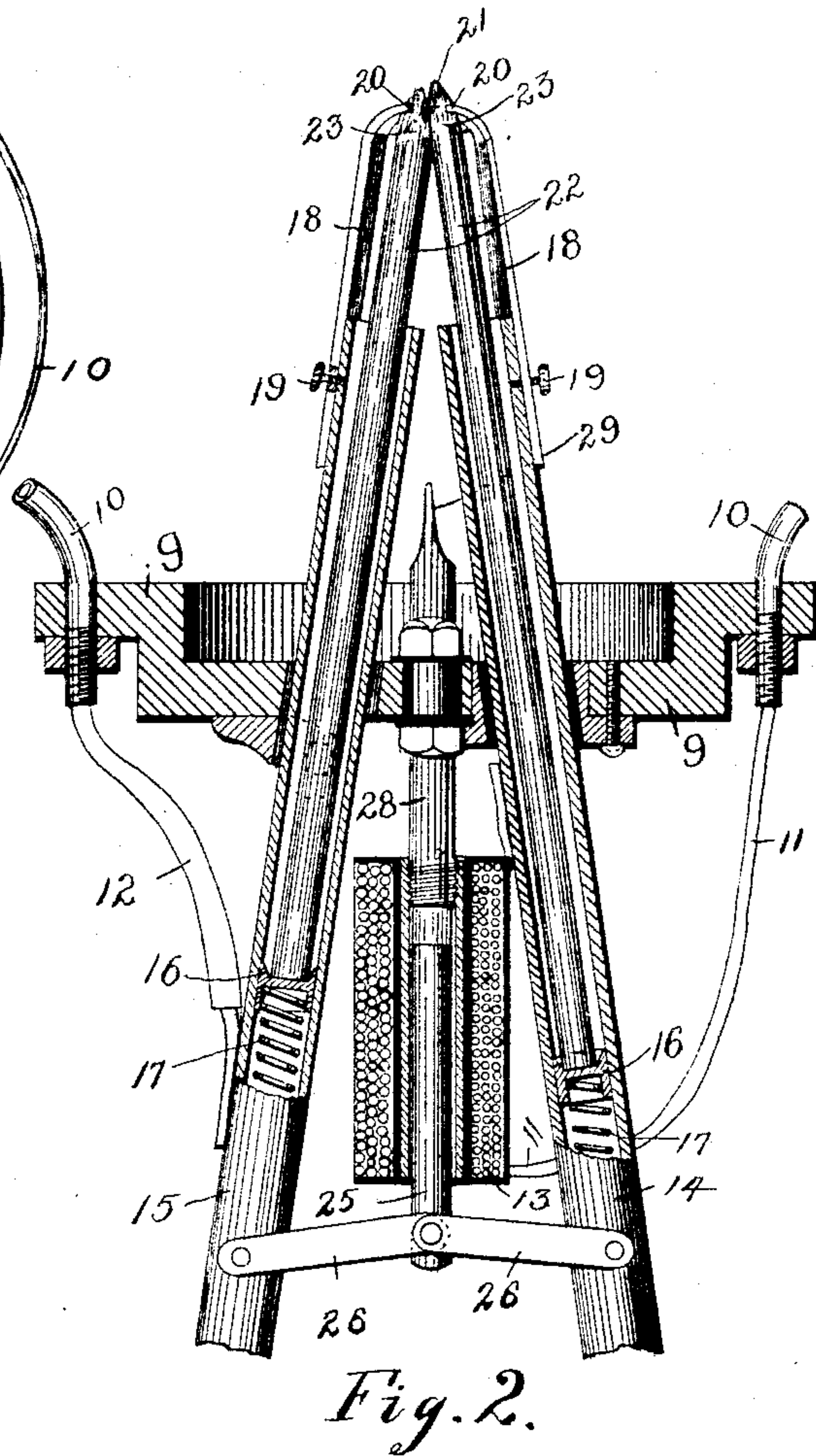
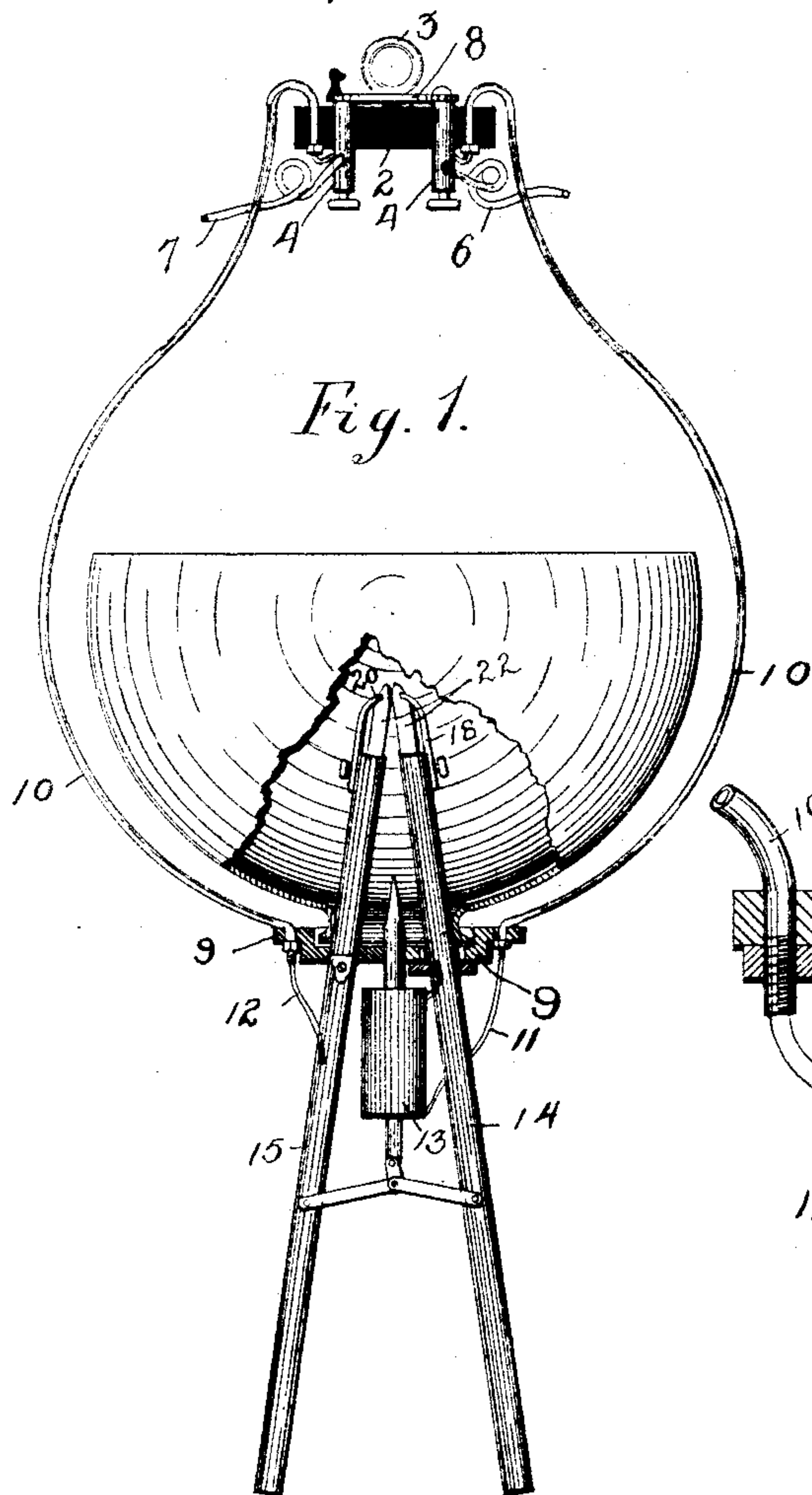


R. H. BEACH.
ARC LAMP.

No. 437,767.

Patented Oct. 7, 1890.



Witnesses
S. M. Roberts
J. Jenson

Inventor
Ralph H. Beach.
By Paul H. Beach, Atty's.

R. H. BEACH.
ARC LAMP.

No. 437,767.

Patented Oct. 7, 1890.

Fig. 5.

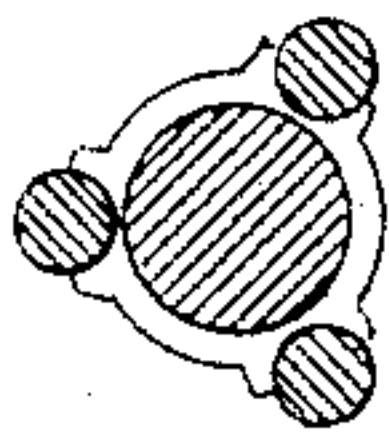


Fig. 3.

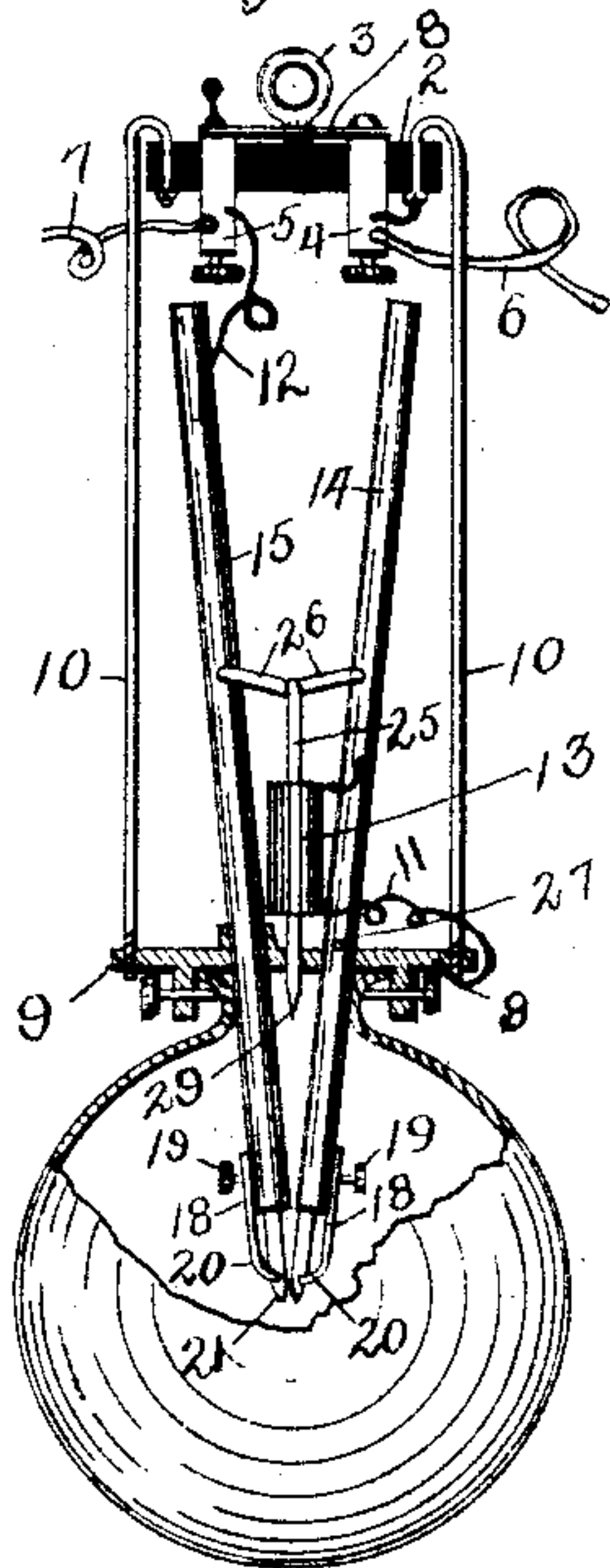


Fig. 4.

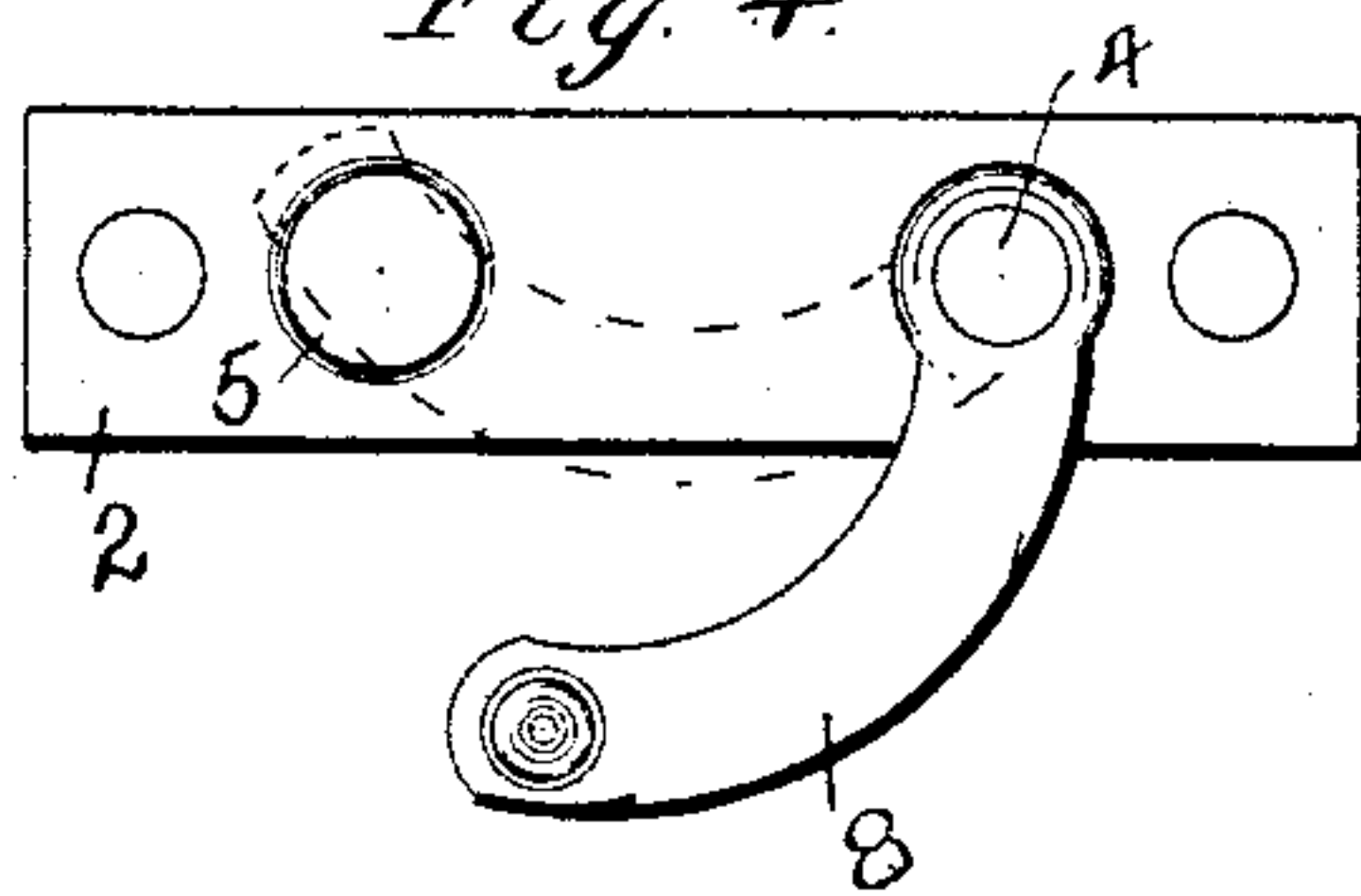


Fig. 6.

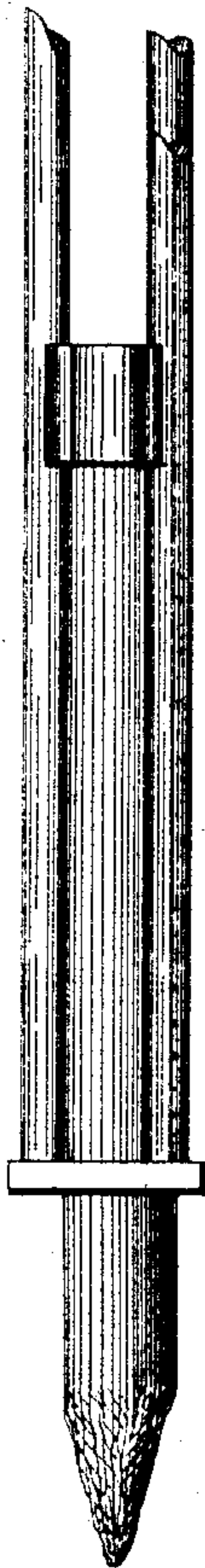


Fig. 8.

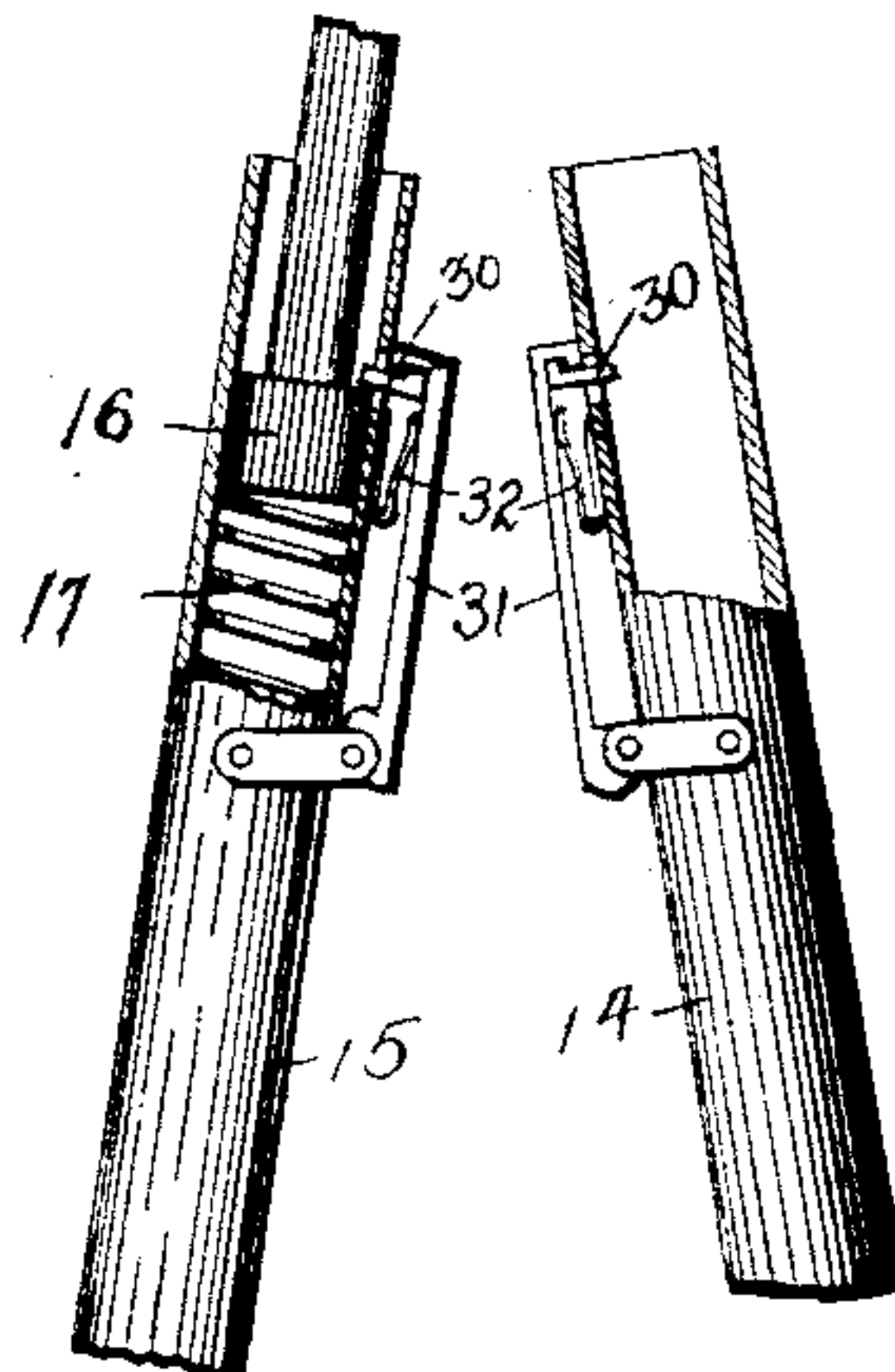


Fig. 7.

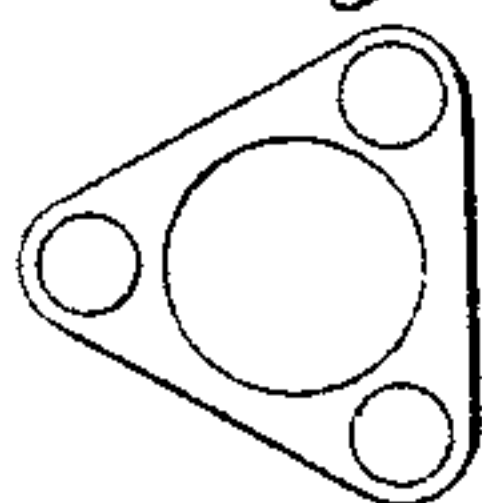
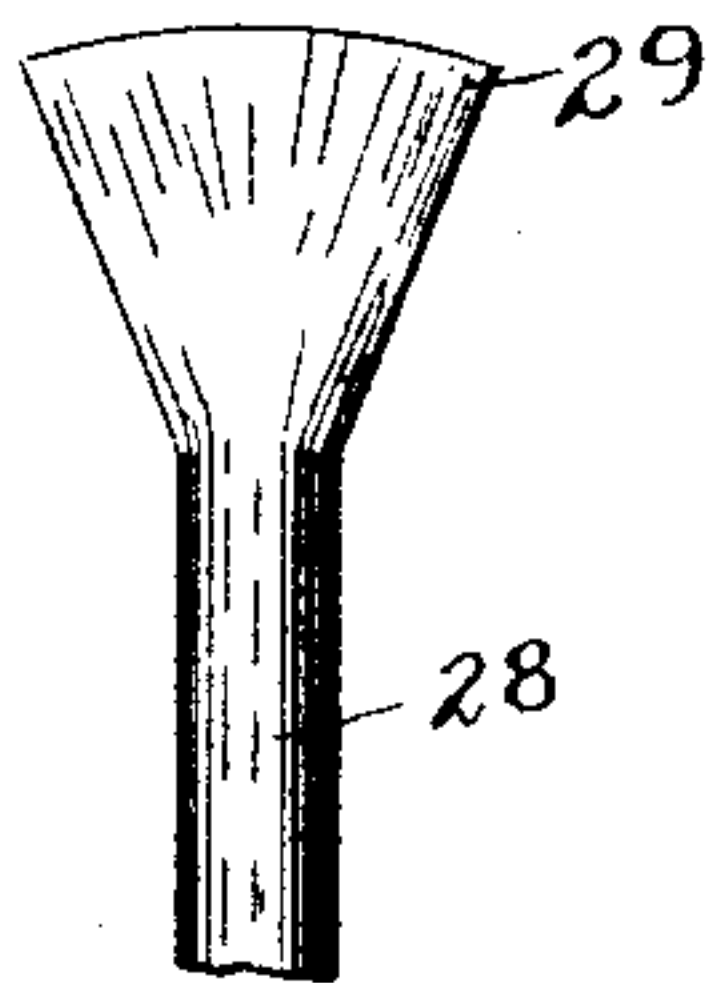


Fig. 9.



Witnesses
S. M. Roberts
J. Jessen

Inventor.
Ralph H. Beach
By Paul & Meunier Atty's.

UNITED STATES PATENT OFFICE.

RALPH H. BEACH, OF ST. PAUL, MINNESOTA, ASSIGNOR TO THE ACME
ELECTRIC COMPANY, OF MINNESOTA.

ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 437,767, dated October 7, 1890.

Application filed January 25, 1890. Serial No. 338,145. (No model.)

To all whom it may concern:

Be it known that I, RALPH H. BEACH, of St. Paul, Ramsey county, Minnesota, have invented certain Improvements in Arc Lamps, of which the following is a specification.

My invention relates to improvements in electric-arc lamps in which the points of the carbon pencils approach each other at an angle, the pencils themselves being advanced automatically as consumed so as to maintain an unvarying point of light; and it consists in improved means for automatically forming the arc and also improved means for determining and maintaining the position of the arc at the tips of the carbon points.

My invention further consists in the construction and combination hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, forming part of this specification, Figure 1 is an elevation of my improved arc lamp, some of the parts being shown in section in order to disclose the construction and connections. Fig. 2 is a detail showing the construction and arrangement of the carbon-holders and the solenoid operating the same. Fig. 3 is an elevation and partial section of a modified form of lamp in which the carbons are fed downward. Fig. 4 is a detail of the lamp-switch. Figs. 5 and 6 are respectively a detail cross-section and side view of a modified form of carbon-holder and its carbon. Fig. 7 is a detail of the collar uniting the rods of the carbon-holder. Fig. 8 is a detail of the short-circuiting switch of the carbon-holders, and Fig. 9 is a detail of the pole-piece of the electromagnet.

In the drawings, 2 represents a suitable plate or support forming part of the lamp-frame and fitted with the ring 3, by means of which the lamp is supported, the plate 2 being formed, preferably, of vegetable fiber or other suitable non-conducting material. Arranged in the plate 2 are the binding-posts 4 and 5, to which are respectively secured the line-wires 6 and 7 of the main circuit. These posts are connected on the top of the plate by means of the short-circuit switch or cut-out 8, pivoted to one and making contact with the

other, by means of which the lamp may be cut out of circuit.

9 is the base-plate or globe-holder of the lamp, adapted to hold the lamp-globe and in which are arranged the carbon-holders. This plate 9 is connected with the plate 2 by means of the tubes 10, rigidly secured to each and forming part of the frame. The lamp-wires 11 and 12 are preferably led through these tubes from the binding-posts 4 and 5 to the carbon-holders, one of the wires being soldered directly to one of the holders 15 and the other being joined to the coil of the solenoid 13, which is connected to the other carbon-holder 14. The carbon-holders are arranged in the base-plate 9, so as to form an acute angle with each other above the plate.

The holder 14 is rigidly secured in the plate 9, which is also preferably formed of insulating material, or if formed of metal suitably insulated from the carbon-holders the other carbon-holder 15 is pivotally supported in the plate 9, so that it may be moved to slightly approach or recede its upper end from the other holder. The holders may be formed in various ways, as desired, as, for example, of brass tubes, as shown in Figs. 1, 2, and 3, or, as shown in Figs. 5, 6, and 7, of three light rods, secured together by suitable collars, with a space between them sufficient to receive the carbon. The advantage of this construction is that the holder, being open-work, prevents liability of clogging the carbon in the holder, from the deposit upon it of carbon-dust, and also prevents undue heating of the holder from the passage of the electric current, as is sometimes an objectionable feature of the other form. Arranged in the holder, and provided, preferably, with a slight depression on its upper surface to receive the end of the carbon, is the follower 16, which is arranged to slide freely to and fro within the holder. A spiral spring 17 is arranged in the bottom of the holder bearing against the follower and tends to force upward the follower with its carbon, or any other preferred means may be employed for automatically advancing the carbon. Arranged at the upper ends of the holders are detaining fingers or abutments 18, secured to the holders, preferably, by means

of set-screws 19, the inwardly-curved points 20 of the detaining-fingers being so arranged as to bear upon the taper or point 21 of the carbon 22 just forward of the shoulder 23, and thus to detain and hold the carbon against the tension of the spring 17. The wearing away of the point as consumed allows the carbon to advance and remain always in contact with the points of the detaining-finger. The normal position of the carbons 22 when the lamp is not in circuit is with their points in contact, as shown in Fig. 2, the arc being automatically formed upon the passing of the current by the separating of the points a predetermined distance, in the manner hereinafter described.

Arranged, preferably, between the holders 14 and 15 beneath the base 9 is the solenoid 13, its coil being in the lamp-circuit. Its core 25 is pivotally connected with the links 26, which are pivoted to the respective holders and so arranged that upon the core being drawn into the solenoid the links tend to draw the holders toward each other. As, however, one of these is fastened rigidly to the base 9, while the other is pivoted at 27 to the base, the pivoted holder is turned upon its pivot and its carbon point withdrawn from the other carbon point a distance determined by the distance of movement of the core 25, which may be allowed more or less movement, as desired, by adjustment of the plug or pole-piece 28.

For the most efficient operation of the lamp it is important not only that the arc be maintained of unvarying length, but also that it be held at the tips of the carbon points, so that the wear of the points may be as uniform as possible. I do this by extending toward the carbon points the plug or pole-piece 28 of the solenoid, which is preferably adjustably secured in the solenoid so as to determine the movement of the core 25, and being firmly secured in the base 9, through which it passes, serves as a support for the solenoid itself. The upper end 29 of the plug is carried to such a point as may be found necessary to secure the desired effect upon the arc when the lamp is in use. In order to make its influence uniform and steady upon the arc, I prefer to widen or flatten the end 29, so as to present a broad edge toward the arc in a plane at right angles to the arc.

By use of an electro-magnet with an elongated pole-piece, as shown and described, I am enabled to employ the modified construction of lamp with inverted carbon-holders and either gravity or spring-actuated followers, as shown in Fig. 3, which is not practicable without the use of the electro-magnet to influence the arc, because the air above the arc and between the carbons is heated by the arc, and thus serves as a conductor for the current and causes the arc to move upward along the carbon points, and even to short-circuit the current between the carbon-holders unless they are widely separated; but by

the use of the electro-magnet, as described, the arc is repelled by the pole-piece of the magnet, so that it is maintained at the tips of the carbon points in the same manner as in the lamp constructed as shown in Figs. 1 and 2.

In order to short-circuit the current through the lamp, instead of having it broken by the burning out of the carbons, I prefer to arrange upon each of the holders near the end next the arc a short-circuiting device to be operated by the carbon-follower as it approaches the end of the holder before a fragment of carbon is thrown out. While any desired form of switch may be used, I prefer to employ that shown in detail, Fig. 8, in which the switch-arm 31, pivoted to the holder and provided with a spring 32, tending to hold the switch closed, while a dog 30, arranged within the holder, is adapted to lock the switch open and to be struck by the follower in passing, whereby the switch is released from the dog 32, and its spring carries it into contact with the opposite holder. By this means, whichever carbon is first exhausted, its follower will close the switch and short-circuit the current from one holder to the other.

Operation: The lamp being placed in circuit and the switch 8 being opened, the current, entering by the wire 6, flows through the binding-post 4, thence through lamp-wire 11 to the coil of the solenoid 24, thence through the holder 14 and its carbon to the opposite carbon and the holder 15, and thence by the lamp-wire 12 to binding-post 5 and line-wire 7. The normal position of the carbons before the current passes is with their points in contact; but the passing of the current through the solenoid energizes it, attracting the core 25, which serves, by acting on the links 26, to turn the holder 15 on the pivot 27 and separate the points of the carbons a predetermined distance, thus forming the arc. The elongated pole-piece or plug, by its repellent influence on the arc, forces it to remain in a fixed position at the tips of the carbon points, whereby the wearing away of the points is caused to be substantially uniform. As the carbons are consumed, they are automatically advanced by the spring-actuated followers 16. When either of the carbons is nearly consumed, its follower, in advancing in the holder, will come in contact with the dog 30, and, tripping the same, will release the switch 31, which, making contact with the opposite holder, serves to short-circuit the current, instead of the same being broken as the remnant of the carbon is forced out of its holder and consequently away from the other carbon, so that the current cannot pass between them. In supplying the holder with a fresh carbon the set-screw 19 is loosened, thus allowing the detaining finger or abutment to be turned aside, when the fresh carbon can be inserted in the holder and pressed down upon the follower against the tension of

the spring. The detaining-finger can then be turned back and secured in position so as to hold the carbon in place.

I claim—

5 1. In an arc lamp, the combination, with the carbons movable one from the other and their holders, of a solenoid in circuit having its core connected with one of said holders to move the same and separate the carbons to
10 establish an arc, and an elongated pole-piece extended in the direction of the carbon points and made flaring at its outer end to repel the arc and maintain it near the tips of the carbon points, substantially as and for the pur-
15 poses set forth.

2. In an arc lamp, the combination, with the carbons and their holders, of a solenoid in circuit having its movable core connected with one of said holders to move the same to sepa-
20 rate the carbons to establish an arc, and an elongated pole-piece entering the solenoid and adjustable relatively to the length of its bobbin and extended in the other direction adjacent to the carbon tips, whereby the arc
25 is repelled and maintained adjacent to the tips of the carbon points and the movable core is influenced by the adjustment of the pole-piece, substantially as and for the purposes set forth.

3. In an arc lamp, the combination, with the carbons and their holders, of a solenoid in circuit having its core connected with one of said holders to move the same to separate the carbons to establish an arc, a plate 9, and a pole-
35 piece 28, having its bearing in said plate and extended above it adjacent to the points to repel the arc and below it to constitute a support for the solenoid, substantially as and for the purposes set forth.

4. In an arc lamp, the combination, with the carbon-holders, their carbons, and means for automatically advancing the carbons, of a short-circuiting device arranged upon each of
45 the holders and adapted to be operated in the movement of a follower to the carbons to close

a circuit between said holders, substantially as and for the purposes set forth.

5. In an arc lamp, the combination of carbon-holders forming an acute angle with each other and laterally adjustable with reference
50 to each other, detaining-fingers arranged upon their adjacent ends and adapted to engage the included carbon points, followers arranged in said carbon-holders and adapted to automatically advance the carbons toward and
55 against said detaining-fingers, a short-circuiting device arranged upon each of said carbon-holders and adapted to be operated by said follower and to close a circuit between said holders, an electro-magnet in the lamp-
60 circuit having its armature connected to said holders and adapted by its movement to separate the adjacent ends of the same and having an elongated pole-piece with its outer end
65 arranged between the carbon-holders and extending toward the carbon points, substantially as and for the purposes set forth.

6. In an arc lamp, the combination, with its frame, of the carbon-holder 14, rigidly secured thereto, the carbon-holder 15, pivotally se-
70 cured thereto and forming an acute angle with the carbon-holder 14, the detaining-fingers 18, arranged upon the adjacent ends of the carbon-holders, the followers 16, arranged in said carbon-holders and adapted to auto-
75 matically advance said carbons into contact with said detaining-fingers, the solenoid 24, having its coil in the lamp-circuit and arranged between the carbon-holders, its core
80 piece 28, extended in the direction of the carbon points, and the short circuit switches 31, arranged upon said carbon-holders, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set
85 my hand this 15th day of January, 1890.

RALPH H. BEACH.

In presence of—

T. D. MERWIN,

S. W. ROBERTS.