(No Model.) 2 Sheets—Sheet 1.

J. A. MONDOS.

ELECTRIC ARC LAMP.

No. 263,938. Patented Sept. 5, 1882.

Fig. 1

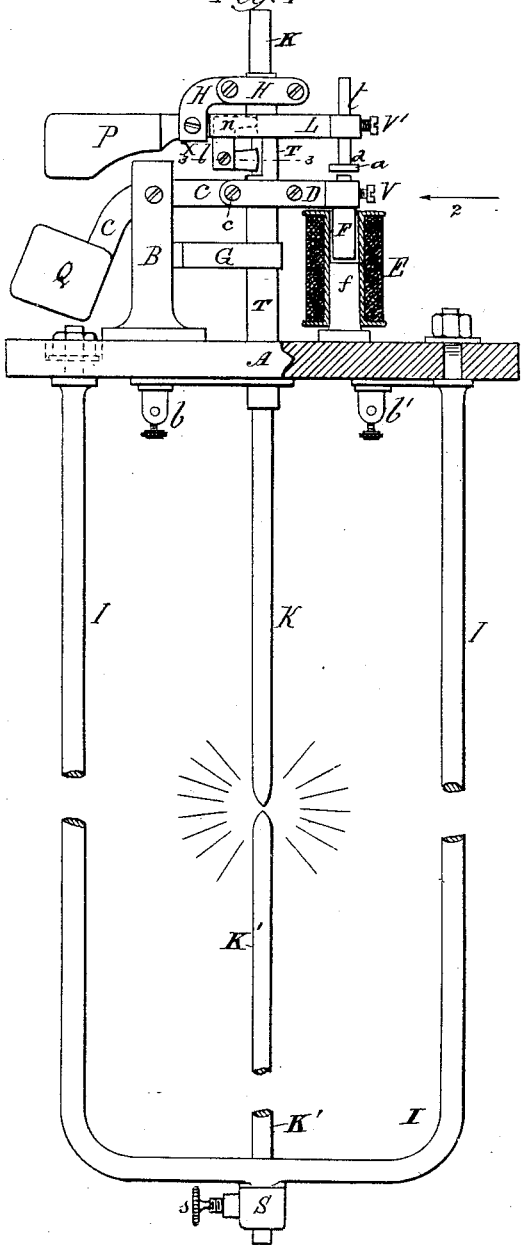

Fig. 2

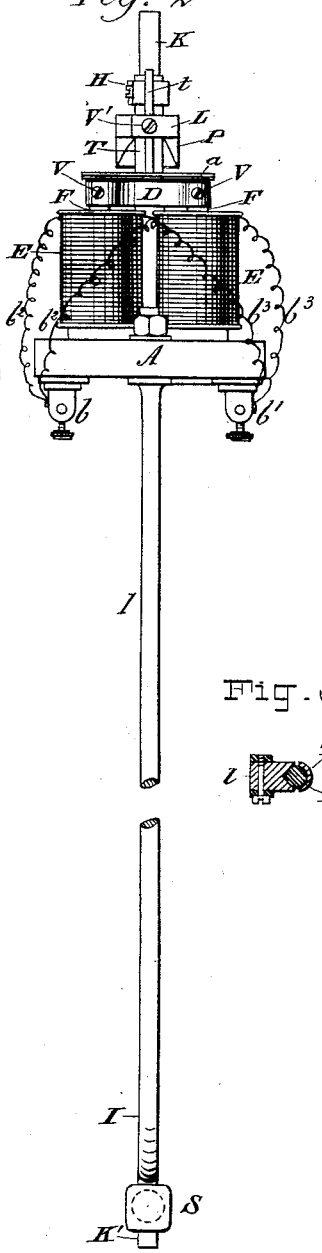

Fig. 3.

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Geo. Bainton

INVENTOR

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Burke, Fraser & Connett

(No Model.)

2 Sheets—Sheet 2.

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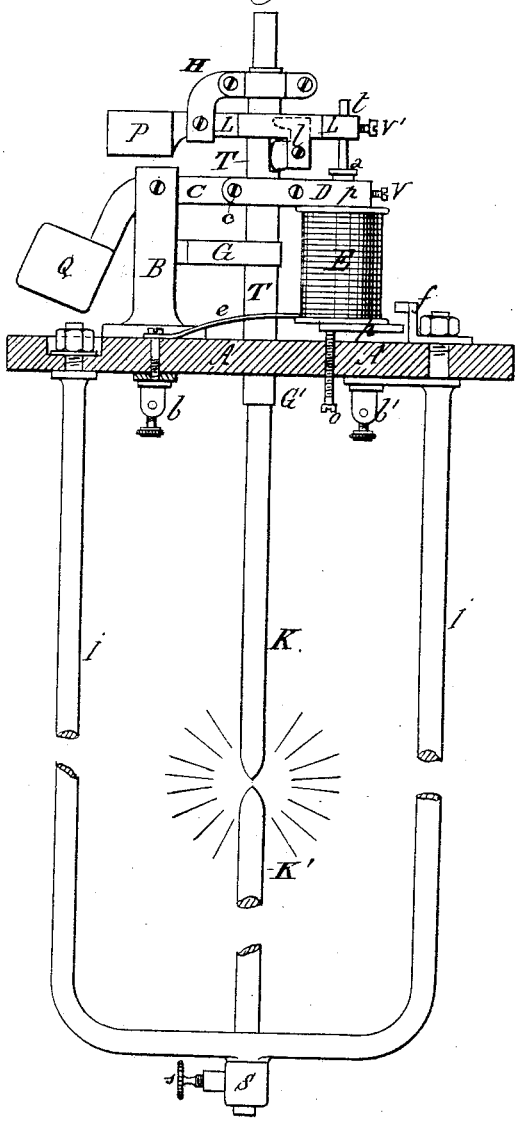
Fig. 4



WITNESSES:

E. B. Bolton

Ed Bainton

INVENTOR:

Jean Auguste Mondos

by his attorneys,

Burke, Fraser & Connett

UNITED STATES PATENT OFFICE.

JEAN AUGUSTE MONDOS, OF NEUILLY, SEINE, FRANCE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 263,938, dated September 5, 1882.

Application filed January 6, 1882. (No model.) Patented in France November 11, 1881.

To all whom it may concern:

Be it known that I, JEAN AUGUSTE MONDOS, a citizen of the French Republic, residing in Neuilly, Seine, France, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This lamp belongs to that class in which the light is produced by means of a voltaic arc between two carbon pencils.

The object of the invention is to provide a simple and cheap automatic regulator for feeding the carbons together and maintaining a uniform length of arc.

In the accompanying drawings, Figure 1 is a front elevation of my lamp, partly in section. Fig. 2 is a side elevation thereof, looking in the direction of arrow 2 in Fig. 1. Fig. 3 is a fragmentary horizontal cross-section cut in the plane of the line 3 3 in Fig. 1; and Fig. 4 is a front elevation similar to Fig. 1, showing a modified construction.

I will first describe the construction shown in Figs. 1, 2, and 3, wherein A is a plate of insulating material, such as slate; B, an upright post fixed thereto; K, the movable carbon pencil held in a tube, T; K′, the fixed pencil; I, the U-shaped frame, depending from the plate A, and S the socket at the bottom of said frame, in which the fixed pencil is secured by a set-screw, *s*.

The carbon-holding tube T is guided by an arm, G, projecting from the post B, and is capable of a short vertical motion. It is hung from one arm of a lever, C, which is fulcrumed on the post B, and whose other arm bears a counter-weight, Q, which slightly more than counterbalances the weight of the tube T and the several parts fixed thereto. To the tube T is fixed a T-shaped arm, D, and to its top is fixed a cross-arm, H. The lever C is jointed to the cross-arm D by a screw, *c*, and the cross-head of the T-shaped arm bears at its ends two armature-cores, F F, of soft iron, which enter the central bores of the two coils of an electro-solenoid, E, which is fixed on the plate A. The cores F F are vertically adjustable on the arm D by set-screws V V.

To the cross-arm H is fulcrumed a lever, L, having a counterpoise, P, on one arm, and bearing on the end of its other arm an armature-plate, *a*, connected thereto through the medium of a rod, *t*, adjustable vertically by a set-screw, V′. Underneath the lever L is pivoted a tongue or pawl, *l*, the end of which projects through an opening in the tube T and presses against the carbon pencil K, (see Fig. 3,) thereby sustaining the latter in the tube T.

The current enters at a binding-screw, *b*, flows through post V, arm G, tube T, carbon pencil K, pencil K′, and frame I, and passes out at the binding-screw *b′*. The coils of the solenoid E are made of very fine wire, presenting a great resistance to the current. They are arranged in derivation, being connected on the one hand by wires b^2 to the post *b* and on the other hand by wires b^3 to the post *b′*, as shown in Fig. 2.

When the lamp is in repose, with no current passing through it, the counter-weight P keeps the pawl *l* biting against the pencil K, and the weight Q keeps the tube T uplifted, so that the pencils are separated. When the current is admitted it cannot pass from one pencil to the other, because of their separation, without the intervention of the voltaic arc, and it is consequently forced to pass through the solenoid E, whereupon the cores F F are attracted, overcoming the counter-weight Q and drawing down the tube T and pencil K. If this pencil is thereby lowered until it touches the pencil K′, the current finds a path through the pencils of less resistance than that through the solenoid, and consequently it deserts the latter, which loses its magnetism and ceases to attract the cores F F, whereupon counter-weight Q lifts the pencil K and establishes the luminous arc. If, on the other hand, the pencil K is not lowered far enough by the movement of the lever C to touch the pencil K′, the cores F F, when they become magnetized by induction from the coils, attract the armature A, thereby tilting the lever L and releasing the pawl *l*, whereupon the pencil K descends until it touches the pencil K′, when the current will pass through the pencils, the solenoid will become demagnetized, the counter-weights P and Q will act, and the pencil K will be uplifted to establish the arc. As the carbon pencils are gradually consumed and the arc

lengthens, thereby increasing the resistance, a continually-increasing portion of the current will pass through the solenoid until sufficient passes to attract the cores F F and lower the pencil K, and also to attract the armature *a*, and thereby release the pencil K from the bite of the pawl *l*, whereupon the pencil will slide down until it shortens the arc and reduces the resistance, when it will be again locked by the pawl *l* and be again lifted by the counter-weight Q. Thus the distance between the carbon pencils is continually and automatically regulated by simple mechanism and without consuming by resistances any portion of the electric current for this purpose except during the time that the regulation is being performed.

A lamp thus constructed may be operated by either continuous or alternating currents.

It is obvious that ordinary electro-magnetic coils may be substituted for the solenoid coils described.

It is of importance to the economical utilization of electric currents for lighting purposes that the current be consumed as little as possible for the purpose of regulating the arc. To this end the current should not be forced to traverse resistances except when the carbons require readjustment. Heretofore, so far as I am aware, this result has been attained only with the use of complicated and delicate mechanism—as clock or wheel works, with ratchets, detents, and other intricate and expensive parts. My lamp, on the contrary, is simple in its construction, and has few working parts, which are of strong and coarse structure, not liable to be broken or to get out of order.

In Fig. 4 is shown a modified construction employing an electro-magnet, and designed to be arranged either in tension or derivation and operated by a continuous current. E is the electro-magnet, the upper poles of which are fixed in the cross-head of the T-piece D, and the two lower poles of which terminate in pole-pieces *p*, which project beneath an elbow-armature, *f*. The downward movement of the magnet E is limited by a screw, *o*. The weight of the counterpoise Q is slightly insufficient to uphold the tube T and the electro-magnet and other parts borne thereby, so that when at rest the pencil K is dropped onto the pencil K′, and it is only lifted when a current passes and the poles of the magnet are attracted upward to meet the armature *f*. The lever L, counterpoise P, and armature *a* are arranged as before described, except that the pawl L is on the opposite side of the carbon pencil, and hence the counterpoise acts to retract it, having only weight enough to serve this purpose, so that the pawl locks the carbon only when the armature *a* is attracted to the magnet. The coils of the magnet are in the same circuit with the carbon pencils, the current entering at binding-screw *b* and flowing thence by wire *e* through the coils of magnet E to tube T, through pencils K and K′ and frame I to binding-post *b*′. When the current passes it excites the magnet E, which attracts the armature *a*, which causes the pawl *l* to lock the pencil K; and it also attracts itself upward toward the armature *f*, thereby lifting the pencil K and developing the arc. When the carbons waste away and the resistance increases the diminution of the current in the magnet will cause it to drop away from the armature *f*, thereby lowering the pencil K, and it will also decrease the pressure of the pawl *l* against the pencil, until the latter will be released and permitted to slide downward, whereupon it will be again gripped and again elevated.

When the lamp is supplied by a current of tension the electro-magnet bears two wires—a coarse wire for the passage of the arc-current and a fine wire for a derived reverse current—so proportioned as to neutralize the current through the coarse wire when the resistance of the arc increases, at which time more of the current will be caused to pass through the fine coil.

The two forms of my lamp which I have described give a light of from thirty to one hundred Carcel burners.

I claim as my invention—

1. The combination of a fixed carbon, a movable carbon tending to feed toward the fixed carbon, a tube holding said movable carbon, means in connection with said tube tending constantly to elevate it, a tooth or pawl borne by said tube and adapted to engage the movable carbon and hold it within the tube, an armature in connection with said pawl, an electro-magnet, the movable core of which is fixed rigidly to said tube, so as to move with it, and is arranged to face said armature at one end and a fixed magnetic body arranged adjacent to and to be attracted by the other end or pole of said core, substantially as set forth.

2. The combination of a fixed carbon, a movable carbon tending to feed toward the fixed carbon, a tube holding said movable carbon, a counterpoised lever jointed to said tube and tending constantly to elevate it, a tooth or pawl pivoted to a counterpoised lever, the said lever borne by said tube, an armature connected to said lever, a fixed electro-magnetic or solenoid coil, the movable core of said coil fixed rigidly to said tube, so as to move with it, and arranged with one of its poles facing said armature, substantially as set forth.

3. The combination of electro-magnetic or solenoid coil of high resistance, installed in a divided circuit, avoiding the carbons, the movable core thereof, the carbon-holding tube connected rigidly to said core, means for normally lifting said tube and its dependent parts, a tooth or pawl adapted to engage the carbon and lock it within said tube, a weighted lever pivoted to said pawl and tending to thrust the latter against the carbon, the fulcrum of said lever borne by said tube, and an armature connected to said lever and arranged in proximity to said core, substantially as set forth.

4. The combination of carbons K K′, tube T, lever C, having counterpoise Q, lever L, fulcrumed to a projection from the tube T, and having counterpoise P, armature *a* on said lever L, pawl *l*, borne by said lever, solenoid E of fixed coils, and cores F F thereof, connected to said tube T, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JEAN AUGUSTE MONDOS.

Witnesses:

DE ROUGEMONT,

EDWARD P. MACLEAN.