(No Model.)

2 Sheets—Sheet 1.

H. S. MAXIM.
Electric Lamp.

No. 234,835. **Patented Nov. 23, 1880.**

Fig: 1.

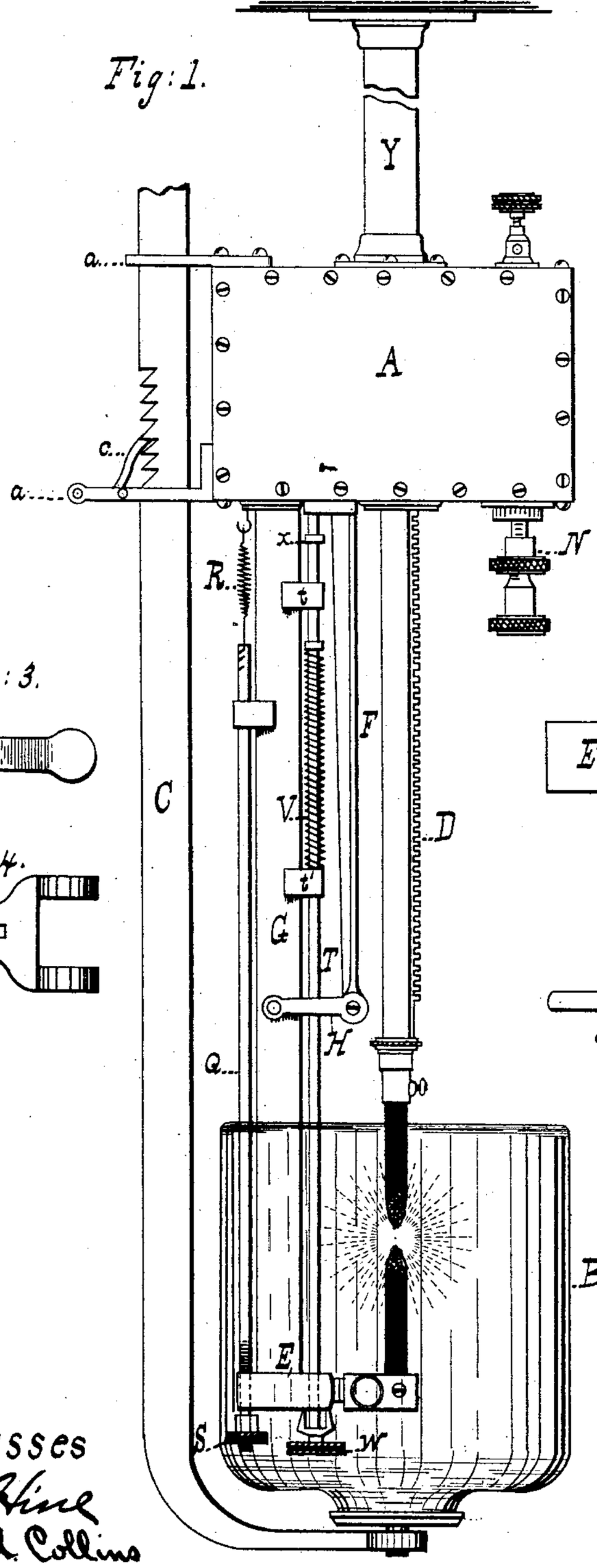


Fig: 3.

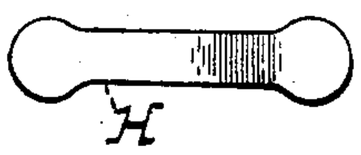


Fig: 4.

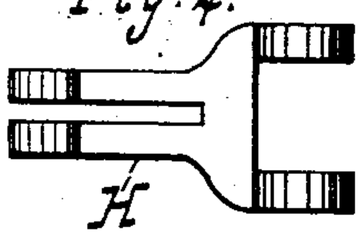


Fig: 5.

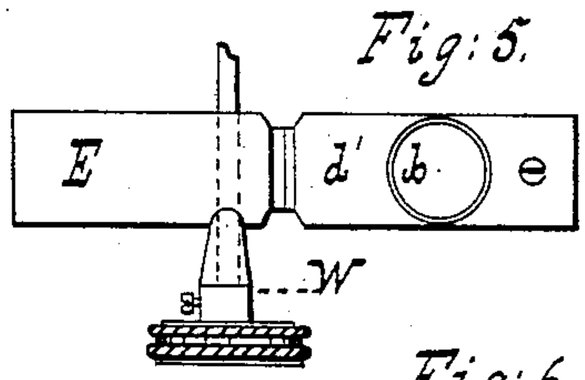
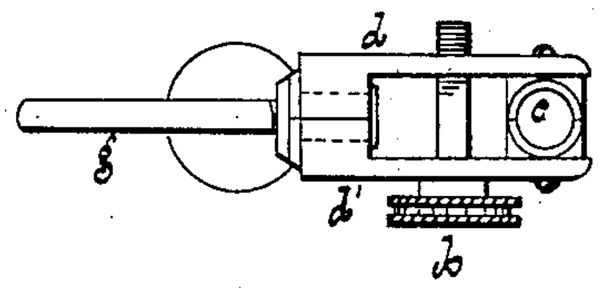


Fig: 6.



Witnesses
Henry Hine
Clarkson A. Collins

Inventor
Hiram S. Maxim
by Leonard E. Curtis
Atty.

(No Model.)

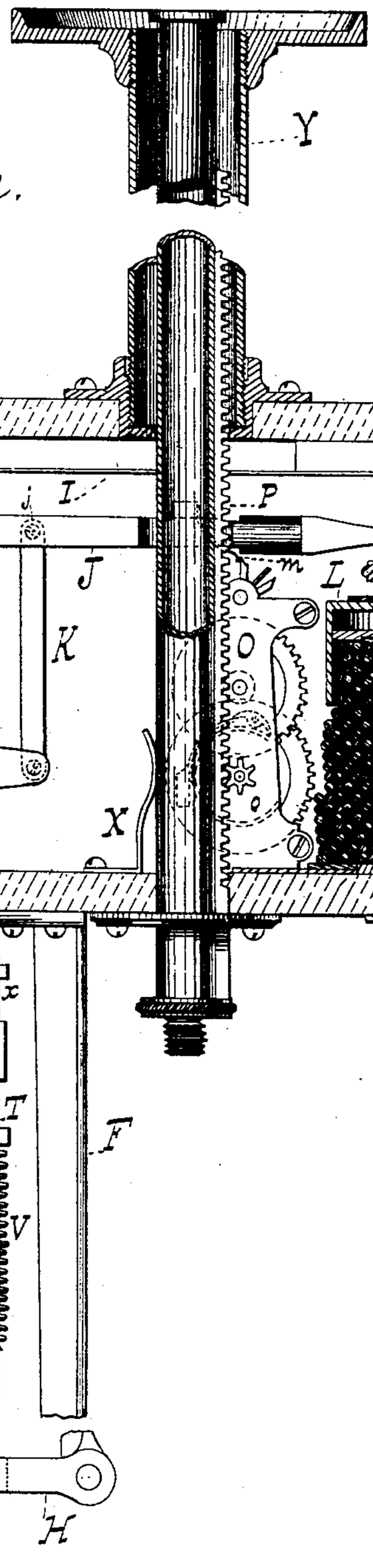
2 Sheets—Sheet 2.

H. S. MAXIM.

Electric Lamp.

No. 234,835. **Patented Nov. 23, 1880.**

Fig. 2.



Witnesses.
Henry Hine
Clarkson A. Collins.

Inventor.
Hiram S. Maxim
by Leonard & Curtis
atty.

UNITED STATES PATENT OFFICE.

HIRAM S. MAXIM, OF BROOKLYN, ASSIGNOR, BY MESNE ASSIGNMENT, TO THE UNITED STATES ELECTRIC LIGHTING COMPANY, OF NEW YORK, N. Y.

ELECTRIC LAMP.

SPECIFICATION forming part of Letters Patent No. 234,835, dated November 23, 1880.

Application filed May 4, 1880. (No model.)

To all whom it may concern:

Be it known that I, HIRAM S. MAXIM, of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Electric Lamps, of which the following is a specification, reference being had to the accompanying drawings, which form a part hereof.

In the drawings, Figure 1 is a side elevation of a lamp constructed in accordance with my invention. Fig. 2 is a vertical section of the same, taken near the center, and Figs. 3, 4, 5, and 6 are enlarged views of detached parts.

Similar letters of reference indicate like parts in each.

A is a case, made of wood or other non-conducting material, containing the mechanism for regulating the feeding of the carbons.

B is a glass globe surrounding the focus.

C is a thin flat bar of metal supporting the globe. It is so arranged as to move freely up and down in slots cut in the arms *a a*, attached to the case A, and is supported at any desired position by the dog *c* engaging with teeth in its edge.

D is the upper-carbon carrier, and E is the lower. The construction of the clamp holding the lower carbon is best shown in Fig. 6. The two sides *d d'* are made in separate pieces, and are held together by the screw *b*. At one end they embrace the head of a horizontal pin, *g*, attached to the lower-carbon carrier, and at the other bear two semi-cylindrical jaws, *e*, of suitable size to hold the lower end of the carbon. The carbon and clamp may be adjusted to any desired position and fixed by turning the screw *b*.

F is a bar rigidly attached to the case A.

G is a flat bar supporting the lower-carbon carrier.

H is a link pivoted to the case A and also to the bar G. The form of the link is best shown in Figs. 3 and 4.

I is a flexible flat strip of metal, attached at one end to the case A and at the other to the bar G.

J is a lever, pivoted to the case A at *h* and to the bar G at *j* by means of the connecting-rod K.

L is an axial magnet placed in the lamp-circuit, and M is its core. The upper end of the core passes through and is firmly attached to the head of an inverted cylindrical box, *q*, which fits over the upper head of the helix and acts as a dash-pot or controlling-chamber, for preventing sudden movements of the regulating mechanism. The end of the lever J works in a recess, *k*, in the side of the core M.

N is an adjusting-screw for limiting the downward movement of the core M.

O is a train of gearing working in a rack, P, on the side of the upper-carbon carrier, and controlling its downward movement.

A detent, *m*, upon the lever J is so arranged as to come into contact with a star-wheel upon the most rapidly-moving shaft of the gearing when the lever is depressed.

Q is a rod passing through the lower-carbon carrier, and suspended from the case A by means of a spring, R.

S is an adjusting-nut for regulating the tension of the spring R.

T is a rod attached to the bar G by means of the brackets *t t'*, through which it has a free movement longitudinally.

V is a spiral spring attached to the rod T and bearing against the bracket *t'*.

The rod T has a shoulder, *x*, so arranged as to bear against the case A when it is thrust up by the spring V, and at its lower end passes through the lower-carbon carrier and terminates in a forked head, W, so arranged that it may be made to straddle the carbon-carrier, as shown in Fig. 5, or when turned a quarter of a revolution to stand upon its lower surface. In the former position the shoulder *x* bears against the lower surface of the case, and in the latter it is drawn down away from it.

The lamp is suspended by means of the tubular support Y, inclosing the upper-carbon carrier, and the current is admitted to the upper-carbon carrier through a binding-post (not shown in the drawings) electrically connected with the spring X, and to the lower-carbon carrier through the binding-post Z and spring I.

The operation of this lamp is as follows: The forked head W is drawn down and turned around until its legs stand upon the lower surface of the carbon-carrier E, when the spring

R raises the bar G and lever J until the detent *m* is raised from the escapement-wheel of the gearing O. The upper-carbon carrier descends by its own weight until the points of the carbons come into contact, when the circuit is completed, and a strong current passing excites the coil L and draws down its core M, at the same time depressing the lower carbon and arresting the descent of the upper.

When the arc becomes long the coil L becomes too weak to overcome the tension of the spring R, and the lower carbon is gradually raised and the detent *m* is withdrawn, allowing the upper carbon to descend until equilibrium is again restored.

The length of the arc may be regulated by adjusting the tension of the spring R, and the lamp may be stopped at any time by turning the head W until it straddles E, when the spring V, obtaining a bearing-point against the case A at the shoulder *x*, overcomes the tension of R and keeps the lower carbon depressed.

It will be observed that the weight of the upper or positive carbon has no influence upon the operation of the regulating device, which is a material advantage, as the negative electrode is consumed only half as rapidly as the positive. Where the spring regulating the length of the arc has to support the upper carbon, as in lamps of the ordinary form, it is frequently necessary to readjust its tension during the burning of a pencil of considerable length on account of the diminution of its load; but this difficulty is greatly reduced by applying the adjusting device to the negative carbon. At the same time the arrangement above described secures all the advantages of locating the regulating mechanism above the focus, where it does not obstruct the light. The pivoted link H and the flexible strip I support the bar G laterally and keep it free from frictional contact with all other parts of the lamp, so that the regulator is very sensitive to changes in the current and susceptible of nice adjustment.

It will also be observed that all the supports, both for the lower-carbon carrier and for the globe, are placed on the same side of the focus and in a line with each other, and they are made flat, with their edges turned toward the focus, so that they cast very little shadow, and that only at one point.

It is obvious, also, that the globe B may be lowered by raising the dog *c* without disturbing the other parts of the lamp. This is a valuable feature of the lamp, as it is frequently desirable to remove or replace the globe when carbons of full length are in position without interfering with their adjustment, and in such lamps as they are ordinarily constructed this cannot be conveniently done.

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

1. In an electric lamp, a gravitating carrier for the upper carbon and a train of gearing controlling its descent, in combination with an electro-magnet and armature-lever operating a detent engaging with said gearing, and a carrier for the lower carbon suspended from said lever, substantially as described.

2. In an electric lamp, an electro-magnet and mechanism for controlling the feeding of the upper carbon, located above the focus, in combination with a carrier for the lower carbon, movable vertically, and connected with the armature-lever of said electro-magnet, substantially as described.

3. In an electric lamp, an electro-magnet controlling the feeding mechanism, in combination with a dash-pot or controlling-chamber fixed to the armature or core of the electro-magnet and surrounding its head, substantially as described.

4. In an electric lamp, the combination of a lower-carbon carrier and a globe surrounding the focus with their flat supports for said carrier and globe, placed edge to edge, upon the same side of the focus, and in the same vertical plane with it, substantially as described.

5. The carbon-carrier E, in combination with the bar G, the link H, and flexible strip I, substantially as described.

6. The carbon-carrier E, in combination with the adjustable spring R, the spring V, rod T, and forked head W, substantially as described.

7. The side pieces, *d d'*, in combination with the screw *b*, pin *g*, and jaws *e*, substantially as described.

8. The combination of the globe B with the support C and the dog *c*, substantially as described.

HIRAM S. MAXIM.

Witnesses:
L. H. LATIMER,
JOHN TREGONING.