No. 668,886. Patented Feb. 26, 1901.

P. H. F. SPIES.

ELECTRIC ARC LAMP.

(Application filed June 5, 1900.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

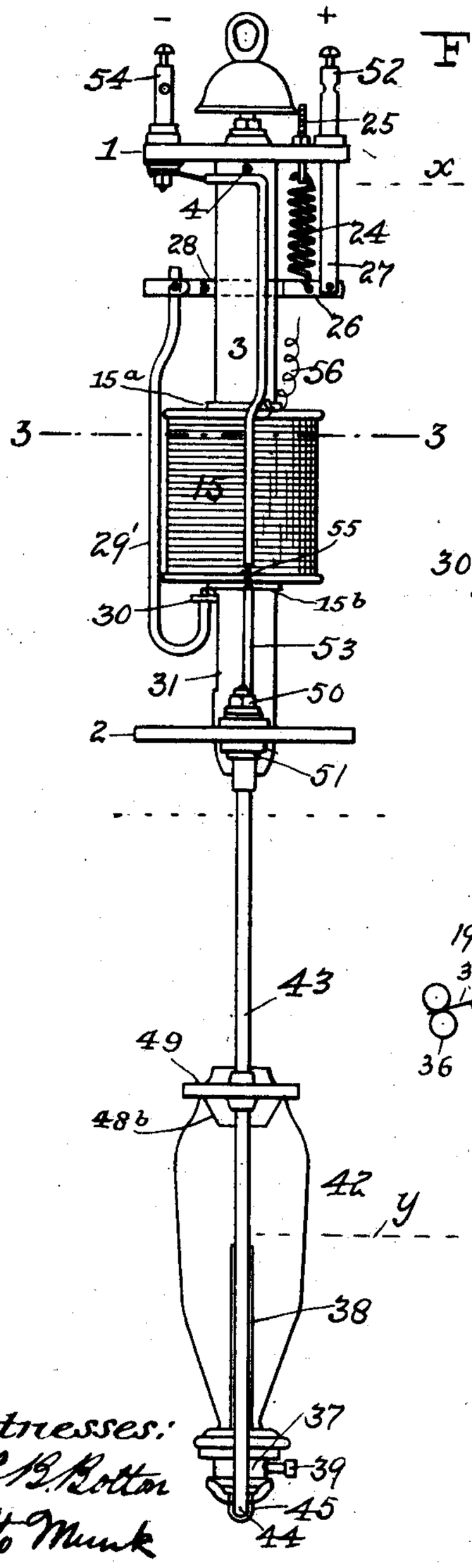


Fig. 2.

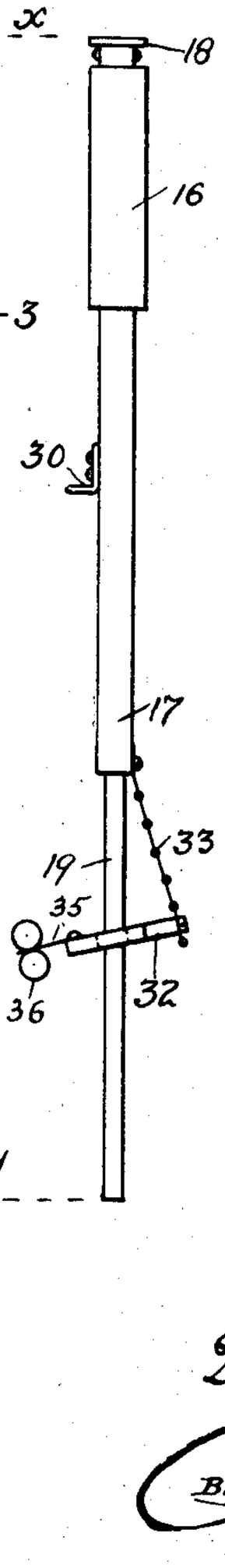


Fig. 3.

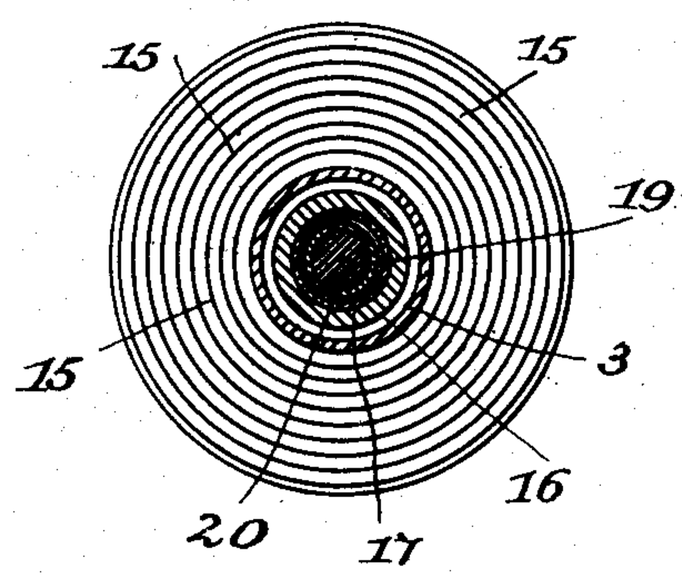


Fig. 5.

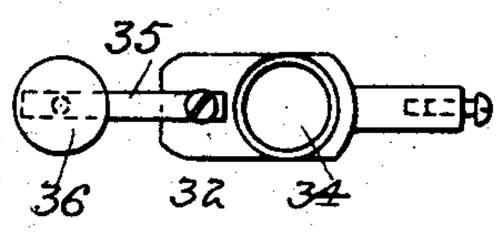
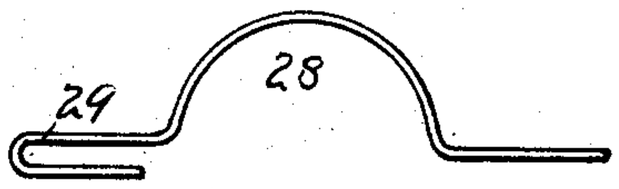


Fig. 6.



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(No Model.) 3 Sheets—Sheet 2.

Fig. 4.

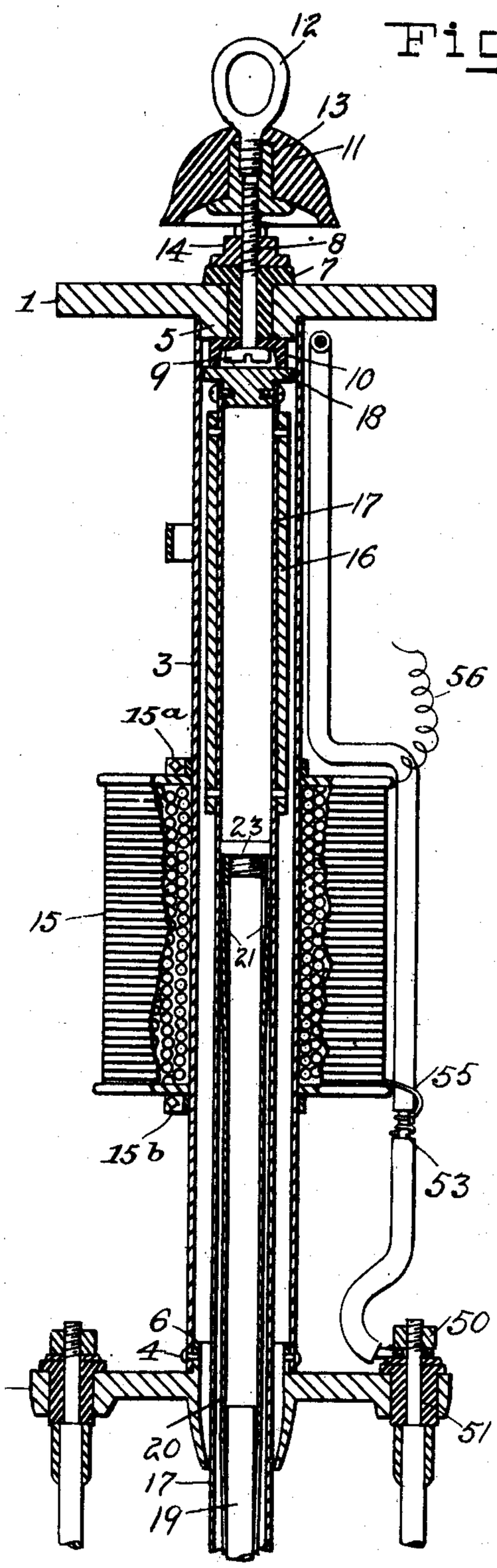
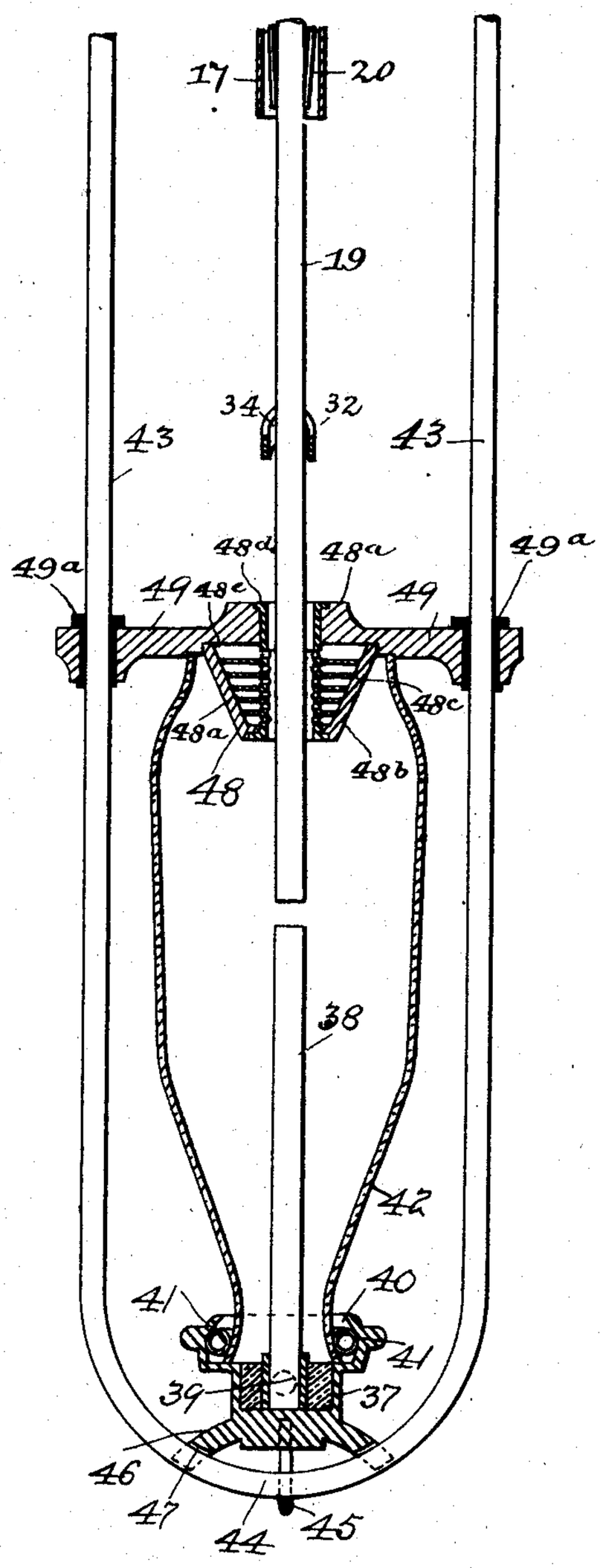


Fig. 4a.



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No. 668,886.

Patented Feb. 26, 1901.

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ELECTRIC ARC LAMP.

(Application filed June 5, 1900.)

(No Model.)

3 Sheets—Sheet 3.

Fig. 7.

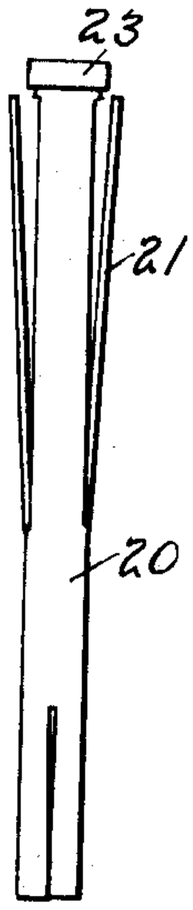


Fig. 8.

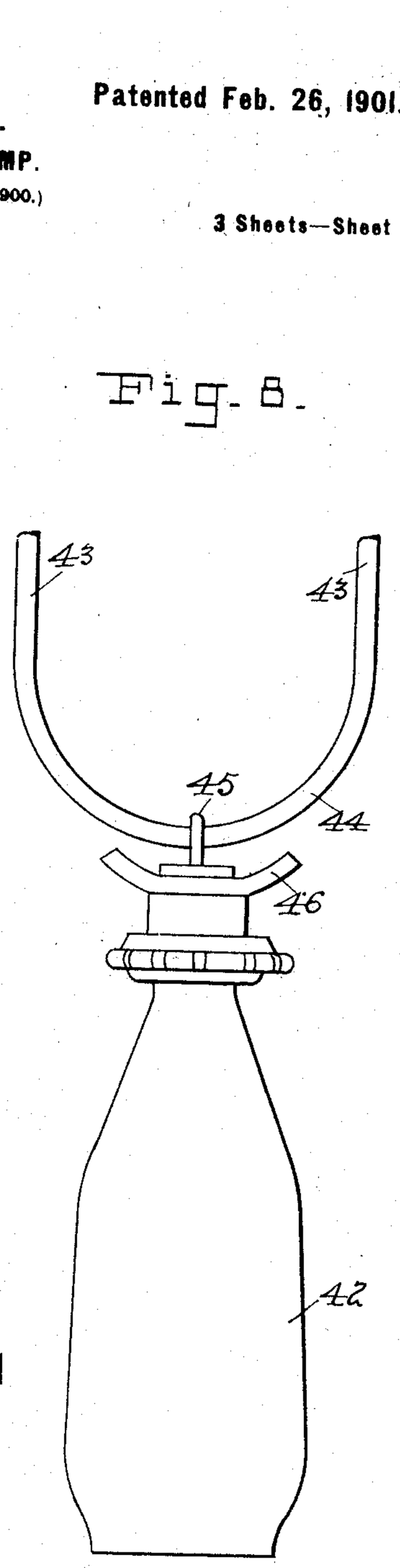
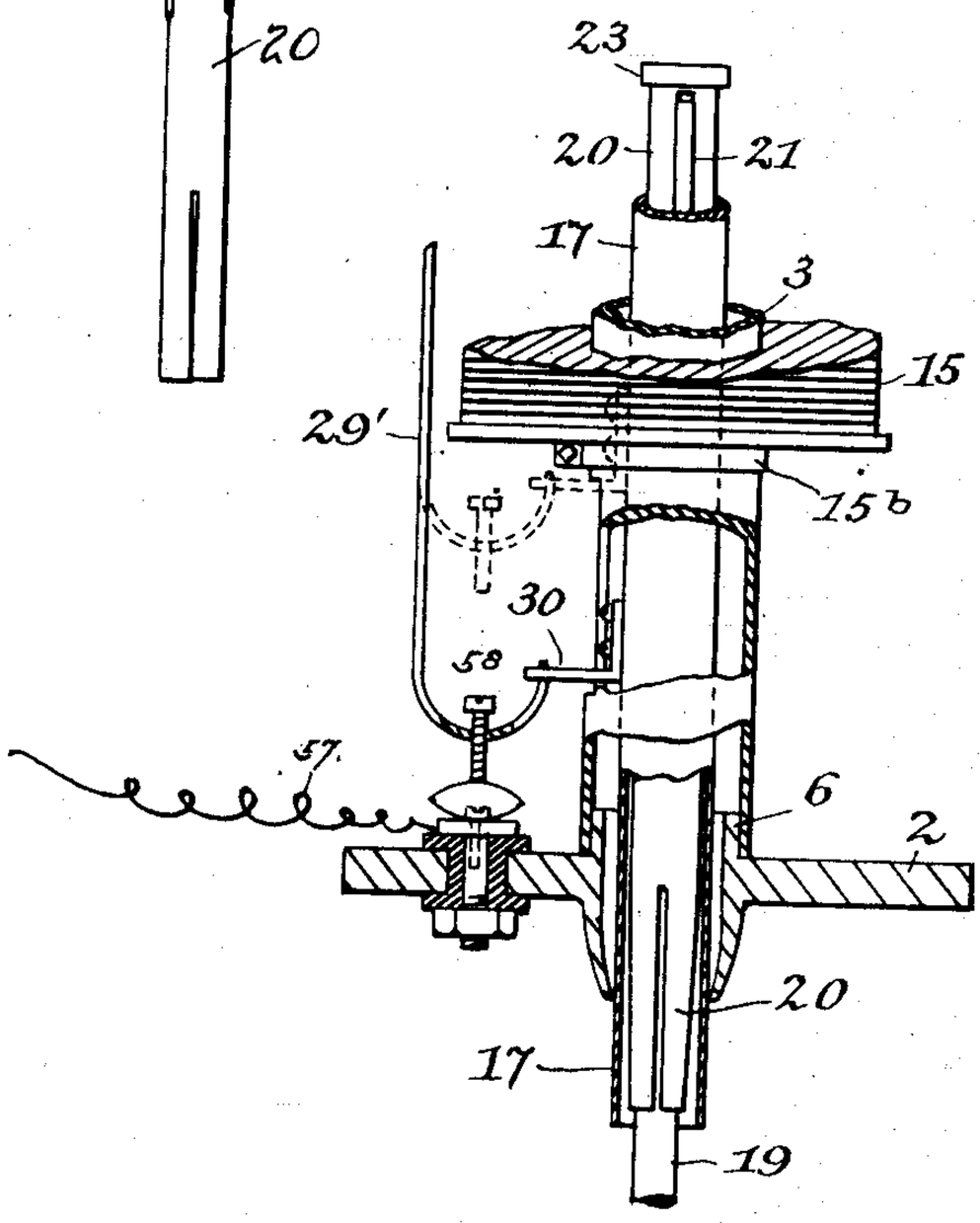


Fig. 9.



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UNITED STATES PATENT OFFICE.

PETER H. F. SPIES, OF MOUNT VERNON, NEW YORK, ASSIGNOR TO HIMSELF AND JACOB NORDEN, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 668,886, dated February 26, 1901.

Application filed June 5, 1900. Serial No. 19,100. (No model.)

To all whom it may concern:

Be it known that I, PETER H. F. SPIES, a subject of the German Emperor, residing at Mount Vernon, New York, have invented certain new and useful Improvements in Arc-Lamps, of which the following is a full, clear, and exact specification.

My invention relates to arc-lamps, and more particularly to means for controlling automatically the feed of the carbon.

In the accompanying drawings, Figure 1 is a side elevation of the lamp. Fig. 2 is a detail view of the armature or core carrying tube, together with the carbon-clutch and the upper carbon. Fig. 3 is a sectional view on line 3 3 of Fig. 1. Fig. 4 is a view of the upper part of the lamp in central vertical section. Fig. 4ª is a similar view of the lower part of the lamp. Fig. 5 is a plan view of the carbon-clutch. Fig. 6 is a detail view of a controlling-lever. Fig. 7 is a detail view of the upper-carbon carrier. Fig. 8 is a detail view showing the globe and the lower-carbon holder as suspended from the lamp-frame. Fig. 9 is a view of a cut-out connection for use when the lamp is operated in series.

The lamp comprises upper and lower plates 1 2, of circular form, connected to each other by a main tube 3 by means of the screws 4, passing through the tube and into bosses 5 6 on the upper and lower plates, respectively. The upper plate is perforated and receives a flanged insulating-piece 7, through which an elongated screw 8 passes, the head 9 of which bears against an inverted cup-piece 10, which in turn bears against the under face of the boss 5. The upper end of the screw 8 carries an insulating-block 11, which carries an eye 12, by which the lamp may be suspended. The eye 12 has a shank which, together with the screw 8, is threaded into a block 13, carried by the insulated piece 11. A nut 14 holds the parts together when the screw 8 is disconnected from the block 13. Upon the main tube 3 a magnet 15 is secured, clamp-rings 15ª and 15ᵇ holding it in position on the tube. The core 16 of this magnet is fixed to a tubular carrier 17, arranged within the main tube 3, the said core or armature encircling the carrier-tube. The upper end of the carrier-tube is closed by a head 18, screwed to the tube and having a flange fitting the interior of the main tube 3. The upper carbon 19 is carried by a tubular carrier 20, slitted at its lower end to firmly grasp the carbon and having tongues 21 cut out from its sides and inclining outwardly to press upon the interior of the armature or core carrying tube 17 to make electrical contact therewith. The carbon-carrier tube is threaded internally at its upper end to receive a piston-like head 23, which is fitted to slide within the tube 17. The tube 17 is held up in the position shown in Fig. 4 within the main tube 3 by a spring 24, connected at one end to an adjustable eye 25, carried by the plate 1, and at its other end connected with a lever 26, pivoted to a depending stud 27, the said lever being curved at 28 to clear the main tube 3 and having a bent end 29, as shown in Fig. 6, to which is pivoted a rod 29′, the lower upturned end of which is connected by a clip 30 with the armature-tube 17, the said clip being screwed to the tube and extending outwardly therefrom through a vertical slot 31 in the main tube 3. A carbon-clutch 32 is connected in any suitable manner with the vertical movable armature-carrying tube 17, and as a representative form of connection I show a chain 33. The clutch comprises a plate having an opening 34 therein, as shown in Fig. 5, of slightly larger diameter than the upper carbon upon which the clutch acts, as indicated in Fig. 2. The clutch also comprises a spring-arm 35, screwed to the plate and carrying at its outer end a weight or weights 36. The lower-carbon holder comprises a socket 37, in which the lower carbon 38 is held by a set-screw 39. The socket is carried by a cap-shaped piece having an upper enlarged recess 40, containing a spring 41, adapted to act as a resilient retaining device for the lower end of the globe 42, which extends upwardly and incloses the arc. The cup-shaped piece is supported by a yoke formed of arms 43, connected with and depending from the lower plate 2, the said arms being connected at their lower ends by a curved portion 44. A staple 45, extending downwardly from the cup-shaped carbon-holder, encircles the curved portion 44 of the yoke, and fingers 46, having their ends notched at 47 to partially embrace the yoke, serve to

hold the cup in position. Upon the upper edge of the globe a gas-check 48 rests. This comprises a plate 48^a, having arms 49, engaging the sides or arms 43 of the yoke, and a cup 48^b, depending from the plate 48^a. The cup 48^b is the frustum of a cone inverted. Fitted within it are a plurality of circular plates 48^c, of sheet-iron, graduated in size as to their respective circumferences and adapted when placed in the cup 48^b to lodge at intervals between the top and bottom of the cup, and thus divide the space into separate chambers. The plate 48^a, the cup 48^b, and the plates 48^c are all provided with openings somewhat larger than the upper carbon and are secured together by a tube 48^d, which may be upset at each end to lock it in place upon the plate 48^a and the cup 48^b. The tube 48^d is provided with perforations 48^e, so located as to admit air into each of the several chambers formed by the division-plates 48^c. The plates 48^c are loosely fitted to the tube 48^d. The arms 49 are insulated from the arms 43 of the yoke by ferrules 49^a. The arms of the yoke are connected with the plate 2 by nuts 50 on their screw-threaded ends and are insulated from the said plate by ferrules 51. The electrical connections are established through a binding-post 52, electrically connected with the plate 1, which is electrically connected with the tube 3, with which the prongs 21 of the upper-carbon holder 20 are in electrical contact. The lower carbon is electrically connected through its cup or holder with one of the arms 43 of the yoke, and this, as shown in Fig. 4, is connected with an insulated conductor 53, which extends to the binding-post 54, which is shown in Fig. 1. The magnet is electrically connected by shunt-wire 55 with the conductor 53, and the other branch of this shunt is shown at 56, and this may have any suitable connection with the binding-post 52. In forming the arc the magnet is energized, and the core or armature 16 is thereby drawn down against the tension of the lifting-spring 24. In this downward movement the armature-tube 17, moving with the armature or core carriers, carries downwardly the carbon-clutch, together with the carbon and the carbon-holder, as one body until the clutch by striking a portion of the gas-check plate 48 is arrested and tilted from its inclined or clutching position of Fig. 2 to a horizontal or substantially horizontal position, with the result that the carbon is now free to fall, together with its holding-tube 20, independent of the further movement downward of the armature-tube 17. The upper carbon falls until it contacts with the lower carbon. The magnet being now deënergized, the spring 24 will lift the core or armature, thus raising the tube 17 and, through the chain 33, lifting the clutch and causing the same to grip the upper carbon, lifting it, and thus striking the arc.

The downward movement of the carbon-holder 20 when the clutch is released is regulated so that the same will take place in a gradual manner and without shock or pounding, and this is due to the fact that the descent of the carbon-holding tube will be in accordance with the inflow of air to the chamber formed within the tube 17. As before stated, the head 23 of the carbon-carrier tube 20 fits within the tube 17 to have a piston-like action therein, and the admission of air past the piston 23 to the chamber in the tube 17 is so regulated as to secure a gradual downward movement of the carbon-holder and carbon when the same is free from the clutch. The tube 17 in this way is in the nature of a dash-pot for the piston of the carbon-holder.

Fig. 8 represents the globe 42 as depending from the yoke 43, and the globe may be caused to assume this position by simply sliding the gas-check upward on the arms 43 to remove the depending portion of said gas-check from the mouth of the globe. In this way the lower carbon, with the globe, can be swung aside and downwardly and out of cooperative relation with the upper carbon and other parts. The spring 35, which holds the weight 36 of the clutch, is intended to take up any shock or jar resulting from the striking of the arc or from other causes, so that the carbon-clutch may maintain a constant and uniform pressure upon the carbon while in retaining engagement therewith and will not be subjected to vibration which might cause the undue feed of the carbon. The relation of the clutch and upper carbon to the lower carbon and other parts is indicated in Figs. 1 and 2 by the lines $x\ y$, this being the working position of the parts and the clutch being located a slight distance above the gas-check plate.

For regulating the arc and accommodating the lamp to the voltage across the arc I lengthen or shorten the operative path of the feed-clutch by increasing or decreasing the distance between the feed-clutch and the clutch-controlling mechanism, and for this purpose the chain may be lengthened or shortened to raise the clutch in relation to the gas-check plate against which the feed-clutch strikes to thereby assume a horizontal position for releasing the upper carbon.

The form of gas-check described serves to increase the life of the carbon, as the air entering the globe through the gas-check passes successively through the several chambers and is greatly heated before reaching the interior of the globe. This check is easily cleaned without taking it apart by inverting and shaking it, the division-plates fall together, and accumulated dirt is loosened and discharged through the perforations.

When the lamp is operated in series, I provide a cut-out connection, Fig. 9. A contact-spring 57 is secured to the plate 2, but insulated therefrom, and connected electrically with an ordinary cut-out by wire 59. In the lower end of the rod 29′, which is electrically connected with binding-post 52, I fix an ad-

justing-screw 58, which is adapted to contact with spring 57 when the carbons burn out, and thus operate the cut-out.

I claim—

1. In an arc-lamp, a carbon-holder, a reciprocating tube or rod concentric therewith, a spring holding the tube against gravitation, a magnet operating in opposition to the tube, a carbon-clutch and a connection between the carbon-clutch and said tube, said spring being arranged independent of the clutch and acting only upon the tube, substantially as described.

2. In combination in an arc-lamp, a carbon-clutch comprising a clutch-plate, the weights and a spring-arm connecting the weights with the plate, whereby vibrations of the weight will not affect the clutch-plate, substantially as described.

3. In combination, the magnet, the armature, the tubular carrier for the armature, the carbon-holder movable in said carrier, a spring, a connection between the same and the tubular carrier, and the clutch connected with the tubular carrier, substantially as described.

4. In combination, the magnet, the main tube, the armature and its carrying-tube within the main tube, the carbon-holder carried by the armature-tube, the spring for drawing up the armature-tube and the connections between said spring and the armature-tube, said connection passing through a slot in the main tube, substantially as described.

5. In an arc-lamp, a carbon-holder, a reciprocable support within which the carbon-holder is mounted, a spring for sustaining the support against gravitation, a magnet actuating the support in opposition to such spring, and a clutch connected with the reciprocal support.

6. In an arc-lamp, the combination of a lower-carbon holder, a support therefor with which the carbon-holder is rotatably connected to be swung around in reversed position or partially so, an arc-inclosing globe connected with the carbon-holder, a gas-check plate engaging the upper end of the globe and means for supporting the gas-check plate independent of the globe, the said carbon-holder being held in operative relation by the arc-inclosing globe and the said gas-check plate, said arc-inclosing globe being removably attached to the gas-check plate, substantially as described.

7. In combination in an arc-lamp, the framework, an arc-inclosing globe rotatably supported at its base and a gas-check plate supported on the frame independent of the globe and engaging the said globe, substantially as described.

8. In combination in an arc-lamp, a feed-clutch engaging the carbon, mechanism for controlling the action of said feed-clutch, the lower carbon, the globe therefor, the gas-check plate and means for regulating the arc and accommodating the lamp to the voltage across the arc, said means being adjustable to lengthen or shorten the operative path of the feed-clutch by increasing or decreasing the distance between the feed-clutch and the gas-check plate, substantially as described.

9. In combination in an arc-lamp, a feed-clutch comprising a plate having an opening for the carbon, clutch-controlling mechanism, a connection between the clutch-plate and the controlling mechanism, a spring-arm attached to the clutch-plate and a weight carried by the spring-arm to press the clutch-plate against the side of the carbon, substantially as described.

10. In combination in an arc-lamp, a feed-clutch comprising means for gripping the carbon, and a weighted spring-arm attached thereto to cause the same to engage the carbon with uniform pressure, substantially as described.

11. In an arc-lamp, the solenoid, a core therefor, a feed-clutch connected to a lower extension-piece of the core, a spring sustaining the extension-piece against gravitation and in opposition to the solenoid, said spring being independent of the clutch, and means for relaxing the grip of the feed-clutch when the extension-piece moves downwardly, substantially as described.

12. In an arc-lamp, the combination with the carbons having a globe inclosing the same, of a plate closing the upper end of the globe, a cup depending therefrom and a series of loose partitions therein dividing said cup into a series of compartments, a central space being left around the upper carbon in communication with said compartments, substantially as described.

13. In an arc-lamp, the combination with the carbons and the globe inclosing the same, of a plate closing the upper end of the globe, a frusto-conical cup depending therefrom, a series of partitions of regular increasing diameters loosely placed in a predetermined order in said cup whereby they will find seats on the wall of the cup at regular distances apart to form a series of compartments and a sleeve loosely surrounding the upper carbon fitted to said plate and depending axially through the partitions into the cup, said sleeve having openings through the wall thereof forming communicating passages between the interior of said sleeve and the said compartments in the cup, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

PETER H. F. SPIES.

Witnesses:
OTTO MUNK,
ISABELLA WALDRON.