

(No Model.)

H. J. FISHER.
ELECTRIC ARC LAMP.

No. 565,971.

Patented Aug. 18, 1896.

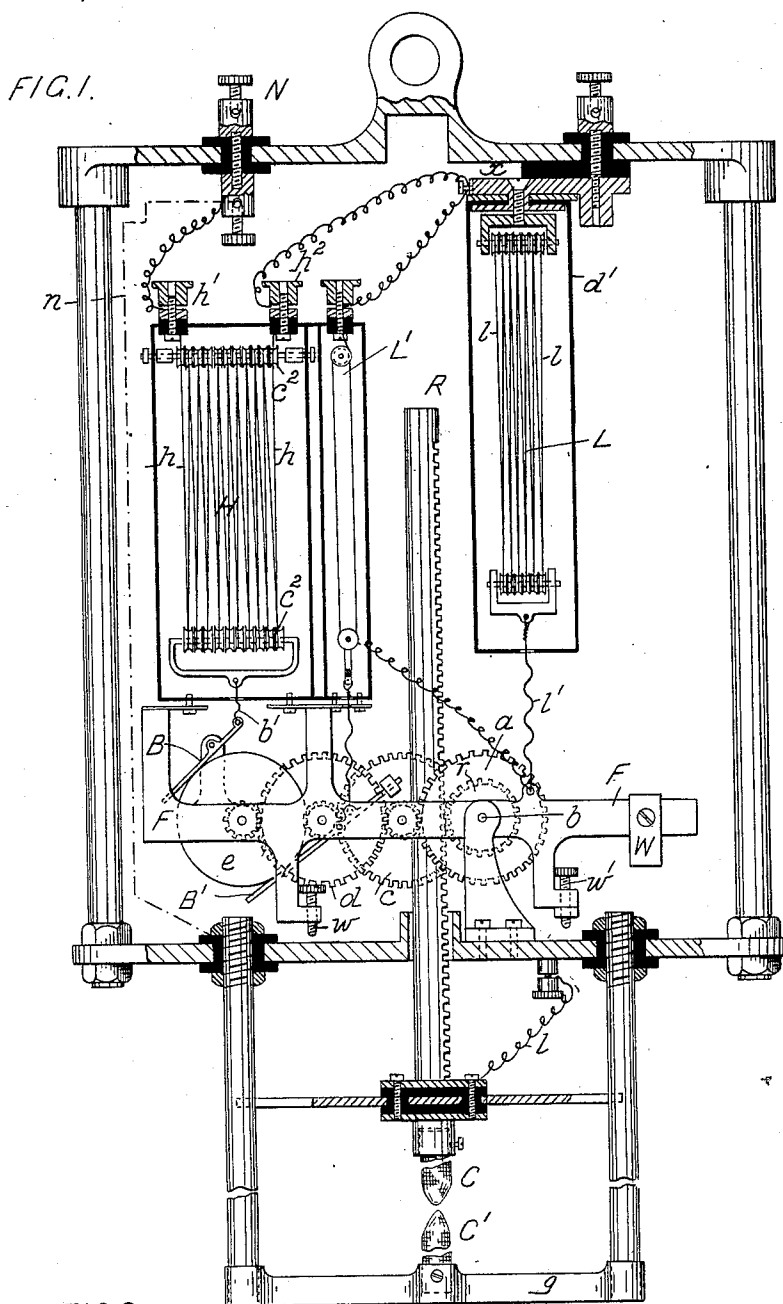
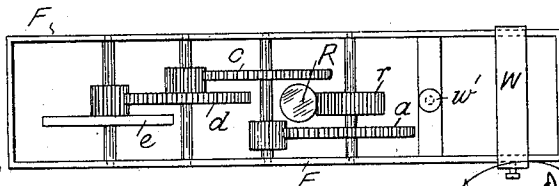


FIG. 2.



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HENRY JAMES FISHER, OF LONDON, ENGLAND.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 565,971, dated August 18, 1896.

Application filed February 26, 1896. Serial No. 580,815. (No model.)

To all whom it may concern:

Be it known that I, HENRY JAMES FISHER, a subject of the Queen of Great Britain and Ireland, residing at 102 Shooter's Hill Road, Blackheath, London, in the county of Kent, England, have invented Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention relates to electric-arc lamps, and has for its objects to economize the current required for automatically controlling and regulating the carbon-feeding mechanism, and to provide an arc-lamp adapted for use at will with either continuous or alternating currents.

According to my invention I am enabled to dispense altogether with the use of solenoids in an arc-lamp, and I use a plurality of novel and useful arrangements and adaptations of the "heated-wire" system for automatically and independently controlling the carbon-feed and for striking the arc; and in carrying out my invention I arrange and combine the elements together in such manner that economy both in first cost and in working conditions is attained, and also other advantages accrue.

I will fully describe my invention, reference being had to the accompanying drawings, in which—

Figure 1 illustrates a type of arc-lamp with the carbon-feed mechanism carried in a balanced frame in which an arrangement of my invention is embodied, and Fig. 2 is a plan of the wheel-gear.

In constructing a lamp I usually employ, as has been previously employed, a rack R, which holds the upper carbon C, into which a pinion *r* gears. This pinion *r* is mounted upon a fixed bearing *b* and is fast to the first, *a*, of a train of wheels *a c d*, terminating in a smooth wheel *e*, upon which a brake B acts. The whole feed mechanism is mounted in a rocking frame F, centered upon the same fixed bearing *b* as the said pinion *r*. The lower carbon C' is held suitably either upon the lower member *g* of the lamp-frame, or for a focusing-lamp it may be carried upon a moving bridge-piece automatically operated in any convenient manner. The lamp-frame is completed in the usual way, suitable insulation being provided where required. The adjustment of the rocking frame F is effected

by means of springs or movable weights, such as W, and regulating-screws *w w'*, suitably arranged.

The above-mentioned brake, (which may be a lever, such as illustrated at B, or a band, cam, or other holding and releasing device of suitable kind,) for controlling the smooth brake-wheel *e* of the feed-regulating mechanism, is operated at the required times automatically by a heated-wire arrangement H of high resistance connected in shunt, as shown, with the main circuit and contained in a casing *c'*, which is mounted upon and moves with the rocking frame F. In this shunt arrangement one or more metallic strips, wires, or conductors *h h'* is or are arranged in series and suitably disposed, being preferably led from one terminal *h'* of the casing *c'* to and fro around or over barrels, such as *c''*, mounted in said casing and connected to the brake, returning over said rollers or barrels to the other terminal *h''* of the case, and thence to circuit, with proper insulations where necessary. The shunt device is connected by a suitably-resilient connection *b'* to the brake B and offers a path for the current other than through the lamp-carbons, and its action is hereinafter explained.

In addition to the above, according to my invention for striking the arc, I employ a similar hot-wire arrangement L, but of low resistance, which is in series with the carbon rods C C' and constructed and disposed as follows:

One or a number of wires or conductors *l l'* of suitable kind and length is or are arranged in parallel or in series, as may be convenient, and inclosed in a case, such as *d'* or otherwise. The device is fixed to the lamp-frame, as shown at *x*, and also connected to the rocking frame F by a conductor *l'* of some and suitable resiliency (on the pinion side of the carbon-holding rack R and at suitable distance from the pinion-center) in such manner as to normally counterbalance the whole rocking arrangement. From the frame F the current passes through the rack R and a flexible conductor *l''* to the carbons. The above-mentioned casings *c'* and *d'* inclosing the wires may be perforated or furnished with valved apertures to provide for efficient and adjustable ventilation.

The operation of my above-described inven-

tion is as follows: When the current is first switched onto the lamp, if the carbon rods happen to be in contact the current from positive terminal P flows through the wires 5 *l* of the low-resistance series device L and through the carbon rods C C', and as the wires *l l* lengthen under the heating action of the current the weighted end of the rocking frame descends for a sufficient distance, regulated by the screw *w'*, and the movement of 10 the pinion *r* raises the rack and separates the points of the carbon rods to the required distance and the arc is struck, the current flowing on to the negative terminal N through the 15 wire *n*. If when the current is switched on the carbon rods C C' are not in contact, then a small current flows through the high-resistance shunt device H, and as the wires *h* thereof lengthen under the heating action of the 20 current the brake B is removed from the wheel *e*, releasing the wheelwork and allowing the carbons to come in contact by gravity. Then the action of the low-resistance series device L and balance-frame F, as above described, serves to automatically separate them 25 to the required distance to strike the arc, when the brake is again automatically applied.

As in use the carbon rods burn away the 30 resistance between them increases, and the adjustment is such that when this resistance has increased beyond a certain point the current flowing through the high-resistance shunt device H increases and heats same 35 sufficiently to release the brake B, allowing the top carbon rod C to approach the other by gravity gradually until the resistance between the carbon rods is so reduced that the current flowing through the shunt-wire device is also reduced. Then the wire *h* cools 40 and shortens and the brake B is again applied to the wheel *e*. As the carbon burns away this action is continuously repeated, and the feed of the carbon rods is automatic 45 and practically continuous.

In some cases it may be advisable to provide supplementary means for assisting and insuring the proper application of the brake at required times, as above set forth, in 50 case its action might be too slow or otherwise insufficient. In such cases I employ a third and auxiliary hot-wire device arranged in any convenient position, for example, as shown in end section at L', and of similar construction to those already described, and of 55 a resistance equal to or somewhat higher than that of the low resistance L, above described, and such auxiliary device L', I connect in shunt or series upon the low resistance L and connect it to a supplemental brake B', 60 acting on the same smooth wheel *e* as the brake B of the feed mechanism in such manner that the brake-power will be sufficiently augmented and applied when the current is flowing through the carbons, as will be readily understood.

By the use of my above-described improve-

ments also not only can the lamp be used with either alternating or continuous currents, as desired, but also much less current is required 70 in my shunt device than is required in the solenoids of lamps as usually constructed, and hence more current is available for producing the light. A further advantage is that the low-resistance device L can readily 75 be made of such resistance that in lamps used on constant potential with continuous currents the resistance-coils usually necessary may be dispensed with, and where alternating currents are employed the choking-coils 80 usually employed may also be dispensed with. It will be evident that if desirable in any case instead of connecting the high-resistance shunt H across the lamp-terminals, as above 85 stated, it may be connected in shunt with the carbon rods only; also, though I have above described a rack-and-pinion arrangement of carbon-feed, I may employ any equivalent means, such as a drum with wound or weighted 90 cord.

I do not confine my invention to any particular kind of arc-lamp mechanism, and I would state that I am well aware that the use of wires or strips of metal adapted to change 95 their length when heated by a passing current and thereby becoming a source of power transmission is not new, and to such principle I lay no broad claim nor to the use of the gear-wheels and a brake controlling same; but 100

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. In an electric-arc lamp, the combination with the rack carrying the movable carbon, of the rocking lever mounted upon a pivot 105 and having a weighted end, the resistance device connected with said weighted end, and acting to raise and lower the same, the gear-wheel mounted on the pivot of the rocking lever and engaging the rack, the train of gearing extending toward the opposite end of the 110 rocking lever, and terminating in a brake-wheel, the brake-shoe arranged to bear against the brake-wheel, and the resistance device connected with the brake-shoe, substantially 115 as described.

2. In an arc-lamp the combination of a hot-wire shunt device of high resistance mounted upon and moving with a rocking frame carrying the feed mechanism and adapted to automatically operate a brake controlling the 120 same and a hot-wire device of low resistance in series with the carbons and adapted to control the position of the said rocking frame and to strike the arc, and a supplementary 125 hot-wire device, the whole being arranged to operate substantially in the manner and for the respective purposes above set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HENRY JAMES FISHER.

Witnesses:

HENRY A. PRYOR,
W. M. HARRIS.