

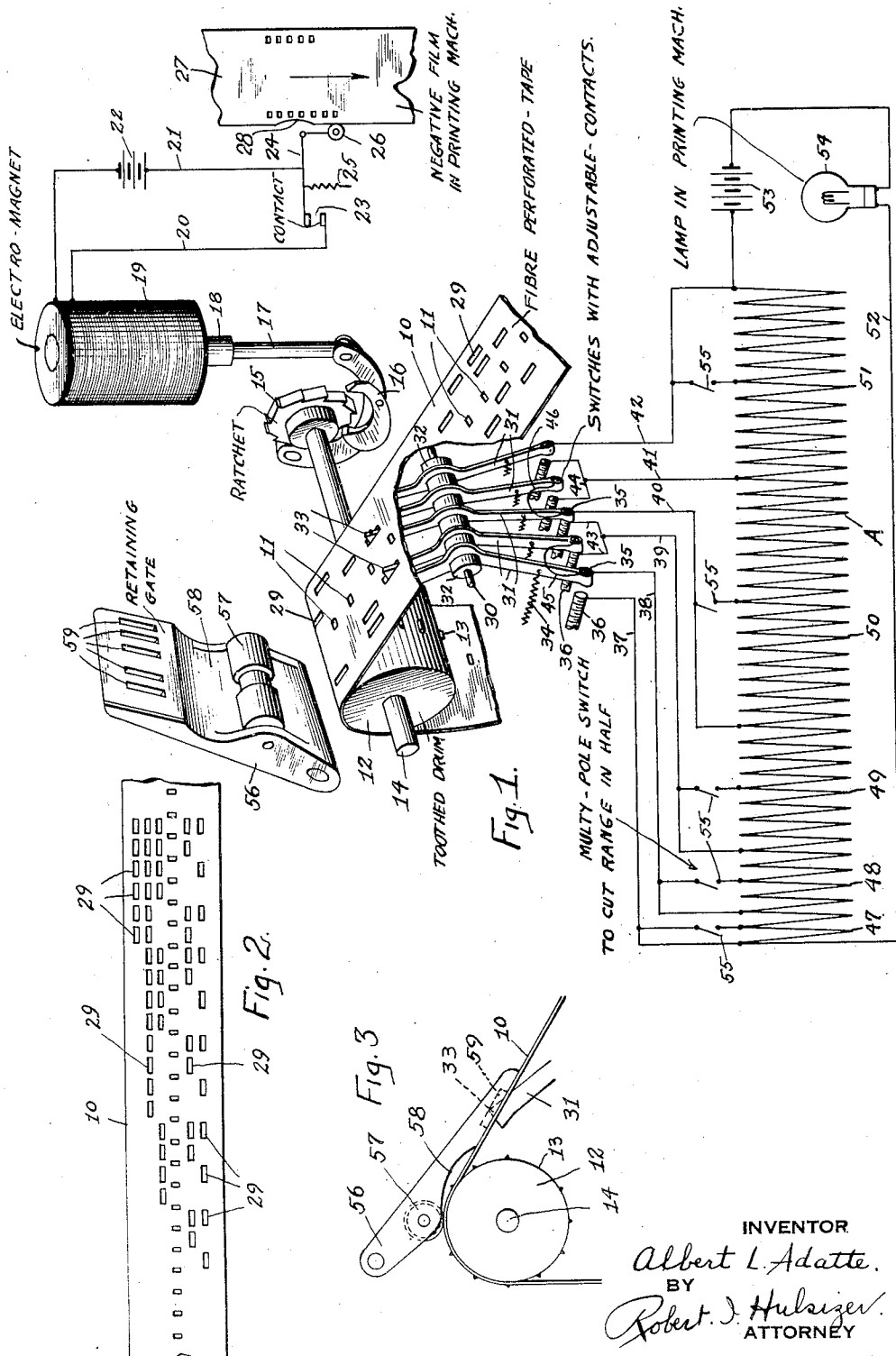
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A. L. ADATTE

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LIGHT CONTROL DEVICE FOR PRINTING MACHINES

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INVENTOR

Albert L. Adatte.

BY

Robert J. Hulzinger.

ATTORNEY

UNITED STATES PATENT OFFICE

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LIGHT CONTROL DEVICE FOR PRINTING
MACHINES

Albert L. Adatte, Plainfield, N. J.

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5 Claims. (Cl. 95—75)

This invention relates to new and useful improvements in machines for printing film and has especial reference to machines for printing motion picture film.

5 An object of the invention is to provide simple and efficient mechanism and devices whereby the control of the light intensity is achieved in a much more simple manner and the range of light is increased and the degree of successive
10 changes of light is made finer without adding any complications to the mechanism or devices employed to achieve this result.

A still further object is the provision of simple means whereby the resistance bank associated
15 with the printing lamp can be quickly changed by merely throwing the switch from a bank which has resistance steps of predetermined value to one which has an equal number of steps but of much less resistance in each so that a finer
20 series of light changes may be employed at will.

Further and more specific objects, features and advantages will more clearly appear from a consideration of the specification hereinafter taken in connection with the accompanying drawing
25 which forms part of the specification and which illustrate a present preferred form of the invention.

In brief the invention comprises a battery or source of current, a printing lamp, and a resistance bank in series. The banks have a plurality of by-pass taps extending therefrom and dividing the bank into a series of resistance units, the values of each are preferably multiples of each other. These taps preferably five in number extend to a plurality, preferably 5, switch devices, the opening and closing of which control selectively the resistance units which are left in or cut out of the circuit to vary the intensity of the light. Preferably also each by-pass tap is provided with an auxiliary tap extending respectively therefrom to a medial point of each resistance unit and provided with a manual switch. These various manual switches are preferably connected to be thrown as a group
40 to by-pass approximately half of each unit by throwing the switch. This divides the value of each unit approximately in half and varies the range of light intensity and the effective value of the light intensity of each unit. By this means
50 the efficiency of the bank to be adapted for various kinds of work and various kinds of negatives to be provided is made more available.

The selector switches are preferably provided with portions contacting with a moving tape in
55 which are selectively disposed combinations of

five or less perforations. As these combinations of perforations are advanced step-by-step across the contacting portion of these selector switches, those portions which encounter a perforation are enabled to move to a position where that particular switch is closed. When any particular switch is closed that determines the cutting out or by-passing of a predetermined portion of the bank. The tape is fed by engagement with a roller or support operated step-by-step through
60 suitable electro-magnetically operated means controlled by the movement of the film through the projector. Preferably this control is effected by having notches formed or made at predetermined points in a lateral edge of the film at such points where changes of light intensity are to be initiated. These notches cooperate with a spring pressed switch arm to activate the switch when the notches are encountered and close the circuit temporarily to the electro-magnetic device for advancing the tape. This advance of the tape brings another portion of perforations in combination with the selector switches. Any given film to be printed is examined by experts and the respective portions of the film which require different intensities of light are noted and the notches in the side of the film made accordingly. This would involve a succession of light intensities according to predetermined values for a given film. After this
65 step is taken the perforated tape is made up and perforated in successive combinations of perforations to effect the various changes in the resistance bank desired to give the light intensities previously determined. In other words, there is a separate perforated tape made up for each negative film from which positives are to be printed.

The preferred present form of the invention is shown in the drawing, of which:

Fig. 1 is a schematic layout of the combination of elements;

Fig. 2 is a partial plan view of the perforated tape; and

Fig. 3 is a section through the tape drum and the keeper plate therefor.

As shown in the drawing the present modified form of the invention comprises a tape 10 preferably made of fiber or heavy paper having a series of sprocket holes 11 adapted to pass over a drum 12 provided with sprocket teeth 13. The drum is mounted on the shaft 14 having at one end a ratchet 15 and any suitable pull mechanism 16 mounted on the shaft 17 connected to a core 18 of the electro-magnet 19. This electro-

magnet 19 is connected by wires 20 and 21 to a battery 22 and a switch 23. This switch is operated by an arm 24 connected by a spring 25 and carrying a roller 26 bearing against the side of a film 27 which may be a negative film from which positives are being printed. At a predetermined point in the side of this film 27 notches 28 are formed for the purpose of permitting the closing of switch 23 to effect the energization of the magnet 19 and the step-by-step movement of the roller 12 and the tape 10.

It will be seen that the tape 10 is provided with a series of transverse combinations of perforations 29. In each transverse row of perforations there is space enough for any desired combination of five perforations. Cooperating with this tape and its perforations 29 are a series of selector switch arms 31 pivotally mounted on a shaft 30 and insulated therefrom by bushings 32 so that each switch is independently and insulatingly mounted on the rod or shaft 30 for independent movement. Preferably the upper ends of these selector switch arms are bevelled as at 33 and these bevelled portions bear against the lateral face of the tape by reason of the pull of the series of springs 34 respectively connected to the lower portions of the switch arms. As the tape is advanced step-by-step to bring successive combinations of perforations 29 into position, those switches the upper ends of which encounter perforations can be moved by the spring 34 because the bevelled portions will slip through the perforations 29 thus presented.

The lower end of each selector switch arm is provided with a contact element 35 which respectively are adapted to cooperate with a series of adjustably fixed contact elements 36.

These selector switch arms are electrically connected in a manner hereinafter described to a resistance bank A in series with a battery 53 and a roller 54. Extending from the selector switch arm unit to the bank are a plurality of by-pass leads 37, 38, 39, 40, 41 and 42. The lead 37 extends from the first fixed terminal 36, the lead 38 extends from the lower end of the first switch arm, the lead 39 is connected to the second and third fixed terminals by wires 43, the lead 40 is connected to the lower end of the third switch arm, the lead 41 is connected to the fourth and fifth fixed terminals by means of wires 44, and the lead 42 is connected to the lower end of the fifth switch arm. The respective opposite ends of these leads are connected to points on the resistance bank dividing the bank into a series of resistance units, the respective value of which are multiples of each other. The contact elements on the lower ends of the first and second switch arms are connected by a wire 45. Similarly the elements on the lower ends of the third and fourth switch arms are connected by a wire 46. The respective bank A is thus divided up into a series of units having multiple values, for instance, the section 47 between the leads 37 and 38 is a given value, the next section 48 between the leads 38 and 39 is a value twice that of section 47, the section 49 between the leads 39 and 40 is a value four times that of section 47, the section 50 between the leads 40 and 41 is a value eight times that of the first section. The section 51 between the leads 41 and 42 is a value which preferably is or may be sixteen times the value of the first section.

It will also be noted that each of the leads 37, 38, 39, 40 and 42 have auxiliary leads connecting them respectively with an intermediate portion

of their respective resistance sections and in each of these auxiliary leads are switches 55. These switches 55 are preferably controlled simultaneously by any suitable manually operable means. When these switches 55 are closed it will be seen that each section of the resistance bank above mentioned is cut in half, this reduces the total of the resistance value in half thereby changing the range of the bank and at the same time making the successive changes of resistance controlled by the selector switches of a finer degree than before.

In order to hold the tape on the roller 12 I have provided a guide plate 56 suitably pivoted on any portion of the printing machine having rollers 57 bearing on the tape and a curved portion 58 to clear the teeth of the roller and a flat portion at the opposite end containing a series of recesses or slots 59 pressing lightly against the tape over the upper ends of the selector switch arms. These recesses provide a passage for the upper end of the switch arms as they project through the tape perforations.

From a consideration of the above description it will be noted that thirty-two different steps of light intensity are provided for by this particular arrangement of bank terminals in combination with only five selector arms and that even this can be modified to cut the range of the bank in half and make the individual steps finer in degree for specified purposes. It will be observed that the tape and its operating mechanism are simple and sufficient in their construction and arrangement and that the operation of the selector arms are effected with a minimum of wear and tear on either the tape or other parts of the apparatus with which they are associated. If desired, a suitable condenser may be used (not shown) for the purpose of reducing sparking at the switch contacts.

While the invention has been described in detail and with respect to a present preferred form thereof it is not to be limited to such details and forms since many changes and modifications may be made in the invention without departing from the spirit and scope of the invention in its broadest aspects. Hence it is desired to cover any and all forms and modifications of the invention which may come within the language or scope of any one or more of the appended claims. What is claimed, is:

1. A printing machine for motion picture film which comprises a resistance bank connected in circuit with a printing lamp, a plurality of by-pass leads connected to said bank to divide it up into a series of successive sections the resistance values of which are successively and in order multiple of each other, selector switches connected to said leads, a perforated tape operating said selector switches, auxiliary leads extending from certain of said by-pass leads to an intermediate point of the respective bank sections and auxiliary switches in said auxiliary leads capable of being manually and simultaneously operated to vary the resistance range of the bank.

2. A printing machine for motion picture film which comprises a perforated tape having a plurality of successive transverse combinations of perforations therein, a plurality of selector switches associated with said tape and adapted to be closed in accordance with the cooperating combination of perforations of the tape, a resistance bank connected to said switches and circuit means between said switches and said bank whereby the resistance of the bank is cut off or

out in units which are multiples of each other, and auxiliary switch means whereby the range of the bank may be changed at will and the value of each resistance step may be varied.

3. A printing machine for motion picture film which comprises a perforated tape, means for moving said tape step-by-step, a roller over which said tape is adapted to pass, said roller and tape having cooperating teeth and holes for effective movement of the one by the other, a guard plate associated with said tape and pivotally connected to a suitable support, rollers on said guard plate bearing on the tape as it passes over the roller, the free end of said guard plate having recesses therein to lie flat over and in line with the perforations of said tape, said guard plate having a curved cutaway portion between said recesses and the rollers thereon whereby the teeth and the tape supporting roller will clear the guard plate.

4. A printing machine for motion picture film comprising a perforated tape, means for moving said tape step-by-step, means responsive to the movement of the film through the machine for operating said film moving mechanism, said tape having a successive series of combinations of perforations thereon of from one to five perforations in each combination, a series of five independently operable selector switch arms disposed adjacent said tape and adapted to cooperate with the perforations in said tape and movable switch contacts on said arms, five stationary contacts adjacent said arms, a resistance bank associated with said contacts and divided up into a series of resistance sections, the values of which are respectively multiples of each other; a by-pass lead extending from the beginning of the first section to the first fixed contact, a by-pass lead extending from the end of the first section to the first movable contact, a by-pass lead extending from the end of the second section and connected to the second and third fixed contacts, a by-pass lead extending from the end of the third section and connected to the third movable contact, a by-pass lead extending from the end of the fourth section and connected to the fourth and fifth fixed contacts, a by-pass lead extending

from the end of the fifth section and connected to the fifth movable contact, a wire connecting the first and second movable contacts and a wire connecting the third and fourth movable contacts.

5. A printing machine for motion picture film comprising a perforated tape, means for moving said tape step-by-step, means responsive to the movement of the film through the machine for operating said film moving mechanism, said tape having a successive series of combinations of perforations thereon of from one to five perforations in each combination, a series of five independently operable selector switch arms disposed adjacent said tape and adapted to cooperate with the perforations in said tape and movable switch contacts on said arms, five stationary contacts adjacent said arms, a resistance bank associated with said contacts and divided up into a series of resistance sections, the values of which are respectively multiples of each other, a by-pass lead extending from the beginning of the first section to the first fixed contact, a by-pass lead extending from the end of the first section to the first movable contact, a by-pass lead extending from the end of the second section and connected to the second and third fixed contacts, a by-pass lead extending from the end of the third section and connected to the third movable contact, a by-pass lead extending from the end of the fourth section and connected to the fourth and fifth fixed contacts, a by-pass lead extending from the end of the fifth section and connected to the fifth movable contact, a wire connecting the first and second movable contacts and a wire connecting the third and fourth movable contacts, auxiliary by-pass leads extending from the first, second, third, fourth and sixth by-pass leads to an intermediate point of the respective adjacent sections, and an auxiliary switch in each of said auxiliary by-pass leads, said auxiliary switches adapted to be operated manually and selectively to vary not only the range of the bank but to vary the value of each section or step.

ALBERT L. ADATTE.

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