

No. 640,466.

Patented Jan. 2, 1900.

J. HARRIS.

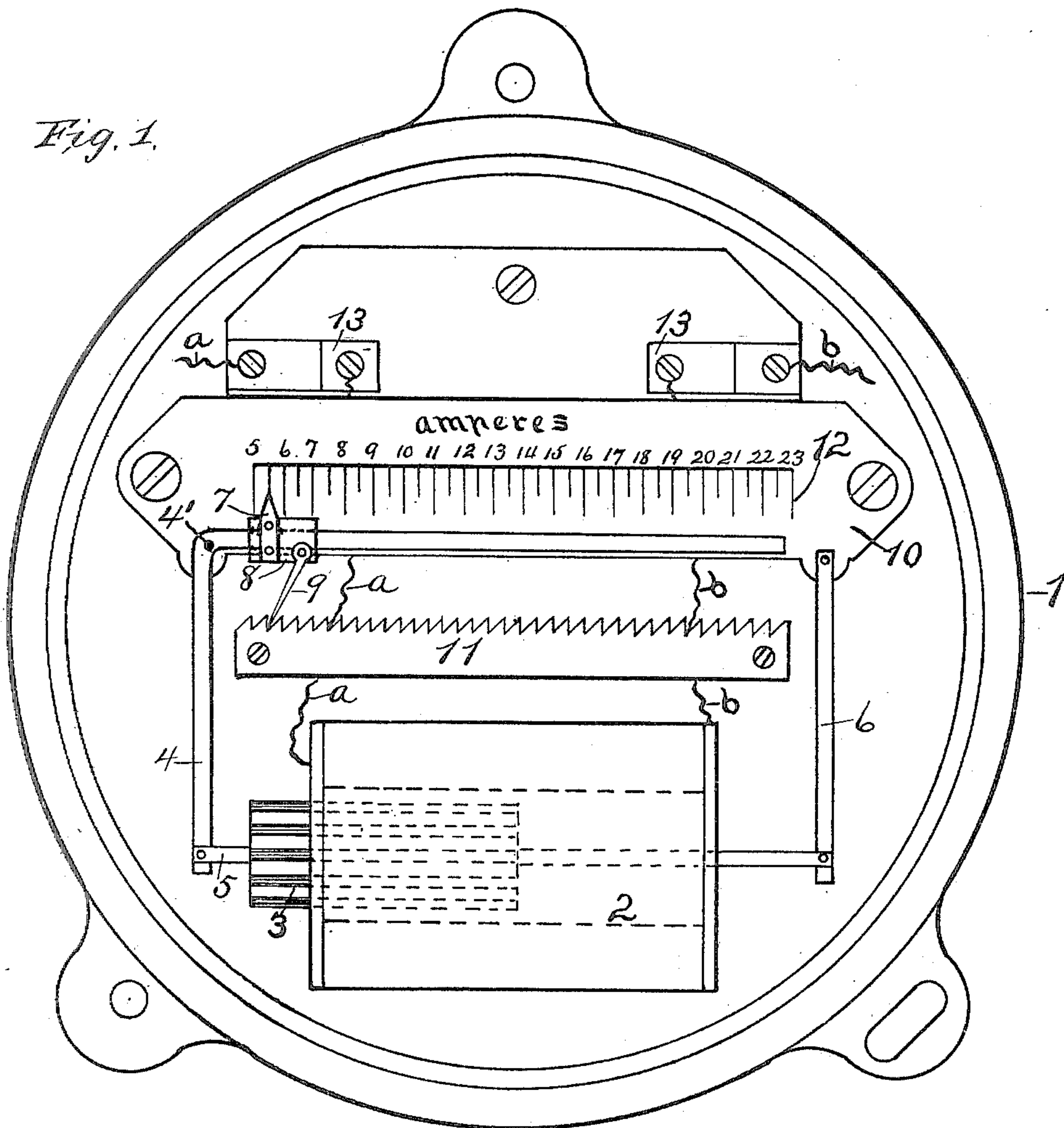
RATE INDICATOR FOR ELECTRIC CURRENTS.

(Application filed Aug. 1, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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Jesse Harris:
By A. M. Brown
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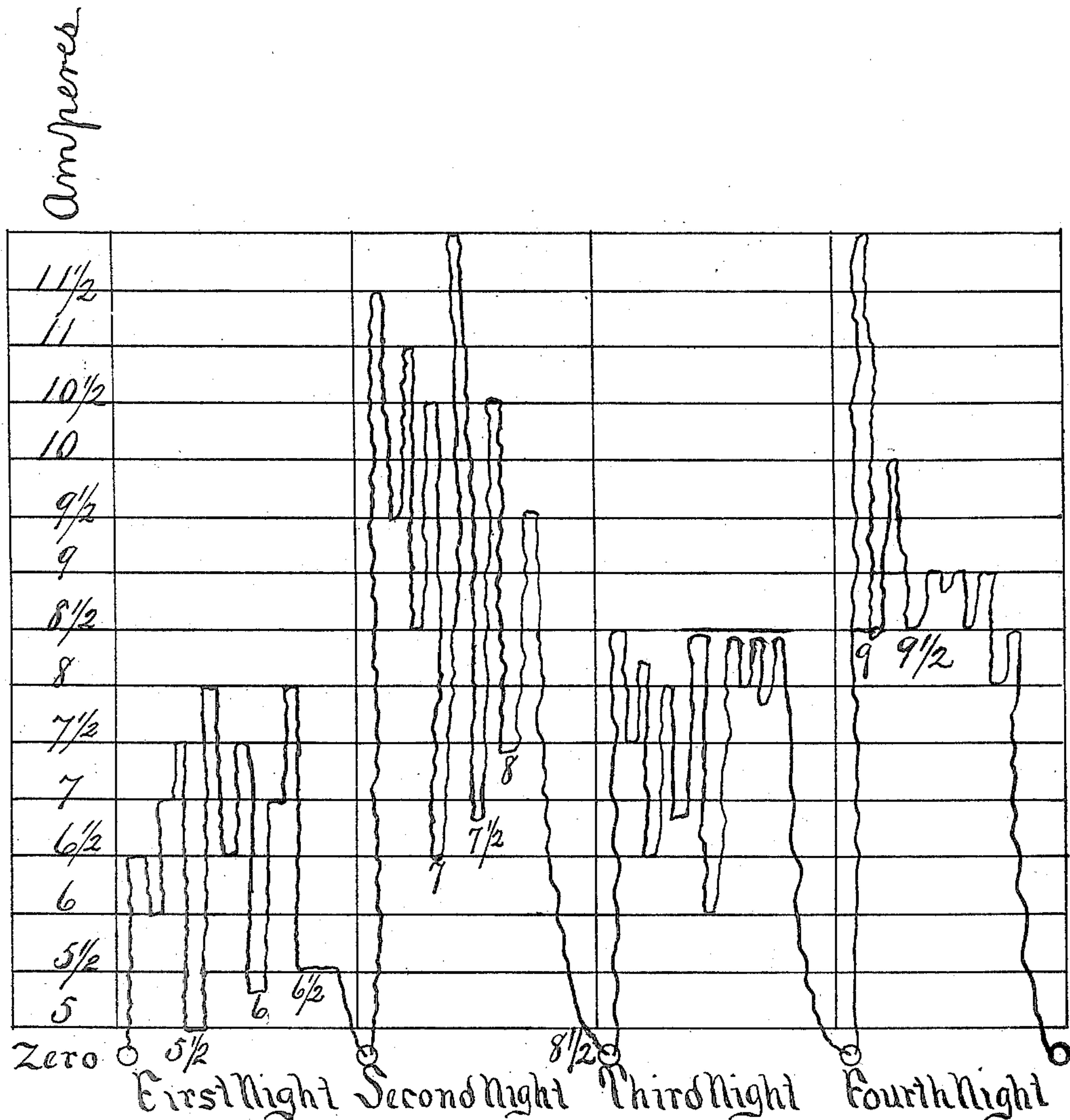
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UNITED STATES PATENT OFFICE.

JESSE HARRIS, OF ALBANY, NEW YORK.

RATE-INDICATOR FOR ELECTRIC CURRENTS.

SPECIFICATION forming part of Letters Patent No. 640,466, dated January 2, 1900.

Application filed August 1, 1899. Serial No. 725,731. (No model.)

To all whom it may concern:

Be it known that I, JESSE HARRIS, a citizen of the United States, residing at Albany, New York, have invented certain new and useful
5 Improvements in Rate-Indicators for Electric Currents; 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
10 make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a
15 new and improved rate-indicator for electric currents which may be either a watt or an ampere indicator, the one shown in the drawings being an ampere rate-indicator; but by substituting for wire 3 a coil or helix in the
20 manner well known to those skilled in the art it may be made a watt rate-indicator.

In the drawings, Figure 1 shows a plan view of my indicator in operative construction; and Fig. 2, a graphical view of the rise and
25 fall of the current and the registrations of my indicator in connection therewith during four succeeding nights, the rise and fall of the current being greatly exaggerated for purposes of illustration.

30 The numeral 1 shows the indicator-case, which may be of any form or configuration desired.

2 shows a solenoid which may be in any form desired, and 3 a bundle of wires preferably
35 forming an armature free to move in the central opening through the solenoid 2, the wires or armature 3 being suspended by the arm 5, pivotally attached to the scale-beam 4, bar 6 being pivotally attached at its upper end, preferably, to the scale-indicator plate 10. The
40 right-hand end of the scale-beam 4, as shown and used by me preferably in my indicators, is free or unattached, and the beam is pivoted at 4'. On the horizontal arm of the
45 scale-beam 4 is a sliding weight or body 8, having attached to it a pointer 7 or its equivalent, pointing to the scale 12, and a pawl 9 or its equivalent, preferably depending from it and arranged to engage with the ratchet-
50 bar 11.

13 13 indicate binding-posts, and *a* and *b* wires for the electric current.

The sliding weight or body 8 has but one direction of movement, and that is to the right or toward the free end of the scale-beam, and
55 will not slide contrariwise or toward the left or pivoted end at whatever angle the scale-beam may be forced by the action of the armature 3, for the scale-beam is never forced to assume a sufficiently sharp angle to allow
60 body 8 to so move, the pawl 9 having nothing to do with preventing such contrariwise motion, its function being to force the body 8 toward the free end of the scale-beam only, as
65 will be described hereinafter, and therefore I make no use of pawls, ratchets, clutches, nor any mechanism whatever to prevent a contrariwise or backward motion of body 8 or pointer 7.

The scale 12, as shown in the device herein
70 illustrated and described, preferably begins at the indication "5," which is an arbitrary fixed point above zero-point, for the reason that the indicator shown is intended for a
75 lighting system of about fifty lights; but for smaller systems I start the indications below "5" and as much below "5" and above zero as the conditions of the case in hand seem to demand. In Fig. 1 the pointer 7 stands at
80 "5½," showing that it has moved one notch, or from "5" to "5½."

The operation is as follows: When the current is completed—i. e., passes over the wires *a* and *b*—armature 3 is moved in the opening
85 of solenoid 2. This movement swings arm 4 to the right, and as the arm 4 and the scale-beam are pivoted at 4' the free end of the scale-beam is elevated and the beam caused to stand at an angle, and pawl 9, by this rising of the scale-beam, becomes disengaged
90 from the teeth on ratchet-plate 11 and stands so disengaged until there is sufficient reduction of current to allow the scale-beam to lower sufficiently, the pawl 9 at no time acting to prevent a rearward or backward movement
95 to body 8 and pointer 7, as the body 8 and pointer 7 will not slide backward on the beam from any position thereon, although pawl 9 be entirely removed. I use, therefore, no mechanism whatever to prevent backward
100

movement to the pointer 7 or its adjuncts, as none are necessary. As the scale-beam falls on a sufficient lowering of current pawl 9, which is loosely pivoted and has a slight backward-and-forward swing and stands nearly or quite perpendicular when disengaged from the ratchet-plate 11, drops with the arm or scale-beam and engages with the teeth in advance of the one it last engaged with and pushes the body 8 and pointer 7 along the scale-beam but one notch, and this is only done when the current has been turned on and rises above and falls below the current force that was required to move the pointer 7 the preceding notch. This will be plainly seen by viewing Fig. 2, wherein the horizontal lines show amperes or are capacity-lines and the vertical lines are time-lines, dividing the capacity-lines into days or nights, and as marked show that the capacity-lines have been divided into four sections representing the first, second, third, and fourth nights the indicator has been used. I make no use of such a card with my indicator. I have introduced it in Fig. 2 simply to assist in illustrating the action of my indicator, and it is used for illustrative and explanatory purposes only. Viewing Fig. 2, it will be seen the horizontal lines are numbered from the bottom upward and that zero-point is below the lower line, marked "5." We will assume that the indicator-pointer 7 is standing at "5" on the scale-plate 12 and a customer or user lights his lamps for the first night and first lights a portion of them, then turns out some, then lights more, and then turns nearly all of them out, then turns on more than he has yet used, and continues this turning on and shutting off during the whole first night. By following and noting the irregular perpendicular solid lines in the space on Fig. 2 marked "First night" the action and registering of my indicator will be easily understood and it will at once be seen that it is not a maximum meter, but a true and accurate rate-indicator. It will be understood that the variations of current shown are greatly exaggerated beyond what would be likely to happen in practice and that this is done to clearly illustrate the action of my indicator.

Beginning at the first night, the current is seen to start at zero and rise or increase to six and one-half amperes and to fall or decrease to six amperes, then rise to seven and one-half amperes, and then fall to slightly below five amperes. Up to the instant the current fell below five amperes, five amperes having been the starting-point from which the pointer was to be first moved, my indicator did not register nor the pointer 7 move along the scale-beam; but the instant the current fell below five amperes the scale-beam fell, pawl 9 entered the second notch or tooth on the scale-plate and pushed pointer 7 along from "5" to "5½," and this was so because my indicator will not register how-

ever high the current may rise until it has dropped its energy below the energy required to move the pointer to the previous position it occupied, and it registers only on the drop of the current and not on its rise or increase. Returning to Fig. 2, the current having dropped slightly below capacity-line "5," which was the starting line or point, the indicator registers "5½," and I mark this point in Fig. 2 as "5½" for illustrative purposes. The current is again turned on and rises to eight amperes or line "8," then falls to six and one-half, then rises seven and one-half, then falls below five and one-half, and as five and one-half was the last point registered and as the current has fallen below the energy that was necessary to move the pointer to five and one-half the pointer is moved forward one notch or point more—viz., to six—and I mark this point in Fig. 2 as "6." The current is again increased and rises to "8" and then falls below "6," the point of last register, and to zero, and having again fallen below the energy (six amperes) which moved the pointer its last notch or point the pointer again moves a notch, or to six and one-half, and I mark "6½" on Fig. 2 at that point. This is then the record for the first night, and it shows or indicates the number of maximums of current the customer has used repeatedly for that night. The second night's diagram may be traced out in precisely the same way; but the only point necessary to be observed is that the fluctuations of current have been such that the pointer 7 on the scale has moved first to "7," then to "7½," then to "8," and finally to "8½" when the zero-point was reached or the lights all turned out. The third night shows no register or movement of the pointer, for the reason that on the third night the indicator started with the pointer at "8½," which represented a point where the current energy must rise above eight and one-half amperes and then fall below it before the indicator could register; but the tracings show that at no time during the third night did the current rise in energy to line "8½," or eight and one-half amperes, and the indicator therefore could not register. The fourth night shows a high rise of energy directly from zero and a heavy fall below line "8½," or eight and one-half amperes, and a register took place, moving the pointer to "9." The energy again rises to line "10" and falls again below line "9," and the indicator-pointer is again moved one notch, or to "9½;" but during the balance of the evening the energy or current did not again rise above line "9½," or to nine and one-half amperes, and consequently could not fall below "9½," and no further register was made for that night.

The periods marked "Nights" may be considered as months, if desired, or any other divisions of time.

When we read the indicator, we know it

started at nothing, which was marked "5," and as it could not register except by successive notches we know that however high the current may have run in amperes, (which 5 would not be indicated on the indicator,) that the customer must have had a maximum above five and one-half, then one above six, then one above six and one-half, then one

istered, and they can be read at any and all times on the scale-plate. It will be evident to any one skilled in the art that where I cause my indicator to register on the fall of 70 the current it can be made to register on the rise of the current energy and the same practical result will be attained; but I prefer to have it register on the fall of the current, as

then one above six and one-half, then one

motion in the armature when the current is reduced substantially as described.

7. An electric rate-indicator consisting of a source of power and an armature arranged
5 to be moved thereby and means for indicating its movements arranged to make one indication for each predetermined maximum of current reached in succession and so that said

indications may be read at any time substantially as described. 10

In testimony whereof I affix my signature in presence of two witnesses.

JESSE HARRIS.

Witnesses:

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A. M. TURNER.