Feb. 28, 1933. H. JANSSEN ET AL 1,899,756

MACHINE FOR CONTROLLING LIGHT INTENSITIES OF MOTION PICTURE PRINTERS

Filed July 9, 1931 2 Sheets-Sheet 1

Fig. 1.

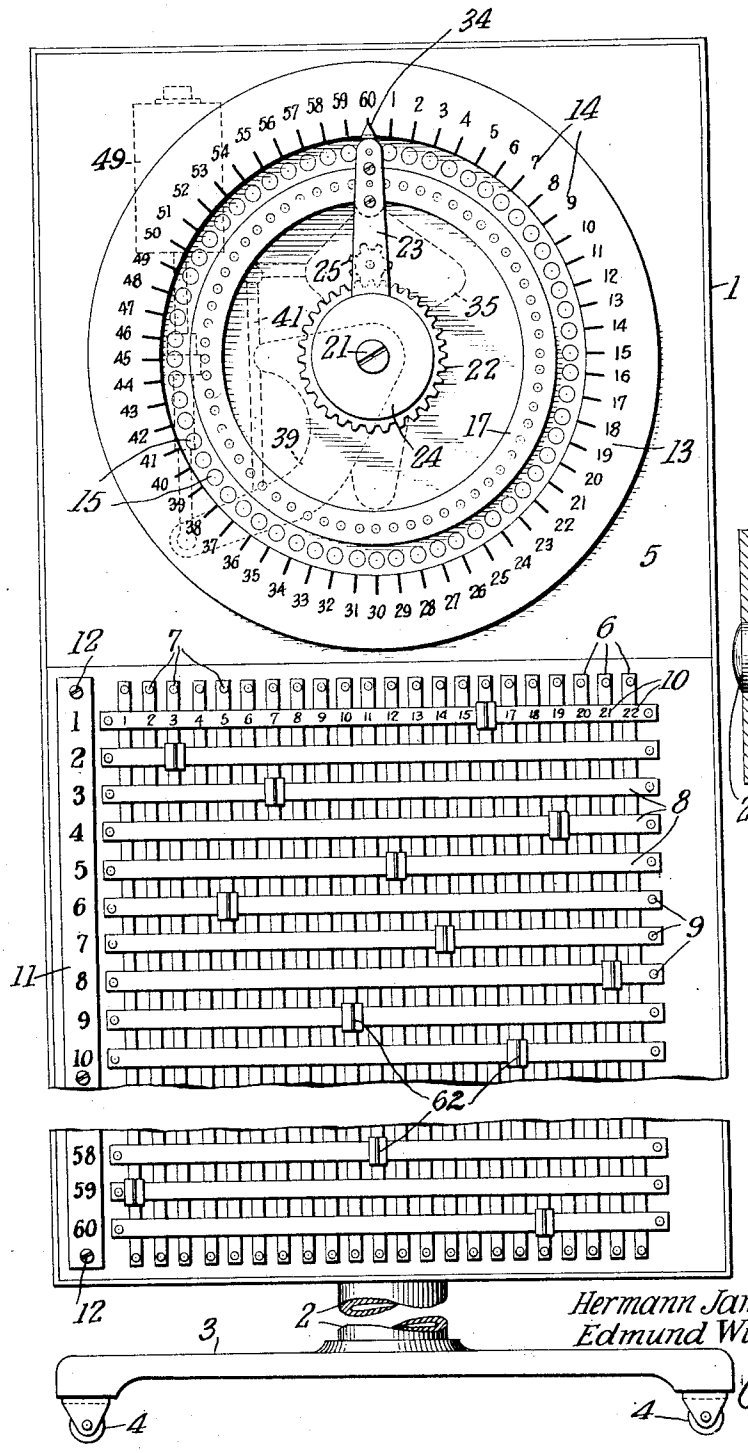
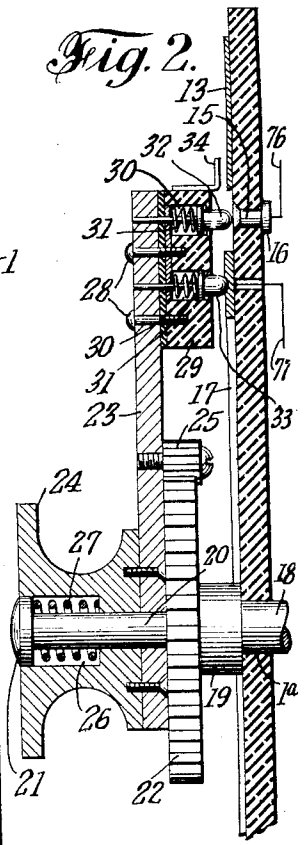


Fig. 2.



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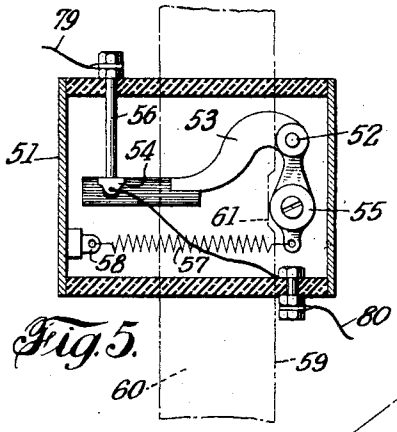


Fig. 5.

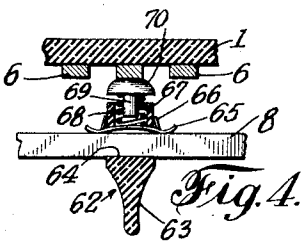
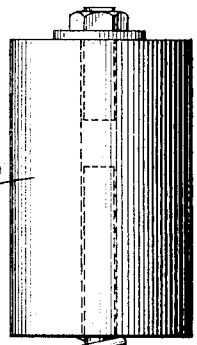


Fig. 4.

Fig. 3.



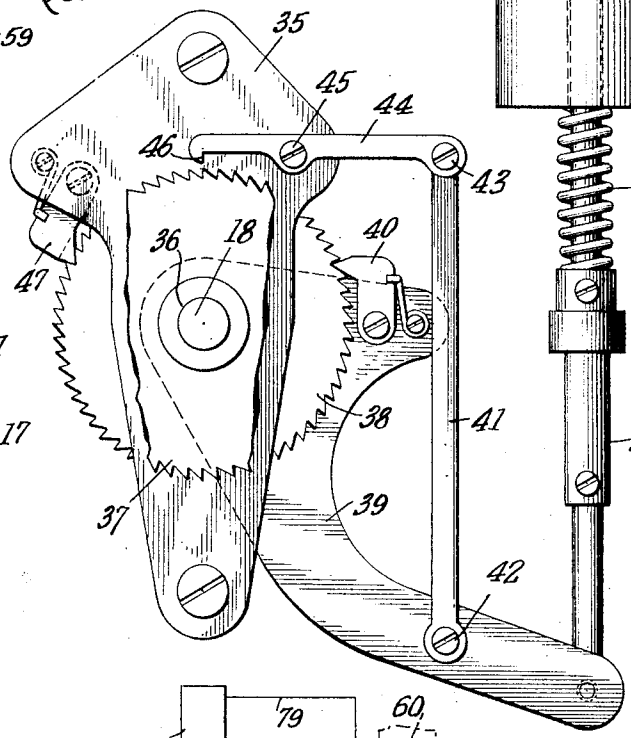


Fig. 6.

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UNITED STATES PATENT OFFICE

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MACHINE FOR CONTROLLING LIGHT INTENSITIES OF MOTION PICTURE PRINTERS

Application filed July 9, 1931. Serial No. 549,634.

This invention relates to machines that are utilized for changing the light intensities of motion picture printing machines during operation. Motion picture negatives generally consist of a large number of various scenes, each of which requires a different or specific intensity of the printing light, and during the printing operation it becomes necessary to alter the light to a new intensity at the moment of commencement of printing a new scene and to retain the light at the changed intensity up to the termination of printing of the same scene, whereupon the light is again changed, etc. Machines used heretofore for this purpose were either non-automatic or only partially automatic, or were capable of automatically printing only a limited number of scenes and had to be reset for continued automatic printing. In the latter case, the machines required stopping of the printing operation, which frequently resulted in impaired work, loss of time, and serious spoilation of film. Such machines were also cumbersome, complicated, subject to frequently become out of order, and otherwise inefficient.

The principal object of our invention is to remedy all of the above mentioned disadvantages, and to provide a simplified, reliable, durable, efficient, and improved machine for this purpose, which will be entirely automatic and capable of continued automatic operation for printing of films of unlimited or great length from negatives having an unlimited or large number of scenes, without necessitating stoppage of the printer or incurring danger of damaging the films.

Other objects and advantages will hereinafter appear to those familiar with the needs and requirements of motion picture printing.

In the accompanying drawings,—

Fig. 1 is a general front elevation of the machine.

Fig. 2 is a cross-sectional side elevation, on an enlarged scale, of a portion of the machine shown in Fig. 1.

Fig. 3 is an elevation, on an enlarged scale, showing the operating mechanism of the machine.

Figs. 4 and 5 show details of the machine.

Fig. 6 is a diagrammatic view illustrating the electrical circuits of the machine.

A board 1 made of insulating material and forming part of the casing of the machine is supported on a post 2 mounted on a base 3 running on casters 4, for conveniently transporting the machine to proximity of the film printer. Upon the face 5 of board 1 are located the several manipulable, settable, and indicating features of the machine. Said features, Figs. 1, 4, include a series of vertical rheostat contact-bars 6, preferably twenty-two in number and corresponding to the various required light intensities, which bars are secured to the board 1 by means of screws 7. Over, in front, and transversely of the bars 6 are located horizontal electrical conductor-bars 8, preferably sixty in number and corresponding to an equal number of scenes in the negative, which conductors are secured to the board 1 by means of studs 9. The contact bars 6 are preferably designated, as to degrees of light intensity, by corresponding numerals "1" to "22" upon each of the conductor bars 8, as indicated at 10 in Fig. 1, while the series of conductor-bars is designated by a plate 11, secured to board 1 by screws 12, and carrying numerals "1" to "60" corresponding to the scenes of the negative, as shown.

Above the bars 6, 8 is secured to the board 1 a ring-shaped dial plate 13, Figs. 1, 2, having thereon markings 14 with sub-joined numerals "1" to "60" corresponding to the conductor-bars 8 and to the scenes of the negative, as shown. Within and adjacent to the dial plate 13 and in registry with its markings 14 are located the top surfaces of the heads of electrical terminal bolts 15, which correspond to the scenes of the negative and pass through the board 1, to which they are secured by means of nuts 16, the numerals and markings upon plate 13 thus designating these terminals and the negative scenes. Within the series of terminals 15, and concentrically therewith and the plate 13, is located a ring-shaped electrical conductor plate 17, suitably secured to the board 1. In a bearing 1*a* of the board 1, at

the centre of plates 13, 17, is rotatably mounted an operating shaft 18, having a spacing bead 19, a reduced shank 20, and a head 21. A spur-wheel 22 is keyed on the shaft 18, and on the shank 20 is pivotally mounted a finger 23 secured to a knob 24. To the finger 23 is secured against rotation a spur-pinion 25 which normally meshes with the wheel 22, and therewith constitutes a clutching means between said finger and the shaft 18. In the centre of knob 24 is formed a recess 26, in which is located a spring 27 coiled around the shank 20 and bearing against the knob and the head 21, to normally maintain the pinion 25 clutched with the wheel 22, while upon withdrawing the knob 24 away from the board 1, contrary to the tension of spring 27, said pinion and wheel become unclutched and permit the knob with the finger 23 to be rotated independently of the shaft 18. To the end of finger 23 is secured, by means of screws 28, a block 29 made of insulated material, in which block are formed holes 30 having therein springs 31 bearing upon switch-buttons 32, 33 that are longitudinally slidable in said holes toward the terminals 15 and plate 17 respectively. A pointer 34 is secured to the tip of finger 23, whereby upon twisting the shaft 18 or knob 24 to direct said finger to point to any enumerated marking upon dial 13, the switch-button 32 will pressingly contact with the terminal 15 registering with such marking, while the button 33 will bear pressingly upon plate 17.

At the rear of the board 1 is fastened a framing 35 having a bearing 36 for the shaft 18, on which are keyed a pair of ratchet-wheels 37, 38 and on which is also pivotally mounted a lever 39 carrying a pawl 40 that cooperates with the ratchet 38. A link 41 is pivoted at 42 to the lever 39 and at 43 to a stop-lever 44, which is swivelled to the framing 35 at 45 and has a pawl-head 46 for engaging the teeth of the ratchet 37, and an arresting pawl 47 is pivoted to the framing 35 to cooperate with the ratchet 38. To the end of lever 39 is pivoted a spring controlled plunger 48 of a solenoid 49, which upon being energized and momentarily deenergized draws said plunger upwardly, contrary to the tension of its spring 50, and imparts an oscillation to the lever 39, first upwardly and through the action of said spring immediately downwardly. As the lever 39 rises it imparts a fractional rotation, through the action of pawl 40 and ratchet 38, to the operating shaft 18, in a counter-clockwise direction as viewed in Fig. 3 and in a clockwise direction as viewed in Fig. 1, which action moves the finger 23 to the extent of one marking or scene upon indicator-dial 13 and transposes the switch-button 32 from one to the other of the terminals 15. During this fractional turn of said parts, the pawl-head 46 descends into engagement with the ratchet 37 and thereby arrests the latter and the other moving parts against any undue momentum that may have been imparted thereto by the action of solenoid 49 through the pawl 40, while as the lever 39 falls, and carries back the actuating pawl 40, the pawl 47 arrests the ratchet 38 and said parts against any accidental undue return motion through possible drag of the pawl 40.

In the film printing machine, not shown, is provided a breaker-box 51 in which is pivotally mounted at 52 a bell-crank 53 having at one end thereof a switch 54, and at its other end is rotatably mounted a contact wheel 55. Opposite to the switch 54 is located a conductor-stud 56 secured to the box 51 and wired to the operating circuit of the machine, and near to the wheel 55 is joined a spring 57 which is in turn joined to the box at 58. Normally, the edge 59 of the negative film 60 running through the printer bears against the wheel 55 and thereby maintains the switch 54 away from and out of contact with the stud 56, contrary to the tension of spring 57, while upon said wheel encountering a notch 61 predeterminately cut into the film, as will be hereinafter explained, it is drawn into said notch by the action of said spring, and the bell-crank 53 is in this manner caused to contact said switch with the stud 56 and to close the operating circuit.

For the purpose of predeterminately selecting a particular light intensity required for each scene of the film, there is mounted on each conductor-bar 8 a switch 62 slidable therealong for the purpose of contacting the bar with any one of the rheostat contact-bars 6. The switch 62, Fig. 4, consists of a fitting 63 shaped as a finger-piece and having a hole 64 through which the conductor-bar 8 passes. A spring 65 designed to embrace the fitting 63 at 66 passes through said hole and bears against the fitting and the bar 8, whereby the fitting is rendered slidable along, while being under spring pressure against its carrying rod 8. In the end of fitting 63 is formed a recess 67 in which is located a spring 68 coiled around a shank 69 having a contact switch-button 70, in which manner the said spring continually presses this button toward the board 1 and in contact with any one of the rheostat bars 6, opposite which the switch 62 may be positioned, as shown.

The electrical operation of the machine, illustrated in Fig. 6, is as follows:—While the film is running during the printing of a scene thereof, current is conducted from the mains along wire 71, through the lamp 72 of the printer, along wire 73, through a rheostat 74, along any one of the wires 75 joining one of the variable resistance coils of the rheostat and leading to a contact bar 6 which may have been selected by a switch 62 belonging to a conductor bar 8 of the par-

ticular scene of the film which is undergoing printing, along a wire 76 leading from such bar 8, through a terminal 15 of such wire corresponding to said scene and said bar 8, through the switch-buttons 32, 33 of finger 23, through the plate 17, and along the return wire 77. Upon completion of printing of the scene, the wheel 55 falls into notch 61 of film 60 and produces contact of the closer 54 with the stud 56, whereupon current flows from wire 71 along a branch-wire 78, through solenoid 49, along a wire 79, through stud 56 and closer 54, and along a wire 80 to the return wire 77. At this moment the solenoid 49 actuates the lever 39 and shaft 18 to partially revolve the finger 23 and closer switches 32, 33 to connect the plate 17 with the next terminal 15 for printing the succeeding scene of the film.

In preparing the negative for printing with the aid of this machine, the expert carefully examines the film to determine the intensity of printing light required for each of its scenes, and he makes notation accordingly for each of the scenes which he enumerates in the order in which they appear upon the negative. With the aid of a special tool, a notch 61 is cut in the negative 60, at the point of commencement of each of the scenes. The operative may then prepare this machine by positioning the finger 23 to the designation 60, and positioning the selecting switches 62 along bars 8 in contact with the proper rheostat bars 6, in accordance with the expert's notation of required light intensities for all the scenes. He may then commence the printing operation, and as the same progresses the finger 23 will automatically switch successively from one to the other of the terminals 15 and control the light intensities for the printer as required for proper production of the positive.

Should the negative embody more scenes than sixty, as directly provided for on this machine, the film examiner may prepare his notations accordingly, and the operative may continue to set the switches 62 of scene-bars "1", "2", "3", etc. in accordance with such notations while the printing of the first sixty scenes is still going on, to prepare the machine for printing the scenes subsequent to the sixtieth. At the termination of printing of the sixtieth scene, therefore the finger 23 will continue to travel to terminals "1", "2", "3", etc., and the printing of the negative may be thereby continued until completion. It will be evident that in this manner negatives having any indefinite or unlimited number of scenes may be printed with the aid of this machine, and the proper light intensities for the purpose will be provided entirely automatically and without any interruption in the printing operation.

Should it be desired to splice several negatives having varying numbers of scenes, such as seventeen, twenty-nine, thirty-three, etc., for therewith performing one continuous printing of the positive, the notations may be prepared to number up the scenes of the combined negative progressively, and the switches 62 may be set up and the machine operated in continuity as above described. Or, the notations may be made up for each of the negatives separately, as from "1" to "17", "1" to "29", "1" to "33", etc., and the switches 62 set up anew for each negative in the spliced reel, and at the termination of the printing of each of the negatives the operative may quickly withdraw the finger 23 from engagement with the wheel 22, turn it backwardly to commencing position, and reingage it with the pointer 34 directing at "60". The printing of the subsequent negative may be then continued until termination while proper light intensities are furnished by the machine for all its scenes. It will be evident that by virtue of this mechanism, the above described resetting manipulation of the finger 23 may be performed so rapidly as to only impair an inconsequential number of images of the positive.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

Having thus described our invention, we claim:—

1. In a machine of the class described, the combination of a circuit for a film printing light having a series of terminals corresponding to scenes of the film, a closer for energizing said circuit successively through each of said terminals, mechanism actuated by the movement of the film to relatively move said closer to automatically continue energizing said circuit an indefinite number of times through said series of terminals, a rheostat in said circuit having a series of contacts corresponding to light intensities, a series of conductors in said circuit corresponding to said terminals and scenes of the film, a device for each of said conductors accessible to manipulation while the machine is in operation to selectively join the conductor with any one of said contacts to permit setting of the devices of the initial conductors and terminals while said closer is cooperating with the subsequent terminals and conductors, and means to disengage said closer from and reingage it with said mechanism while the machine is in operation to selectively contact it with any one of said terminals.

2. In a machine of the class described, the combination of a circuit for a film printing light, a rheostat in said circuit having a series of contacts corresponding to light intensities, a series of conductors corresponding to scenes of the film, a device for each of said conductors to selectively join it with any one of said contacts, said device includ-

ing a finger piece slidable along each of said conductors, a spring exerting pressure of said piece against said conductor, a button for contacting with said contacts, and a spring carried by said piece to exert pressure of said button against said contacts.

3. In a machine of the class described, the combination of a circuit for a film printing light having a circular series of terminals corresponding to scenes of the film, a closer for energizing said circuit successively through each of said terminals being revoluble relatively to said terminals, mechanism actuated by the movement of the film to impart an indefinite number of revolutions to said closer relatively to said terminals to automatically continue energizing said circuit an indefinite number of times through said series of terminals, a rheostat in said circuit having a series of contacts corresponding to light intensities, a series of conductors in said circuit corresponding to said terminals and scenes of the film, a device for each of said conductors accessible to manipulation while the machine is in operation to selectively join the conductor with any one of said contacts to permit setting of the devices of the initial conductors and terminals while said closer is cooperating with the subsequent terminals and conductors, and means to disengage said closer from and reingage it with said mechanism while the machine is in operation to selectively contact it with any one of said terminals.

4. In a machine of the class described, the combination of a circuit for a film printing light having a circular series of terminals corresponding to scenes of the film, a closer for energizing said circuit successively through each of said terminals being revoluble relatively to said terminals, mechanism actuated by the movement of the film to impart an indefinite number of revolutions to said closer relatively to said terminals to automatically continue energizing said circuit an indefinite number of times through said series of terminals, and means to disengage said closer from and reingage it with said mechanism while the machine is in operation to selectively contact it with any one of said terminals.

5. In a machine of the class described, the combination of a circuit for a film printing light having a series of terminals corresponding to scenes of the film, a closer for energizing said circuit successively through each of said terminals, mechanism actuated by the movement of the film to relatively move said closer to automatically continue energizing said circuit an indefinite number of times through said series of terminals, and means to disengage said closer from and reingage it with said mechanism while the machine is in operation to selectively contact it with any one of said terminals.

Signed at the city of New York, in the county of Queens, and State of New York, this 7th day of July, A. D. 1931.

HERMANN JANSSEN.
EDMUND WISNIEWSKI.