(No Model.)

E. THOMSON.

ELECTRIC ARC LAMP.

No. 258,684. Patented May 30, 1882.

Fig. 1

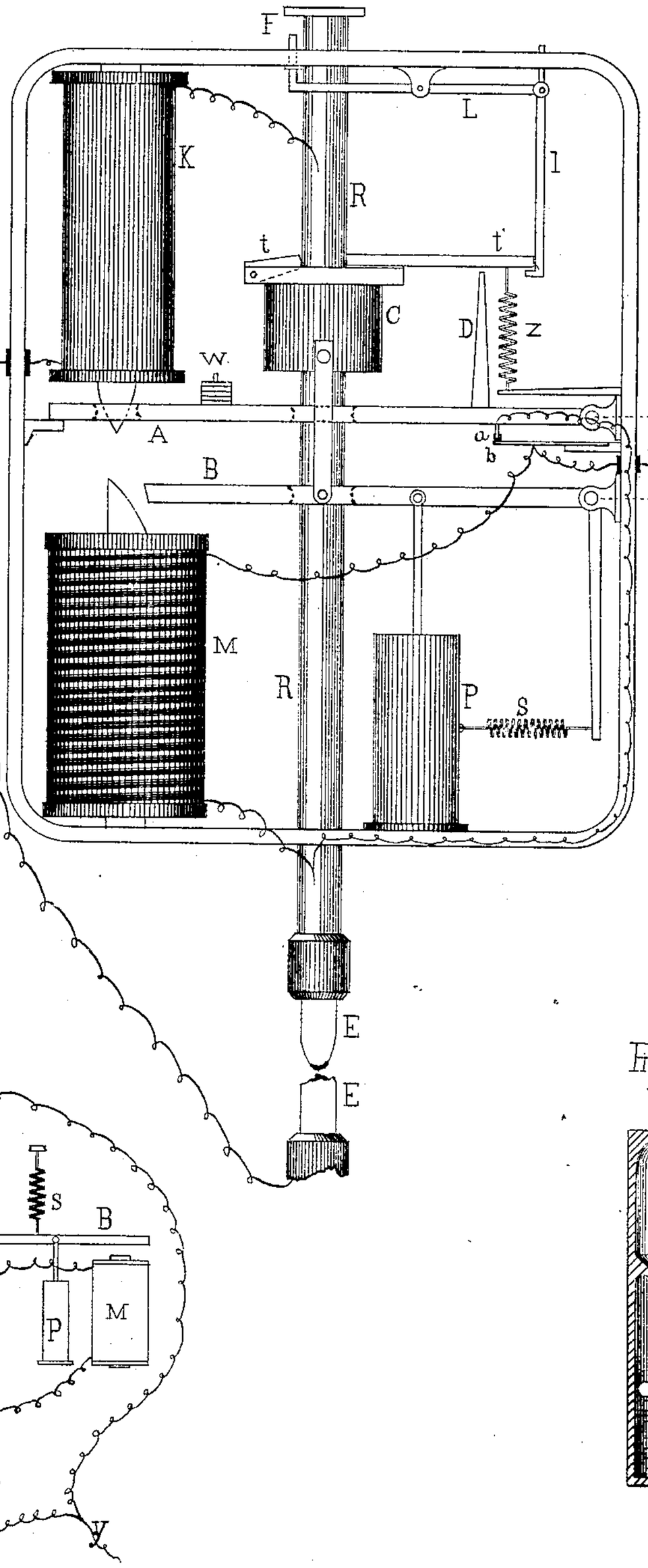


Fig. 2

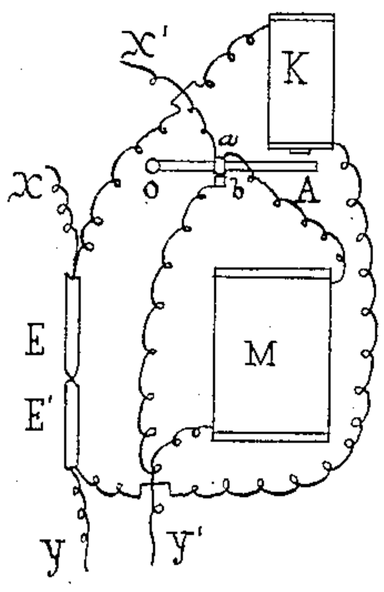


Fig. 3

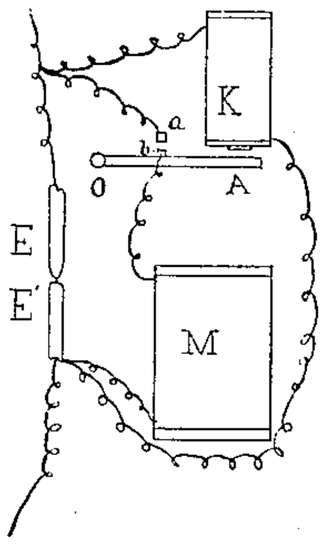


Fig. 4

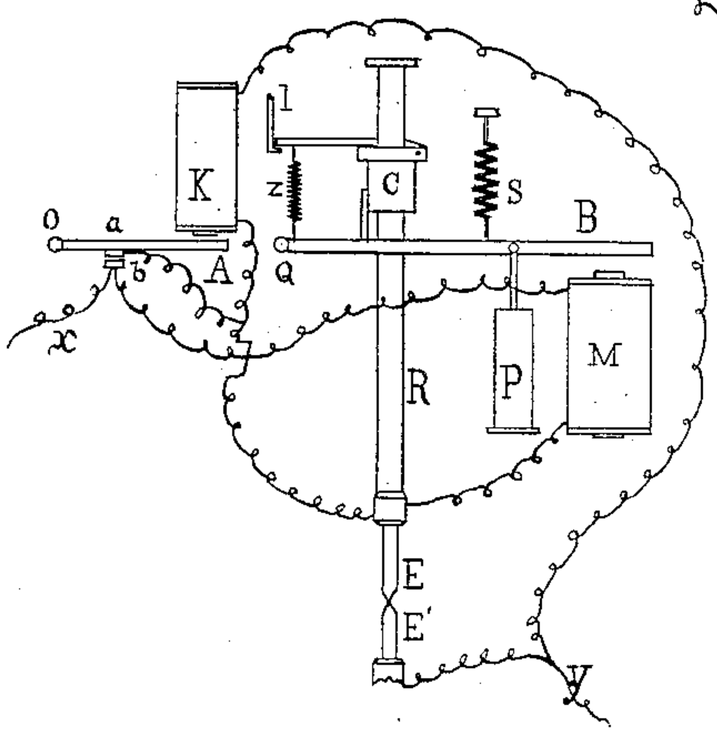
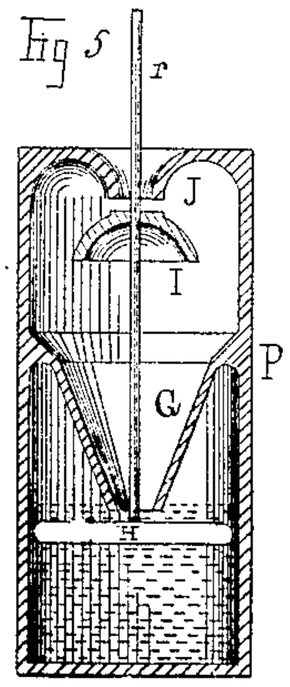


Fig. 5



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UNITED STATES PATENT OFFICE.

ELIHU THOMSON, OF NEW BRITAIN, CONNECTICUT, ASSIGNOR TO THE AMERICAN ELECTRIC COMPANY, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 258,684, dated May 30, 1882.

Application filed July 11, 1881. (No model.)

To all whom it may concern:

Be it known that I, ELIHU THOMSON, a citizen of the United States, residing in New Britain, county of Hartford, State of Connecticut, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention relates to electric lamps designed to be placed upon a circuit in series, and in which the electro-motive force of the generators supplying said circuit is sustained, whether the circuit be closed or open, through the lamp-carbons. It is therefore adapted to be run by generators the field-magnets of which are excited by separate currents from those traversing the lamp itself, or by generators the field of which is not dependent on the reaction of the current supplying the lamps, or by batteries and thermo-electric generators where the electro-motive force is sustained whether the circuit be open or closed.

Briefly, my invention comprises the combination of devices controlling the position of the carbon pencils and arranged to mechanically separate said carbons to a small interval; an electro-magnet fed by any suitable current from any source, the action of which upon a core or armature causes the approach and feeding of the carbons toward one another, and a shunt or derived circuit magnet around the arc controlling the admission of current to the magnet, by which the feeding mechanism is operated in such manner that when said derived-circuit magnet is strengthened by the fact of an elongated arc between the carbons it shall attract an armature which actuates a pair of contacts by which current is admitted to the other electro-magnet and the carbons caused to approach or feed together thereby.

My present invention differs from former inventions in that the carbon-adjusting magnet is energized when the carbons are to be fed, and receives no current until the arc has lengthened sufficiently, instead of the carbon-adjusting magnet being cut out or weakened when the feed is to take place.

Figure 1 shows a regulating mechanism constructed in accordance with my invention; Fig. 2, a modification of circuit-connections; Fig. 3, a further modification of said connections; Fig. 4, an outline view of the relations of circuits as in Fig. 1; Fig. 5, a form of dash-pot used in my invention for checking sudden movements of the parts.

It will be understood that any well-known mechanism can be used for the adjustment of the carbons which can be placed under the control of an electro-magnet for effecting the approach of the carbons, called "feeding," and in which the separation is effected in any suitable manner, as by a spring or weight acting to open the carbon arc.

In Fig. 1, R R is a rod supporting the electrode of carbon E, and by which it is held opposite the other carbon, E′. A clamp, C, is arranged to seize said rod, and said clamp is lifted by the agency of a spring, S, acting upon a lever, B, pivoted at Q, by which the clamp C is supported. The lever B is provided with a dash-pot or check, P.

The clamp C is preferably provided with a movable jaw, *t*, with elongation *t′*, by which the rod R is gripped, as fully described in prior applications for Letters Patent, the spring Z acting to hold the jaw *t t′* in place. The clamp C is opened by the lowering of the armature when attracted by the magnet M when it is energized by a current. The clamp opens by the part *t′* coming into contact with a stop, *l*, when said clamp is so depressed or lowered.

The electro-magnet M, which, as stated, acts to open the clamp by attracting its armature B against the spring S, is either placed in circuit with the carbons, as in Figs. 1 and 4, or in a separate circuit, as in Fig. 2, or in a derived circuit around the arc, as in Fig. 3. In either case the said magnet is provided with a set of open-circuiting or shunting contacts, *a b*, the closing or opening of which controls the presence or absence of current in the coils of the magnet M.

An electro-magnet, K, Figs. 1, 2, 3, 4, is placed in a derived circuit around the carbons E E′ and the arc, and adjusted so as to attract the armature A and move the contacts *a b* to admit the current to the magnet M when the power of said magnet K has increased, due to a lengthening of the arc. The proper adjustment is easily effected by providing the armature A with a retracting-spring or with weights

W, serving the same purpose. It is preferable, also, to give the magnet-poles of K a tapered form and provide a corresponding opening in its armature A, to secure uniformity of attraction in various positions of said armature, as described in prior applications for Letters Patent.

As shown in Figs. 1 and 4, the current enters at X, passes to contact *b*, to the magnet M, thence to the rod R, Fig. 4, branched to the other contact, *a*, Fig. 4, passes the carbons at E E′, and out at Y. The shunt branch through K is, as usual, any connection around the arc. When the contacts at *a b* are closed the magnet M is shunted, and is momentarily energized when the said contacts are opened by the increased power of K, and the armature B being then attracted, the clamp C opened in consequence, a downward movement of the rod R takes place and the carbon E is fed. This action is repeated as often as necessary.

The carbons E E′, on starting, require to be thrust together to establish the arc, after which the lamp is self-adjusting. This putting together of the carbons is not needed in modifications shown in Figs. 2 and 3.

The magnet M is in Fig. 2 not placed in the main circuit with the carbons; but it and the contacts *a b* are traversed by a separate current from any source. The action is the same in principle as in Fig. 1.

In Fig. 3 the magnet M is put in a derived circuit around the carbon arc by the closing of the contacts *a b* by the action of the shunt-magnet K, as before. In this latter case the magnet M is of high resistance and the spark at the opening of the contacts *a b* very feeble.

In Fig. 1 the armature A is provided with a projection, D, so that when the arc E E′ has increased to an abnormal extent, resulting in greatly-increased strength of the shunt-magnet K, the jaw *t t′* is opened by the projection D lifted by the armature A, owing to said increased strength of K. This latter action only takes place when the magnet M fails to effect a feeding of the carbons.

When the carbons are consumed to a sufficient extent it is desirable that they be no longer allowed to produce an arc between them but that they should fall together and maintain a closed circuit. This I accomplish by placing a projection or button, F, at a suitable point upon the rod R, which, when the rod R descends, shall come into contact with a lever, L, to which the stop *l* is hung. When the button F strikes the lever L the stop *l* is raised, at the same time raising the toe or jaw *t t′*, so as to free the clamp C from the rod R. The rod R, being thus relieved of the supporting action of the clamp C, descends so as to close the arc at E E′, the lever L having a sufficient range of movement to allow free descent of the rod R even after the button F has struck the lever L.

The dash-pot check P, Fig. 1, may be a cylinder fitted with a long plunger and containing only air, as often employed as a check upon sudden movements; but where a liquid—as oil or glycerine—is used, difficulty arises from the spilling of fluid should the lamp be inverted or placed considerably out of the vertical. Such difficulty I completely avoid by constructing the dash-pot as shown in Fig. 5.

The body or cylinder P is provided in its interior with an inverted tubular neck, G, and at its top with a recurved cap, J.

The piston H is placed in the fluid in the lower compartment, and its rod *r* has an inverted cup, I, attached and hung in the upper compartment between the cap J and the neck or partition G. In the inverted position the cup I is seated as a valve upon the inner edges of the cap J, and the piston H covers the opening in the part G. The device may be turned into any position or moved rapidly without the escape of its liquid contents, which in quantity are sufficient to just cover the piston H.

I claim—

1. The combination, with the clamp or clutch in an electric lamp, a feed-operating electro-magnet normally out of circuit, and a retractor acting in opposition to said electro-magnet for holding the clamp in position, where it will engage with and prevent the carbon rod from feeding, of a derived-circuit electro-magnet, a circuit-closer and breaker operated thereby, and circuit-connections arranged in the manner described, whereby when the derived-circuit magnet is strengthened, owing to an increase in the length of arc, an electric current is admitted to the feed-operating electro-magnet and energizes the same for the purpose of producing a feed of the carbon.

2. The combination, with the feed-regulating mechanism in an electric lamp, an electro-magnet for releasing said feed mechanism, and a retractor acting in opposition to said electro-magnet to hold the feed mechanism out of action, of a derived-circuit electro-magnet, a circuit-closer, and connections, substantially as described, whereby when the power of the derived-circuit electro-magnet is increased an electric current may be admitted to the electro-magnet of the feed-regulating mechanism, so as to energize the same and cause the feeding of the electrode.

3. The combination, with the carbon rod or carrier in an electric lamp, of a clutch or clamp and spring for normally holding said clamp in engagement with the rod or carrier, an electro-magnet for releasing the clutch from the rod or carrier, a derived-circuit electro-magnet, and a circuit-closer, and connections, as described, for admitting an electric current to the releasing electro-magnet when the power of the derived-circuit electro magnet increases.

4. The combination, with the feed-regulating clutch or clamp for the carbon rod or carrier, of means for releasing the clamp, and a lug, toe, or projection upon the carbon rod, arranged as described, to come into contact with and actuate the releasing devices.

5. The combination, substantially as described, with the spring-actuated clamping-

toe, of mechanism engaging with the toe so as to disengage it from the carbon-carrier, and a lug or projection upon the carbon-carrier.

6. The combination, with the carbon-support and its lug F, of lever L, stop *l*, and clamp-jaw *t t'*, substantially as and for the purpose described.

7. The combination, with an electric lamp, of a dash-pot having division G placed with its opening immediately above the piston, so that the latter acts as a valve when the cup is inverted.

8. The combination, with an electric lamp, of a dash-pot having a division, G, and curved cap J, combined, in the manner shown and described, with the piston H, rod *r*, and inverted cup I.

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