

(No Model.)

E. THOMSON.  
ELECTRIC ARC LAMP.

No. 297,201.

Patented Apr. 22, 1884.

Fig. 1,

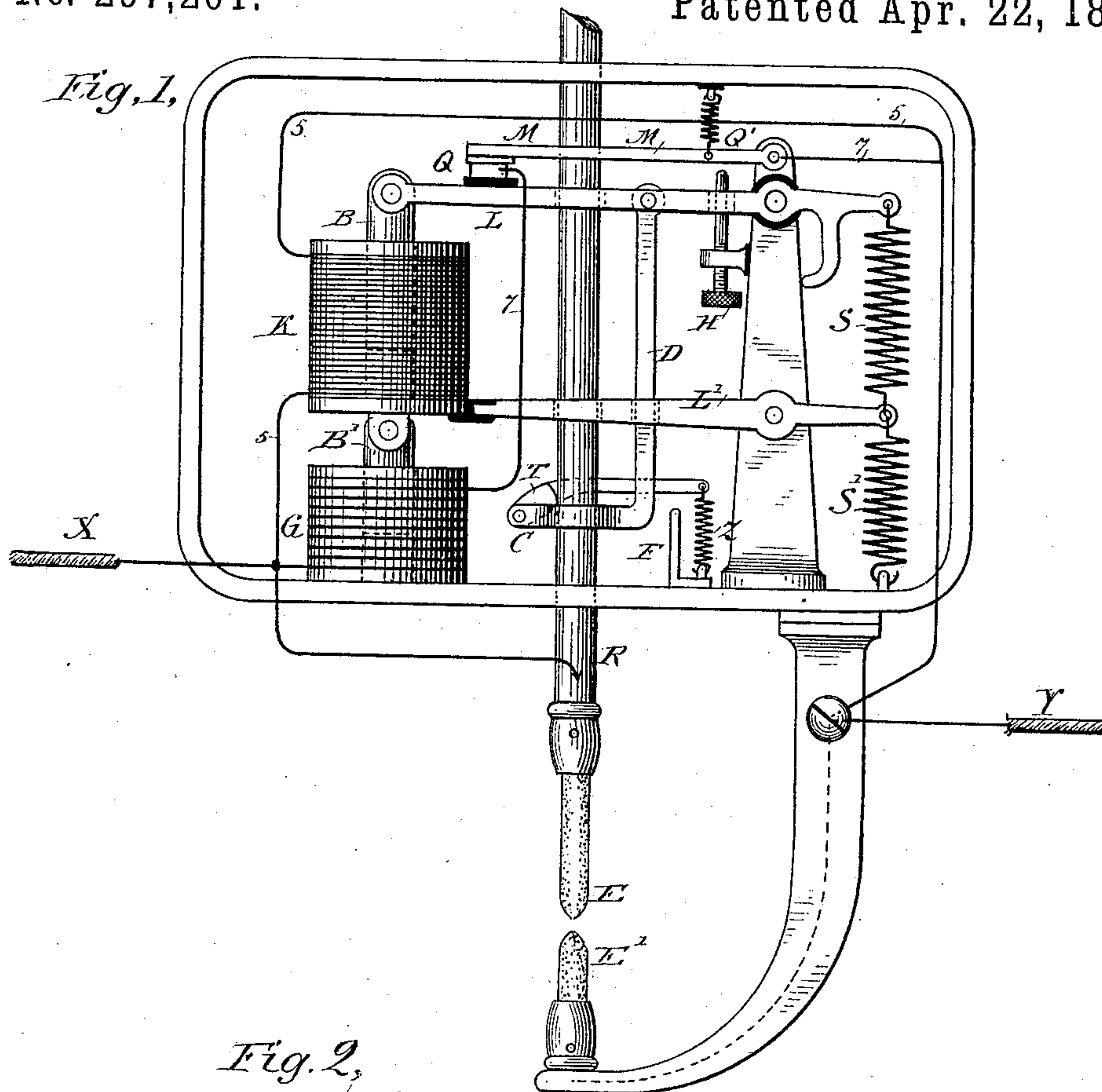


Fig. 2,

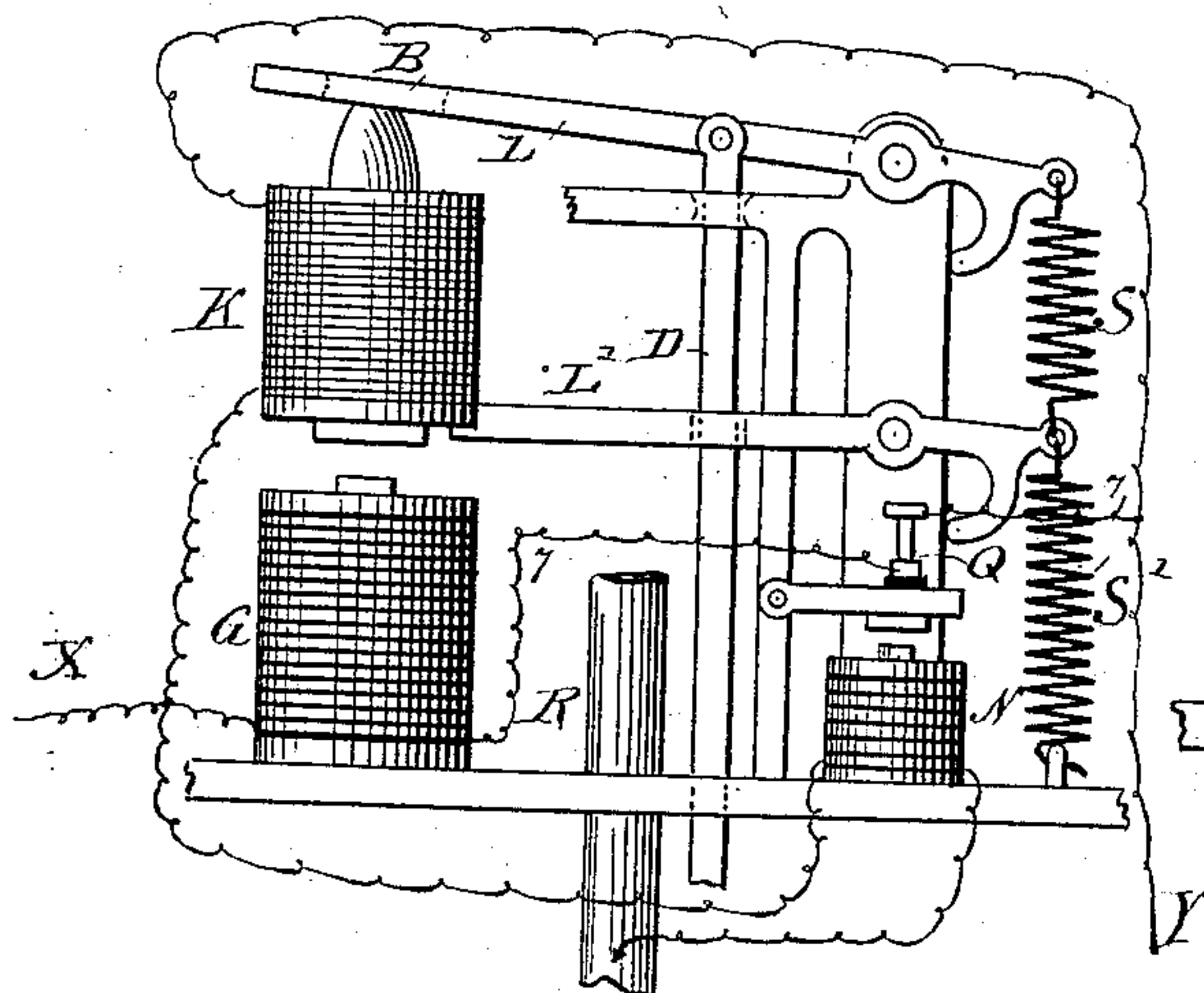
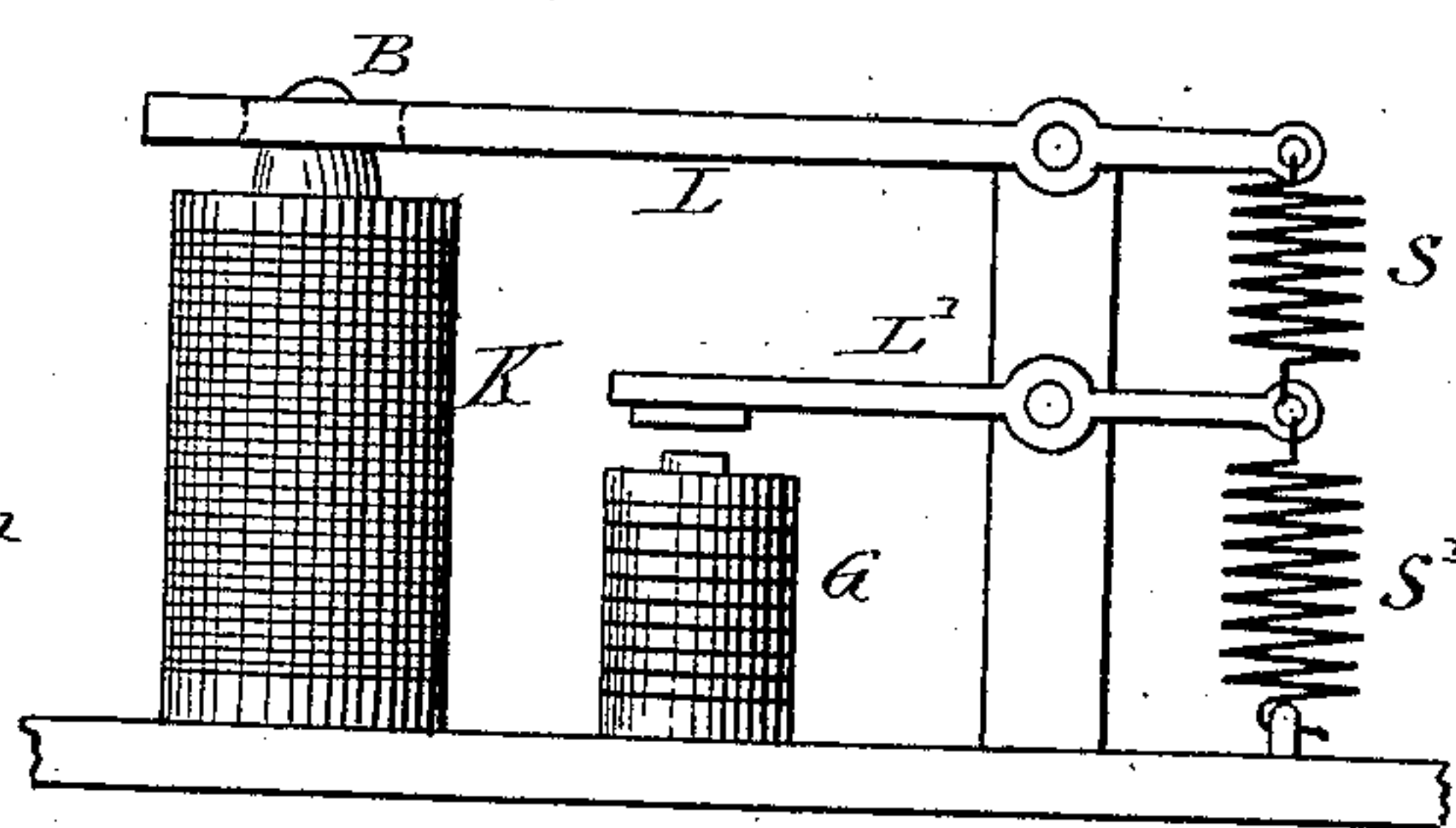


Fig. 3,



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# UNITED STATES PATENT OFFICE.

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## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 297,201, dated April 22, 1884.

Application filed January 8, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, ELIHU THOMSON, a citizen of the United States, and a resident of Lynn, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention relates, generally speaking, to electric-arc lamps, but more particularly to lamps operating on the general principle described in other applications for patent now on file. In such applications are described electric lamps in which the feed-regulating operations are under the control only of a high-resistance derived-circuit magnet acting in opposition to a suitable retracting spring or weight, the starting of the lamp or the bringing of the lamp mechanism into proper feed-regulating position being effected by the agency of a starting coil or circuit, through which current flows when the current is turned on, but which coil or circuit is automatically cut out or open-circuited, so as to be rendered ineffective, as soon as the lamp mechanism is brought into proper position by its agency, and is maintained in such condition while the lamp continues to burn.

My present invention relates to the manner of applying the effects of said starting coil or circuit to the lamp mechanism; and it consists, broadly, in causing the same to temporarily slacken or weaken the retractor for the feed-regulating lever or armature, so that the high-resistance derived-circuit magnet may act effectively on said armature to bring the lamp mechanism into proper position, after which the starting coil or circuit is automatically cut out, and the retractor resumes its normal strength and produces a separation of the carbons.

My invention consists, also, in making the feed-regulating magnet movable, and causing the starting coil or magnet to lower the same bodily at the start, but to afterward, on being cut out, permit the magnet to move to its normal or feed-regulating position.

My invention consists, also, in certain combinations of apparatus that will be specified in the claims.

In illustrating my invention, I have shown

the starting-circuit as a branch around the carbons, and as containing an electro-magnetic coil for producing the desired action on the lamp mechanism; but it is to be understood that other arrangements of the starting-circuit may be employed without departing from the invention, and that the current in said circuit may produce the desired motor effects by the well-known expedient of a thermostat heated by the current, instead of by its electro-magnetic action. The circuit controller or switch, whereby the starting circuit or coil is cut out, may be of any desired form or construction. That herein shown is here adopted because of its simplicity; but many others devised by me might be used in its place, its function being simply to open-circuit or otherwise render ineffective the starting coil or circuit when the lamp mechanism has been brought to the proper position.

In the accompanying drawings, Figure 1 is an elevation of a lamp embodying my invention. Fig. 2 illustrates a modified construction of the same. Fig. 3 shows another arrangement of the parts.

Referring to Fig. 1, L indicates the feed-regulating lever of the lamp, which lever is under the opposing influences of a retractor, S, and of current flowing in a high-resistance derived circuit around the carbons, and serves in any proper manner, when moved in one direction by the retractor, to cause a separation of the carbons, and when moved in the other to a sufficient extent by any means to cause a release or feed of the carbon to take place.

As the simplest form of carrying out my invention, I cause the lever L to impart movement to a feed-regulating clamp or clutch, or to other suitable feed-regulating mechanism—such, for instance, as a gear-train.

As typical of a clamp or clutch, I have shown a form hitherto invented by me, and consisting, briefly speaking, of a body or guide, C, through which the carbon or carbon-carrier R may move, a dog or clamping-toe, I, pivoted on C, a spring, z, for holding the toe against the rod, so as to prevent the rod from moving downward through the clamp, and a releasing-stop, F, against which an arm extending from the toe impinges when the clamp is lowered,



thus releasing the rod R and permitting the upper carbon, E, to feed.

D indicates a link connecting the clamp with the lever L.

5 K indicates a feed-regulating magnet of high resistance in a derived circuit, 5, around the carbons, and having its movable core or armature B connected to the lever L, as indicated in Figs. 1 and 2.

10 In Fig. 1, magnet K is mounted on a lever, L', upon which the current of a starting circuit or coil acts, so as at the start to lower the magnet bodily. The starting device is here shown as an electro-magnetic coil, G, of low resistance, which is in a branch, 7, around the carbons completed at the start through contacts Q of a switch or circuit-controller that will be presently described.

20 The movable core or armature of G is indicated at B', while S' indicates the retractor for lever L'.

The retractor for the feed-regulating lever L is, as shown, connected to the lever L', and, as will be obvious, current in coils G will, by 25 moving lever L' against its retractor S', slacken or weaken retractor S for L, so that the latter may, by the weight of the parts and the assisting action of K, lower the clutch or clamp to the feed-regulating position or the point, when 30 release of the rod R will be produced. When current ceases to flow in G, retractor S' acts and tightens S, so that the latter will lift the clamp and rod R.

The switch or circuit-controller that completes the circuit of coils G through contacts 35 Q consists of a lever, M, carrying one of the contacts Q, the other contact being carried by L. The lever M is normally, or while the lamp is in action, held at such a point by its retractor that the lever L will not close the con- 40 tacts. When, however, the current ceases to flow or the lever is abnormally retracted, the contacts Q are closed for the start.

In order to preserve the circuit 7 at Q until the lever L is lowered sufficiently to bring 45 the clamp to the releasing-point, and thus permit the carbons to come together, I make M a magnet and the contact on L an armature therefor, so that the parts will stick together 50 and be drawn down by the lever. When the feed mechanism has been lowered to such a point that the lamp may be left to the control of the retractor S and coil K, the contacts are pulled apart, retractor Q' for M being suitably 55 adjusted for such purpose, or they are positively disengaged by a stop, H, against which the lever M impinges when sufficiently lowered. When the magnet and armature are thus detached, the spring Q' raises M out of 60 range of the lever L in ordinary feed-regulating movements.

Many other switching or circuit-controlling devices might be used for the same purpose. I do not limit myself in this respect. The 65 kind here shown is claimed in another application for patent filed by me.

The general operation is as follows: When the lamp is out of action, the parts assume the position shown in Fig. 1. The carbons are held apart by the action of spring S, and the 70 circuit 7 is closed through contacts Q. Current entering at X, finding no path between the carbons E E', passes in large proportion through coils G, contacts Q M, and out at Y, with the effect of lowering L' and K against the 75 action of the retractor S', and also permitting lever L and the clamp to be lowered through slackening of the spring S. This movement continues until the carbons E E' come together, and until the magnet M fails longer to follow 80 L downward, being restrained by spring Q' or stop H. At this moment contact is opened at Q, magnet G goes out of action, current passes at E E', and spring S' lifts the upper carbon to form an arc by raising L' B', and indirectly 85 also L B by spring S. The regulation is subsequently effected by the resultant action of the derived-circuit magnet K, upon changes in arc-resistance and the electric force of the spring S, as well understood in the art. 90

In Fig. 2 the magnet system is slightly modified, the magnet having, in this instance, a core with a paraboloidal or conoidal pole, P, acting upon a perforated armature, B, attached 95 to L. This form may be used when it is desired to obtain a practically uniform strength of pull for all positions of the armature with the same strength of current. This figure also shows how the starting-circuit may be opened at the proper time in another way, as 100 by a magnet, N, whose armature-lever controls the contacts Q, and whose coils are in the circuit or branch with the carbons. The retractor for the armature-lever of N closes the 105 contacts Q at the start, and keeps them closed until the circuit between the carbons is established, when magnet N is energized, opening the circuit 7, and remains energized so long as the lamp continues in operation. This special switching arrangement is claimed in another application for patent. 110

In Fig. 3, the magnet K is shown fixed or stationary. In this case the starting-coil G simply slackens and stiffens the retractor S at the proper times. 115

What I claim as my invention is—

1. The combination, in an electric lamp, of a derived circuit of high resistance carrying the feed-regulating current, feed-regulating mechanism controlled thereby, a retractor 120 acting in opposition to the effects of the feed-regulating current, and an electro-magnet for diminishing the retracting force when the lamp starts, as and for the purpose described.

2. The combination, in an electric lamp, 125 of a feed-regulating armature-lever, a retracting-spring therefor, an electro-magnet for slackening said spring when the current is turned on, and means for rendering said electro-magnet ineffective when the lamp mechanism has been brought to normal or proper 130 feed-regulating position.



3. The combination, in an electric lamp, of a high-resistance derived-circuit magnet mounted on a movable support, a feed-regulating lever controlled by said magnet, and an electro-magnet that acts on said support and simultaneously lowers said support and diminishes the retracting force acting on the feed-regulating lever.

4. The combination, in an electric lamp, of a feed-regulating magnet mounted on a movable support, an armature for said magnet having a retractor connected with said support, a starting electro-magnetic coil for simultaneously lowering said support and slackening the retractor, and means for cutting out said coil when the lamp mechanism has been brought to feed-regulating position.

5. The combination, in an electric lamp, of a feed-regulating lever, a high-resistance derived-circuit magnet acting thereon, an auxiliary or starting magnet, and a retractor for the feed-regulating mechanism connected with the armature-lever of the starting-magnet.

6. The combination, in an electric lamp, of a starting electro-magnet, a high-resistance derived-circuit magnet mounted on the arma-

ture-lever for the starting-magnet on one side of its fulcrum, and a retracting-spring for the feed-regulating armature-lever connected with the armature-lever for the starting-magnet on the other side of the fulcrum.

7. The combination, in an electric-arc lamp, of a high-resistance derived-circuit magnet, an electro-magnet whose coils carry current when the lamp starts for lowering said high-resistance magnet, and means for cutting out the coils of the starting-magnet when the lamp mechanism has been brought into operative position.

8. The combination, in an electric lamp, of a feed-regulating lever and a starting-magnet having an armature connected with the feed-regulating lever through the retractor for the latter, as and for the purpose described.

Signed at Lynn, in the county of Essex and State of Massachusetts, this 4th day of January, A. D. 1884.

ELIHU THOMSON.

Witnesses:

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E. B. DOEN.