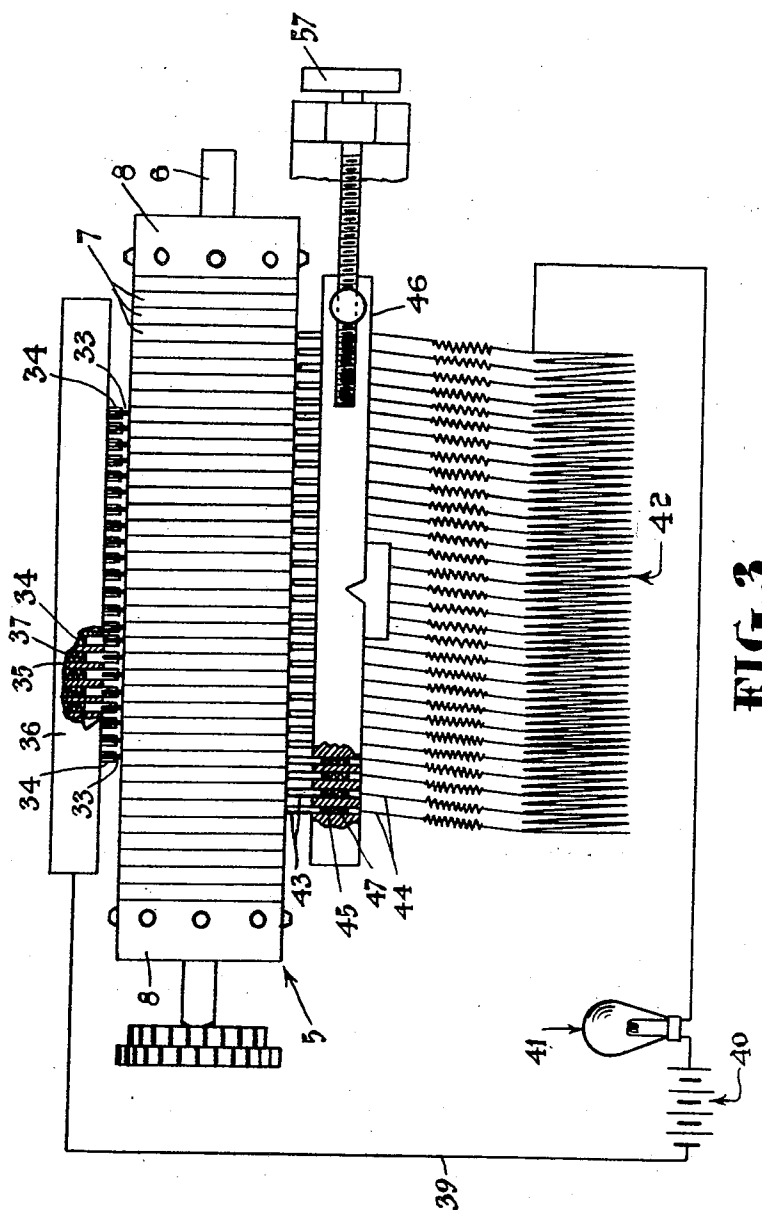
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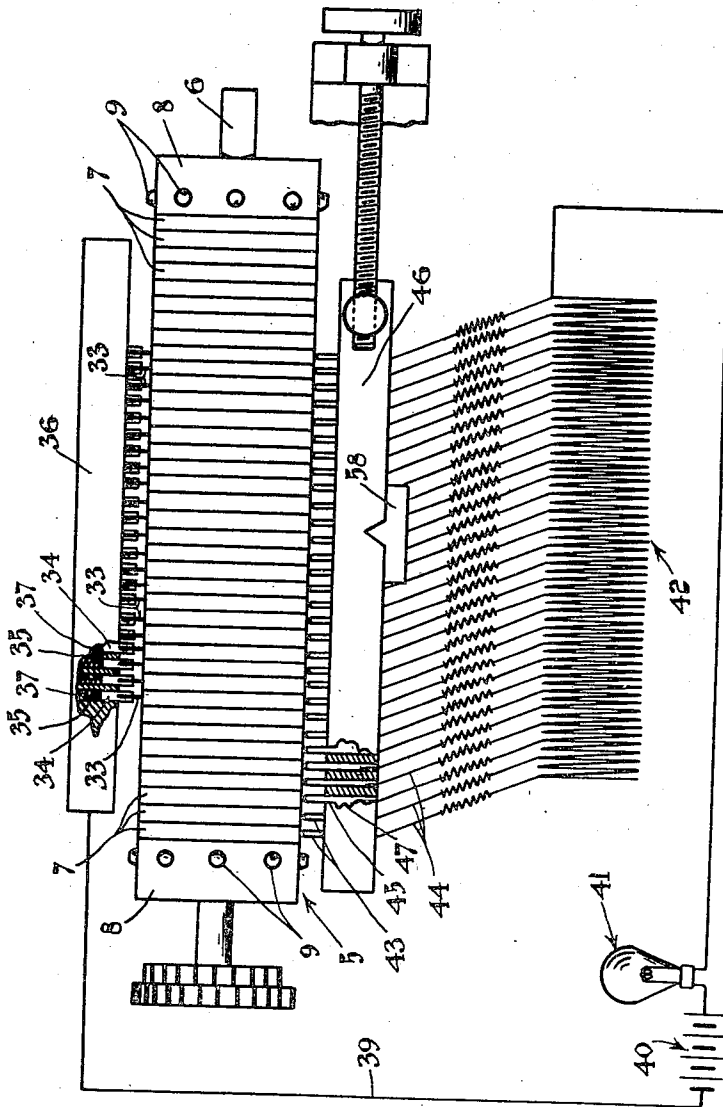


FIG. 4

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UNITED STATES PATENT OFFICE

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LIGHT CONTROLLING MECHANISM FOR
FILM PRINTING MACHINESMaurice T. Metzger, Montreal, Quebec, Canada,
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10 Claims. (Cl. 315—292)

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This invention relates to improved light-controlling mechanism for film printing machines.

An important object of this invention is the provision of light-controlling mechanism which, in addition to automatically changing the intensity of the printing light to suit the density of succeeding scenes or sections of the negative film being printed, is also capable of selective setting to compensate for variations in the emulsion speed of the film stock used in the printing operation.

A further object of the invention is to provide a generally improved light-controlling mechanism comprising a cylinder including a plurality of insulated contact discs arranged in side by side relation, means for intermittently rotating said cylinder, a control tape passing over and driven by said cylinder and provided with a predetermined arrangement of light-controlling perforations, a plurality of selector switch contacts riding the portion of the tape passing over the cylinder and connected in series with one terminal of the printing lamp, each of said contacts being adapted, during passage of a light-controlling perforation of the tape therebeneath, to engage an underlying contact disc of said cylinder, a second series of selector switch contacts movable longitudinally of said cylinder for direct selective engagement with said contact discs, a resistance connected to the remaining terminal of the printing lamp and a plurality of taps separately connecting the selector switch contacts of the second series to the resistance at different points so that the light intensity of the printing lamp is automatically changed as the lamp circuit is closed through different selector switches of the second series.

Other objects, advantages and characteristic features of the invention will be more readily understood from the following detailed description taken in connection with the accompanying drawings, in which—

Figure 1 is a perspective view showing the relative arrangement of the control tape, the tape-driving cylinder and the selector switch contacts of my improved light-controlling mechanism.

Figure 2 is a detailed perspective view of the pawl and ratchet cylinder driving and locking mechanism forming part of the assembly shown in Fig. 1.

Figure 3 is a diagrammatic view of the light-controlling mechanism including the printing lamp and the electrical circuits.

Figure 4 is a view similar to Fig. 1 but showing the setting of the light-controlling mechanism changed to compensate for a variation in the

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emulsion speed of the film stock used in the printing operation.

Referring more particularly to the drawings, 5 designates a cylinder comprising a shaft 6, a plurality of insulated contact discs 7 and a pair of end heads 8. The contact discs 7 are arranged on the shaft in side by side relation between the end heads 8 and the latter are provided with tape-driving projections 9. Ratchet wheels 10 and 11 are fixed to one end of shaft 6 with the teeth 12 of wheel 10 reversely arranged with respect to the teeth 13 of wheel 11. A driving pawl 14 co-acts with the teeth 12 of ratchet wheel 10 to rotate cylinder 5 in the direction indicated by the arrow X in Figure 1. Pawl 14 is intermediately pivoted to an operating lever 15 and is held against the teeth of ratchet wheel 10 by a biasing spring 16. Lever 15 is mounted to swing about a pivotal axis 17 which is located at the upper end thereof and coincides with the central longitudinal axis of shaft 6. Lever 15 is connected to the armature 18 of an operating solenoid 19 which is periodically energized and deenergized through the agency of conventional switch mechanism controlled by the travelling movement of the film negative (not shown).

A pivotally mounted holding pawl 21 is held against the teeth 12 of ratchet wheel 10 by a biasing spring 22 to prevent rotation of ratchet wheel 10 in a direction opposite to that indicated by the arrow X. A second holding pawl 23 co-operates with the teeth 13 of ratchet wheel 11 to limit the extent to which the cylinder 5 is rotated at each operation of the driving pawl 14. Pawl 23 is actuated by lever 15 through the agency of a connecting link 24.

After each operation thereof by the solenoid 19 the pawl-actuating lever 15 is retracted by a biasing spring 26.

A control tape 28 is trained over cylinder 5 and is provided with marginal openings 29 adapted to receive therein the driving projections 9 of cylinder heads 8. Tape 28 is provided, in accordance with conventional practice, with a predetermined arrangement of light-controlling perforations 30, only a few of which are shown in Figure 1. A series of selector switch contact rollers 33 are arranged to ride the portion of tape 28 which passes over cylinder 5. Each contact roller 33 is arranged directly above one of the contact discs 7 and is adapted to make electrical contact with said disc when one of the light-controlling apertures 30 is moved to a position beneath said roller. It will be noted here that the number of

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contact rollers 33 provided is considerably less than the number of contact discs 7.

In the present instance each contact roller 33 is shown carried by a supporting member 34 which slides in a guideway 35 provided in a contact holder 36 and is yieldingly urged toward the cylinder 5 by biasing spring 37. The contact rollers 33 are connected, through holder 36 and conductor 39, to one terminal of a source of current 40 having its opposite terminal connected to one terminal of the printing lamp 41. The remaining terminal of printing lamp 41 is connected to one end of a resistance element 42.

A second series of selector switch contacts 43 are arranged beneath the cylinder 5 for direct engagement with the lower portions of contact discs 7. These contacts 43 are separately connected to resistance 42 at different points by tap conductors 44.

The number of selector switch contacts 43 exceeds the number of selector switch contacts 33 but is less than the number of the cylinder contact discs 7. The selector switch contacts 43 of the second series are movable longitudinally of cylinder 5 for selective engagement with the contact discs 7. In this connection it will be noted that contacts 43 slide in guideways 45 provided in a longitudinally movable contact holder 46 and are yieldingly urged toward cylinder 5 by biasing springs 47. The contact holder 46 slides in a horizontal guideway 48 provided in a horizontal supporting structure 49 which extends longitudinally beneath cylinder 5. The holder 46 is equipped with laterally projecting supporting pins 50 and 51 working in guide slots 52 and 53 provided in supporting structure 49. The pin 51 is provided with a threaded hole 54 for the passage of an adjusting screw 55 which is rotatably supported in a bearing bracket 56 carried by the supporting structure 49 and is held against longitudinal movement relative to said supporting structure. An operating knob 57 is provided at one end of the screw 55 so that the latter may be conveniently turned to shift the contact holder 46 and the selector switch contacts 43 in either direction to different positions of adjustment longitudinally of cylinder 5. The purpose of this adjustment is to enable the resistance of the printing lamp circuit to be varied to compensate for variations in the emulsion speed of the film stock being used during the printing operation. Ordinarily, such changes in the emulsion speed of the film stock must be taken care of by repunching the light controlling tape to compensate for such changes. According to my invention, these changes in emulsion speed of the film stock may be easily and conveniently compensated for by shifting the selector switch contacts a predetermined distance to the right or left from the position shown in Fig. 1. In this connection it will be noted that the supporting structure 49 is provided with emulsion speed indicating scale markings A to H inclusive and that the contact holder 46 is provided with a pointer 58 arranged to travel over said scale markings when the contact holder is moved to the right or left. The movement of the contact holder 46 and pointer 58 from the left to the position shown in Fig. 1 changes the light density of the printing lamp to compensate for an increase in the emulsion speed of the film stock while movement of the contact holder 46 and pointer 58 to the right from the position shown in Fig. 1 compensates for a decrease in the emulsion speed of the film stock.

From the foregoing description and the showing of Figs. 3 and 4, it will be seen that each of the insulated discs 7 which is positioned below one of the selector switch contacts 33 of the first series is also engaged by a selector switch contact 43 of the second series, the particular contact 43 engaging each contact disc 7 being determined by the position to which the contact holder 46 is adjusted.

Having thus described what I now conceive to be the preferred embodiment of this invention it will be understood that various modifications may be resorted to within the scope and spirit of the invention as defined by the appended claims.

I claim:

1. Light controlling mechanism for film printing machines comprising a series of insulated contacts, a travelling control tape arranged to travel over said contacts and provided with light-controlling perforations through which said contacts are exposed, a series of selector switch contacts arranged to ride the portion of the tape passing over said insulated contacts, each selector switch contact of said series being movable into engagement with an underlying insulated contact when a light-controlling perforation of the tape is moved to a position beneath said selector switch contact, a second series of selector switch contacts arranged so that each is in direct engagement with one of said insulated contacts, the arrangement being such that each of the insulated contacts which is positioned below one of the selector switch contacts of the first series is also engaged by a selector switch contact of the second series, a resistance element, a printing lamp and a source of current connected in series with each other, with the selector switch contacts of the first series and with said resistance element and a plurality of tap conductors separately connecting the contacts of the second series to the resistance element at different points.

2. Light controlling mechanism for film printing machines as set forth in claim 1, in which the number of selector switch contacts included in the second series is greater than the number of selector switch contacts included in the first series but is less than the number of the insulated contacts and in which means are provided for shifting the selector switch contacts of the second series so that each of said last mentioned contacts may be selectively engaged with any one of several insulated contacts to vary the light intensity of the printing lamp to compensate for variations in the emulsion speed of the film stock used in the printing operation.

3. Light controlling mechanism for film printing machines comprising a cylinder including a plurality of insulated contact discs arranged in side by side relation, means for intermittently rotating said cylinder in one direction, a control tape passing over and driven by said cylinder and provided with a predetermined arrangement of light-controlling perforations in the portion passing over said contact discs, a plurality of selector switch contacts riding the portion of the tape passing over said contact discs and connected in series with one terminal of a printing lamp, each of said contacts being adapted, during passage of a light-controlling perforation of the tape therebeneath, to engage an underlying contact disc of said cylinder, a second series of selector switch contacts arranged to directly engage said contact discs so that each contact disc which is periodical-ly engaged by one of the selector switch contacts

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of the first series is also engaged by one of the selector switch contacts of the second series, a resistance connected in circuit with the remaining terminals of the printing lamp and a plurality of taps separately connecting the selector switch contacts of the second series to the resistance at different points so that the light intensity of the printing lamp is automatically changed as the lamp circuit is closed through different selector switch contacts of the first and second series.

4. A light controlling mechanism for film printing machines as set forth in claim 3, in which the number of insulated contact discs is greater than the number of selector switch contacts included in either the first or second series of selector switch contacts and in which the number of selector switch contacts included in the second series is greater than the number of selector switch contacts included in the first series, said light-controlling mechanism being further characterized in that means are provided for shifting the selector switch contacts of the second series longitudinally of said cylinder so that each selector switch contact of said second series may be selectively engaged with any one of several of the insulated contact discs forming part of said cylinder.

5. Light controlling mechanism for film printing machines comprising a series of insulated contacts, a travelling control tape arranged to pass over said contacts and provided with light-controlling perforations through which said contacts are exposed, a series of selector switch contacts arranged to ride the portion of the tape passing over said insulated contacts, each selector switch contact of said series being movable into engagement with an underlying insulated contact when a light-controlling perforation of the tape is moved to a position beneath said selector switch contact, a resistance element, a printing lamp connected between said selector switch contacts and one terminal of the resistance element in series with a source of current and adjustable means for selectively connecting each of said insulated contacts to different portions of said resistance element.

6. Light controlling mechanism for film printing machines comprising a plurality of insulated contacts arranged in side by side relation, a travelling control tape arranged to travel over said contacts and provided with light-controlling perforations through which said contacts are exposed, a plurality of selector switch contacts arranged to ride the portion of the tape passing over said insulated contacts, each selector switch contact being positioned and biased to move into engagement with an underlying insulated contact when a light-controlling perforation of the tape is moved to a position beneath said selector switch contact, a second series of selector switch contacts adapted to be selectively engaged with said insulated contacts, a movable contact holder in which the selector switch contacts of the second series are mounted so that each of said contacts may be selectively engaged with any one of several insulated contacts by appropriate movement of said contact holder, means for moving said contact holder to different positions of adjustment, a resistance element, taps separately connecting the selector switch contacts of the second series to the resistance element at different points

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and a printing lamp connected between the selector switch contacts of the first series and one terminal of the resistance element in series with a source of current.

7. In light controlling mechanism for film printing machines, the combination of a series of insulated contacts, a travelling control tape arranged to travel over said contacts and provided with perforations through which said contacts are exposed, a series of selector switch contacts arranged to ride the portion of the tape passing over said insulated contacts, each selector switch contact being movable into engagement with an underlying insulated contact when a perforation of the tape is moved to a position beneath said selector switch contact and a second series of selector switch contacts arranged so that each is in direct engagement with one of said insulated contacts, the arrangement being such that each of the insulated contacts which is positioned below one of the selector switch contacts of the first series is also engaged by a selector switch contact of the second series.

8. The combination set forth in claim 7, in which means are provided for shifting the selector switch contacts of the second series so that each of said contacts may be selectively engaged with any one of several of the insulated contacts.

9. Light controlling mechanism for film printing machines as set forth in claim 1, in which the number of selector switch contacts included in the second series is greater than the number of selector switch contacts included in the first series.

10. Light controlling mechanism for film printing machines as set forth in claim 5, in which the last mentioned means comprises a second series of selector switch contacts containing a greater number of contacts than the first mentioned series of selector switch contacts, an individual tap connecting each contact of the second series of selector switch contacts to a different portion of the resistance element and means for shifting the selector switch contacts of the second series relatively to the insulator contacts so that each selector switch contact of said second series may be selectively engaged with any one of several of the insulated contacts.

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