

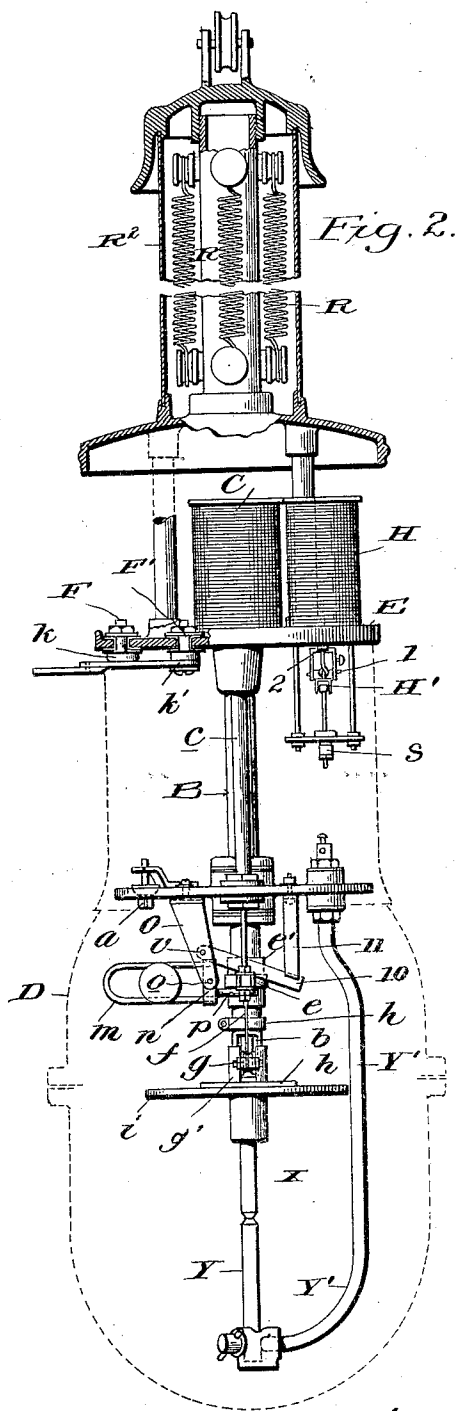
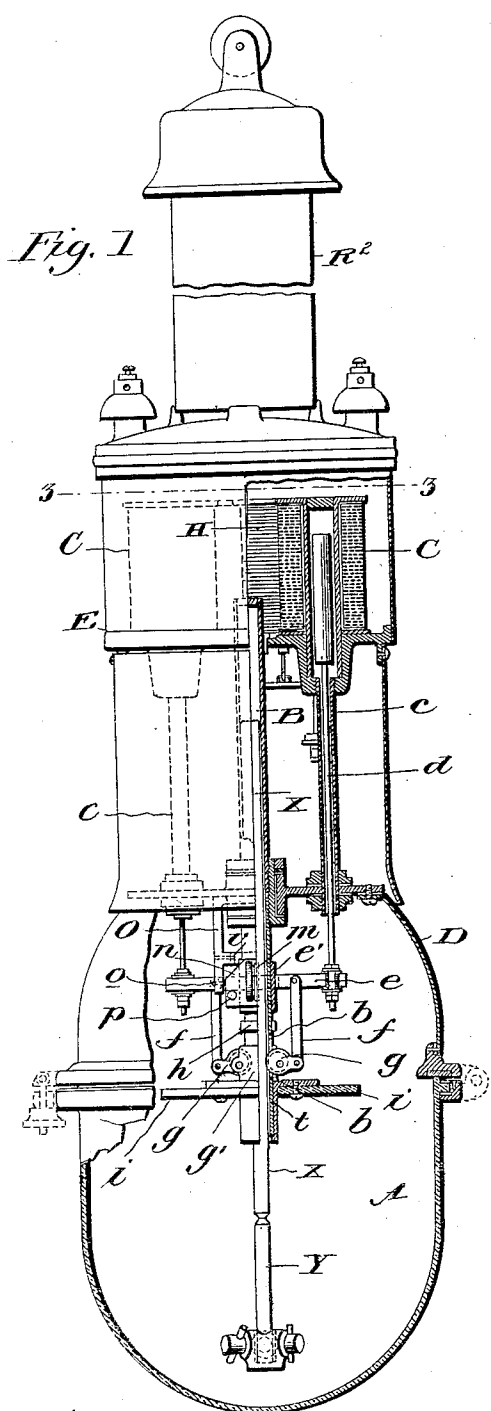
(No Model.)

2 Sheets—Sheet 1.

M. WHELESS.
ELECTRIC ARC LAMP.

No. 559,649.

Patented May 5, 1896.



Witnesses:

L. C. Hills.

Frederic B. Keefe

Inventor:

Malone Wheless,

by Marshall Bailey
his Att'y

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Fig. 3.

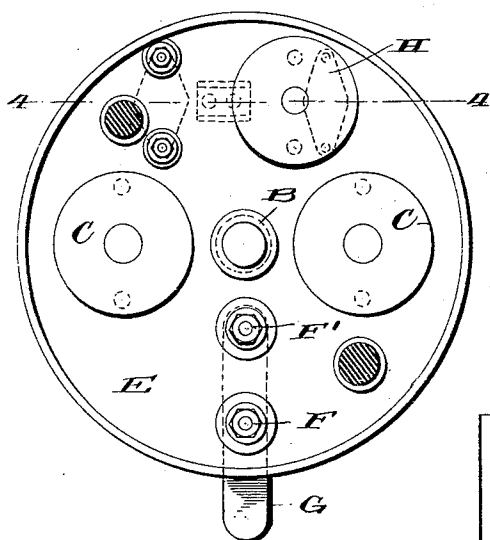


Fig. 4.

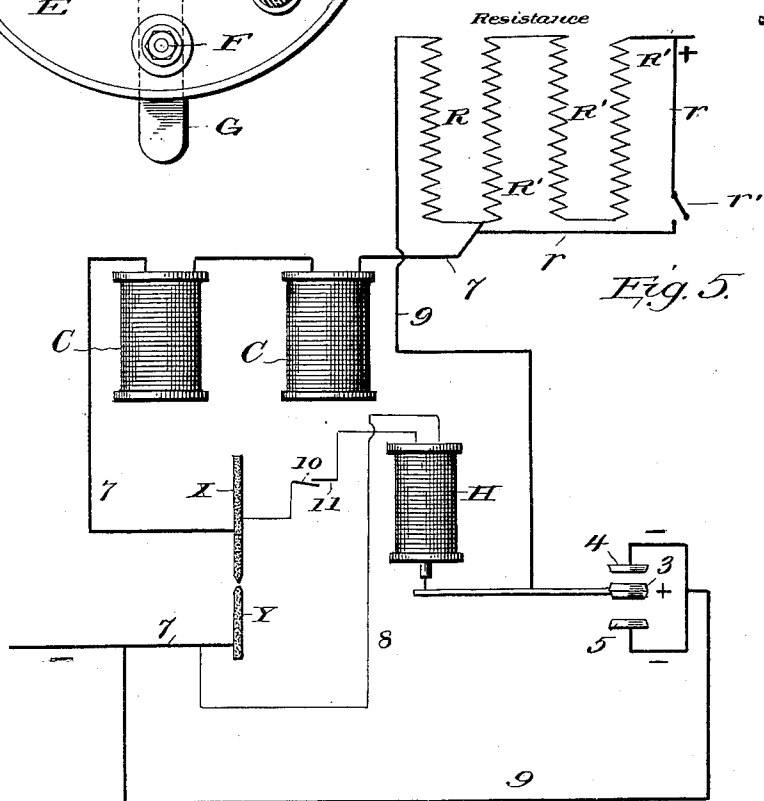
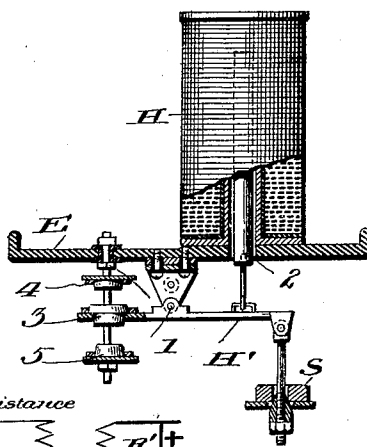


Fig. 5.

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UNITED STATES PATENT OFFICE.

MALONE WHELESS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR
TO THE WHELESS ELECTRIC LAMP COMPANY, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 559,649, dated May 5, 1896.

Application filed January 29, 1896. Serial No. 577,304. (No model.)

To all whom it may concern:

Be it known that I, MALONE WHELESS, of Washington city, in the District of Columbia, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention has relation to feed and regulating devices of an electric-arc lamp, such as set forth in my allowed application filed December 7, 1895, Serial No. 571,379, on which Letters Patent will issue of even date herewith—that is to say, devices comprising a feed magnet or magnets in the arc-circuit of the lamp and feed mechanism controlled thereby in combination with a regulator-magnet, also included in said circuit either directly or in a shunt thereto, a shunt or short circuit around the arc and feed and regulator magnets completed through either one of two sets of contacts controlled by the regulator-magnet, according as the potential of the arc-circuit materially exceeds or falls below the normal.

The invention refers to certain improvements designed to enable the lamp to be used more conveniently in either an arc or an incandescent electric circuit, or in other words whether connected up in circuit, in series, or in multiple; and also to means by which the lamp will be more surely short-circuited in event of the upper carbon dropping below the feed or gripping devices, as it may do when it has been nearly all consumed.

The improvements will first be described by reference to the accompanying drawings, and will then be more specifically pointed out in the claims.

In the drawings, Figure 1 is a sectional side elevation of a lamp embodying my improvements. Fig. 2 is a sectional side elevation of the same at right angles to the plane of elevation in Fig. 1. In this figure a portion of the counterweight mechanism is obscured in order not to conceal the parts. Fig. 3 is an enlarged section on line 3 3, Fig. 1. Fig. 4 is a section on line 4 4, Fig. 3, illustrative of the regulator-magnet and its appurtenances. Fig. 5 is a diagram of the circuit connections of the lamp.

The arc or light-giving part of the lamp is

inclosed in a globe A of any suitable kind. That shown in the drawings is of the same general type as that of the well-known "Pintsch" lamp, now so generally in use on railway-cars, the lower part of the globe, made of glass or other translucent or transparent material, being hinged on a horizontal axis to a metallic dome, in which is an outwardly-opening relief-valve *a* to give vent to the heated and expanded air. The feed-regulating works of the lamp extend down through this dome. These works consist in the main of the central tubular carbon-holder B for the upper movable and positive carbon X, the two solenoids C, the tubular stems *c*, and the rods *d*, vertically movable in said stems, attached at their upper ends to the cores of the solenoids and at their lower ends to opposite ends of the yoke or cross-bar *e*, provided with a central hub or sleeve *e'*, fitting and vertically movable on the outer carbon-holder B. The yoke by links *f* is attached to the arms of gripping-cams *g*, pivoted in a sleeve *g'*, fitting and vertically movable upon the carbon-holder and adapted to work through slots *b* in the carbon-holder against the carbon X therein. Stop-rings *h*, one above and one below the sleeve *g'* and adjustable upon the carbon-holder B, limit the extent to which the sleeve can move up and down thereon.

At the lower end of the positive-carbon holder is a disk *i*, of asbestos or other refractory material, to shield the works from the heat and from carbon deposit.

The works above the globe A are surrounded by a ventilated shell D, attached to the closed case E, on the floor of which are secured the feed and regulator magnets.

The stems *c* are attached at their upper ends to the under side of the floor of case E and at their lower ends to the top of the dome of the globe A.

The current enters the lamp at the binding-posts F and leaves it at the binding-post F'.

Attached to the floor of the case E is the usual manually-operated cut-out switch G, having one contact, *k*, connected to binding-post F and the other contact, *k'*, connected to binding-post F'. Whenever the two contacts

are in electrical communication through the movable member of the switch, the current passes through them and the binding-posts without going through the lamp. The counterweight for facilitating the lifting action of the feed-magnet consists of a rolling weight having the form of a flanged roller, which runs on and is held in a track-like lever *m*. This track is fast to a cross-piece *n*, pivoted at *o* in a suitable bracket or hanger *O*, attached to and depending from the dome of globe *A*, as seen in Fig. 2. From the track-formed counterweighted lever thus arranged project forward to steady pins *p* beneath yoke *e*, one on each side of the hub *e'*. One only of these pins is indicated in Fig. 1.

The regulator-magnet is shown at *H*, having armature-lever *H'*, pivoted at 1 and connected at or near one end to the core 2 of solenoid *H*. At its other end is an insulated contact 3, which plays between the two stationary contacts 4 5. The armature-lever is provided with a weight *s*, which has the same function as the similarly-lettered spring in my aforesaid application, Serial No. 571,379.

Y is the lower carbon, and *Y'* is its holder. The contacts 3 4 5, as seen in Fig. 5, are in a shunt 9 around the arc, the feed solenoids, and the regulator-magnet, the two fixed contacts 4 5 being in parallel in said shunt-circuit.

The arc or lamp circuit is shown at 7. The regulator-magnet *H* is energized from the arc-circuit, not directly, but by a high-resistance shunt-circuit 8, in which it is included.

A resistance *R*, as in my aforesaid application, is included in the shunt-circuit 9 around the arc and the feed and regulator magnets. Under this arrangement whenever the potential of the current in the arc-circuit materially exceeds or falls below the normal the shunt-circuit 9 will be closed between one or the other set of contacts, as the case may be.

In order to adapt the lamp to be conveniently used either in an arc or in an incandescent circuit, I arrange things so that the lamp itself shall contain all the accessories needed to permit it to be used in either connection. To this end I provide it with a resistance *R'*, (in addition to the coil *R* already described,) which can be connected up or not in the lamp-circuit, as desired. The resistance *R'* is typified in the diagram Fig. 5 as consisting of three coils. It and the resistance *R* are contained in a receptacle *R''* on top of the lamp, and means are provided by which the resistance *R'* can be cut into or out of the lamp-circuit. These means are typified in Fig. 5 as a shunt *r* around the resistance *R'* and a switch *r'* by which the shunt may be opened or closed, as desired. In practice, however, connections will be provided by which the binding-post *F* can be connected or not to the resistance *R*, as desired. This resistance is proportioned to the standard

current employed on an incandescent circuit, and is used only when the lamp is placed in multiple in such a circuit. When the lamp is used as a series lamp, the resistance *R* is cut out. By this convenient arrangement the lamp in itself contains all the accessories which enable it to be put to either use without further preparation.

When the upper carbon is nearly used up, there remains but a short stick. When still further consumed, it will finally, in dropping, get below and out of control of the gripping-cams *g*. This stub will then rest permanently upon the lower carbon, thus permanently closing the lamp-circuit, and, through the consequent energizing of the regulator-magnet, holding the shunt 9 open. To prevent any such occurrence, I provide in the upper-carbon holder an inner lining *t* of insulating material, such as asbestos, which extends up far enough to insulate from the holder any piece of carbon short enough to fall below and out of reach of the gripping-cams *g*. The shunt 8, in which the regulator-magnet is included, is in this instance around the arc, and to prevent the current under these conditions from passing over the shunt I provide a cut-out 10 11 in said circuit connected to and operated by the feed mechanism in such manner as to open the regulator-circuit whenever the upper carbon is not between the gripping-cams. In any such event there is nothing to offer resistance to an abnormal descent of the cross-head *e*, and I avail of this abnormal movement to open the circuit 8 of the regulator-magnet. To this end the circuit 8 is closed through a fixed contact 11, Fig. 2, and a movable contact 10, which is pivoted at *v* to the counterweighted lever-supporting hanger *O*, and extends across and rests upon the cross-head *e*. The two contacts are always in electrical connection so long as the conditions in the lamp are normal, but whenever the cross-head descends abnormally low the contact 10 will be free to drop, and will do so, thus separating from contact *H* and breaking the circuit 8.

Having described my improvements and the manner in which the same is or may be carried into effect, what I claim, and desire to secure by Letters Patent, is—

1. The feed magnet or magnets included in the arc-circuit of the lamp and the feed mechanism controlled thereby, in combination with the regulator-magnet included in a high-resistance shunt from that circuit, and a shunt-circuit around the arc and the feed and regulator magnets, completed through either one of two sets of contacts, controlled by the regulator-magnet, according as the potential of the arc-circuit materially exceeds or falls below normal, substantially as hereinbefore set forth.

2. In an electric lamp, and in combination, the lamp-circuit, the feed-magnets included therein, the regulator-magnet energized from the lamp-circuit, the shunt around the arc

and the feed and regulator magnets completed through either one of two sets of contacts controlled by the regulator-magnet, the resistance R' and means whereby the same may be
5 excluded from or included in the lamp-circuit at will so as to adapt the lamp for use in either an arc or an incandescent circuit, substantially as and for the purposes hereinbefore set forth.

10 3. In combination, the resistances R R' mounted in and carried by the lamp, the lamp-circuit including the feed-magnets, the regulator-magnet energized from the lamp-circuit, the shunt around the arc and the feed
15 and regulator magnets containing the resistance R and completed through either one of two sets of contacts controlled by the regulator-magnet, and means for including the resistance R' in, or cutting it out from, the

lamp-circuit as desired, substantially as and 20 for the purposes hereinbefore set forth.

4. The combination of the feed mechanism, the lamp-circuit including the feed-magnets, the regulator-magnet in a shunt to the lamp-circuit, the shunt-circuit around the arc and 25 the feed and regulator magnets, completed through either one of two sets of contacts controlled by the regulator-magnet, and a circuit-breaker connected to and operated from the feed mechanism to open the circuit of the 30 regulator-magnet, at the time and in the manner, substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 28th day of January, 1896.

MALONE WHELESS.

Witnesses:

FREDERIC B. KEEFER,
EWELL A. DICK.