(No Model.)

4 Sheets—Sheet 1.

J. A. MOSHER.

ELECTRIC ARC LAMP.

No. 485,293. Patented Nov. 1, 1892.

Fig. 1.

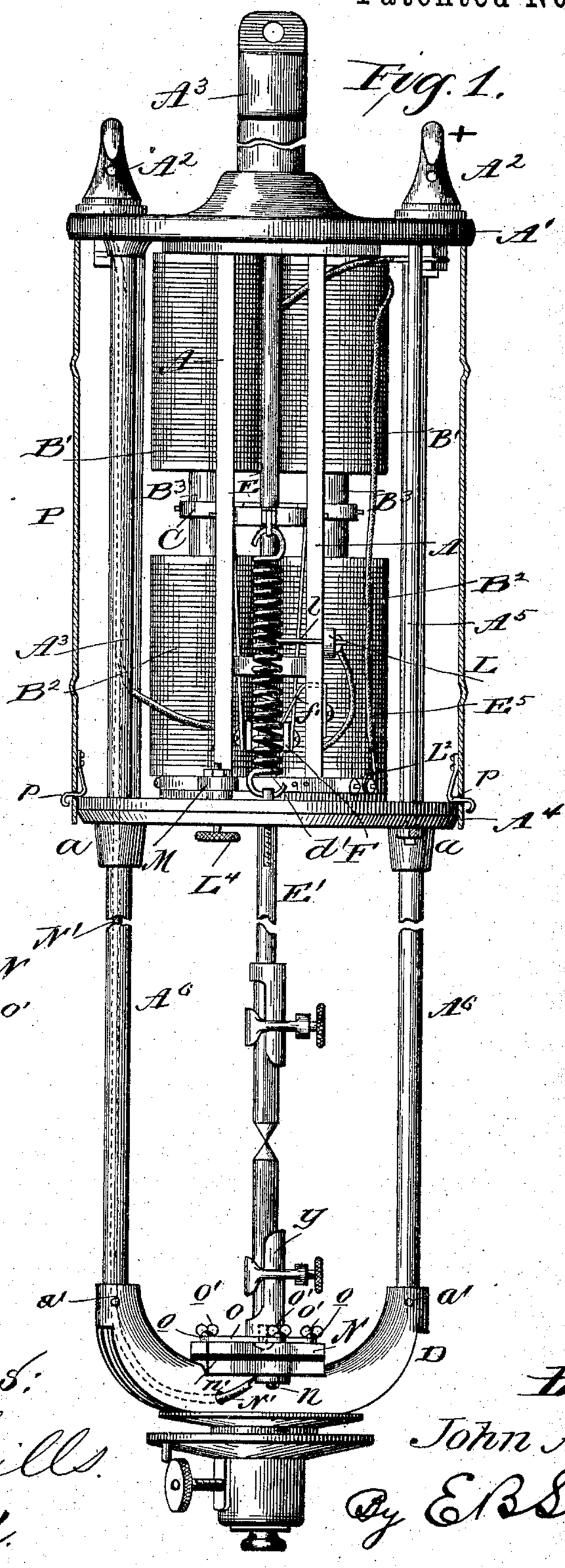

Fig. 1.a

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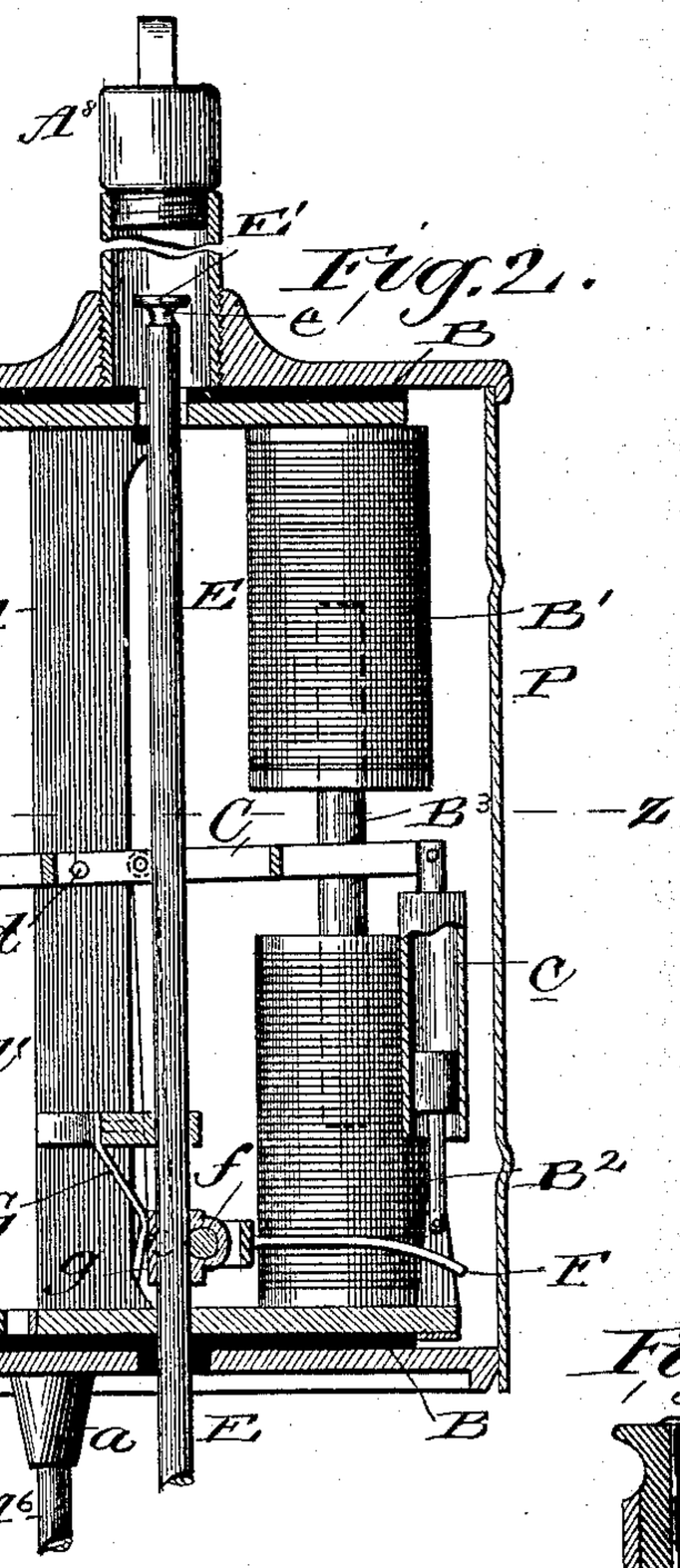

Fig. 2.

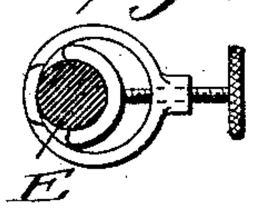

Fig. 7.

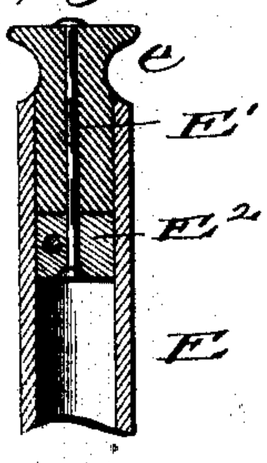

Fig. 8.

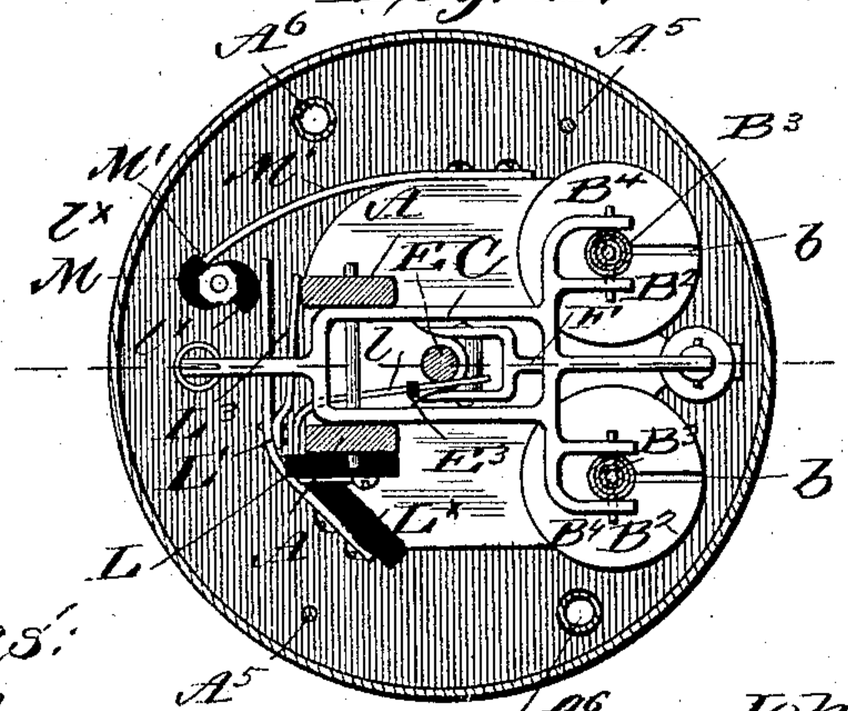

Fig. 4.

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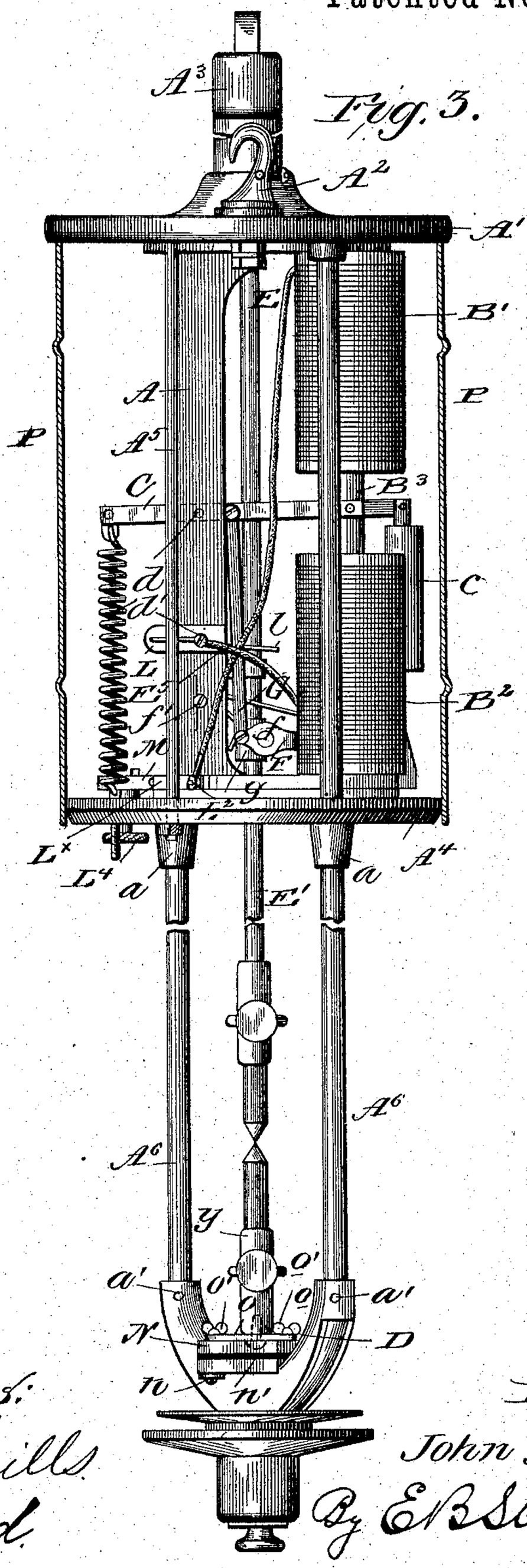
Fig. 3.



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ELECTRIC ARC LAMP.

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Fig 5

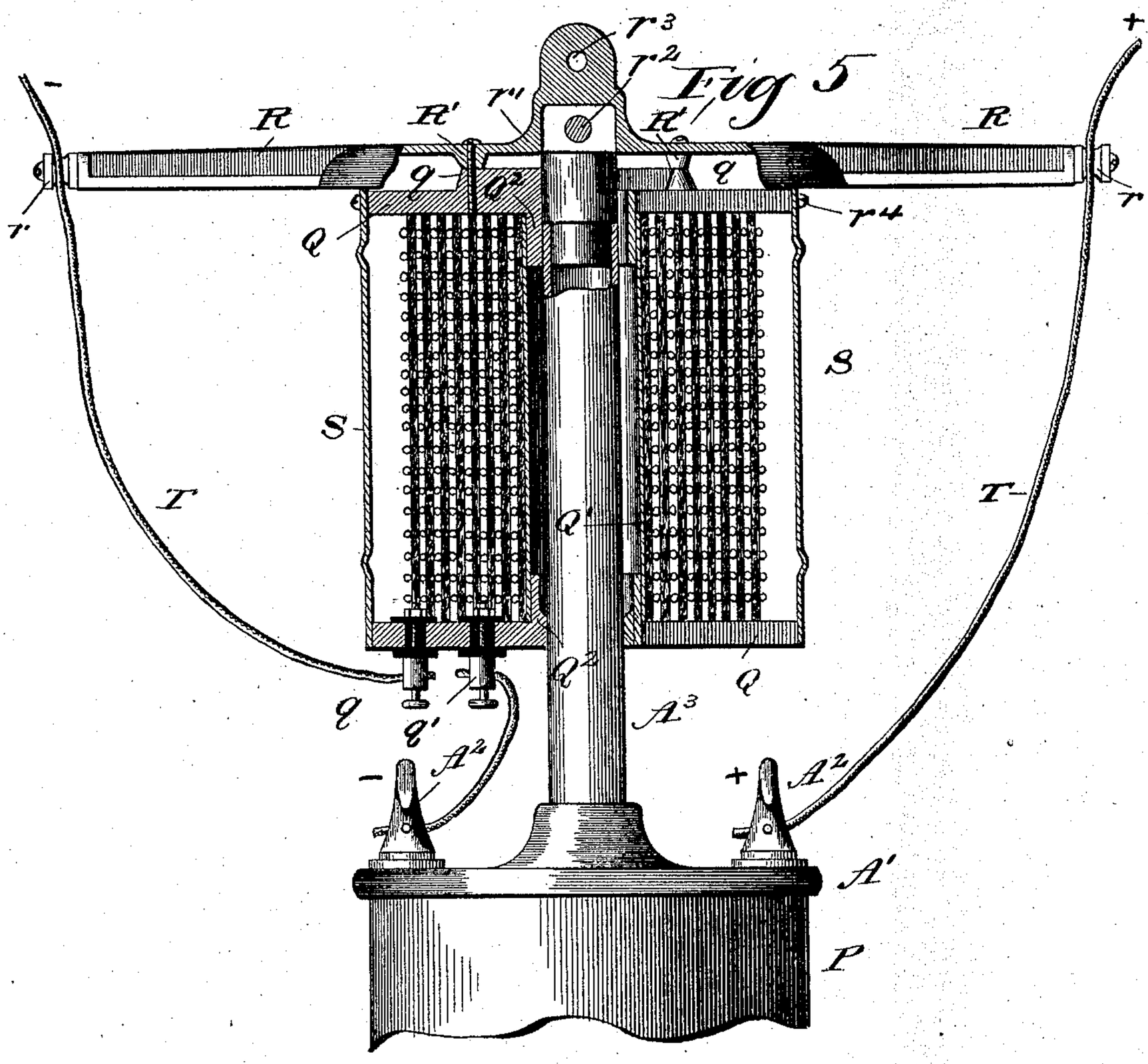
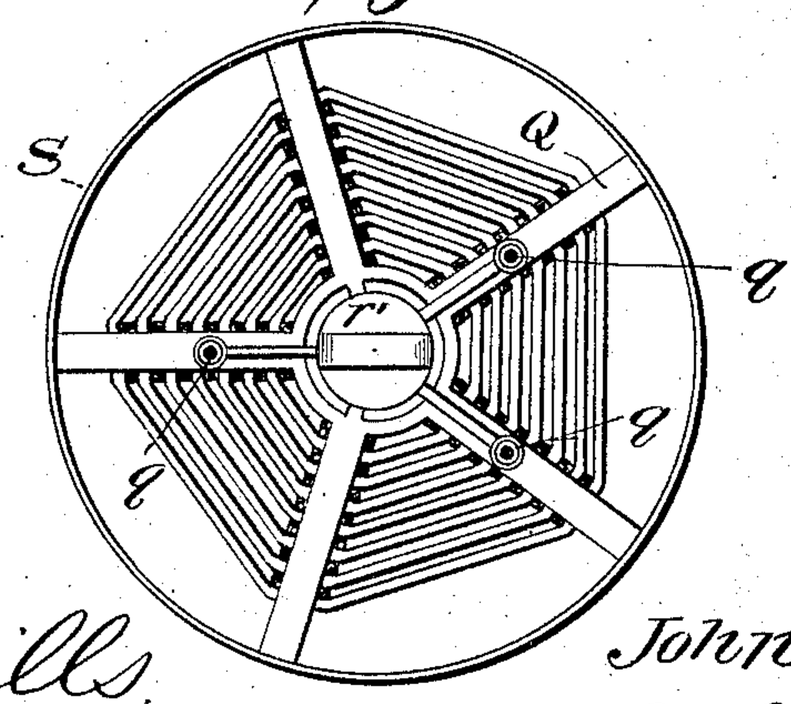


Fig. 6



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UNITED STATES PATENT OFFICE.

JOHN A. MOSHER, OF CHICAGO, ILLINOIS.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 485,293, dated November 1, 1892.

Application filed January 2, 1892. Serial No. 416,833. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. MOSHER, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Arc Lamps, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in arc lamps; and it has for its objects, among others, to produce a lamp that will require the minimum of labor in mechanical construction; also, that will burn on an alternating constant-potential current circuit, as well as on a direct-current circuit.

Other objects and advantages of the invention will hereinafter appear, and the novel features thereof will be specifically defined by the appended claims.

The invention in its preferable form is clearly illustrated in the accompanying drawings, which, with the letters of reference marked thereon, form a part of this specification, and in which—

Figure 1 is a side elevation of my improved lamp. Fig. 1ª is a detail in plan of the lower carbon-holder plate. Fig. 2 is a central vertical section through the upper part of the lamp. Fig. 3 is a side elevation at right angles to Fig. 1. Fig. 4 is a cross-section on the line *z z* of Fig. 2. Fig. 5 is an enlarged sectional view of the rheostat. Fig. 6 is an end view of the rheostat. Fig. 7 is a cross-section through the carbon-rod, showing the clamp in plan. Fig. 8 is a sectional detail showing the fiber plug in the end of the carbon-rod.

Like letters of reference indicate like parts throughout the several views.

Referring now to the details of the drawings by letter, A designates a cast-iron frame, in which all the working parts of the lamp are secured independent of the frame of the lamp proper, so that it is practically impossible for the parts to get out of line or cramped in any way.

A′ is the upper disk, to which are attached the binding-posts A^2 and chimney A^3.

A^4 is the lower disk.

A^5 are rods connecting the upper and lower disks, being screwed into the one disk and connected to the other in any suitable manner—say, for instance, by passing therethrough—and provided with nuts on their ends.

A^6 are small metal tubes or gas-pipes secured to the upper disk A′ and extended down through bosses *a* on the under side of the lower disk and are secured at their lower ends in any suitable manner, as by removable pins *a′*, to the yoke D.

B is insulation arranged at the under side of the upper disk and the upper side of the lower disk, as seen best in Fig. 2, and serving to insulate the frame A from the frame of the lamp proper, and as the lower disk is made to slide freely on the tubes A^6 all that it is necessary to do to hold the frame A in place is to tighten the nuts on the lower ends of the said rods, when the frame will be clamped firmly between the disks.

B′ are the main-circuit coils, and B^2 are the derived-circuit coils. Their relative positions will be best understood from Figs. 1 and 4.

B^3 are the magnet-cores. They are preferably built up of thin pieces of annealed sheet-iron with a thickness of paper between each two pieces of iron, thus making a thoroughly-laminated core. I have found that I get just as good results by not connecting the cores together in the letter-H manner, as heretofore. When the coils are arranged in this manner, the spools on which the main and derived circuit coils are wound are made of fiber to avoid induction, or the spools may be made of metal if split, as shown at *b* in Fig. 4, the spools being designated by the letter B^4.

C is a walking-beam pivoted to the frame A, as at *d*, and carries at one end a regulating-spring *d′*, and at the other end it has the magnet-cores B^3 and dash-pot or air-cushion *c* attached, as seen best in Fig. 4.

L is a small block of insulation secured to the frame A in any suitable manner, and to this block is attached the horizontal wire *l*, the free end of the wire being arranged to rest firmly against the carbon-rod E, thus making electrical contact, as seen best in Fig. 4. The top end of the carbon-rod has a fiber plug E′ inserted therein and riveted or otherwise secured in place in any suitable man-

ner—as, for instance, as seen in Fig. 8, where it is shown as secured to a metal plug E^2, which in turn is secured to the carbon-rod in any suitable manner. (See Fig. 8.) This avoids any liability of the fiber getting loose or breaking off. This fiber plug is grooved out just beyond the end of the carbon-rod, as seen at *e*, so that when the carbon-rod feeds down the free end of the wire *l* will rub against the rod; but when it comes to the plug the free end of the wire will slip off the carbon-rod into the groove, and thus break electrical contact with the carbon-rod. The outer end of the plug is slightly greater in diameter than the rod, as seen in Figs. 2 and 8, and the shape of the groove is such, being beveled on its under upper wall, that the free end of the wire will slip back onto the carbon-rod when the same is shoved up to trim the lamp, as will be readily understood from Fig. 8.

E^3 is a small fiber stop or collar on the wire *l* near its free end to prevent the wire from coming in contact with any metal except the carbon-rod. The stationary end of the wire *l* is connected with or attached to one of the terminals E^5 of the derived-circuit coils or magnets, as best seen in Fig. 3.

F is a trip-lever carrying the grip-pin *f*, and *f'* is a wire used as a spring, (see Figs. 1, 2, and 3,) being passed through a hole in the frame A and bent in such a manner that its free end rests upon the top of the trip-lever. The manner of attaching and bending this spring will be readily determined in practice. The function of this spring resting on the trip-lever is to keep the grip-pin firmly pressed against the carbon-rod to prevent slipping only when the rod is allowed to feed by the end of the trip-lever coming in contact with the bottom of the frame A, thus revolving the grip-pin sufficient to release the carbon-rod, which is allowed to feed downward by gravity. The trip-lever and grip are substantially the same as shown and described specifically in my application, Serial No. 378,956, filed Jannary 24, 1891.

G is a flat spring, the free end of which rests against the back of grip-block *g*. The pressure of this spring keeps the grip-block from rocking or tilting and cramping the carbon-rod when the feed takes place by the trip-lever coming in contact with the bottom of the frame A, as well as making electrical contact with the grip-block and thus to the carbon-rod, which insures at all times a good contact.

L' is a brass strip secured to the insulating-block $L^\times$ and to which is attached one of the terminals of the main-circuit coils or magnets, as seen at L^2 in Fig. 3. The free end of this strip has a branch or prong L^3, which is allowed to come in contact with the frame A when the fiber block M is in one of its two positions. This fiber block M rubs against a spring-arm M', (see Fig. 4,) which holds the block in position. When the brass strip is in contact with the frame A and the fiber block is turned one-quarter round, the brass strip will slip off the shoulder $l^\times$ on the fiber switch-block and rest in the same position that the spring-arm M' did, thus allowing the brass strip to instantly break contact with the frame A. It is in fact a snap-switch, which is necessary when the circuit is to be entirely broken to avoid sparking.

L^4 is a thumb-screw by which the fiber block or switch is designed to be turned or rotated.

N is a casting secured to the yoke D by screws *n* and insulated from the yoke by an insulating-washer *n'*. (See Figs. 1 and 3.) One of the securing-screws has attached thereto the return negative wire N', as seen in Fig. 1, which wire passes upward through the tube A^6, as seen in said Fig. 1, to one of the binding-posts A^2.

O is a piece of steel having four radial arms *o*, each with a thumb-screw *o'* through the end of the arm and screwed into the casting N. The lower-carbon holder *y* is secured to this piece of steel by means of a round-headed screw, which passes up through the center of the steel and into the lower-carbon holder. The casting should have a countersink for the reception of the head of the screw. This center screw serves as a pivot to permit of adjustment of the piece of steel and carbon-holder. It will be readily seen that if one of the screws passed through the end of any one of the radial arms is tightened or the one diametrically opposite thereto be loosened the upper end of the carbon-holder will be tilted so that the lower-carbon holder can be adjusted to bring the parts in such position as to bring the upper and lower carbons together. Both the lower-carbon holder and the upper one may be of any approved form of construction; but I preferably employ the form shown and described in my application above referred to.

The magnets and operating parts may be inclosed in any suitable manner—as, for instance, by a sheet-metal case, as seen in Figs. 1, 2, and 3, which may be held in position in any suitable manner, as by spring-catches, as seen at *p*, attached to the inner wall of the case P and adapted to engage the upper face of the lower disk, as seen in Fig. 1.

In Figs. 5 and 6 I have shown my improved rheostat, which I prefer to employ in this connection. It consists of the upper and lower castings Q with radial arms, the upper casting having bosses *q*, while the lower casting is webbed between two of its arms, as seen in Fig. 5, and to this webbed portion are attached or supported the two binding-posts *q'*. These castings are separated and held the required distance apart by a tube Q', riveted or otherwise held to the projections or bosses Q^2 on the castings, as seen in Fig. 5. The arms of the castings are grooved upon their adjacent faces to receive the metal strips, which in turn are covered by asbestus or any other fireproof insulation. I first preferably take a strip of metal and asbestus and place

it in the grooves of the arms and then a layer of wire composed, preferably, of braided wire of two or more strands. I prefer a core of somewhat larger wire and smaller wire braided around it. This holds the wires apart and gives better radiation, thus avoiding heat. This manner of winding the wire on the rheostat is kept up till there are six consecutive layers. The one terminal is fastened to one of the binding-posts q' and the other terminal to the other binding-post, as seen in Fig. 5.

R is a casting the body of which is saucer-shaped with radial arms provided with porcelain insulators r. The center of this casting has a boss r', which allows the top of the lamp-chimney A^3 of the lamp to enter, and it is secured by a screw or other means r^2, which passes through the boss of the casting and into a hole at the top of the lamp-chimney, as seen in Fig. 5, the boss being provided with a hole r^3 for the attachment of the means by which the whole is suspended.

R′ are small bosses on the under side of the casting R, corresponding with the bosses q, as seen in Fig. 5. The casting R forms a hood over the rheostat proper, and yet provides ample ventilation.

S is a case or cage extending from the upper to the lower casting and secured to the ends of the arms thereof in any suitable manner, as by the screws r^4. When used in doors, the radial arms on the casting R may be omitted.

Modifications in details of construction may be resorted to without departing from the spirit of the invention or sacrificing any of its advantages.

With the parts constructed and arranged as above set forth the lamp works as follows: The current enters at the positive binding-post of the lamp, then to the main-circuit coils, then to the stationary end of the brass strip L^2, then through the brass strip L, through which it is in contact with the carbon-rod, and passes down through the rod and carbons to the lower-carbon holder and back through the wire that passes from the lower-carbon holder up the tube A^6 to the negative binding-post and through the rheostat. The wires leading to the rheostat from the binding-posts A^2 are designated by the letter T. The current to supply the derived circuit is taken from the carbon-rod by means of the wire l, then around the derived-circuit magnets, and then to the negative binding-post. The carbons are together when the lamp is at rest, and when the current is turned on they are separated by means of the main-circuit magnets and the arc is formed. When the carbons are together, there is practically no current through the derived-circuit coils; but as the arc is lengthened the derived-circuit magnets increase in power and pull in the opposite direction to the main-circuit magnets, so the length of the arc is determined by the point at which the force of the two magnets balance—that is, the main and derived circuit magnets. As the arc lengthens, the main-circuit coil diminishes in power and the derived increases, and the magnets and the suspended parts are allowed to descend until the trip-lever rests on the bottom of the frame A sufficient to slightly revolve the grip-pin enough to release the carbon-rod, which is allowed to descend by gravity sufficient to maintain a normal arc. When the carbon-rod has descended its entire length, the wire l will slip off the end into the groove in the fiber plug E′, thus breaking the derived-circuit connection, and then the main-circuit magnet, not having any opposition, will rise to its fullest extent, thus separating the arc too far to be maintained, which will break. The lamp will then be at rest, as the carbon-rod cannot descend enough to let the carbons touch again, owing to the top of the fiber plug being larger than the carbon-rod. By this means the lamp will cut itself out.

What I claim as new is—

1. The combination, with the carbon-rod, of a fiber plug in the upper end thereof and a spring-contact carrying the lighting-current, having a portion in contact with the rod, as set forth, the spring co-operating with the plug to cut out the lamp at the end of the movement of the rod.

2. In an arc lamp, a spring-contact and a carbon-rod provided with a fiber plug with a portion extended beyond the end of the rod and of greater diameter than the rod and having a circumferential groove above the end of the rod, as and for the purpose specified.

3. The combination, with a carbon-rod provided with a fiber plug having a groove, of a contact adapted to move in electrical contact with the rod and engage said groove, as set forth.

4. The combination, with the carbon-rod having a fiber plug with groove, of a spring-contact carrying the lighting-current and having its free end held against said rod, the spring co-operating with the plug to cut out the lamp at the end of the movement of the rod, as and for the purposes specified.

5. The combination, with the carbon-rod having a fiber plug with groove and of greater diameter than the rod outside the same, of a spring-contact with its free end held against the rod and provided with a stop, as and for the purpose specified.

6. The combination, with the frame, the carbon-rod, and the trip-lever and block embracing said carbon-rod, of a plate-spring having its free end resting against the said block, as and for the purposes specified.

7. The combination, with the lower-carbon holder, of a plate to which it is attached, provided with a plurality of arms, the casting beneath said plate, the interposed insulation, and means for holding and adjusting each arm independent of the other to tilt the plate and holder, as and for the purposes specified.

8. The combination, with the frame and the rotatable switch-block, of a spring-arm hav-

ing a prong substantially parallel therewith to engage the frame, as and for the purposes specified.

9. The combination, with the rotatable fiber switch-block, of the spring-arm arranged to engage said block and having a prong substantially parallel therewith to engage the frame, as and for the purpose specified.

10. The combination, with the main and derived circuit magnets and their cores, of the walking-beam carrying the cores, a cushioning device for the same, the carbon-rod, the spring-contact engaging the same, the trip-lever and grip-pin, and the spring bearing directly against the grip-block, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN A. MOSHER.

Witnesses:
JOHN M. FISHER,
GEO. WEHMHOEFER.