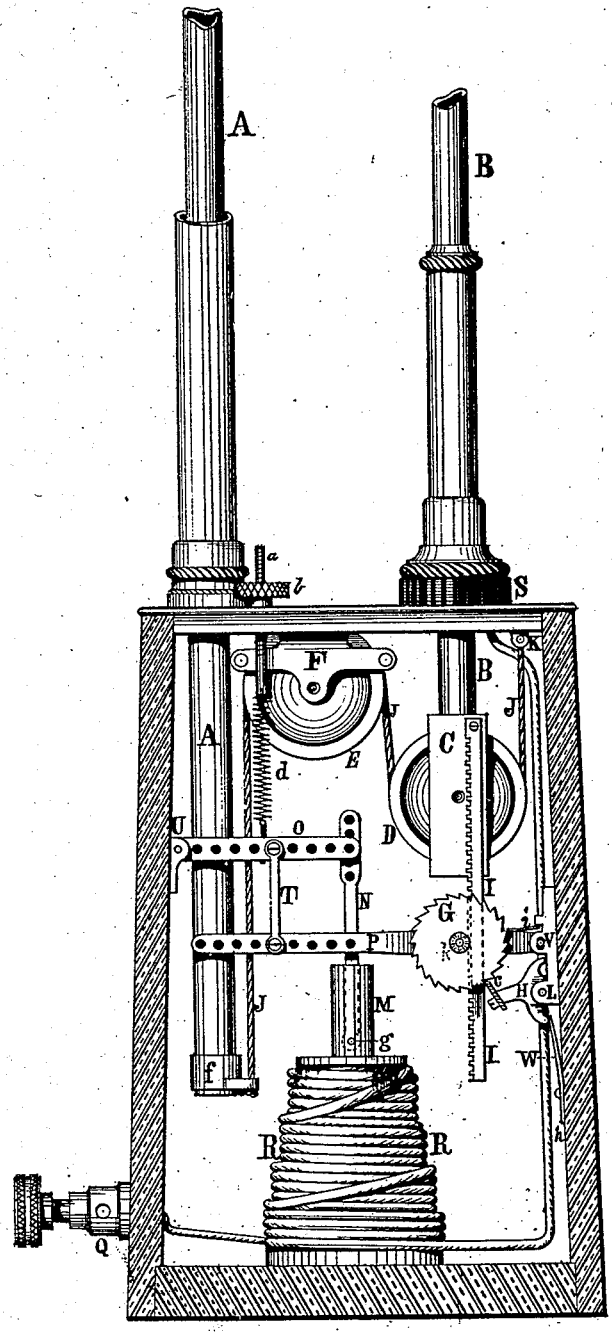
BEST AVAILABLE COPY

H. S. MAXIM.

Regulator for Electrical Lamps.

No. 208,253. Patented Sept. 24, 1878.



Witnesses;
L. O. Schuyler
George R. Williamson.

Inventor;
Hiram S. Maxim

BEST AVAILABLE COP

UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN REGULATORS FOR ELECTRICAL LAMPS.

Specification forming part of Letters Patent No. **208,253**, dated September 24, 1878; application filed August 12, 1878.

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, of the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Lamps or Regulators, which improvements are fully set forth in the following specification and the accompanying drawing, which forms a part of the same.

The object of this invention is to produce an electric lamp which shall have no clock-work about it, and yet be quite as sensitive as those which do contain such work.

Electric lamps as heretofore made may be said to consist of two classes, viz., those which are operated by clock-work and have many fine adjustments which feed the positive and negative carbons in proportion to their consumption, and those which contain no clock-work and feed but one carbon, and thus allow the arc to change its relative position. Those of the first class are expensive in construction, and, from their fine adjustments, are liable to derangements, while those of the latter class have never been made to feed steadily, and when the light is used with a reflector it is soon out of focus, as but one carbon is fed.

In my invention I have produced a lamp which, while it is without clock-work and delicate points, is quite as sensitive as any lamp heretofore made, and also keeps the arc always in focus, as it feeds both of the carbons exactly in proportion to the consumption of each.

The accompanying drawing is a side elevation of my invention, in which A represents the positive-carbon carrier; B, the negative-carbon carrier; C, a block secured to carrier or rod B, and provided with a pulley, D; E, a pulley mounted on the stationary frame F; G, a ratchet, the shaft of which passes through the lever P, and is provided with a pinion at the other end. (Shown in dotted lines.) Both ratchet and pinion are secured firmly to the same shaft and revolve together, the pinion meshing into the rack I. H, the pawl of ratchet G, tipped with a hardened-steel point; J J J, a cord, one end of which is secured to the lower end of the positive-carbon carrier at *f*, thence up and around the pulley E, thence down and around the pulley D, and thence upward, when it is secured to the stationary eye K; L, the pivot of pawl H; M, a core of soft iron, suspended by the link N, which is pivoted to lever O. The lower end of link N is pivoted inside of core M, as shown in dotted lines at *g*. Q, the negative binding-post. The positive binding-post may be placed anywhere, and be connected with the top plate of the case. R R, a coil of insulated copper wire, having an opening through the center to allow the core M to move freely; S, an insulating-ring; T, a small link, connecting the levers O and P; U, the pivot, as fulcrum of lever O; V, the fulcrum of lever P; W, a spring secured to the case at *h*, and pressing the lower toe-piece of the pawl H outward; *a*, a screw-rod, provided with nut *b*, used to adjust the tension of spring *d*.

The operation of this lamp is as follows: The carbons being secured to the carriers A and B, and the wires of a strong source of electricity properly connected, the top (positive) carbon may be allowed to slide downward until it touches and makes electrical contact with the lower (negative) carbon. When the circuit is thus established the current passes through the helix R R. This excites magnetism in the core M and draws it downward with the link N and levers O and P, also the ratchet G, rack I, and negative-carbon carrier B. This downward movement of the negative-carbon carrier draws the cord J and raises the positive-carbon carrier A a corresponding distance. This establishes the arc by drawing the carbons apart. The ratchet cannot turn in this position and allow the rack to move upward, as it is prevented by the embrace of pawl H. As the carbons are consumed and the arc increases in length and resistance, the tendency of core M to fall downward is correspondingly diminished. This enables the retractile spring *d* to draw the core and ratchet upward, and so shorten the arc until so much of the carbon has been consumed that the ratchet G is moved beyond the reach of pawl H. Then the ratchet turns upon its axis, and, by allowing the negative-carbon carrier to rise, will so slacken the cord J that the positive-carbon carrier can fall. As the carbons approach each other the arc is shortened and the magnetism increased. This

BEST AVAILABLE COP

draws down the core M, and with it all its connections, until the ratchet is again held stationary by the pawl H. Should the carbons approach too near each other, the increased magnetism draws the core still farther into the helix, as it will be seen that the pawl H is free to move downward with the ratchet.

On the top side of the lever P, and near its fulcrum V, is secured a small spring, *i*, the strength of which is nearly equal to the upward pull of the rack I. When the stress is all upward, this spring is compressed; but when the ratchet has moved upward away from the pawl until it is free to turn, then the spring *i* will throw the end of the lever P downward, and with it ratchet G, causing it to catch on the tooth next following the one liberated.

It will be seen that there is lost motion allowed at fulcrum V, the hole being larger than the pin; and as the pull of the rack I is balanced by spring *i*, it follows that any slight relaxation of this pull, which must occur in the liberation of the ratchet, must enable the spring to move the ratchet downward sufficiently to catch the next succeeding tooth on the pawl.

The length of the arc may be regulated by the nut *b*. The tension of the spring *d* has to be changed as the electro-motive force of the current is changed. The link T may also be changed to give the core more or less travel, to increase or diminish its leverage, and to adapt it to strong or weak currents of electricity. By the arrangement of the levers as shown, I am enabled to make the work so light on the core that very little change in the electro-motive force is required to move the carbons.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination of ratchet G, pawl or detent H, rack I, and spring *i*, when said ratchet G is attached to and operated by a train of levers, as herein shown, and for the purpose set forth.

2. The combination of ratchet G, pawl or detent H, and spring *i*, when constructed as and operating in the manner and for the purpose herein shown and specified.

3. The combination of levers O and P, links T and N, core M, and helix R R, when operating in connection with a rack, pinion, and ratchet, substantially as and for the purpose herein shown and specified.

4. The combination of springs *i* and W, lever P, and fulcrum V, when constructed substantially as and operating in the manner and for the purpose herein shown and described.

5. The combination of cord J J J, pulleys E and D, eye K, and ratchet G, when constructed as and operating in the manner and for the purpose herein shown and specified.

HIRAM S. MAXIM.

Witnesses:
W. H. TUCKER,
GEORGE R. WILLIAMSON.