M. S. CUMNER & F. W. GEISSENHAINER.

RHEOSTAT.

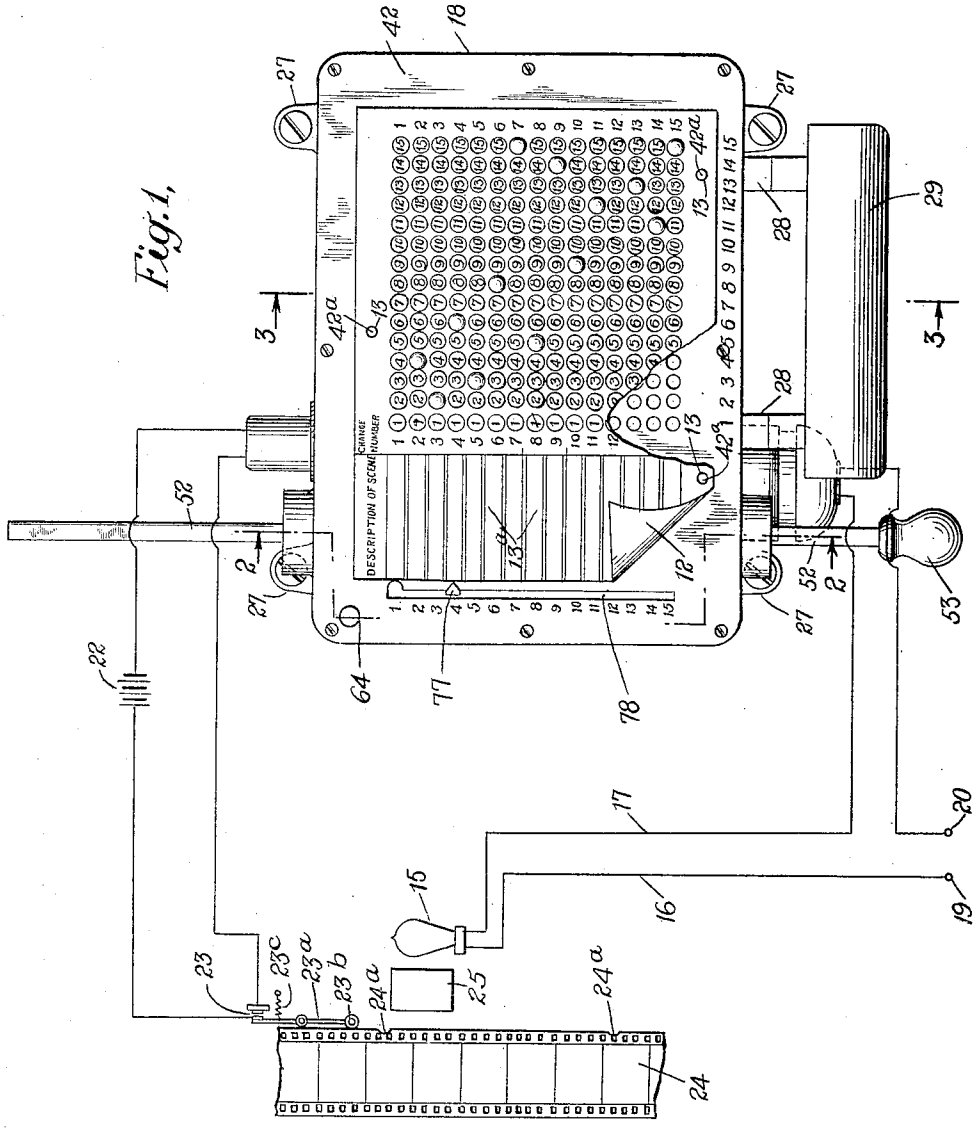
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1,224,610.

Patented May 1, 1917.

3 SHEETS—SHEET 1.

Fig. 1.



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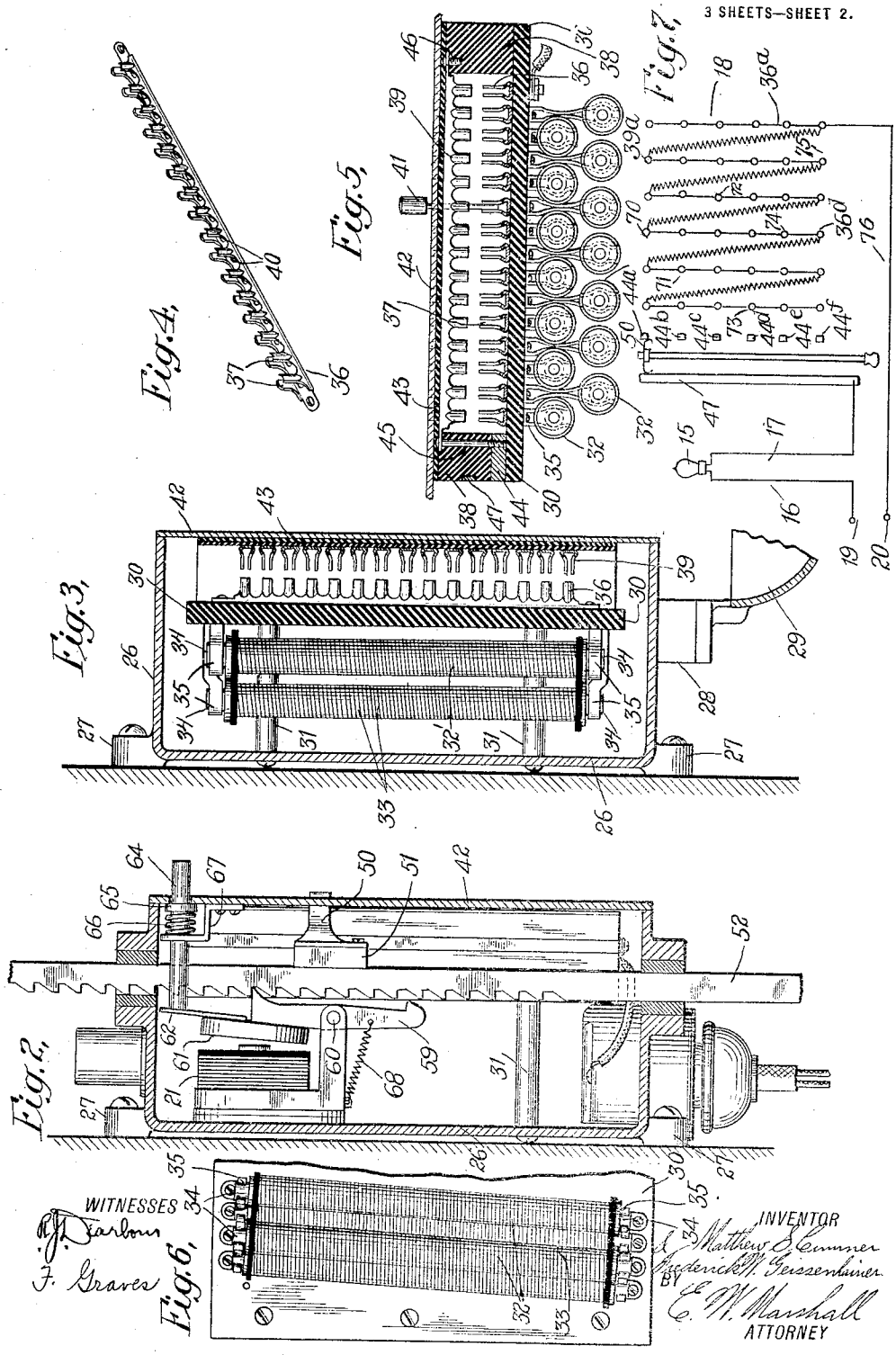
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3 SHEETS—SHEET 2.



WITNESSES

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3 SHEETS—SHEET 3.

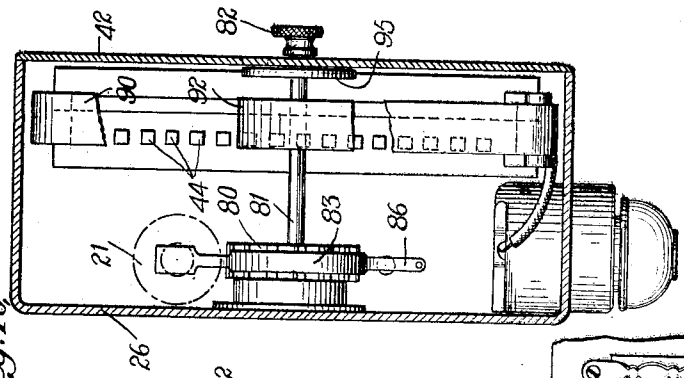


Fig. 10

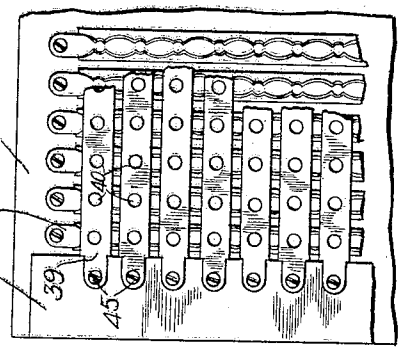


Fig. 8,

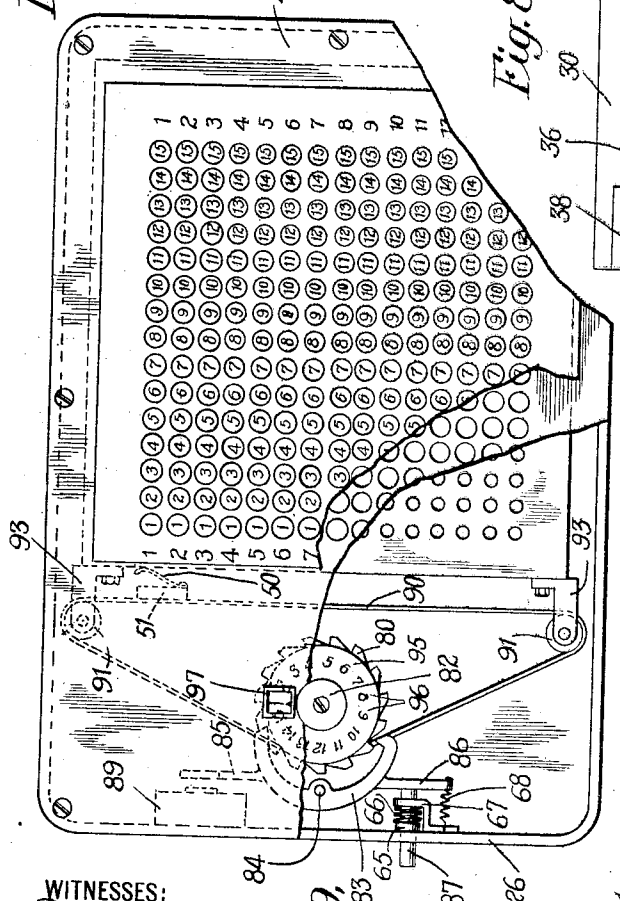


Fig. 9,

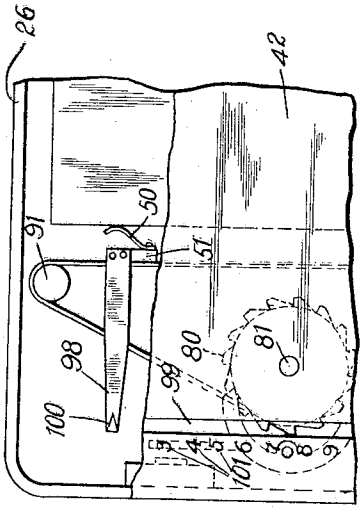


Fig. 11,

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UNITED STATES PATENT OFFICE.

MATTHEW S. CUMNER, OF NEW YORK, N. Y., AND FREDERICK W. GEISSENHAINER, OF FREEHOLD, NEW JERSEY, ASSIGNORS TO NESTOR MANUFACTURING CO., INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

RHEOSTAT.

1,224,610. Specification of Letters Patent. Patented May 1, 1917.

Application filed December 11, 1914. Serial No. 876,659.

To all whom it may concern:

Be it known that we, MATTHEW S. CUMNER, a citizen of the United States of America, and a resident of New York, county and State of New York, and FREDERICK W. GEISSENHAINER, a citizen of the United States of America, and a resident of Freehold, county of Monmouth, and State of New Jersey, have invented certain new and useful Improvements in Rheostats, of which the following is a specification, reference being had to the accompanying drawings forming a part thereof.

Our invention relates to electric regulating systems and controllers and has special reference to those of the rheostatic type.

One object of our invention is to provide a simple and compact regulator that shall be peculiarly adapted for controlling the intensity of an electric light so as to secure the best results when the light is utilized for photographic printing from a moving picture or other film or roll.

Another object of our invention is to provide an electric circuit regulator or controller composed of a plurality of members, each having means for predetermining the effect of the regulator, and automatic means for making the action of the regulator in governing the circuit, successively dependent upon the several members.

Another object is to provide a rheostat having an electric circuit regulating resistance, a plurality of independent selective contacts for predetermining the effective resistance of the regulator, and automatic means for successively utilizing the several contacts whereby a succession of changes are automatically effected.

Still another object is to provide a rheostat having a relatively few number of different parts, and a plurality of interchangeable contact members of simple and inexpensive construction.

Other objects and advantages of our invention will be set forth hereinafter, and in order that our invention may be thoroughly understood, we will now proceed to describe the same in the following specification and then point out the novel features thereof in appended claims.

Referring to the drawings:

Figure 1 is a partially diagrammatic view of a regulating system embodying our invention and including a front elevation of our regulating rheostat.

Figs. 2 and 3 are sectional elevations taken respectively on the lines 2—2 and 3—3 of Fig. 1.

Fig. 4 is a perspective view showing a single regulating contact in detail.

A sectional plan view at right angles to Fig. 3, including the resistors and the regulating contacts, is shown in Fig. 5.

Fig. 6 is a rear elevation of a portion of the resistor supporting plate, with several of the resistors mounted in position thereon.

A diagrammatic view setting forth the circuit connections of the resistors and the regulating contacts is shown in Fig. 7, the total number of resistors being reduced for convenience as it is obvious that any desired number may be employed.

Fig. 8 is a detailed elevation showing the regulating contacts assembled.

Fig. 9 is a front elevation corresponding to that embodied in Fig. 1, of a modified regulating rheostat which also embodies our invention.

Fig. 10 is an end elevation of the structure shown in Fig. 9, the casing being partially broken away in each figure.

Fig. 11 shows another modification of our invention.

While we have illustrated a regulator of the rheostatic type, for which we now believe our invention is particularly adapted, we intend that our invention shall not be limited in this regard and that only such limitations be imposed as are indicated in the appended claims.

Like parts are designated by the same reference characters in each of the figures of the drawings.

As shown in Fig. 1, the regulating system comprises an electric lamp 15, which receives its energy from circuit 16—17, one side of which includes the regulating rheostat which is shown at 18. Any suitable source of energy (not shown) may be connected to the terminals 19—20 of the circuit 16—17. As hereinafter explained more in detail, the regulating resistance comprises an actuating magnet 21 which is supplied with energy

from some suitable source, such as a storage battery 22, and is governed by a circuit closer 23 which is controlled by the film or negative 24 from which a positive is being printed.

The film is run from one reel to another in a well known manner (the reels not being shown) and the printing is accomplished in a chamber having an opening, indicated at 25, through which light is admitted from the electric lamp 15. Before describing the details of the rheostatic regulator, the operation of the regulating system may be outlined as follows: A negative roll, such as a moving picture film 24, may contain a number of scenes which vary very materially in density, by reason of the varying lights to which the negative was originally exposed and the color and character of the objects reproduced. It has been our aim to provide for variations in the density of the film by automatically varying the intensity of the printing light as each successive changing scene is brought under the light.

Inasmuch as a great many prints may be made from a single film, we have furthermore provided a templet or pattern card 12 which may be utilized directly for setting the regulator after it has been once suitably prepared for any particular roll. Thus a single templet will be made for each film or roll and may be utilized as hereinafter explained whenever it is desired to print from that roll.

Referring to Figs. 1 to 8 inclusive, the rheostat itself comprises a box or casing 26 having perforated lugs or ears 27 by which it may be mounted on a wall or support, and a pair of downwardly extending projections 28 to which a trough-like receptacle 29 is secured. Within the casing is a slab or plate 30 of insulating material which is supported by posts 31 from the bottom of the box or casing 26. A plurality of tubular resistors 32 are supported in two parallel rows upon one side of the plate 30 and between the plate and the bottom of the box. Each resistor comprises an insulating cylinder or tube, on which a resistance wire or other conductor 33 is wound in the form of a helix, and having extensions 34 of conducting material which are electrically connected to the respective ends of the resistance wire. Each resistor is removably supported in position by spring contact clips 35 which are secured to the plate 30 and are adapted to engage the extensions 34 of the resistors. The structure of the resistors may be materially varied within the spirit and scope of our invention, the tubular resistors being shown merely as one suitable form.

Secured to the opposite side of the plate 30 from the resistors are a plurality of stationary contacts 36 which correspond in number and approximate location to the resistors and are connected at their respective ends to the supporting clips 35 of two adjacent resistors. In other words, each resistor is electrically interposed between two of the contacts 36, the resistors being connected in series relation through the contacts as shown in Fig. 7.

Each of the contacts 36 is formed, as clearly shown in perspective in Fig. 4, to constitute a channel having a plurality of spaced contact sockets 37 which are adapted to be engaged by contact pins 41 as hereinafter explained. Each of the contacts is preferably formed of sheet metal by a stamping process and the jaws of each of the sockets make a yielding contact with the pins by reason of the resiliency of the material of which the contact is formed. As shown in Fig. 3, the resistors are substantially vertical and this is also true of the contacts 36 and for convenience they will be described as in this position although our invention is of course not restricted to any specific arrangement or mounting of the device.

A pair of insulating strips or blocks 38 are secured to the plate 30 near its opposite edges and constitute supports for a second set of stationary contacts 39 which are preferably identical in form to the contacts 36 but extend at right angles thereto, being shown in horizontal position in Fig. 3. The sockets of the contacts 39 are in superposed alinement with the sockets of the members 36, the arrangement of the two sets of contacts being clearly shown in Fig. 8. Suitable holes 40 are provided in each of the contact members 39 in order to permit each of the contact pins 41 to extend through them and make a bridging contact with one of the sockets of the contacts 36.

The outer surfaces of the contacts 39 are protected from a cover plate 42 of the box 26 by an insulating plate 43, the cover plate 42 and insulating plate 43 being perforated to permit the contact pins 41 to extend through them into the various parts of opposite sockets. The receptacle 29 is provided for the purpose of containing the contact pins when not in use.

The plate 30 and its attached parts do not occupy the entire space within the box but are located at one end under the part provided with perforations in Fig. 1. Extending through the block 38 at the left hand side of the structure shown in Fig. 5, are a plurality of contacts 44 which are connected to the respective contacts 39 by screws 45. The same screws are utilized for supporting the contacts 39 at one end, small screws 46 being utilized for securing contacts to the block 38 at the opposite end. Adjacent to the stationary contacts 44 is a single contact strip 47 from which the contacts 44 are equally spaced.

Electrical contact is established between one of the contacts 44 and the contact strip 47 by means of a movable contact member 50 as shown in Fig. 2. This contact is secured to a block 51 of insulating material which is attached to a toothed rack 52. This rack or bar extends vertically through the casing and is provided at one end with a knob or handle 53 by which it may be returned to its initial position. Adjacent to the rack and coöperating with its teeth is an escapement pawl 59 pivotally supported at 60 and having an arm 61 which is provided with an extension 62. The arm 61 is magnetizable and is adapted to be influenced to tilt the escapement pawl by the electro-magnet 21. The pawl may be also actuated independently of the electro-magnet by a push button 64 which is adapted to act upon the extension 62. The push button comprises a pin which extends through a suitable hole near one end of the cover plate 42 and has an enlargement 65 within the casing against which it is normally pressed by a spring 66. The spring reacts against a perforated guide 67 through which the inner end of the pin extends into engagement with the extension 62.

A spring 68 is interposed between the pawl and the adjacent wall of the casing and tends to act in opposition to both the action of the push button and that of the electromagnet. The arrangement of parts is such that a succession of actuations either of the magnet or of the push button will produce a step by step movement of the rack 52. The contact 50 is advanced with the rack to which it is secured into successive engagement with the stationary contacts 44. 77 is a pointer affixed to the block 51 and projecting through a vertical slot 78 in cover plate 42.

As clearly indicated in Fig. 7 a circuit is neither completed, solely by the moving contact 50 engaging the stationary contacts 44, nor by the contact pins 41 bridging the regulating contacts, both these instrumentalities being necessary to the completion of the circuit.

Referring specially to Fig. 7 and assuming that a pin 41 has been inserted in the socket 70 of the first row, 71 of the second row, 72 of the third row, 73 of the fourth row, 74 of the fifth and 75 of the sixth,—when the movable contact 50 occupies the position shown in Fig. 7, a circuit is established from terminal 20 through a conductor 76 to one of the regulating contacts 36^a. From this point circuit is completed through three of the resistor sections to regulating contact 36^d which, by reason of the pin 70, is connected to a regulating contact 39^a. Circuit is thus completed through the pin and the regulating contact 39^a, to the stationary contact 44^a, thence through movable contact 50, stationary contact 47, conductor 17, electric lamp 15 and conductor 16 to the line terminal 19.

It is evident that the pins 71 to 75 do not in any way influence the active resistance of the rheostat when the movable contact 50 is in engagement with contact 44^a, but as the movable contact successively engages contacts 44^b, 44^c, etc., the active resistance will depend not upon the position of the pin 70 but successively upon the positions of the pins 71—72, etc. With the arrangement of the pins illustrated, when the movable contact engages stationary contact 44^c, the active resistance is the same as when the movable contact engaged contact 44^a. This is because pin 74 as well as pin 70 engages contact 36^d.

Thus it is evident that the whole or any part of the resistance to which the movable contact may be adjusted may be included in the circuit at each step.

As already explained, the step by step movement of the contact is effected by either successively actuating the push button 64 whenever a change is desired or by energizing the electro-magnet 21. If the device is to be manually controlled by an attendant the push button should be actuated, once for each new scene of the film, the rheostat having first been set by the templet to make the resistance changes correspond to the changes in the density of the film.

The templet card 12 has holes 13 near its margin and is adapted to be mounted on the face of the cover plate which is provided with pins 42^a to hold the card in position. It is ruled transversely near its left hand end as shown in Fig. 1 for the purpose of providing spaces 13^a for a list of the scenes on the film under the heading "Description of scene." The pointer 77 moves along the edges of these spaces. To the right of these spaces are a series of numerals under the heading "Change number." Beyond these to the right is a space having coördinate lines which intersect directly over the contact sockets 37, when the card is in position on the cover plate. The arrangement of parts is such that a hole may be punched in the card on each transverse line at a point of its intersection with a vertical line to provide the suitable opening for one of the contact pins 41, the location of the holes being predetermined in accordance with the requirements of the film with which it is to be used.

When the electro-magnet is depended upon to actuate the escapement pawl, the circuit arrangement of Fig. 1 may be employed. The film 24 is provided with a plurality of edge notches 24^a at predetermined intervals corresponding with scene changes, which are adapted to release an arm or finger 23^a of the circuit closer 23 and allow it to

temporarily complete the battery circuit through the electro-magnet 21.

The edge of the film between notches engages a roller 23^b and holds the finger 23^a, in opposition to the spring 23^c, in such position as to interrupt the circuit at the contacts of the circuit closer 23. The arrangement of the notches depends upon the changing scenes of the film, the arrangement of parts being such that, for each change of scene in which the density of the film changes, a notch is provided so as to temporarily close the circuit closer 23. The closing of the battery circuit in this manner, as already explained, temporarily energizes the electro-magnet 21, which in turn actuates the escapement pawl 59 and produces a forward movement of the contact 50.

A comparatively few number of regulating contacts are illustrated in the diagrammatic view of Fig. 7, in order to avoid confusion, but it will, of course, be understood that any suitable number may be employed.

The escapement pawls 59 and 83 operate in the usual manner, one end having the form of a hook and the other end acting as a stop, and the two being alternately thrown into engagement with the teeth of the ratchet. These teeth, however, are so formed as to permit the ratchets to be readily returned to their initial positions.

Reference may now be had to Figs. 9 and 10. Instead of the toothed rack of the previous figures, a ratchet 80 is secured to a shaft 81 which extends outwardly through the cover plate of the casing and terminates in a knurled handle or knob 82. An escapement pawl 83 which corresponds to the pawl 59 of the previous figures is pivotally supported at 84 and is provided with a pair of oppositely extending projections or arms 85—86. The arm 85 is adapted to be actuated by a push button 87 corresponding to the push button 64. The other arm is adapted to be influenced by an electro-magnet 89 which corresponds to the magnet 21. The movable contact member 50 instead of being secured to the rack bar is attached to a belt 90 which extends over pulleys 91 and is wound upon a drum 92. This drum is secured to the shaft 81 and the pulleys are respectively supported by brackets 93 which are secured to the opposite ends of one of the blocks 38.

Secured to the shaft 81, close to the cover plate 42, is a dial 95 on which a series of numerals 96 are marked. These numerals correspond to the several regulating contacts 39 and are so positioned that one of them is centrally visible through an opening 97 in the casing just at the time when the movable contact member 50 is in engagement with the contact 44 of the corresponding regulating contact. The knurled knob or handle 82 constitutes a simple means for returning the ratchet drum and the contact 50 to their initial positions after a series of regulating steps have been completed.

Instead of the index dial 95 an index finger 98 may be attached to the supporting block 51 of the movable contact as shown in Fig. 11. The end of this index finger is bent over so as to extend through a slot 99 in the casing cover and constitutes an index 100, a series of numerals 101 being located adjacent to the slot and corresponding in position to the several contacts 44.

We have illustrated and described several modifications of construction to show that we do not limit ourselves to any specific arrangement, and we intend no limitations other than those imposed in the appended claims.

What we claim is:

1. A contact for electric regulators comprising a channel shaped member of conducting material notched to provide a plurality of resilient sockets and having perforations in alinement with the sockets whereby contact pins may extend through the perforated back of the channel into the sockets.

2. A rheostat comprising a supporting plate of insulating material, a plurality of channel shaped regulating contacts mounted thereon in parallel relation, a plurality of resistor units having end contacts, spring clips adapted to engage the end contacts of said resistor units secured to the opposite side of the plate and electrically interposed between said regulating contacts, a second set of channel shaped regulating contacts supported in parallel relation at a fixed distance from the first set of regulating contacts and extending at right angles thereto, each of said regulating contacts being notched and formed to provide a series of resilient contact sockets, and one of said contacts having perforations in alinement with the sockets, the sockets of one being in alinement with the sockets of the adjacent set and removable contact pins for connecting each of the contacts of one set with one of the contacts of the other set.

3. A rheostat comprising a supporting plate of insulating material, a plurality of channel shaped regulating contacts mounted thereon in parallel relation, a plurality of resistor units secured to the opposite side of the plate and electrically interposed between said regulating contacts, a pair of spaced insulating blocks secured to the insulating plate near its opposite edges in parallelism with the regulating contacts, a second set of regulating contacts extending in a direction at right angles to the first set and secured at their ends to said spaced blocks, each of said contacts comprising a

series of contact sockets, the sockets of one set being in alinement with the sockets of the other set.

4. A rheostat comprising a supporting plate of insulating material, a plurality of channel shaped regulating contacts mounted thereon in parallel relation, a plurality of resistor units secured to the opposite side of the plate and electrically interposed between said regulating contacts, a pair of spaced insulating blocks secured to the insulating plate near its opposite edges in parallelism with the regulating contacts, a second set of regulating contacts extending in a direction at right angles to the first set and secured at their ends to said spaced blocks, each of said contacts comprising a series of contact sockets, the sockets of one set being in alinement with the sockets of the other set, and a perforated plate mounted upon and insulated from the second set of regulating contacts having its openings in alinement with the contact sockets.

5. A rheostat comprising a supporting plate of insulating material, a plurality of channel shaped regulating contacts mounted thereon in parallel relation, a plurality of resistor units secured to the opposite side of the plate and electrically interposed between said regulating contacts, a pair of spaced insulating blocks secured to the insulating plate near its opposite edges in parallelism with the regulating contacts, a second set of regulating contacts extending in a direction at right angles to the first set and secured at their ends to said spaced blocks, each of said contacts comprising a series of contact sockets, the sockets of one set being in alinement with the sockets of the other set, and a perforated plate mounted upon and insulated from the second set of regulating contacts having its openings in alinement with the contact sockets, and a series of contact blocks embedded in one of said insulating blocks and severally connected to the regulating contacts supported by said insulating blocks and a movable contact member adapted to successively engage said contact blocks.

6. A rheostat comprising a supporting plate of insulating material, a plurality of channel shaped regulating contacts mounted thereon in parallel relation, a plurality of resistor units secured to the opposite side of the plate and electrically interposed between said regulating contacts, a pair of spaced insulating blocks secured to the insulating plate near its opposite edges in parallelism with the regulating contacts, a second set of regulating contacts extending in a direction at right angles to the first set and secured at their ends to said spaced blocks, each of said contacts comprising a series of contact sockets, the sockets of one set being in alinement with the sockets of the other set, and a perforated plate mounted upon and insulated from the second set of regulating contacts having its openings in alinement with the contact sockets, and a series of contact blocks embedded in one of said insulating blocks and severally connected to the regulating contacts supported by said insulating blocks and a movable contact member adapted to successively engage said contact blocks, and means for imparting a step by step movement to the movable contact member.

7. An electric regulator comprising a plurality of contact sockets, a plurality of removable contact pins adapted to be set in predetermined positions in said sockets, and means for supporting a templet as a guide for the placing of said removable contact pins.

8. An electric regulator comprising a plurality of parallel regulating contacts, resistances electrically interposed between adjacent contacts, a second set of parallel regulating contacts at right angles to said first set, said contacts being constructed to form sockets at their points of intersection and the outer set of contacts having perforations in alinement with the sockets, a plurality of removable contact pins adapted to be set in predetermined positions in said sockets, and a removable templet having perforations over said predetermined positions.

9. An electric regulator comprising a plurality of parallel regulating contacts, resistances electrically interposed between adjacent contacts, a second set of parallel regulating contacts at right angles to said first set, said contacts being constructed to form sockets at their points of intersection and the outer set of contacts having perforations in alinement with the sockets, a row of contact blocks each connected with one of said outer set of regulating contacts, a slidable contact arranged to be moved into successive engagement with said contact blocks, a plurality of removable contact pins adapted to be set in predetermined positions in said sockets, and a removable templet having perforations corresponding with the different positions of said slidable contact and over the predetermined positions of the pins.

In testimony whereof we have hereunto set our hands this 9th day of December, 1914, in the presence of two subscribing witnesses.

MATTHEW S. CUMNER.
FREDERICK W. GEISSENHAINER.

Witnesses:
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A. M. WHEELER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."