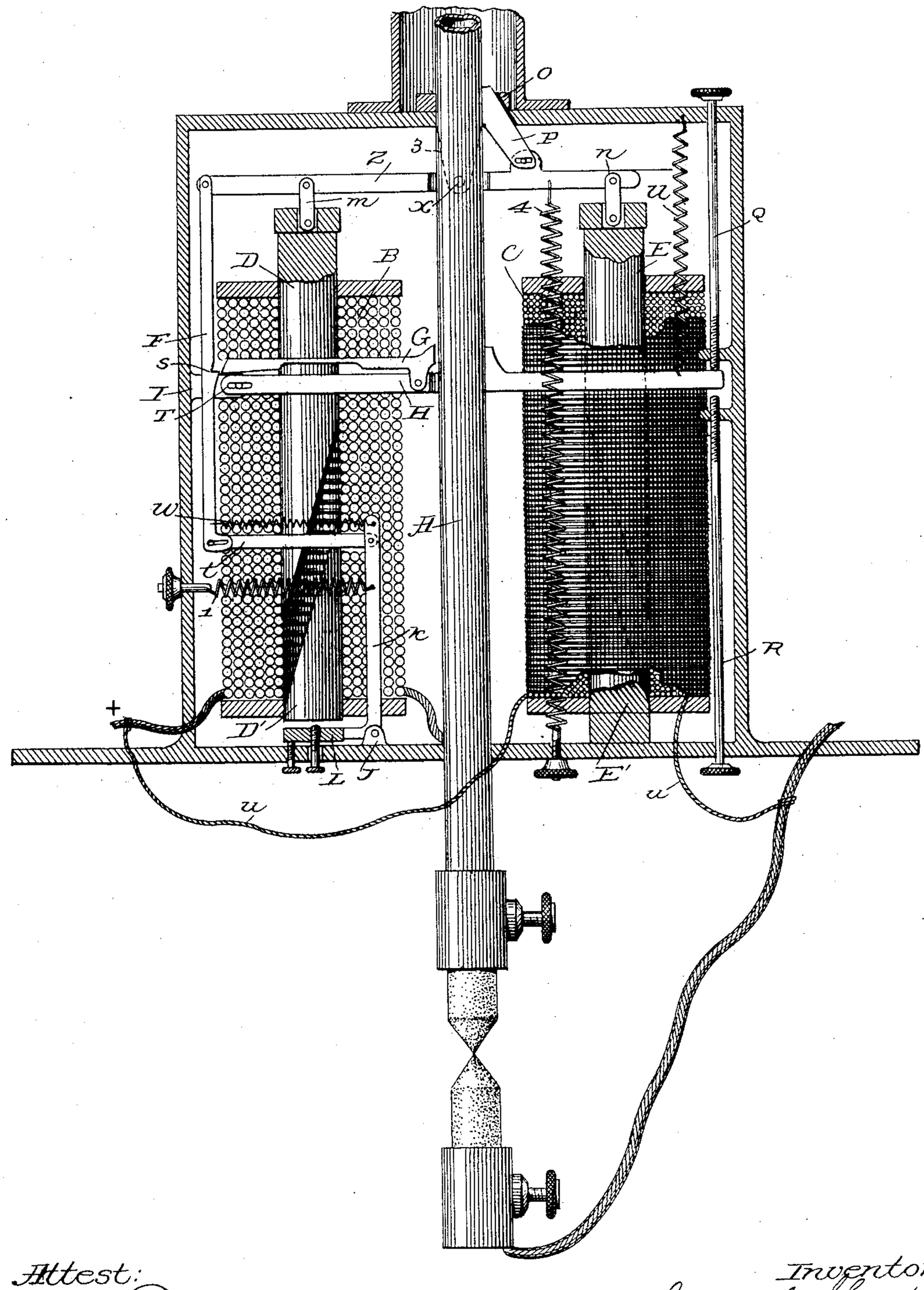
(No Model.)

S. H. SHORT.

ELECTRIC ARC LAMP.

No. 310,736. Patented Jan. 13, 1885.



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SIDNEY H. SHORT, OF DENVER, COLORADO.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 310,736, dated January 13, 1885.

Application filed January 31, 1884. (No model.)

To all whom it may concern:

Be it known that I, SIDNEY H. SHORT, of Denver, in the county of Arapahoe and State of Colorado, have invented a new and useful Improvement in Electric Lamps; and I do hereby declare that the following is a full, clear, and exact description of the same.

My invention relates to electric lamps designed to be placed upon a circuit in series. It refers more particularly to the feeding and adjusting mechanism for the electric-arc lamp, and is intended to be an improvement upon the many forms now in use in the following respects.

The mechanism is so arranged that the armature and cores may be suspended in such a way as to balance each other, in order that the electric current employed in the lamp will have no other work to do than to lift the upper carbon and its holder.

A further improvement is a mechanism whereby the carbon points are allowed to move forward by brief and rapid advances through a certain adjustable distance, and then are stopped, the movement being made in such rapid succession that there is no appreciable change in the light.

Another improvement is the form of the cores which I use in the helices. Their arrangement is such that it allows the cores to travel some distance vertically, and all the time be in close proximity to the armature.

Another improvement in my lamp is the means by which it can be quickly and easily adjusted to give any required length of arc.

I have also improved the apparatus in respect to simplicity of structure and ease of manufacture.

The chief result of my improvements is the steadiness of the light, it being entirely free from both noise and flickering.

The principle of construction and particular devices are fully described hereinafter in connection with the accompanying drawing, and are particularly specified in the claims.

In the drawing, the figure is a central longitudinal section through the case and one spool, parts being shown broken away and in side elevation.

In the drawing is shown a case, which may be mounted on the top of any suitable framework adapted to support the lower-carbon holder. In this case are placed hollow coils of wire B and C, the first of large and the second of small wire. The wire from the source of electricity is connected with the coil B, and the other end of the coil-wire is connected with the upper-carbon holder A in any suitable manner to make good electrical connection with it. The other wire from the source of electricity passes by means of suitable conductors to the lower-carbon holder. The fine wire in the coil C forms a shunt between the terminals of these wires around the arc by means of connections *u u*, as represented in the drawing. In the lower ends of these hollow coils are fixed cores of soft iron, which extend up for a short distance. The iron cores D′ and E′ are cut obliquely across their length, as shown in the drawing. Movable cores D and E fit into the upper portions of these coils in such a way that they may have an easy movement vertically inside the coils. Their lower ends are also cut obliquely, in order that when pushed clear into the coils their diagonal faces will come in contact with the inclined faces of the lower fixed cores. This will allow extended movement of the free cores inside of the coils in a vertical direction without their coming into contact with the lower cores, and still their faces be close together.

A conical core with a conical extension on the lower part of the magnet is, I am aware, not new, and my invention is limited to the two cores cut with inclined and parallel faces, formed by cutting the ends obliquely—a practical and operative form for the object here had in view.

I desire it also to be understood that two helices may be used on each side, with two sets of cores and armatures connecting them above and below in a manner well known to the art; also, that these coils may be set in any position, either horizontally or inclined, as well as in that represented.

A lever, Z, pivoted on the point X on the bracket 3, has at either end short connecting-links *m* and *n*, which are pivoted to it, and also to the yoke which connects the ends of the movable cores D and E. Movement into

the coils of D will carry with it the left-hand end of the lever Z, and lift up the right-hand end, carrying with it the movable core E.

It will be seen that at about half the distance between X and N there is attached on a movable pivot passing through a slotted hole the wedge P, which has its flat face moving freely upward along the upper-carbon holder A. It enters a passage cut for it in a ring, O, which surrounds the carbon-holder A. When it has been pushed up far enough to completely fill the space left for it, and into which it fits, it clamps the ring O tightly against the carbon-holder A, and any further movement downward of the core D causes the lever, wedge, and ring to lift the upper-carbon holder A and separate the upper carbon from the lower, which establishes the arc.

Any other kind of a clutch or clamp may be used in connection with this lever to grasp the carbon-holder A and lift it; but I prefer to use the one I have just described, because it preserves the rod from being chamfered.

After the carbons have burned awhile the arc becomes long and the resistance is correspondingly increased. This will shunt more and more current through the coil C, which will cause the movable core E to act on the lever Z and make the left-hand end come up, lifting with it the catch-rod F, which is pivoted to its extreme end. A projection on this rod at S lifts the end of the lever G, which is attached to a second lever, H, which at its center surrounds the carbon-holder A, and causes the toe of the lever G to press tightly against the carbon-holder A, clamping it firmly. The left-hand end of the lever H is pivoted on the frame-work of the case I with a slotted hole, T. The right-hand end of this lever is allowed to move freely through an adjustable space determined by the adjusting-screws Q and R. A light spring, U, keeps the end of the lever H against the end of a set-screw, Q, until the downward movement of E is sufficient to pull the wedge P from the ring O and release carbon-holder A. Then the entire weight of the carbon-holder rests upon the lever H and the toe of the clamp G. The spring U is not sufficiently strong to sustain this weight; so the lever H and carbon-holder A drop quickly until the end of the lever H rests on the end of the set-screw R, when the arc is shortened and its resistance reduced sufficiently to make the core D again descend in the coil B and replace the wedge P in the ring, and the rod F being lowered, the toe of G is released from the carbon-holder A and the spring U allowed to again lift the lever H to its original position.

The long arm of the lever G is flattened into a spring, in order that after the toe of G has clamped the carbon-holder A considerable movement of E may be made downward to release P. This operation will continue and feed the upper-carbon point down with movement so rapid that no flicker is discernible by the eye. It is easy to see that this arrangement also prevents the carbon points from approaching too near each other, thus obviating the frying sound so disagreeable in arc-lighting at present. It can be also seen that by adjusting the position of H by means of the set-screws the arc can never become so long as to produce the flaring of the light, which is another great objection to the arc light.

The weights which are suspended from the lever Z on either side of the pivoting-point X are made as nearly as possible equal to each other, in order that the current will have very little work to do in moving the iron cores and the rest of the mechanism. A dash-pot may also be connected with this lever to make its movements slow and regular.

A spring or weight may be attached to the right-hand end of the lever Z, as shown at 4, which will move that end of the lever down when no current is passing through the lamp, for a purpose explained hereinafter in connection with the mechanism which is attached to the lower end of the rod F. This mechanism consists of a standard, J, on which is pivoted a short lever, K. To the lower end of this lever is attached an armature, L, which is acted upon by the attraction of the fixed cores in the lower portions of the coils B. This armature and lever are provided with suitable set-screws to regulate the amount of their movement. This lever is provided with a spring, 1, so that when the current is not passing through the coils B the armature L is pulled a short distance away from the fixed cores. The upper end of the lever K is connected with the lower end of the rod F by a link, *t*, which will push the rod F to the left as the upper end of the lever K moves to the left. This bar is pivoted to the lower end of F in such a manner that F may be pushed farther to the left by means of the slotted hole represented in the drawing.

A light spring, W, passes from K to F, to keep the rod F as close to K as the short bar will allow. The object of this is as follows: When no current is passing through the lamp, the armature L is released, the lever K moves to the left, pushing with it the lower end of F, so that the end of the lever G drops from the projection S and becomes inactive. At the same time the spring 4 pulls the lever Z down, releasing the grasp of P on A, allowing the upper carbon to drop freely onto the lower one. When the current is starting, the first thing which takes place is a movement of the armature L to the ends of the cores D'. This brings into position the rod F, and on the first downward movement of the core D the spring W allows F to move out sufficiently for the projection S to pass over the end of G, so that it may act as heretofore described.

I do not, therefore, limit myself to this particular arrangement, but claim the essential features of the inclined or tapering cores to give movement, without too great separation

of the parts, to the two alternate-acting clamping devices, whereby the upper carbon is permitted to drop a limited distance, the balance-cores, and the general plan of the subordinate details.

I claim as my invention—

1. In combination with the coils of an electric-arc lamp, the fixed and movable cores formed with inclined faces, which faces are in planes parallel with each other, as set forth.

2. In an electric-arc lamp, and in combination, coils of larger and smaller wire, as described, cores suspended from a lever, a clamp connected to said lever to raise the upper-carbon holder, and gripping mechanism, substantially as described, adapted to drop the said carbon when the arc is unduly increased.

3. In combination, substantially as described, the coils of larger and smaller wire, the suspended cores, the pivoted lever Z, carrying a clamp adapted to raise the upper-carbon holder, the rod F, lever H, clamp-lever G, mechanism for turning rod F into and out of connection with lever H, springs for the levers Z and H, and means for limiting the movement of lever H.

4. A lever pivoted in the manner represented, in combination with the movable cores, wedge, ring, and rod F, substantially as and for the purpose set forth.

5. In combination with the carbon-holder A, the lever Z, and suspended cores of the electro-magnets, one having smaller and the other larger wires, as described, and with a spring, 4, the ring O and the wedge P, pivoted on the lever Z, and projecting upward against the carbon-holder, all substantially as described.

6. In combination with the rod F and the lever Z, the lever H, spring U, adjusting-screws, and the clamping-lever G, the lever K, and armature L, and the spring and link connection of the lever K, all substantially as described.

7. In combination with electro-magnets having coils of wire of different size, a lever connected to the movable cores, and means thereon for separating the carbons, a gripping-lever for lowering the upper carbon, a catch-rod for operating the grip of the lowering-lever, and an armature, L, opposite the fixed core of the electro-magnet, having the larger wire, and connections between said magnet and the catch-bar, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SIDNEY H. SHORT.

Witnesses:
M. F. SHORT,
M. N. MEYRUE.