(No Model.)

# T. G. TURNER.

## ELECTRIC ARC LAMP.

No. 304,473. Patented Sept. 2, 1884.

*Fig. 1.*

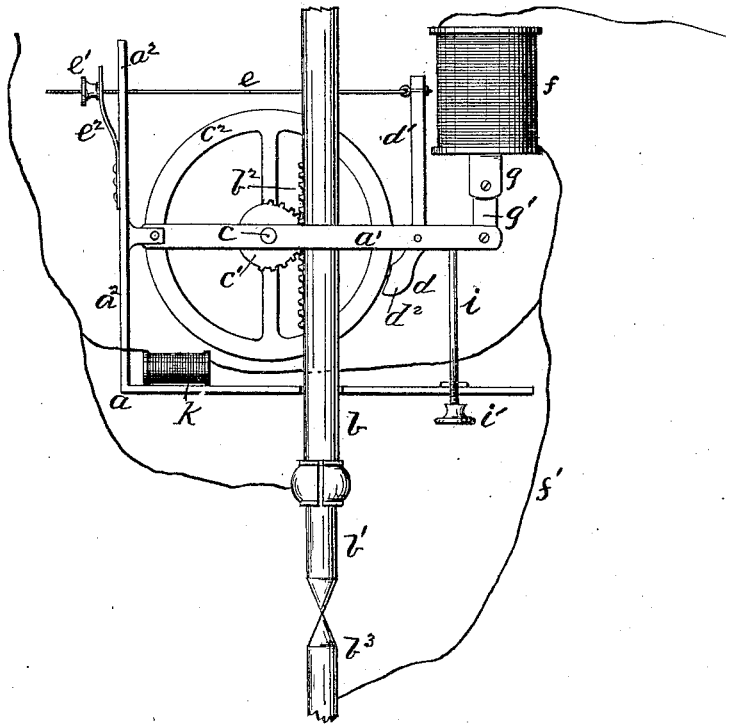
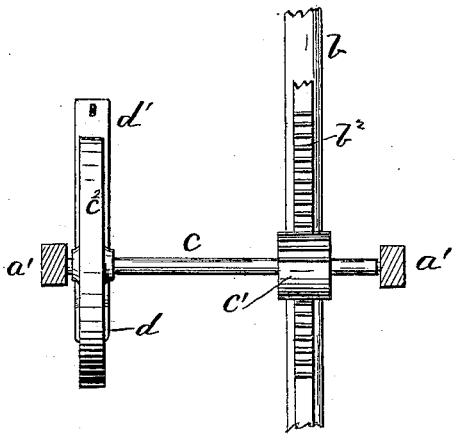



*Fig. 2.*




Witnesses:
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# UNITED STATES PATENT OFFICE.

THOMAS G. TURNER, OF NEW YORK, N. Y.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 304,473, dated September 2, 1884.

Application filed September 30, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS G. TURNER, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electric-Arc Lamps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to electric-arc lamps; and it consists in the pivoted movement-frame having the fly-wheel journaled in and movable therewith, and provided with the pivoted brake and connected with the magnet in the manner presently described. It also consists in other improvements, as will be hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of so much of the lamp as is necessary to show my improvements; and Fig. 2 is a detail view showing a portion of the carbon-rod, the balance-wheel, the brake-bar, and the pinion which engages the rack on the carbon-rod.

The mechanism of the lamp is supported by any suitable frame, *a*.

*b* is the rod which carries the upper carbon, *b'*, and it has formed on or fixed to its side the cog-rack $b^2$. I have not shown any mechanism supporting the lower carbon in its position. Any ordinary mechanism well known to the art of electric lamps may be employed for such purpose.

*c* is a shaft placed transversely to the carbon-rod, and has its ends journaled on the movement-frame or arms *a' a'*, pivoted to the frame *a*. Near one end of the shaft I fix a spur-pinion wheel, *c'*, which is arranged to mesh with the cog-rack $b^2$ on the carbon-rod. Near the other end of the shaft I fix a balance or fly wheel, $c^2$. The arms *a' a'* have one of their ends pivoted to the frame $a^2$, as shown, while their opposite ends extend past the carbon-rod *b* and beyond the periphery of the fly-wheel, and are connected to the magnet-spool, as will be hereinafter described.

*d* is the brake, which is pivoted to one of the bars *a'*, and its upper end, *d'*, is extended upward above the said arm near to the magnet-spool. It is so arranged that when its upper end is drawn toward the spool by the magnetism thereof the bearing-head $d^2$ will be pressed against the periphery of the fly-wheel $c^2$. To the upper end of the arm *d'* of the brake I attach one end of a tension-rod, *e*, the other end of which is passed through a hole in the upright bar $a^2$ of the frame *a*, and it is provided with a screw-thread and a thumb-nut, *e'*.

$e^2$ is a spring fixed to the bar $a^2$, and arranged to bear on the inner end of the thumb-nut *e'* and press the rod *e* and brake-arm *d'* in opposition to the action of the magnet-spool.

*f* is the magnet-spool of the lamp. It receives the current from the lower carbon, $b^3$, by wire *f'*.

*g* is the core of the magnet, and it is coupled to the movement-frame by the connecting-rod *g'*.

*i* is a stop-pin, with thumb-nut *i'*. The thumb-nut is on the outside of the lamp, so that it will be within easy reach. The arc is governed or controlled by the adjustment of the nut *i'* on the rod *i*, and by the nut *e'* on the rod *e*. By the rod *i* and its nut *i'* the pivoted movement-frame *a' a'* is controlled, and by the rod *e* and its nut *e'*, bearing on the spring $e^2$, the action of the brake *d* is controlled.

The brake is actuated by the magnet *f*. The amount of pressure on the wheel $c^2$ depends on the tension of spring $e^2$, which is intended to counteract the attraction of the magnet insomuch as to allow just enough pressure on the wheel when the magnet is at its full power, which will be when the arc is of the desired length. The moment the arc is lengthened the magnet will lose a part of its power, and will slack in its pull on the brake-arm and allow the wheel to slip down, carrying the carbon-rod with it just enough to re-establish the arc.

The workings of the lamp may be briefly stated thus: The current is started with the carbons in contact, and flows to the magnet, and establishes a power greater or less, according to the amount or degree of the current. The action of the magnet is to lift the movement-frame *a' a'*, and with the frame to lift the upper carbon, and at the same time to put on the brake to the fly-wheel. It is necessary

that the motion of the fly-wheel shall be governed and fully controlled from the instant of the passing of the electric current. If the fly-wheel be free to move when the movement-frame is lifted, the carbon rod would be thrown downward and the carbons would remain in contact. It has been a matter for much experiment to find means for preventing carbons from remaining in contact, as hereinbefore indicated. The perfection of the arc light requires that the carbons shall remain constantly separated. Various methods have been invented for the purpose of controlling the carbons. The one hereinbefore shown and described, whereby all the movements are controlled by a single magnet, is the most feasible. In my lamp the first action is a grip of the brake on fly-wheel, and then the magnet, as it gains power, will lift the frame and the carbon-rod and the upper carbon, and in this way separate the two carbons to the distance of a full arc; and it will be readily understood that the power to start my lamp will be no greater than the power required to run it.

*k* is a high-resistance spool arranged in a shunt around the lamp. Its function is to act as an escape for the current when the arc is too long.

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

1. The combination of the magnet-spool, the carbon-rod provided with a rack, the movement-frame pivoted at one end and having its other end connected with the magnet-spool, the shaft journaled in the movement-frame at a point midway the ends of said frame, a pinion keyed on said shaft and meshed with the carbon-rack, and a suitable brake, substantially as and for the purposes set forth.

2. The combination, with the carbon-rod, the spool, the movement-frame having one end pivoted and its other end connected with the core of the spool, and provided with the fly-wheel and pinion, of the brake pivoted in the movement-frame, and having one arm arranged to bear on the fly-wheel and its other arm arranged in position to be acted on by the magnetism of the spool, the connecting-rod *e*, and spring $e^2$, substantially as set forth.

3. The combination of the carbon-rod, the movement-frame, the movement mechanism, the brake pivoted in the movement-frame, the tension-rod *e*, spring $e^2$, and the magnet, substantially as set forth.

4. The combination, substantially as hereinbefore set forth, of the carbon-rod, the movement-frame, the movement mechanism, the brake pivoted in the movement-frame, the tension-rod *e*, spring $e^2$, rod *i*, connected with the movement-frame, thumb-nut *i'*, and the magnet, all arranged and operating as and for the purposes specified.

5. The electric-arc lamp herein described, composed of the main supporting-frame, the carbon-rod, the magnet-spool, the movement-frame, pivoted at one end and having its other end connected with the magnet-spool, the shaft journaled in said frame midway its ends, and provided with fly-wheel $e^2$, the pinion keyed on said shaft and meshed with the carbon-rod, the brake *d'*, the tension-rod *e*, spring $e^2$, and rod *i*, connected with the movement-frame and provided with the adjusting-nut *i'*, all substantially as and for the purposes set forth.

In testimony whereof I affix my signature in presence of two witnesses.

THOMAS G. TURNER.

Witnesses:
A. P. LACEY,
T. N. GRIFFIN.