No. 630,905. Patented Aug. 15, 1899.

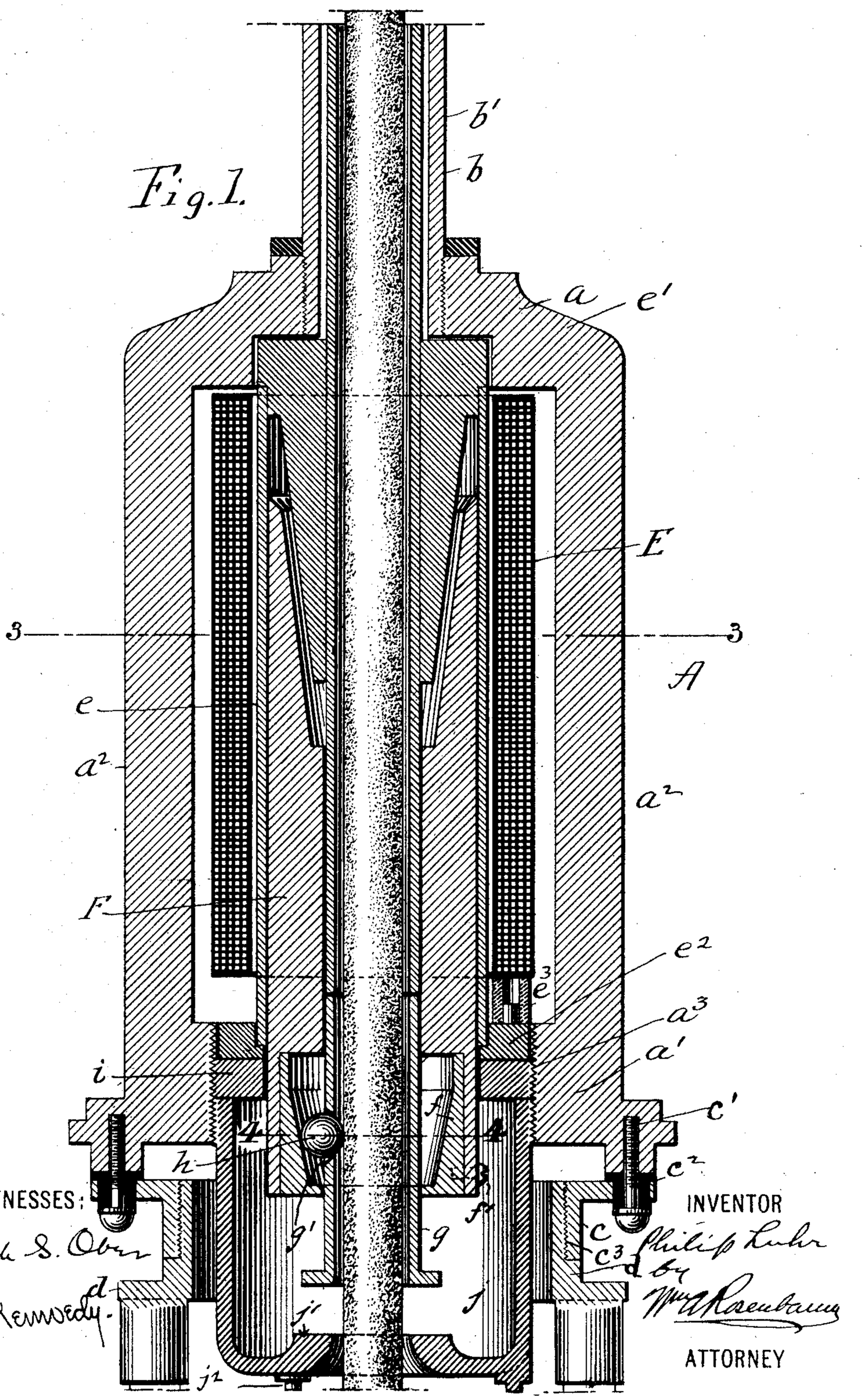
P. LUHR.

ELECTRIC ARC LAMP.

(Application filed Aug. 17, 1898.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



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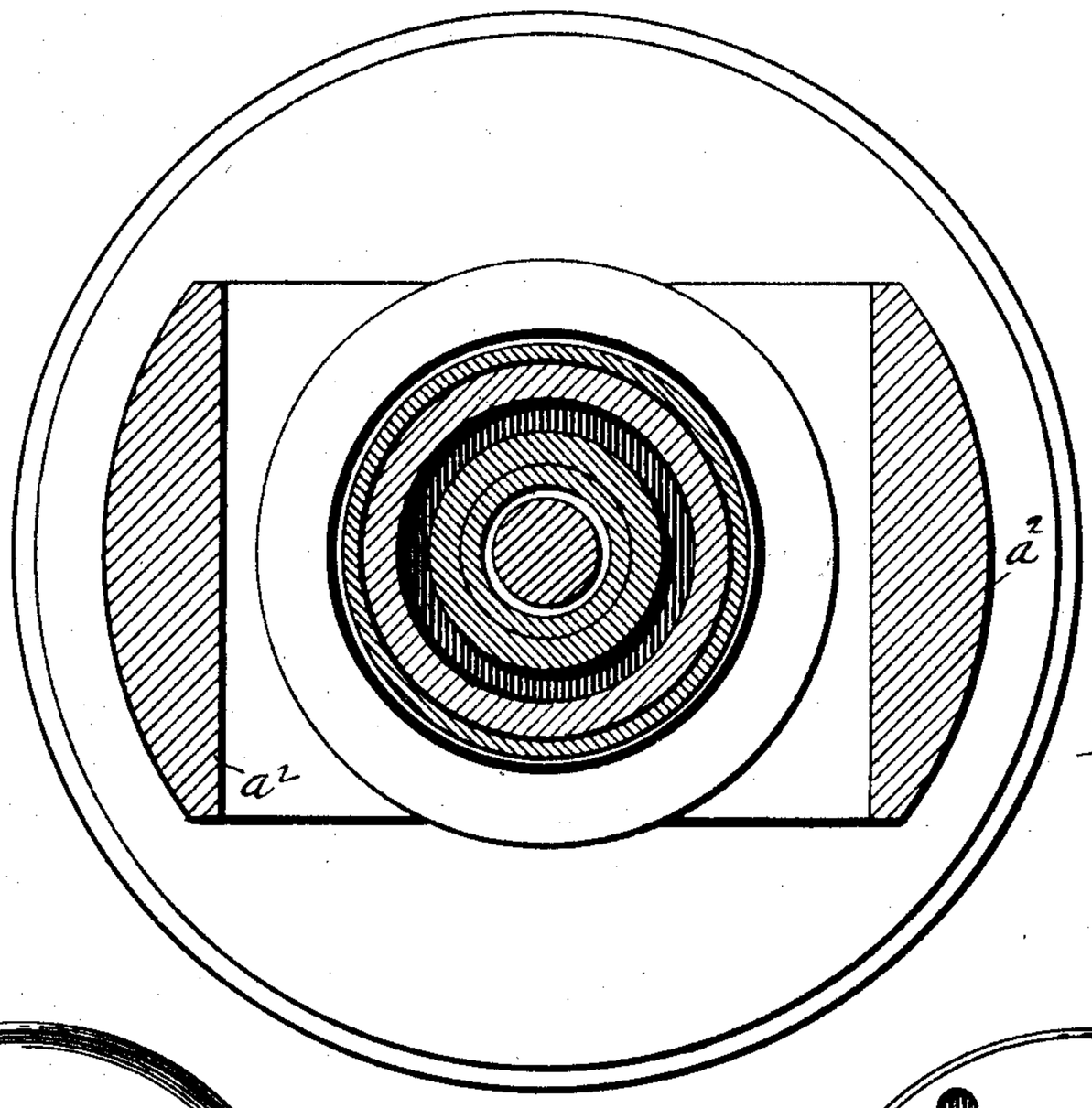

Fig 2

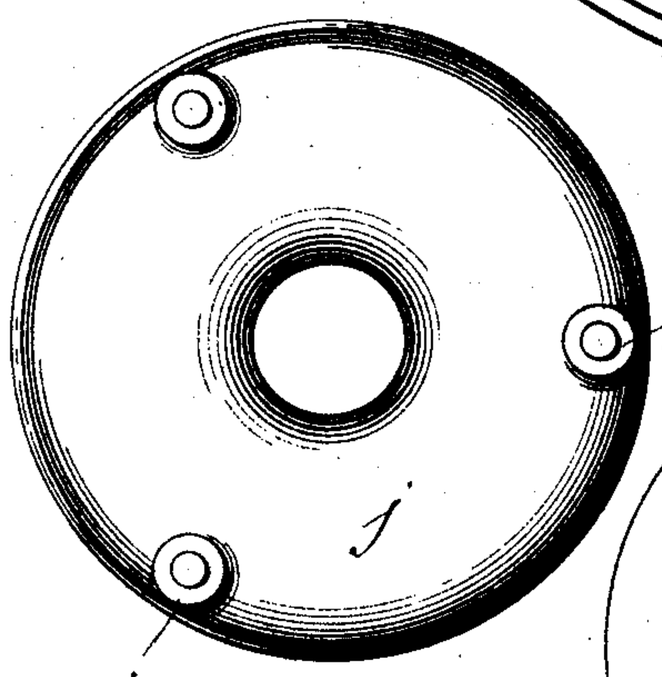

Fig. 4

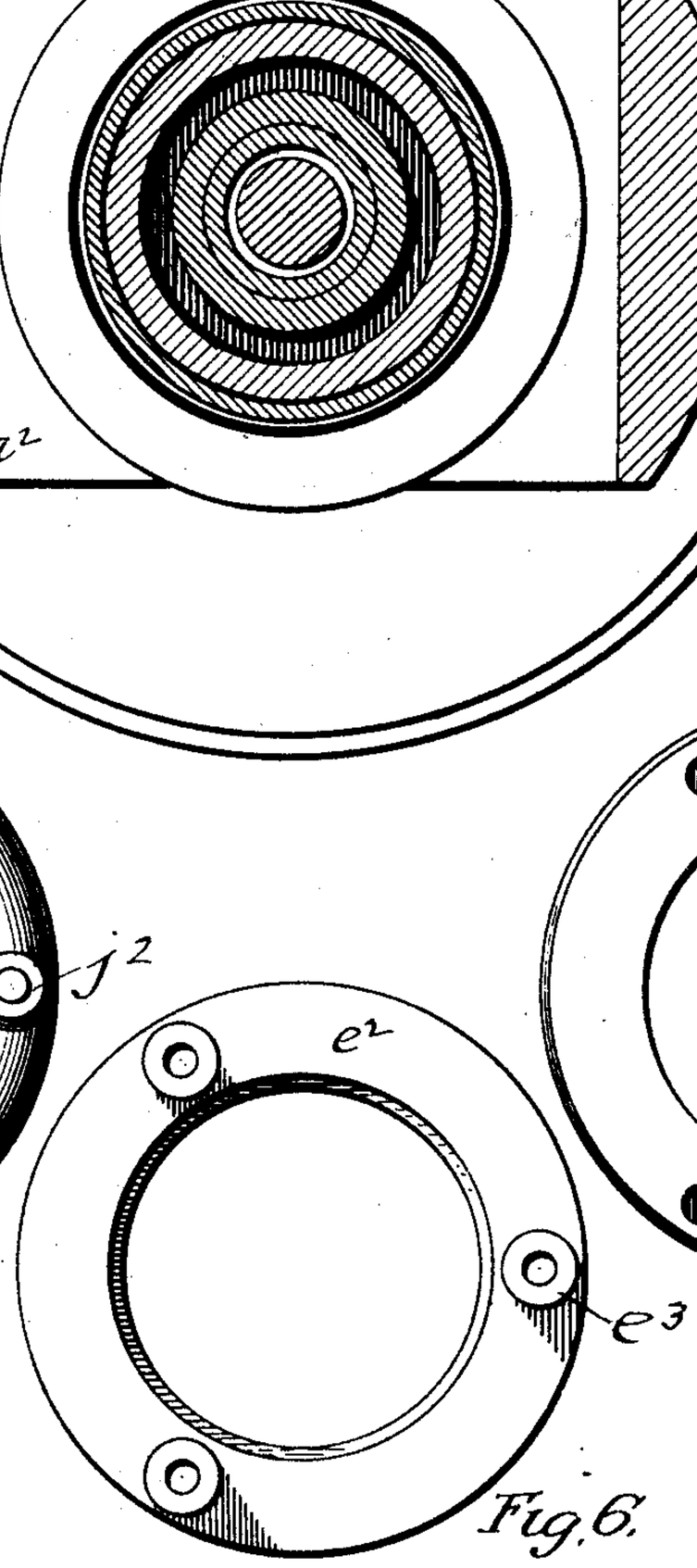

Fig. 6.

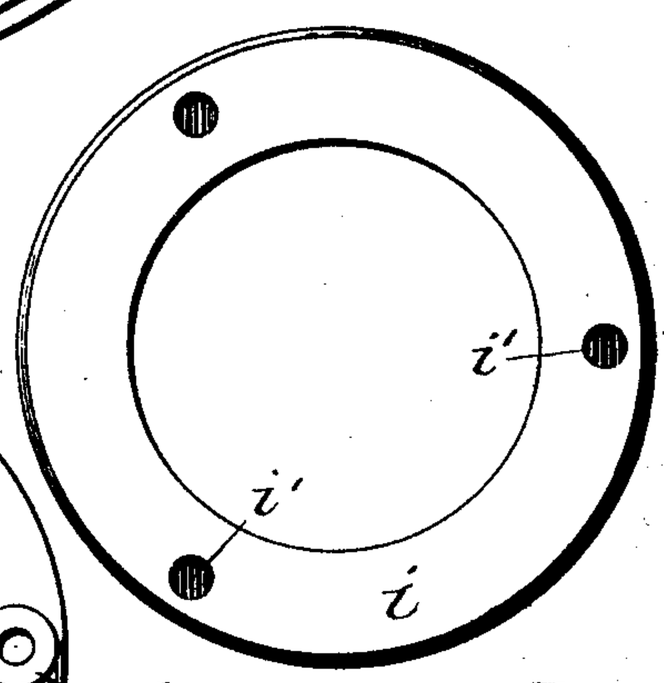

Fig. 5.

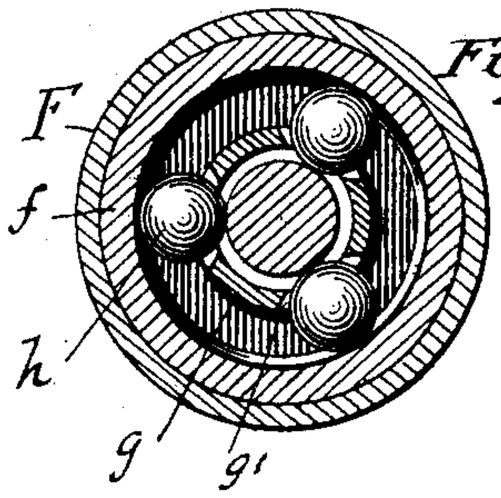

Fig. 3.

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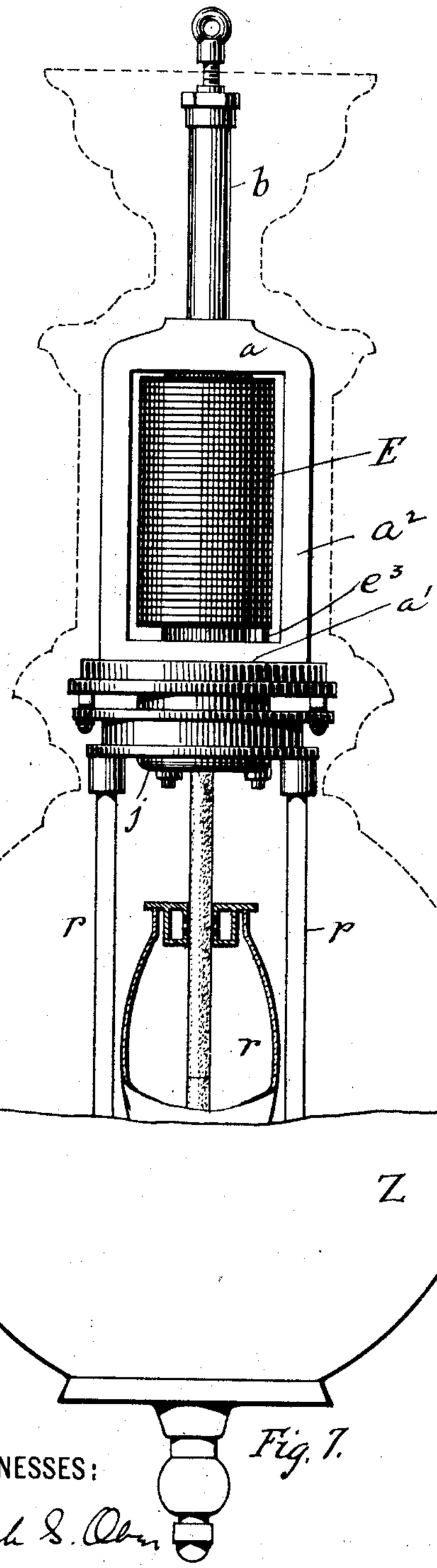

Fig. 7.

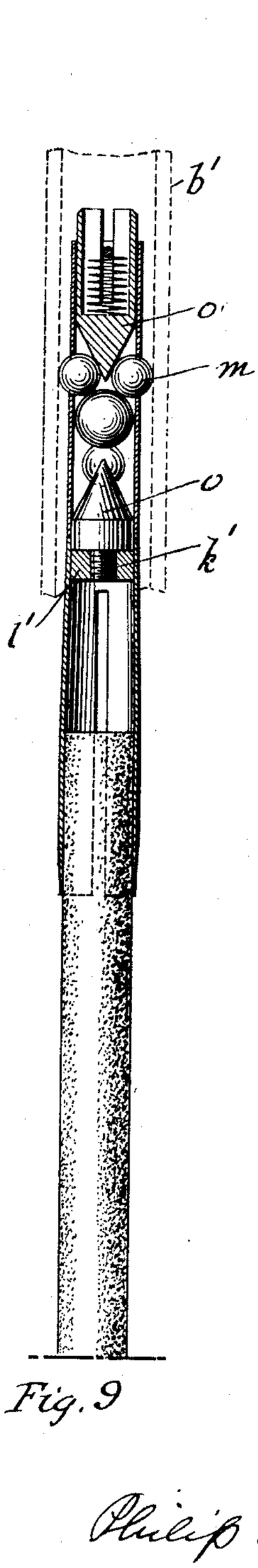

Fig. 9

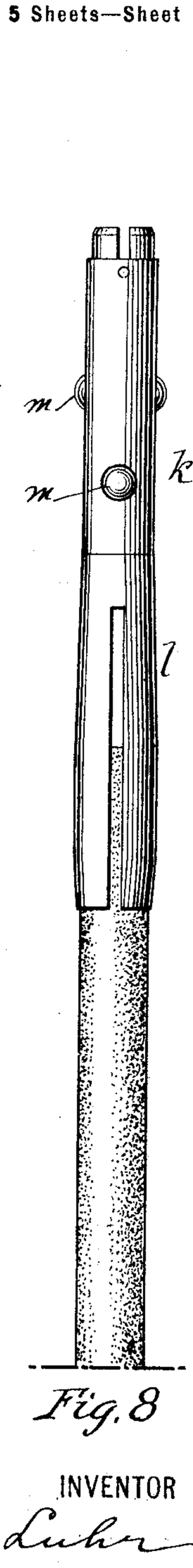

Fig. 8

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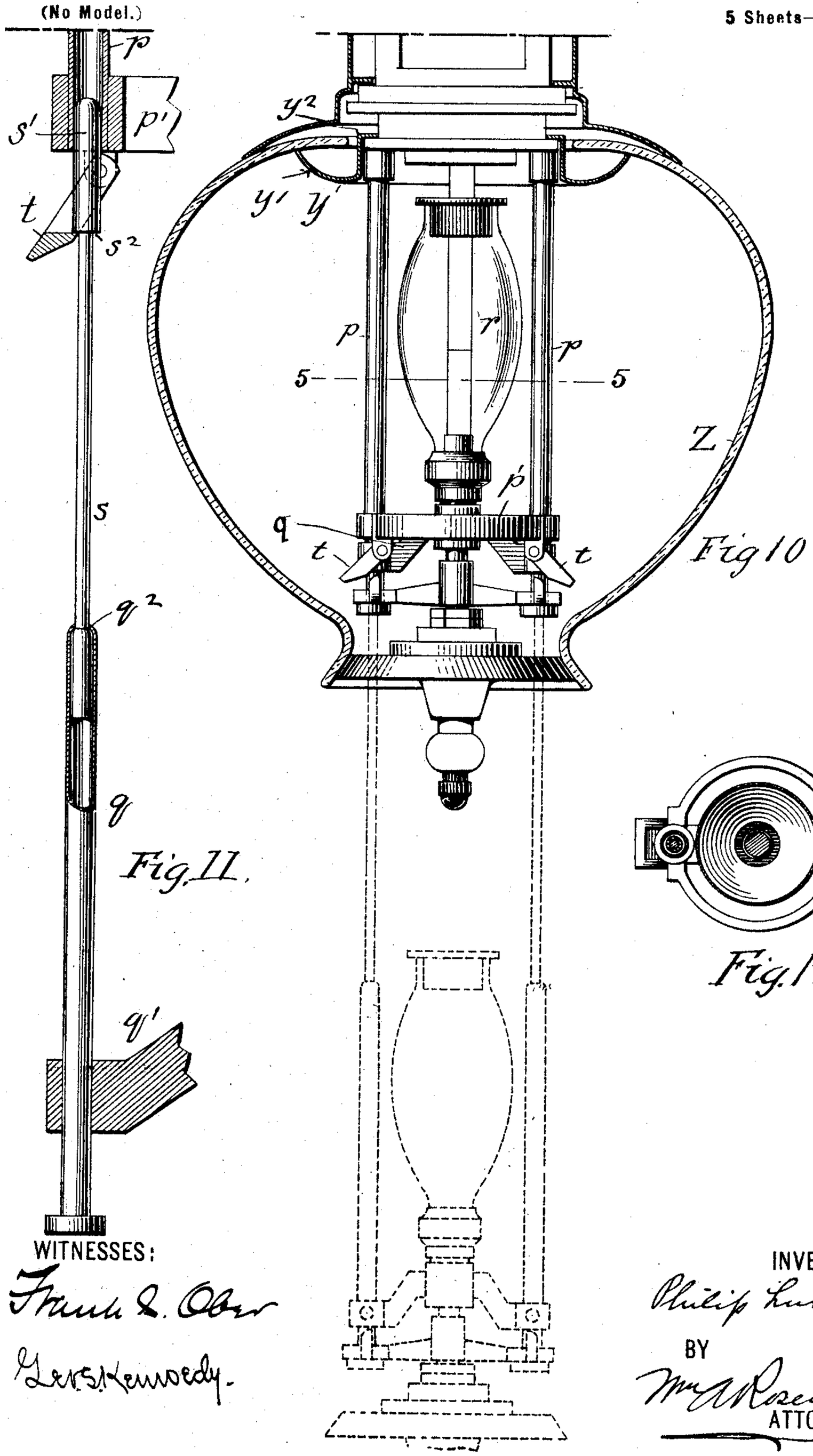

Fig 10

Fig. 11.

Fig. 12

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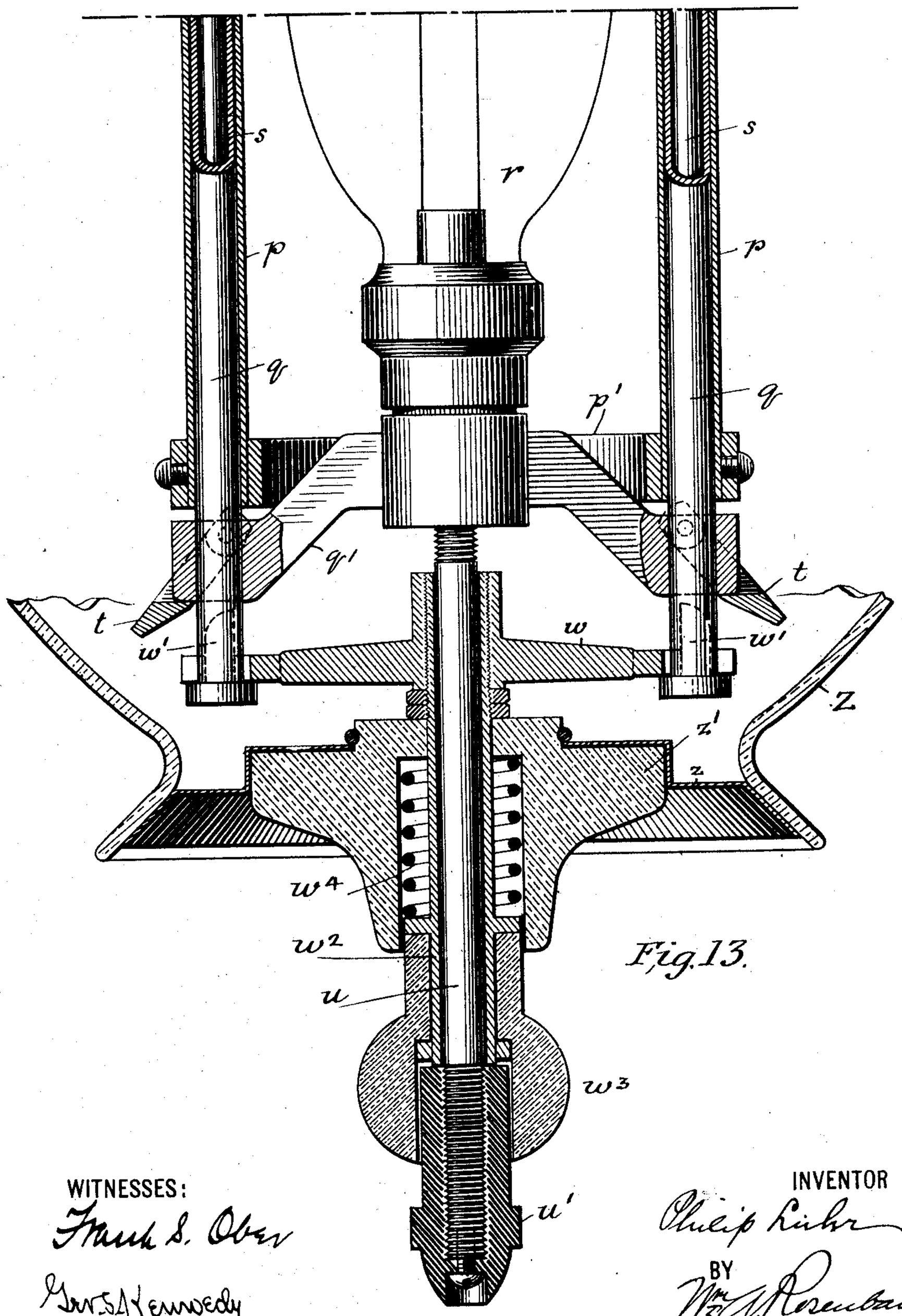

Fig. 13.

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UNITED STATES PATENT OFFICE.

PHILIP LUHR, OF ORANGE, NEW JERSEY, ASSIGNOR TO THE MANHATTAN GENERAL CONSTRUCTION COMPANY, OF NEW YORK.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 630,905, dated August 15, 1899.

Application filed August 17, 1898. Serial No. 688,829. (No model.)

To all whom it may concern:

Be it known that I, PHILIP LUHR, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a full, clear, and exact description.

This invention relates to electric-arc lamps of that type in which the arc is inclosed in a small and practically sealed globe. The improvements have reference to the arc-regulating mechanism, to the construction whereby the lamp may be readily taken apart and assembled, and to the mechanism for facilitating the "trimming" of the lamp, all of which will be described in detail with reference to the accompanying drawings, in which—

Figure 1 represents a vertical central section through the upper and arc-regulating mechanism. Fig. 2 is a section on line 3 3 of Fig. 1. Fig. 3 is a section on line 4 4 of Fig. 1. Fig. 4 is a view of the bottom of a combined nut and wrench. Fig. 5 is a view of a retaining-ring. Fig. 6 is a view of a coil-supporting ring. Fig. 7 is a side view of the lamp with parts removed. Figs. 8 and 9 show the carbon-sheath and contact device in elevation and section, respectively. Fig. 10 is a side view of the lower portion or "trim" of the lamp, showing in dotted lines the inner globe lowered. Fig. 11 is a detail of one of the telescoping side rods. Fig. 12 is a section through line 5 5 of Fig. 10. Fig. 13 is an enlarged sectional view of the mechanism for lowering the inner globe.

With reference to the upper part of the lamp, A is an iron magnet-frame consisting of top and bottom disks a and a', connected by oppositely-disposed side uprights a^2. The upper disk is perforated centrally and threaded to receive the lower threaded end of a tube b, by which the lamp is suspended and which contains the carbon-inclosing tube b'. The lower disk a' is also provided with a large central opening a^3, which is threaded to receive the supporting devices for the magnet and its armature, as will be hereinafter referred to.

To the under side of disk a' is permanently secured a flanged ring c, by means of screws c', suitable non-conducting bushings c^2 being interposed to effectually insulate the ring from the frame A. The ring thus insulated is provided with threads c^3, adapted to receive a threaded ring d, from which all the lower portions of the lamp depend. The positive current of the lamp traverses the frame A and other upper parts, while the negative current is in the lower parts supported by the ring c, the two currents being effectually insulated and the construction of the lamp being such, as will be seen, that it is never necessary to disturb the insulation in any manipulation of the lamp while it is on the line.

A single magnet-coil E is used in this lamp, and it is located between the uprights a^2 axially in line with the disks $a\,a'$. The coil surrounds a brass sleeve e, which carries at its upper end a fixed iron core e' and at its lower end a fixed iron ring e^2. The core e' is conical in shape and projects downward into the coil. To the core is attached a brass tube b', passing axially through it and extending downward to a point near the lower end of the coil and upward through the tube b. This tube incloses the upper carbon electrode and furnishes a guide therefor. The armature of the magnet is a cylinder of iron F, having a conical cavity in its upper end corresponding to the conical shape of the core, over which it will fit. It also has a central passage, into which the tube b' enters and through which the carbon passes. The armature thus fills the annular space between the cylinder e and the tube b, the air in the space between the core e and the armature being confined forms a cushion to retard the movements of the armature. The lower end of the armature has formed in it a cylindrical cavity, in which is placed a pan f, containing a conical chamber through which the carbon-rod passes. The bottom of the pan is closed, except for a central opening through which the carbon passes axially. A loose sleeve g surrounds the carbon and projects upward toward the tube b' and downward through the bottom of the pan. This sleeve is provided with three lateral openings g', and the pan contains three metallic balls h, one extending into each of the lateral openings g' and adapted to bear against the surface of the carbon-rod passing through the sleeve. The upward movement of the

sleeve with respect to the armature lifts the balls toward the widest diameter of the conical chamber in the pan and so removes them from contact with the surface of the carbon, while, on the other hand, the upward movement of the armature and pan will throw the balls into the narrower diameter of the conical chamber and force them into contact with the carbon, causing the carbon to be clamped and to travel upward with the pan. The pan is secured in the armature by a screw f'. The lower end of tube b' serves as a stop, against which sleeve g may strike to limit the "pick-up" of the carbon when the current is turned on. When the lamp is not burning, the sleeve and armature both rest on the table j', the balls being in the upper or widest part of the conical chamber. When the current is turned on, the armature rises independently of the sleeve until the balls grip the carbon, whereupon the sleeve and carbon follow until the sleeve strikes the end of tube b'. With this arrangement different sizes (diameters) of carbons may be used, for with the smaller sizes the armature simply travels farther before the carbon is gripped, and with all sizes the length of the pick-up is the same.

The magnet-coil E is supported on three feet or spacing-blocks e^3, of insulating material, carried on the top of the ring e^2, the latter being attached friction-tight to the sleeve e. The magnet-coil is thus elevated from the ring, which permits a current of air to pass under it and upward through a space between the coil and the cylinder e to ventilate the parts. The ring e^2 and the parts which it carries are supported in place by a nut i, the ring having a smooth periphery and passing upward into the opening in disk a', without engaging with its threads, and the nut being screwed into place behind it until it is supported at the position indicated in Fig. 1.

j represents a device having several functions. It is a cup-shaped casting having a central opening in its bottom, through which the carbon-rod passes and around which a horizontal rim j is formed to receive the end of the clutch-sleeve g and limit the movement of the latter. The upper edges of the casting are surrounded by a screw-thread adapted to enter the opening in disk a', behind the nut i, it being thereby supported in place. The cup thus supported forms an air-chamber protecting the upper parts of the lamp from the heat of the arc. In dismantling the lamp the cup is used as a wrench to remove the nut i. For this purpose it is provided on its under side with three pins j^2. When the cup has been removed, the armature is next taken out by drawing it downward, and then by reversing the cup and adjusting its pins to the holes i' in the nut the latter may be unscrewed and removed, after which the ring e^2, with the cylinder e, core e', and the tube b', may be lowered through the opening in the disk a'. The coil comes out laterally through one of the openings between the uprights a^2. The reverse of these operations reassembles the parts described.

Refer now to Figs. 8 and 9 for an illustration of the carbon-sheath and the device for conveying the current to the upper-carbon rod. The fixed tube b' is represented in dotted lines. The carbon-sheath consists of two portions k and l, respectively. The former carries the contact device, and the latter is merely a split cylinder adapted to fit over the end of the carbon-rod. The two parts are held together by a screw k', which enters the plug l', the former being attached to the part k, while the latter is attached to the part l. Thus when either part becomes destroyed or injured it is not necessary to renew the entire sheath. The contact device consists of four balls m, of magnetic material, contained in the tubular part k and projecting partially outside thereof through lateral openings in the tube. The balls are arranged in pairs, each pair standing across the diameter of the tube at right angles to each other and with a larger ball between the two pairs and in contact with each of the others. The conical plugs o and O' enter the opposite ends of the tube and project between the members of each pair of balls, thus preventing them from falling inward. One of these plugs is spring-supported, as shown, to keep the balls in contact and prevent rattling. When the magnet of the lamp is energized, the balls are attracted outward and maintain a good rolling contact with the inner surface of the brass tube b'. This tube being in electrical connection with the positive side of the circuit, the current is conveyed from it through the sheath to the upper carbon electrode. A contact device of this character offers the least resistance to the movements of the carbon-rod and cannot bind in the tube b', because the balls will individually yield to any sidewise pressure.

Depending from the ring d are two hollow side rods $p\,p$, braced at their lower ends by a ring p'. Inside of these rods are two other hollow rods $q\,q$, the lower ends of which pass out of the rods p and are connected together by a yoke q', at the center of which the arc-inclosing globe r and the lower-carbon holder and electrode are supported. Inside of the tubes q are rods $s\,s$. These rods have enlarged lower ends which engage with inwardly-turned lips q^2 at the upper ends of the rods q to prevent them from passing entirely through the open ends of the latter. Likewise the upper ends of rods s have enlargements s', provided with shoulders s^2, adapted to be engaged by latches t, pivoted to the ring p. The enlargements s' are elongated and fit nicely in the tube p, so as to form a guide and steadying device for the rods. From what has been said it will be seen that the arc-inclosing globe is supported upon double telescoping rods, which permit of the dropping of the smaller globe to a very low position for trimming. As a means for raising and lowering

the globe, the yoke q is provided with a downwardly-projecting stem u, having a knob u', of insulating material, at its lower end and screwing at its upper end into the yoke. By using this stem as a handle the globe and telescoping rods may be lifted and lowered.

In order to retain the globe in its elevated position and to release it at will for lowering, I have provided the following-described device:

$t\,t$ represent U-shaped latches pivoted at their extremities to the ring p' and embracing the ends of yoke q'. The latches normally rest against rods q or s, but when the yoke is below them and is lifted its extremities force the latches outward and upward until they fall by their own weight over the ends of the yoke and against the rods q, in which position the yoke will rest upon the latches and so support the globe and rods. To release the latches for lowering the globe, I have provided a cross-arm w, having forked ends, which embrace the two rods q, respectively, immediately below the ends of yoke q'. These forks at the extremities of the arm w are provided on each side with a cam-shaped upward projection w', which normally stands just beneath the latches when in their locking position. By lifting this cross-arm the cams strike the under side of the latches, throwing them upward and releasing the yoke. For the purpose of thus lifting the cross-arm it is connected with a sleeve w^2, surrounding the stem u, the sleeve being screw-threaded into the arm for the purpose of adjustment. The lower end of the sleeve carries a knob w^3, by grasping which the sleeve and cross-arm may be moved vertically independent of the stem. To insure the return of the cross-arm to its lower position (shown in Fig. 13) after it has once been lifted to release the latches, a spring w^4 is used, which bears at one end against the shoulder of the sleeve w^2 and at the other end against the cover of the outer globe.

The outer globe is represented by Z. It is provided with an opening through which the inner globe is lowered, the outer globe not being disturbed in trimming the lamp. This opening is normally covered by the plate z of spring metal, which is provided with a flange to bear against the bottom opening in the globe. This cover has a hub z', of porcelain or other suitable material, which surrounds the sleeve w^2 and is provided with an internal chamber to accommodate the spring w^4 and to furnish a bearing for one end of the spring. Thus when the knob w^3 is lifted the spring is compressed, since the cover-plate is held against the flange of the outer globe. This power stored in the spring will then be exercised to lower the cross-arm w to prevent its sticking in its elevated position.

The operation of lowering the inner globe consists in grasping the knob w^3, (which is of porcelain,) lifting it to release the latches, and allowing the inner globe, the cover z, and the connected parts to lower through the opening in the outer globe to the position shown in dotted lines in Fig. 10. After the lamp has been trimmed the parts are returned to their normal position by pressing upward upon the lowermost knob u'.

If it is desired to detach the trim of the lamp entirely from the other parts, this may be done by lifting both latches while the inner globe is lowered, whereupon the telescoping rods may be drawn entirely out of the stationary rods $p\ p$.

Inside of the outer globe and arranged annularly above the inner globe is a reflector y. This consists of a split ring having a curved surface y', coated with white enamel, and having an upwardly-extending flange y^2, which rests upon a ledge on the upper frame of the lamp. The reflector is made of spring metal, so that its outer edges rest snugly against the inner side of the globe to support the same and exclude air. At the same time the reflector and globe together form an annular air-chamber, which protects the upper works from the heat of the arc.

Having described my invention, I claim—

1. In an arc-lamp, a magnet-coil supported above a floor upon feet or spacing-blocks, in combination with an armature, an air-space being provided between the coil and armature, substantially as described.

2. In an arc-lamp, the combination of an axial magnet, a magnet-frame embracing it, said frame provided with an axial opening through which parts of the magnet pass, and through which the armature of the magnet normally projects, a cup-shaped casting screwing into said opening and inclosing the lower end of the armature, a carbon-rod passing through the armature and cup-shaped casting, a clutch-releasing sleeve carried by the armature and projecting into the cup-shaped casting, the bottom of which serves as a stop for said sleeve in releasing the clutch, substantially as described.

3. In an arc-lamp, the combination of an axial magnet, a magnet-frame embracing it, said frame provided with an axial threaded opening, a nut screwing into said opening and supporting parts of the magnet, a cup-shaped casting also screwing into said opening and inclosing the carbon-clutch, said casting being provided on its lower end with means for engaging the nut, whereby the latter may be unscrewed, substantially as described.

4. In an arc-lamp, a contact device for conveying current to the carbon-rod, which consists of a tube containing a plurality of balls projecting through lateral openings in the sides thereof, in combination with two conical plugs entering the respective ends of the tube and bearing against the balls, for the purpose set forth.

5. In an arc-lamp, a contact device for conveying current to the carbon-rod, which consists of a tube containing a plurality of balls projecting through lateral openings in the sides thereof, in combination with two conical

plugs entering the respective ends of the tube and bearing against the balls, one of said plugs being yieldingly supported, substantially as described.

6. The combination with a fixed outer globe, of a lower-carbon holder, two hollow stationary side rods and double telescoping side rods entering the same and upon which the carbon-holder is supported.

7. In an arc-lamp, a stationary outer globe having a bottom opening, a cover for said opening, telescoping side rods inside of said globe, an inner globe designed to raise and lower and be supported on the telescoping rods located inside the outer globe, means for sustaining the inner globe in its normal or elevated position and mechanism located outside of the outer globe whereby the inner globe may be released and lowered through the opening in the outer globe.

8. In an arc-lamp, a stationary outer globe having a bottom opening, a cover for said opening, stationary side rods inside of said globe, latches supported thereby, an inner globe and a raising and lowering frame carrying the same and normally supported in its elevated position by said latches, and means whereby said latches may be released from outside of the outer globe, substantially as described.

9. In an arc-lamp, the combination of a pair of stationary side rods carrying latches, a pair of telescoping rods therein carrying the lower-carbon holder, said latches adapted to engage and support the carbon-holder, means for disengaging said latches consisting of a reciprocating cross-arm acting upon both latches simultaneously and means for manually moving the cross-arm to release the latches, substantially as described.

10. In an arc-lamp, the combination of a pair of stationary side rods carrying latches, a pair of telescoping rods therein carrying the lower-carbon holder, said latches adapted to engage and support the carbon-holder, means for disengaging said latches consisting of a reciprocating cross-arm acting upon both latches simultaneously, means for manually moving the cross-arm to release the latches and a spring for returning the cross-arm after it has been thus moved, substantially as described.

11. In an arc-lamp, the combination of an arc-inclosing globe, a pair of telescoping rods connected by a yoke, upon which the globe is supported, retaining-latches for said yoke a stem secured to said yoke, by which it may be raised, a sleeve surrounding the stem and carrying a cross-arm, and means for reciprocating the sleeve to release said latches, substantially as described.

12. In an arc-lamp, the combination of a globe having an opening, a cover for said opening, a fixed stem passing axially through said cover, a sliding sleeve on said stem and a spring interposed between the cover and sleeve.

13. In an arc-lamp, the combination of an inner and an outer globe, and a reflector located annularly above the inner globe forming an air-chamber protecting the lamp from the heat of the arc and sustaining the outer globe.

14. In an arc-lamp, a lower-carbon holder, an inner arc-inclosing globe and an outer globe having an opening in its bottom through which the carbon-holder and inner globe are adapted to be raised and lowered, in combination with means for supporting the carbon-holder and inner globe in their raised position, said means being located inside the outer globe, means located outside the outer globe for disengaging said supporting means, and a sustaining device for the carbon-holder and inner globe when in their lower position.

15. In an arc-lamp, the combination of the lower-carbon holder, two hollow stationary side rods and double telescoping side rods entering the same, and upon which the carbon-holder is carried, and means for supporting the carbon-holder against the action of gravity.

In witness whereof I subscribe my signature in presence of two witnesses.

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