

(No Model.)

F. BAIN.  
ELECTRIC ARC LAMP.

No. 300,433.

Fig. 1. Patented June 17, 1884.

Fig. 2.

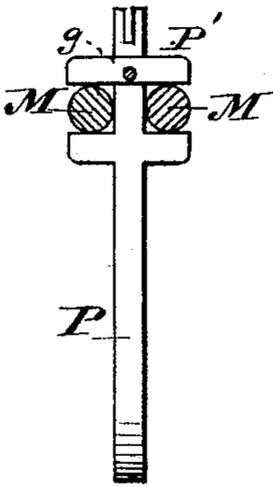
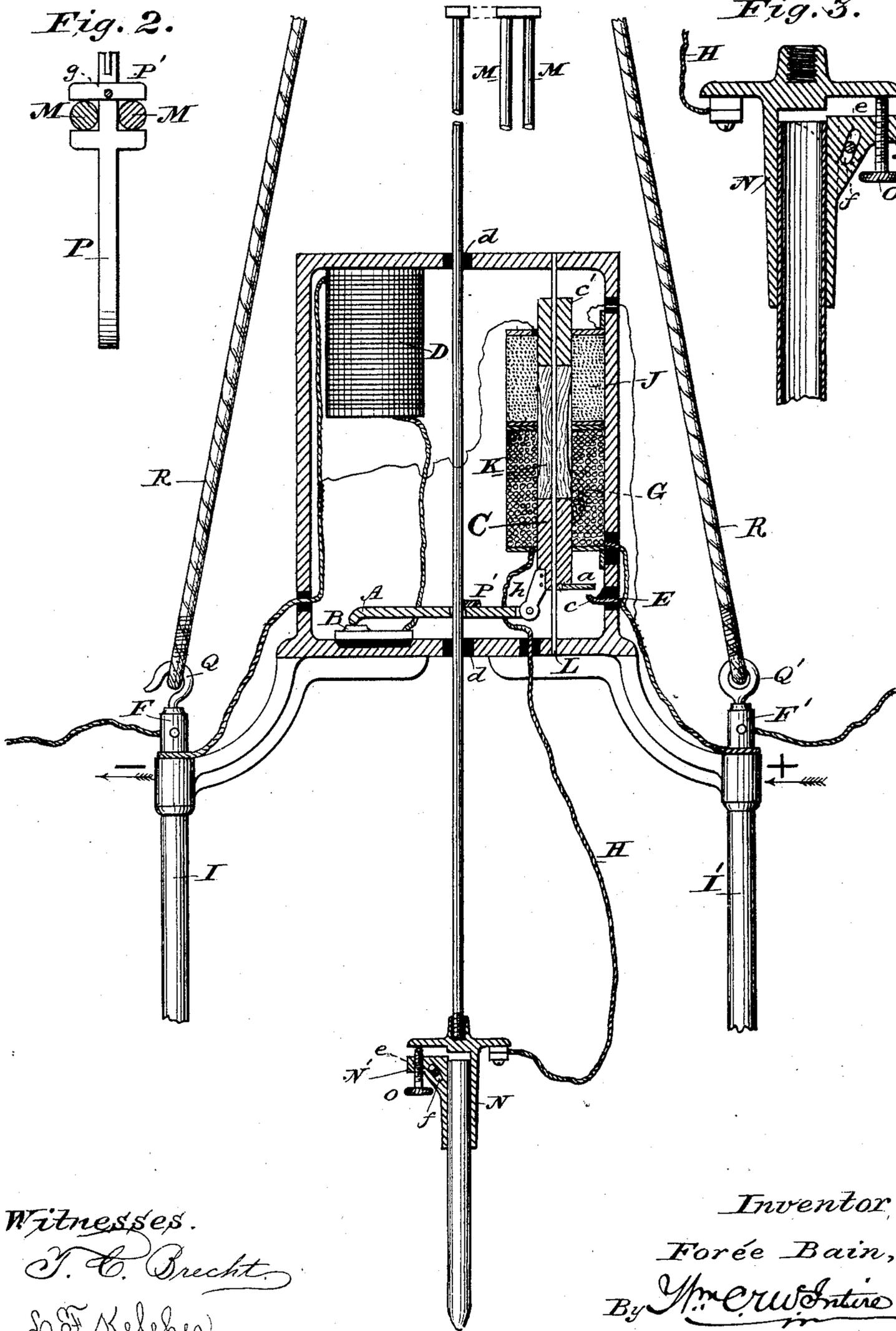
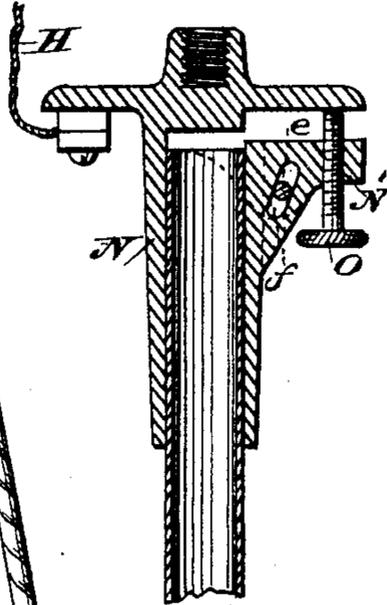


Fig. 3.



Witnesses.

J. C. Brecht.

L. F. Keleher.

Inventor:

Forée Bain,

By J. M. Entwistle

Attorney.

# UNITED STATES PATENT OFFICE.

FORÉE BAIN, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR TO THE BAIN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 300,433, dated June 17, 1884.

Application filed December 27, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, FORÉE BAIN, a citizen of the United States, residing at Minneapolis, Hennepin county, Minnesota, have invented  
5 new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

My invention relates to certain new and useful improvements in electric-arc lamps, and  
10 also to certain combined devices for automatically cutting out of circuit a lamp when its arc fails or when from any cause it offers an abnormal resistance.

My invention also relates to certain new and  
15 useful improvements in the mechanism adapted to control and regulate the movement of the carbons.

My invention also relates to certain improvements in the carbon-clamp, and to the means  
20 for suspending the entire lamp; and with these ends in view my invention consists in the peculiar construction and arrangement of parts hereinafter fully described and specifically claimed.

When a number of arc lamps are placed in one circuit in series, it is well known that the arcs must be kept at a practically uniform length, for should any one of the lamps hold  
25 an abnormally long arc its resistance would correspondingly weaken or close down the arcs in the remaining lamps in the series, and should  
30 the arc in the faulty lamp still increase, its great resistance would finally break the general circuit and cause the extinction of all of  
35 the lamps.

In order that those skilled in the art to which my invention appertains may fully understand the same, I will proceed to describe its construction and operation, referring by letters  
40 to the accompanying drawings, in which—

Figure 1 represents a sectional side elevation of my improved lamp with shunting device and connections. Fig. 2 is an enlarged  
45 plan view of the carbon-holder clamp, showing the two carbon-holder rods in cross-section; and Fig. 3, a detail view of the carbon-binding clamp.

Similar letters denote like parts in the several figures.

50 A is the clutch, which in its normal condi-

tion rests on a point, B, and the lower armature or core, C, rests on a contact, *c*, through the medium of a metallic projection, *a*, the resistance D being approximately equal to the  
55 normal arc. Now, when the current arrives at point E, there are three distinct closed circuits through to binding-post F; consequently it divides at this point and traverses the paths in inverse proportion to the resistance in such  
60 paths, which is about as follows: the greatest portion passing through coil G, thence through electrode H, thence through the carbons, and thence through the side rods I to binding-post F. The next branch in proportion to the current is from point E through *c*, thence to *a*,  
65 thence through the clutch A to contact B, thence through resistance D to post F, the smallest branch being through the high-resistance shunt-coil J direct, as shown. Now, as the current passes through coil G, it raises the core  
70 C first from contact at *a c*, which breaks the safety-circuit; then the coil G is re-enforced by that portion of the current which was previously passing through the safety-circuit, and it then further raises the core C, which in turn  
75 lifts the system of clamp and carbon-carrier devices, thereby separating the carbons the proper distance, and the lamp continues to operate in the well-known manner. It will be observed that in its normal state there are  
80 three complete and distinct circuits from binding-post F' to post F.

The core is composed of two distinct armatures—the one, C, already referred to and another, C'—the two armatures C C' being separated by an interposed non-magnetic body, K,  
85 the armatures and body all sliding freely upon a vertical rod, L. The lower armature, C, is within the influence of the coil G, and the upper armature, C', is within the influence of the coil J, and by reason of the interposed non-magnetic body K these relations are never  
90 disturbed, and consequently their action will be opposed to each other, without reference to the direction of the currents, the action of the armatures being as follows: When the lower armature, C, is raised by attraction, the current flowing in the upper coil is weak, and consequently the upper armature, C', by reason of its relation to the lower one and the non-  
95 100

magnetic body K, is raised correspondingly and partly beyond the coil J, and when the coil J becomes the strongest, by the increase of current resulting from an elongation of the arc, the armature C' is pulled down and the lower arm, C, is correspondingly forced downward.

The carbon-carrier is composed of two rods or tubes, MM, arranged parallel to each other, and securely fastened together at or near their ends, and adapted to move freely up and down through insulated bearings *d* at the top and bottom of the lamp-frame. To the lower ends of the rods M M is secured the carbon-clamp, which, by reference to Fig. 3 of the drawings will be seen, is composed of two parts, N N', the latter being secured to the former by a pivot, *e*, on the main portion N, passing through an incline slot, *f*, on part N'.

O is a thumb-screw passing through a projection on part N', and bearing against a similar projection from the part N, so that as the point of the screw O is forced against the projection on N it will cause the portion N' to approach the confined carbon in a line substantially parallel to its axis; and by reason of the pivot and slot *e f* the portion N is capable of adjusting itself against any inequalities in the carbon.

The clutch A is composed of two parts, P P', pivoted together at *g*. The part P is in the form of a cross, and the part P' is so pivoted that a space about equal to the diameter of the carbon-carrier rods M M is left between the two, and by reason of the pivotal connection of the parts at *g* either or both of the rods M may be readily clutched; and it will be observed that by reason of the clutching portions of the parts P P' being parallel to each other I obtain contact at four geometrical points, which is sufficient to cause the proper grip, while at the same time the possibility of any sticking of the carrier in the clutch by reason of the presence of dirt is greatly lessened over that of the ordinary surrounding clutch.

The frame of my improved lamp is made in the usual manner, except that I construct the binding-posts F F' with a vertically-moving binding-screw, Q, the upper end of which I make in the form of an ordinary eye or hook, as clearly shown in the drawings, and adapted to connect with the ends of a non-conducting suspension-cord, R, either by ordinary knots or metallic hooks or eyes at the end of such cord. I thus provide a double use for the binding-screws.

In referring to the clutch A it will of course be understood that the short end of the clutch is connected with the lower end of the armature C by a metallic connecting-arm, *h*, in an obvious manner.

What I claim as new, and desire to secure by Letters Patent, is—

1. In an electric lamp, the combination, substantially as herein set forth, with a normally-closed short circuit having a resistance substantially equal to that of the lamp, and including the clutch mechanism, of main and shunt magnet coils, the core of which is connected directly with the clutch mechanism.

2. In an electric lamp, the combination, substantially as herein set forth, of a short circuit including the clutch or carbon-lifting device, a magnet in the main and a magnet in the shunt circuit, and a core directly connected with the clutch device, the arrangement being such that normally there are three paths for the current, and that the short circuit is made or broken in accordance with the varying currents flowing through the main and shunt circuits.

3. The combination, in an electric lamp, of a carbon-carrier composed of two rods or pipes arranged parallel to each other and firmly attached together, with a clamp or clutch adapted to clamp or clutch either or both of the rods or tubes in the act of lifting the same, substantially as described.

4. The combination, in an electric lamp, of a carbon-carrier composed of two rods or tubes arranged parallel to each other and firmly attached together, and a clutch constructed substantially as described.

5. The combination, in an electric lamp, of a carbon-carrier composed of two rods or tubes arranged parallel to each other and firmly attached together, and a clutch composed of two parts, connected together as described, and adapted to bite at four geometrical points, substantially as set forth.

6. In an electric lamp, a clutch device consisting of a plate in the form of a cross, having another plate connected thereto above the cross-bar of the cross, substantially as described.

7. In an electric lamp, the binding or connecting posts provided with binding-screws having their upper ends formed into hooks or eyes, and adapted for connection with a non-conducting suspension-cord, substantially as described.

8. A carbon-clamp for securing the carbons in the carrier, composed of two parts connected together by a pivot working in an inclined slot, and an adjusting thumb-screw, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FORÉE BAIN.

Witnesses:

F. L. BROWNE,  
N. C. LAMMOND.