(No Model.)

E. H. CROSBY.

ELECTRIC ARC LAMP.

No. 553,335. Patented Jan. 21, 1896.

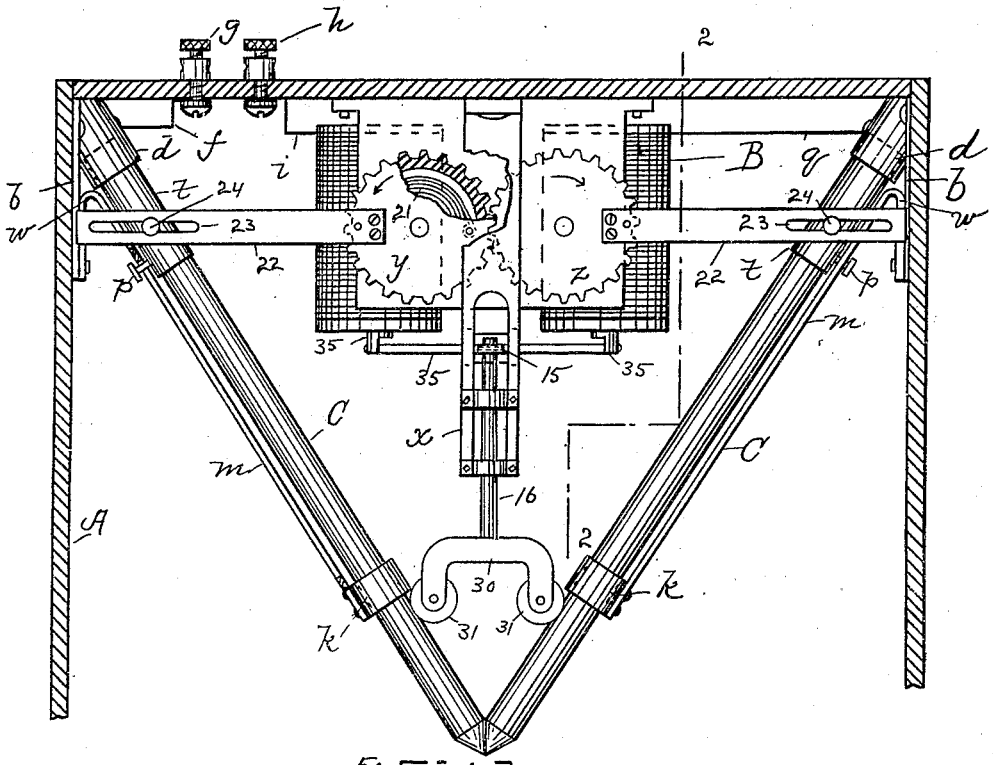

Fig. 1.

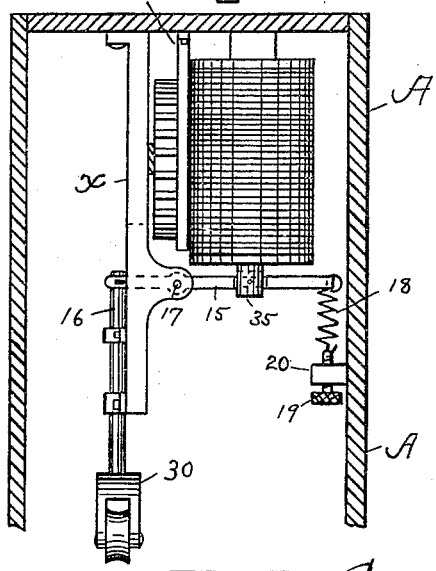

Fig. 2.

WITNESSES.

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ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 553,335, dated January 21, 1896.

Application filed May 27, 1895. Serial No. 550,798. (No model.)

To all whom it may concern:

Be it known that I, EDWARD H. CROSBY, of Boston, in the county of Suffolk, State of Massachusetts, have made certain new and useful Improvements in Electric-Arc Lamps, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation of my improved lamp, the box or holder being shown in section, and Fig. 2 a sectional view on line 2 2 in Fig. 1.

Like letters and figures of reference indicate corresponding parts in both figures of the drawings.

My invention relates to portable electric-arc lamps, and is an improvement on the device shown and described in my United States Letters Patent No. 537,633, dated April 16, 1895, and granted to me for improvements in arc lamps.

An especial object of the invention is to provide an automatic and positive feed for the carbons, whereby the arc when "struck" may be rendered constant and the flickering and jumping incident to the use of many lamps of this class is prevented.

My improved lamp is designed for use as an "electrocalcium" in producing scenic effects, and is adapted to burn on an incandescent circuit with either a direct or an alternating current.

The nature and operation of the improvement will be understood by those conversant with such matters from the following explanation.

In the drawings, A represents the containing-box, which may be the ordinary "lens" or "flare" box employed with the ordinary lime or calcium lamps, and which are usually mounted on a pivot and quadrant that the light may be thrown in any direction. An electromagnet B is secured by suitable means within the box. In each upper corner of said box a metallic socket *d* is fast by a plate *b*. Posts *g h* for the line-wire connection are connected respectively by a wire *f* with one socket and by a wire *i* with the electromagnet, from which a wire *q* leads to the companion socket. Two metallic spring-arms *m* are each bent at *w* to form V-springs, the short arms of which are respectively secured to the plates *b*. These arms are slotted longitudinally, as indicated at the left in Fig. 1. A tubular follower *t* is fitted to seat in each socket *d*, and is adapted to hold the upper end of the carbon sticks C, which are secured therein by set-screws *p*, which pass through the slots in the spring-arms *m* and guide the followers. Each arm *m* has a ring *k* on its lower end through which the carbon passes loosely, permitting slight lateral play thereto. These springs and rings form guides for the carbons. The current passes through these spring-arms and their rings into the carbons adjacent their free ends. This is an essential feature, as by introducing the current to the carbons near the arc, instead of forcing the current through the entire length of said carbon, as is usual in arc lamps, the resistance offered by said carbon is avoided and the efficiency of the lamp is thereby proportionally increased. Moreover, the necessity of copper-plating the carbons is done away with, as is also the danger of heating said carbons at points where imperfections or excessively hard places occur. By thus introducing the current near the arc carbons of much greater length can be employed than is practicable by the usual methods on account of the resistance offered.

On the bracket 50, which supports the magnet, two meshing gears *y z* are journaled. The gear *y* is hollow and a helically-wound spring 21 is mounted on its shaft, tending to rotate said gear in the direction indicated by the arrows in Fig. 1. On each gear there is a radiating arm 22 rigidly secured, their outer ends being slotted at 23 and working on pins 24, respectively, secured to the followers *t*.

To the armature 35 of the magnet a bar 15 is pivotally connected. One end of said bar (see Fig. 2) is connected by a coiled spring 18 with an adjusting-screw 19 in a lug 20 on the box A. This spring may be substituted by a weight adjustable on said bar. The bar is pivoted at 17 to a hanger *x* within the box. A rod 16 is fitted to slide vertically on said hanger and is pivoted to the outer end of said

bar. The lower end of the rod 16 has a forked head 30, in the arms of which rollers 31 of porcelain or other insulating material are journaled in position to engage the carbons C below the rings *k*.

Any suitable resistance may be employed in the circuit to reduce the current.

The current from the line entering the post *h* passes into the adjacent coil of the magnet, thence through wire *q*, socket *d*, and spring-arm *m*, and its ring *k*, into the carbon held therein; thence to the opposite carbon and its holder through the return at post *g*. The magnet being thus charged its armature 35 is drawn up, forcing the rod 16 downward against the pull of the spring 18 and driving the rollers 31 against the carbons. This forces the carbons laterally or outward in opposition to the spring-arms *m*, separating the points thereof and forming the arc. As the arc increases and the current in the magnet correspondingly decreases the spring 18 will act to draw up the rod 16, which will lessen the tension between the carbons and the rings *k* sufficiently to permit the spring 21 in the gear *y* to operate and rotate said gears. This will cause the gear-arms to move the followers *t* downward and feed the carbons correspondingly until they have approached so near that the current in the magnet will increase sufficiently to again operate the plunger and spread the carbons as before. This feed is positive and these movements are so nearly instantaneous that an arc of substantially constant size is maintained. The carbons are locked against feeding by gravity until the pressure of the rollers is lessened sufficiently and no jumping or flickering of the light can be observed.

I do not confine myself to employing the helical spring, as any spring mechanism that will operate the gears may be employed.

The arms *m* may be substituted by tubing if preferred.

The gear-feed is a salient feature of my invention and it will be understood is applicable for use with other forms of lamp to feed the carbons.

The spring tensioning the gears may be omitted when the lamp is to be used in vertical position, but the employment of said spring enables the lamp to be burned in any inclined position, and the carbons will be fed thereby even when the lamp is inverted; and when one carbon begins to advance, either by gravity or the use of the spring, the companion carbon must advance conjointly therewith. These features and the fact that the arc is "self-focusing," said arc being constant in the same position, carbons of any size may be employed and either direct or indirect currents be used, render the lamp especially valuable for search-lights, lighthouse-lamps, and similar work where lenses are required.

One arm or carbon-guide may be rigid, if preferred, as the opposite arm will yield enough to strike the arc if slight lateral play be permitted the plunger-rod 16. The gears may be substituted by an equivalent series of levers or other mechanism, insulated and connecting the upper ends of the diagonally-arranged carbons, whereby when one carbon moves longitudinally the companion carbon will be caused to move conjointly therewith. This is of material advantage, as, when direct currents are used, by employing a positive carbon of slightly greater diameter than the negative they will consume at substantially the same rate of speed and yet maintain the arc in the same relative position.

Having thus described my invention, what I claim is—

1. In an electric arc lamp two diagonally arranged carbons mounted to move longitudinally in combination with electrically actuated mechanism for spreading the adjacent ends of said carbons to strike the arc; and mechanism connecting the upper portions of said carbons for automatically feeding the same longitudinally and conjointly substantially as described.

2. In an electric arc lamp two diagonally arranged carbons spring-tensioned laterally and having their free ends normally in contact in combination with guides of conductive material engaging said carbons adjacent their arc ends; electrically actuated mechanism for spreading said carbons in opposition to said spring; and insulated mechanism connecting the upper ends of said carbons for feeding the same conjointly and longitudinally when the tension of the spreading mechanism is lessened substantially as specified.

3. In an electric arc lamp two diagonally arranged carbons having their adjacent ends normally spring-pushed into engagement; an electro-magnet; mechanism actuated by the magnet for spreading said carbons in opposition to said spring; and mechanism for automatically feeding said carbons longitudinally when the tension of said spreading mechanism is lessened substantially as described.

4. In an electric arc lamp the combination of the laterally spring-pushed carbons; the magnet; the insulated plunger actuated by the armature of said magnet; the intermeshing gears; and connections between the gears and carbons whereby said carbons may be fed when the current in the magnet is lessened substantially as specified.

5. In an electric arc lamp two diagonally arranged carbon-guides spring tensioned laterally in combination with carbons fitted to slide therein; followers for said carbons; an electromagnet; a plunger actuated by the armature of said magnet for engaging and spreading the free ends of said carbons; two intermeshing gears; an arm on each gear respectively having a sliding connection with said followers substantially as set forth.

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Witnesses:
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