(No Model.) 2 Sheets—Sheet 1.

A. W. RICHARDSON.

ELECTRIC ARC LAMP.

No. 532,095. Patented Jan. 8, 1895.

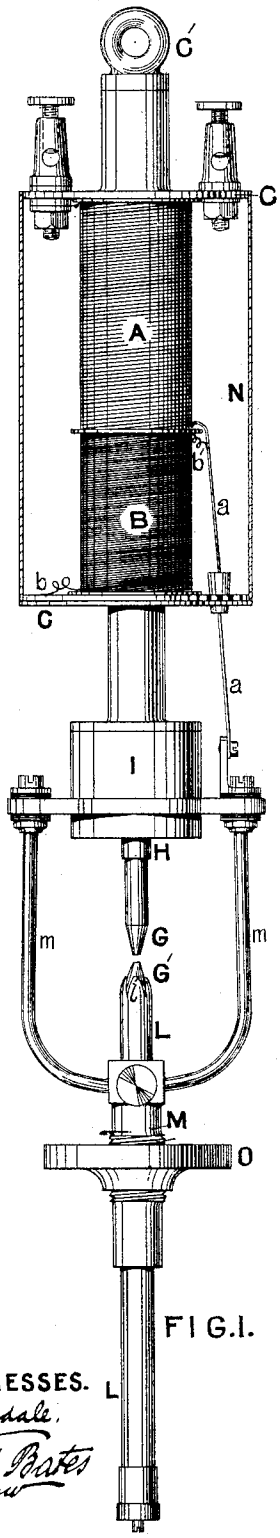

FIG. 1.

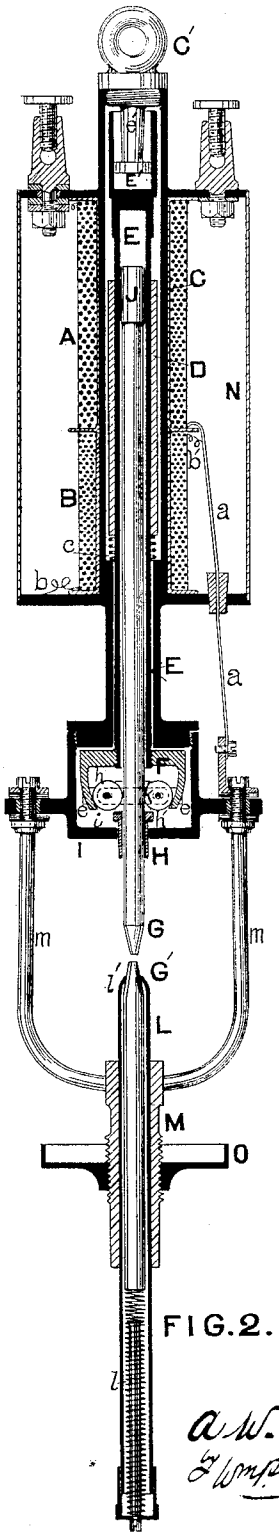

FIG. 2.

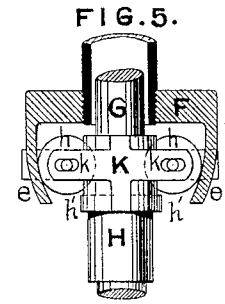

FIG. 5.

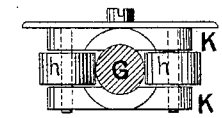

FIG. 6.

WITNESSES.

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A. W. Richardson

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(No Model.) 2 Sheets—Sheet 2.

A. W. RICHARDSON.

ELECTRIC ARC LAMP.

No. 532,095. Patented Jan. 8, 1895.

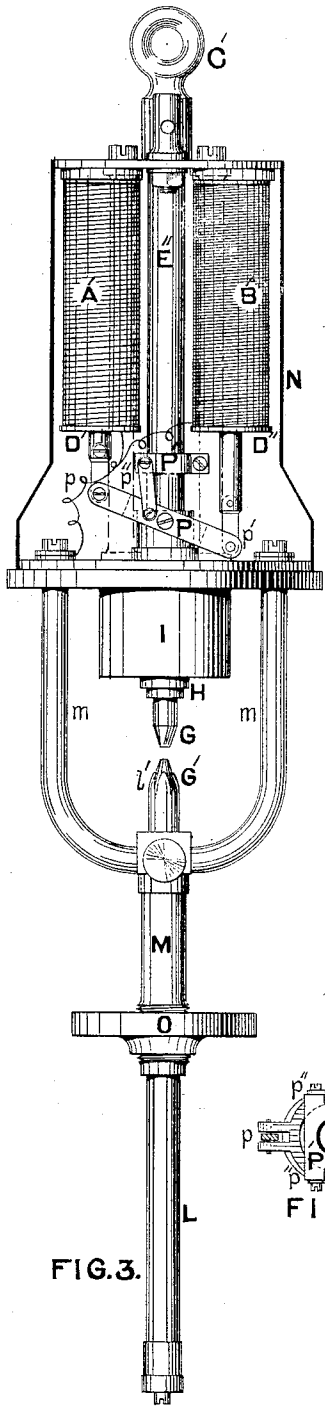

FIG. 3.

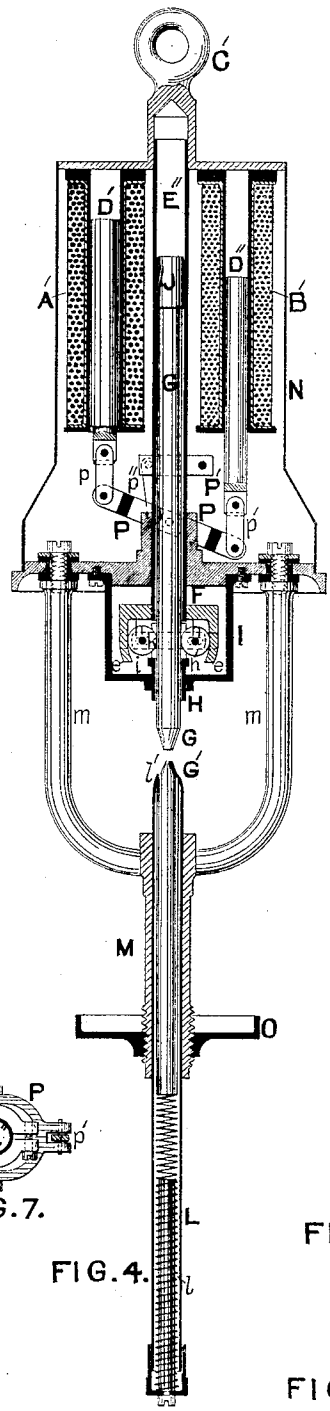

FIG. 4.

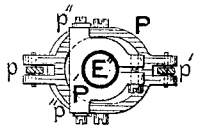

FIG. 7.

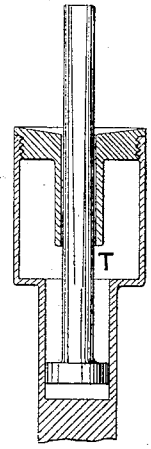

FIG. 12.

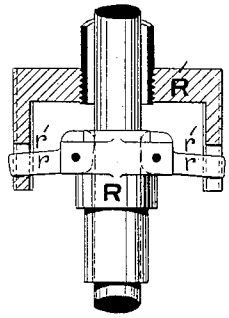

FIG. 8.

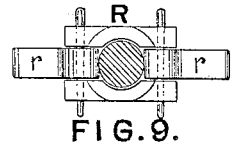

FIG. 9.

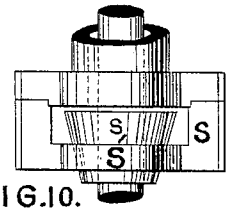

FIG. 10.

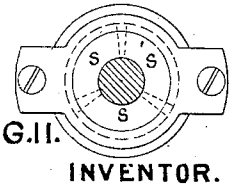

FIG. 11.

WITNESSES.

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Attys.

UNITED STATES PATENT OFFICE.

AMOS WILLIAM RICHARDSON, OF PATRICROFT, ENGLAND.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 532,095, dated January 8, 1895.

Application filed March 2, 1894. Serial No. 502,122. (No model.)

To all whom it may concern:

Be it known that I, AMOS WILLIAM RICHARDSON, a subject of the Queen of Great Britain, residing at Patricroft, near Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention is designed to consolidate and simplify the construction of electric lamps and the operative parts thereof.

In carrying out the invention the main solenoid or the main and the shunt solenoids combined form the base which carries all the parts of the lamps or to which all the parts are attached, and the top or positive carbon is carried in a hollow tube with a self acting clutch at the bottom end by means of which as the core of the solenoid drops the carbon is released and as the core is lifted the carbon is raised with it. It will be fully described with reference to the accompanying drawings.

Figure 1, is a front elevation. Fig. 2, is a sectional elevation. Fig. 3, is a front elevation of modified form. Fig. 4, is a sectional elevation of Fig. 3. Fig. 5, is an enlarged front elevation of top carbon holder or clutch. Fig. 6, is a plan of Fig. 5; Fig. 7, a plan of oscillating lever P Figs. 3 and 4. Fig. 8, is a front elevation (enlarged) of modified form of carbon holder. Fig. 9, is a plan of same. Fig. 10, is a front elevation (enlarged) of another modification of the carbon holder. Fig. 11, is a plan of same. Fig. 12, is a modified form of dash pot.

Referring to Figs. 1 and 2 the main solenoid A and the shunt solenoid B are mounted on a central core C insulated therefrom and from one another. The central core C is hollow and lined with brass and the armature D is mounted upon and carried by a brass tube E through which the top or positive carbon passes. At the lower end of the tube E is placed a small clutch or holder F for the top or positive carbon G. This clutch or carbon holder is so constructed that when it is raised or suspended it holds the carbon in position and when it is lowered it releases the positive carbon and allows it to approach or come in contact with the lower carbon and when raised again lifts the positive carbon with it. It consists of a short tube H provided with friction runners *h* held in position by two inclined fingers or prongs *e*. The runners *h* are mounted on pins or pivots capable of moving to and fro in slots *k* in the cross bar K and are pressed inward by the inclined sides of the prongs *e* against which the outer sides of the runners *h* bear. The short tube, H, the runners *h* and the prongs *e* are inclosed in a box I. When the tube E and prongs *e* are lowered the shoulder *h'* of the short tube H comes in contact with and rests upon the bottom *i* of the clutch box I and the prongs fall clear of the runners when they move outward and release the carbon G. When the tube E is raised again the prongs *e* come in contact with the runners *h* and cause them to close upon and grip the carbon G. Electrical contact is maintained between the hollow core C through which the positive current passes and the tube E by a spring *c* of brass, copper or other suitable metal. Inside the tube E is placed a small metal weight or cap J which is fitted upon the end of the positive carbon G. The metal weight or cap J is provided with a small spring or springs which bear against the inner sides of the tube E and through it contact is made therewith for the positive current to pass through the positive carbon G. On the upper end of the tube E is a cylinder E' forming a dash pot with a piston or plunger *e'* therein which is stationary and attached to the upper end of the core C the top end of which also forms an eye C' by which the lamp may be suspended. The lower or negative carbon G' is carried in an adjustable tube L and is pressed up by a spring *l* placed therein against the compressed points or prongs *l'* at the upper extremity thereof. The tube L which carries the lower carbon is adjustable in a tube M carried by the two arms *m* attached to the flanges of the clutch box or lower extremity of the central core C. The end of the negative carbon G' is always maintained in the same relative position as it is consumed by the spring *l* being held thereby against the prongs *l'* which only allow the point as it is reduced in thickness to protrude through the end of the tube L. The solenoids A and B are protected or covered by a casing N of metal, celluloid, vulcanite or other material and a globe is carried by the adjustable disk O mounted on a screw on the exterior of the lower tube M.

Instead of the spring *l* to maintain the neg-

ative carbon G′ against the contracted end of the tube L the carbon may be raised by weights with a cord or wire passing over pulleys carried by the bracket M a slide being placed under the end of the carbon extending through slots in the side of the tube.

The holder for the bottom carbon may be attached to and carried by the globe or shade instead of by the arms *m* in which case the wire *a* will be extended down through the globe to the bracket M to complete the circuit or the current may be passed through the wires which incase and protect the globe.

In operation the positive current passes through the central core C and tube E to the positive carbon G and the negative current returns through the arms *m* to the wire *a* and through the main solenoid A. The wire of the shunt solenoid B is connected at *b* with the central core C and at *b′* with the wire *a*. The positive carbon G falls of its own gravity onto the negative carbon G′ and the negative carbon G′ is pressed up and the point always held in the same position by the prongs *l′* of the tube L. When the current is passed through the lamp the armature D is lifted by the solenoid A to strike the arc as the carbons consume and the resistance through them increases the current passing through the shunt solenoid B from *b* to *b′* and acting on the lower end of the armature D balances the main solenoid A and the tube E falls of its own weight carrying down with it the carbon. When the shoulder *h′* on the lower end of the tube H rests on the bottom *i* of the clutch box I the holder F releases the carbon and allows it to descend. When the resistance of the arc is thus reduced the main solenoid raises the tube E and the clutch or holder F again engages the carbon G and so on as the carbon consumes it is gradually lowered, the dash pot E′ preventing any sudden or violent movement either up or down.

Referring to Figs. 3 and 4 a modified construction of lamp is shown in which a similar clutch or holder F is applied to the positive carbon G where the main and shunt solenoids are placed side by side and the tube E″ which carries the carbon passes up alongside of them. In this lamp A′ is the main solenoid and B′ the shunt solenoid with cores or armatures D′ D″. These are connected to and move the tube E″ up and down by the oscillating lever P and links *p p′ p″*. On the tube E″ is fixed a ring or bracket P′ to which is connected the link *p″* the other end of which is pivoted to the oscillating lever P which is pivoted on the top of the stationary clutch box I and the extremities of the lever P are attached by the link *p* with the armature D′ of the main solenoid A′ and by the link *p′* with the armature D″ of the shunt solenoid B′. The clutch F and the other parts of the lamp are such as have already been described, like letters referring to like parts. When the current through the main solenoid A′ raises the armature D′ the tube E″ is raised and with it the carbon G and when the attractive force of the shunt solenoid is greatest the tube E″ is drawn down and the carbon G released and allowed to fall or approach the negative carbon G′.

Fig. 7 is a plan of the oscillating lever P with a section of tube E″.

Referring to Figs. 8 and 9 a modified form of carbon holder or clutch is illustrated in which the rollers are replaced by two eccentric levers *r* which are pivoted to the central tube R and the outer ends engage with slots *r′* in the prongs or fingers R′.

Referring to Figs. 10 and 11 another modification of self acting clutch is shown. A conical bush in two, three, or more parts is placed in the tube S taking the place of the rollers K. The bush fits into a ring S′ and is compressed thereby against the carbon. When they rest against the bottom of the clutch box they are moved away from the ring S′ and release the carbon.

Referring to Fig. 12 a modified form of dash pot is shown in which a tube T depending into the interior prevents the liquid from escaping if turned upon its side or inverted.

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

1. In an electric arc lamp the combination with a long metallic tube for carrying the positive carbon of an automatic holder F provided with a short tube H friction runner *h* two inclined fingers *e* and the cross bar K with slots *k* substantially as described.

2. In an electric arc lamp the combination with a hollow tube through which the positive carbon passes of the tube H provided with a shoulder *h′* the runners *h*, the prongs or fingers *e* and the clutch box I substantially as described and shown.

3. In an electric arc lamp the combination of the main solenoid A the shunt solenoid B the central supporting core C the armature D attached to and carrying the tube E through which the positive carbon passes, the automatic carbon holder attached to the bottom of the tube E the clutch box I and the contact making piece J substantially as described.

4. In an electric arc lamp the combination with the main solenoid A the shunt solenoid B and the central supporting core C of the armature D the contact making piece J the tube E carried by the armature D through which the positive carbon passes, the positive carbon G, the carbon holder F attached to the tube E the short tube H the prongs *e* runners *h* and clutch box I substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

AMOS WILLIAM RICHARDSON.

Witnesses:
J. OWDEN O'BRIEN,
CHAS. OVENDALE.