

M. H. BAKER.
SELF REGULATING ARC LAMP.
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969,510.

Patented Sept. 6, 1910.

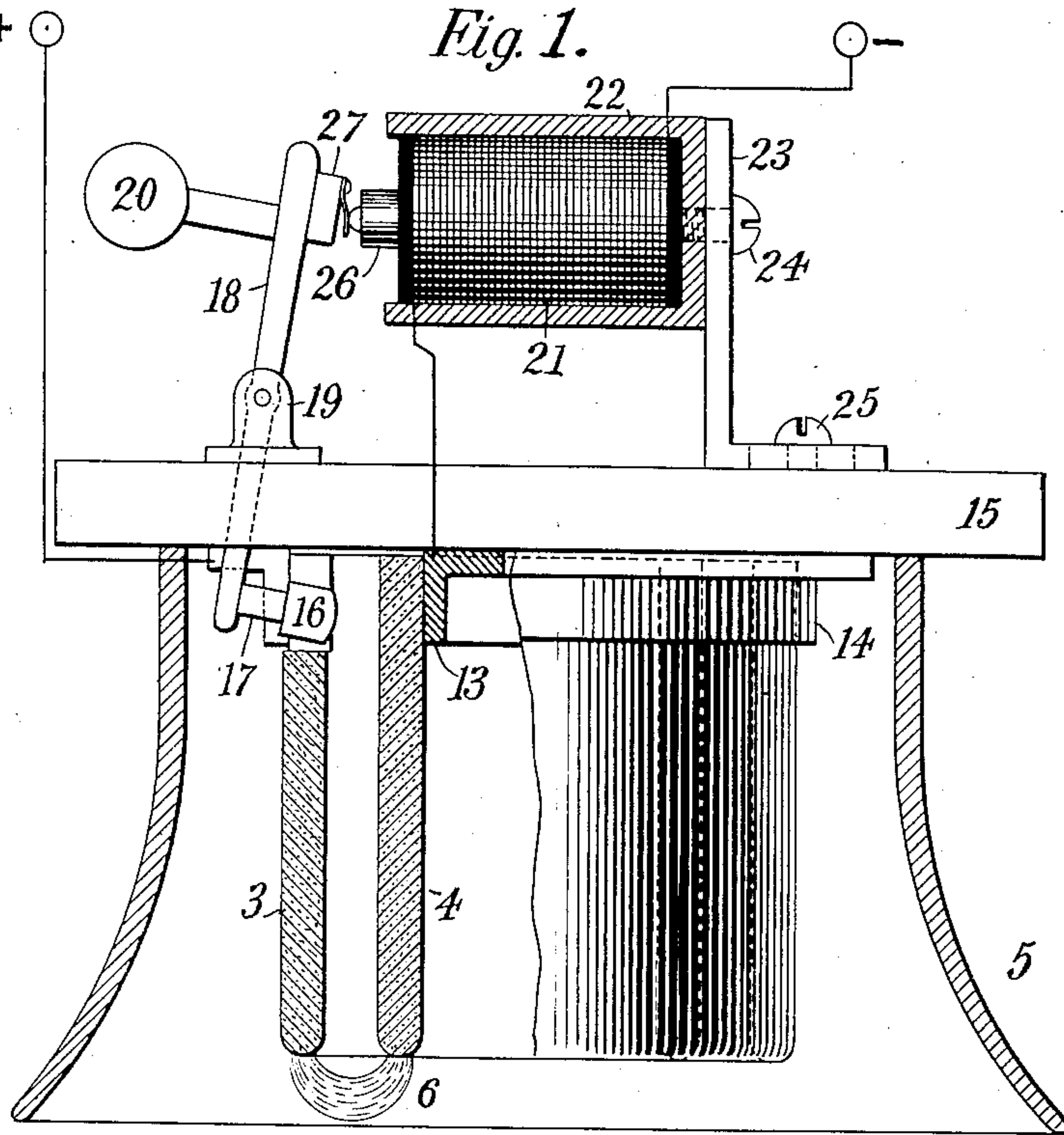
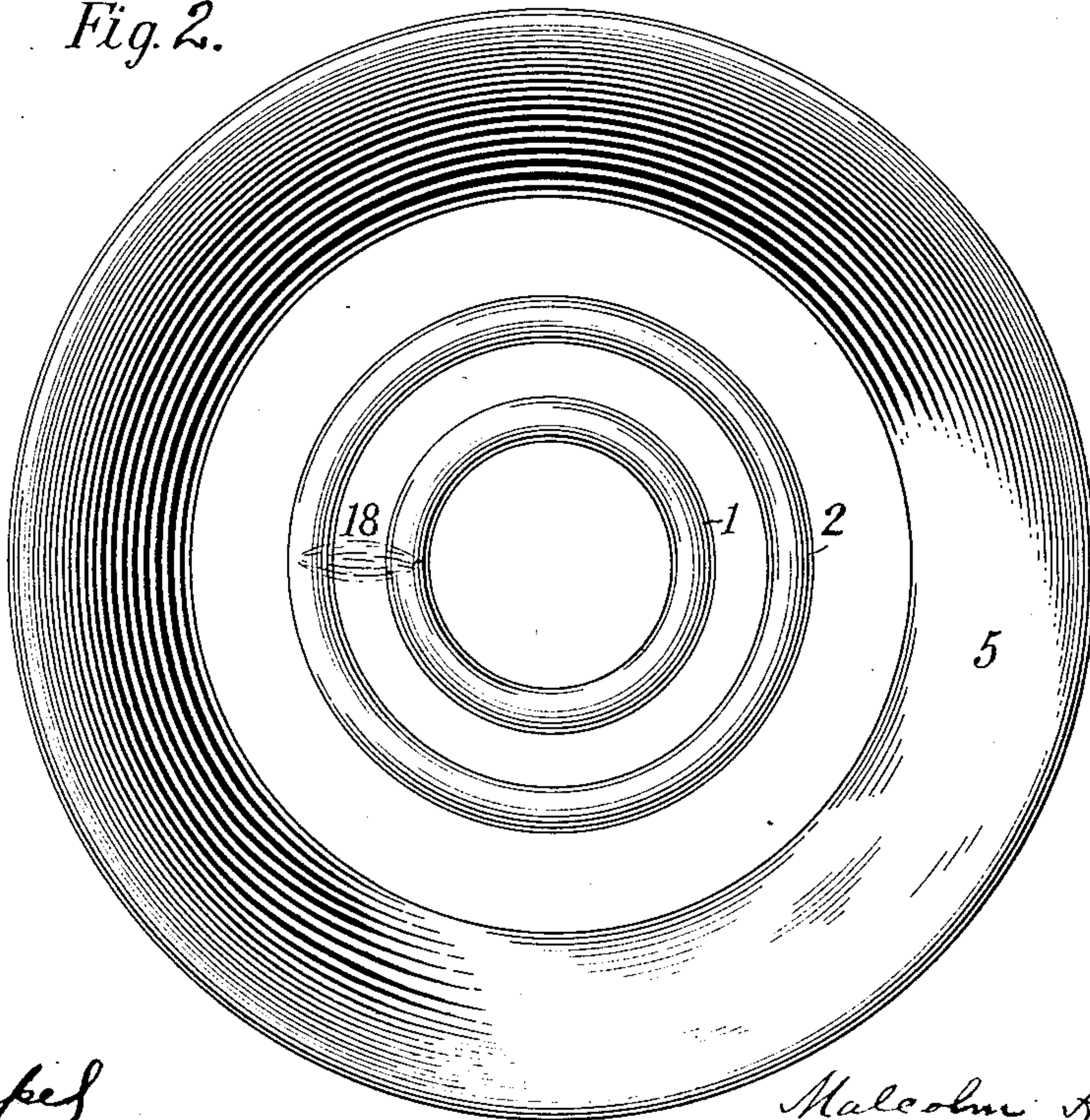


Fig. 2.



Witnesses:
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UNITED STATES PATENT OFFICE.

MALCOLM H. BAKER, OF NEW YORK, N. Y., ASSIGNOR TO WESTINGHOUSE ELECTRIC AND MANUFACTURING COMPANY, A CORPORATION OF PENNSYLVANIA.

SELF-REGULATING ARC-LAMP.

969,510.

Specification of Letters Patent.

Patented Sept. 6, 1910.

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To all whom it may concern:

Be it known that I, MALCOLM H. BAKER, a citizen of the United States, and resident of New York, county of New York, State of New York, have invented certain new and useful Improvements in Self-Regulating Arc-Lamps, of which the following is a specification.

The present invention relates to arc lamps and it has for its object to provide an arc lamp of special construction which shall have certain new and desirable functional characteristics.

It is well known that, in the operation of an ordinary arc lamp wherein the arc is formed between the points of electrodes in alignment with each other, the voltage of the arc varies in inverse ratio to the current. For this reason, any changes of electrical conditions at the arc introduce disturbances of the circuit conditions generally, and such disturbances have to be guarded against by external means of regulation and control.

One of the objects of the present invention is to make the electric arc self-regulating by providing such paths for the current leading to the terminals of the arc that the lines of force due to the current in the said paths acting upon the lines of force generated by the current in the arc itself will tend by mutual repulsion to make the voltage of the arc vary in direct ratio to the current. This is done by so relating the direction of flow of the current to the arc terminals that the lines of force due to the current will tend to fan out the arc, and as the lines of force increase in direct proportion to the strength of the current, such an arrangement will cause the arc to be fanned out still further by an increase of current, whereby the desired condition is attained. In other words, an increase of current will be followed by an increase of voltage at the arc and vice versa. In this way, the arc itself becomes the regulator for the lamp circuit; that is to say, the entire control and regulation of the said circuit are localized in the arc. Besides rendering unnecessary the usual external regulating devices, the described property of the self-regulating arc makes it possible to dispense with all magnetic or other artificial means for spreading the electric arc, as when the arc itself is designed to be used as the main source of illumination.

As a convenient means for conducting the electric current to the arc terminals in a manner suited to produce the effects described, I may make use of parallel electrodes, and I generally prefer to establish the arc at the bottom of a pair of vertical electrodes arranged parallel to each other. Such an arrangement provides for the even burning away of the electrodes at their lower ends and renders it unnecessary to provide any feeding mechanism, inasmuch as, when the electrodes are parallel, their ends will remain the same distance apart.

My invention will be understood by reference to the accompanying drawings, in which—

Figure 1 illustrates a lamp having electrodes in the shape of two concentric cylinders; and Fig. 2 is a bottom view of the lamp shown in Fig. 1.

In the drawings, 3 and 4 are the cylinder electrodes suitably mounted in holders, 13 and 14, the said holders being rigidly attached to a bed plate, 15, of some suitable insulating substance. The electrodes are surrounded by a conical chamber, 5, to protect the arc from air drafts. In order to establish the arc, an igniter, 16, of metal or carbon, is pivoted to a metal strip, 17, to swing loosely at one end of a lever, 18. This lever 18 is pivoted to a support, 19, mounted upon the bed plate, 15, and carries at its upper end a counterweight, 20, so arranged as to hold the igniter 16 in contact with the electrode 4 when the lamp is out of operation. A small starting magnet, 21, is surrounded, by an iron clad shield, 22, and is mounted on a bracket, 23, by means of a screw, 24. This bracket is attached to the bed plate 15 by means of a screw, 25, working in a slot in the bracket so that the position of the magnet 21 with relation to the lever 18 may be altered at will. This is necessary in order to permit the proper setting of the igniter.

When the current is thrown upon the lamp, the core, 26, of the magnet, 21, is magnetized and attracts an armature, 27, fixed upon the lever 18, thus moving the said lever and establishing the arc by drawing the igniter 16 across the gap between the electrodes. The electrode 3 is fitted with a slot through which the igniter 16 travels. The arc is thus established and then travels down

until it reaches the lower ends of the electrodes where it fans out to shape as represented at 6.

It is important to iron clad the magnet 21 in order to prevent magnetic leakage, which would affect the arc and disturb its even burning and proper action.

When I employ cylindrical electrodes, as shown, I prefer to use the outer cylinder as the positive electrode on direct current circuits and the inner cylinder as the negative electrode. Under the assumption that the electrodes are of equal thickness, the larger volume of the outer electrode will compensate for its more rapid consumption when it is used as the positive.

In employing cylindrical electrodes, on alternating current circuits it will be found advantageous to construct the outer cylinder so that it shall have a proper fractional part of the thickness of the inner cylinder. I have found that the relative thickness may be made as one to two, the outer electrode being one half as thick as the inner. These data relate to cylinders adapted for use on commercial circuits.

It may be possible, under the proper conditions, to remove the arc striking magnet 21 to a sufficient distance from the electrode points to prevent any interference with the normal action of the arc. In that case the

distancing of the magnet would be equivalent to the device embodied in the iron shield described.

It is manifest that the electric arc, arranged under the described conditions, will be self-regulating, not only in multiple circuits but in series circuits as well. Should the arc length in a series lamp become shortened for any reason, the inter-acting lines of force would be brought into closer relation, would exercise a greater mutual repulsion and the arc would tend to resume its original length. On the other hand, should the arc become lengthened, the current strength being constant and the interacting lines of force being more widely separated, the arc would tend to shorten itself and tend to resume its original length.

I claim as my invention:—

In an arc lamp apparatus, the combination with a pair of cylindrical electrodes, located the one within the other, of an igniter located at a point remote from the arcing ends of the electrodes.

Signed at New York, in the county of New York, and State of New York, this 16th, day of June, A. D. 1903.

MALCOLM H. BAKER.

Witnesses:

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