

(No Model.)

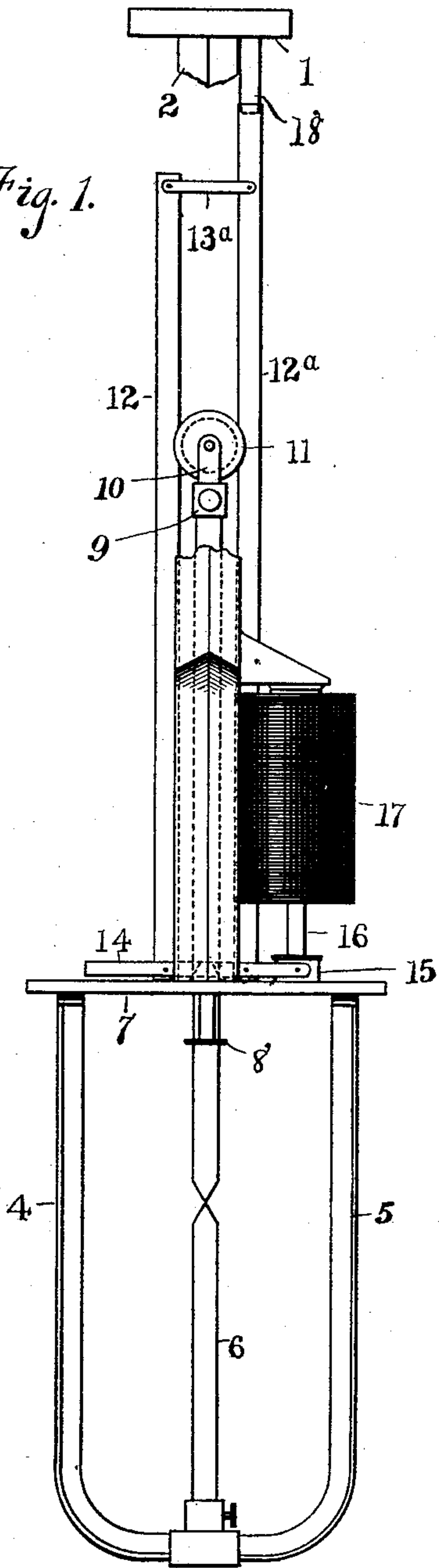
2 Sheets—Sheet 1.

T. SPENCER & C. TOERRING, Jr.  
ELECTRIC ARC LAMP.

No. 572,777.

Patented Dec. 8, 1896.

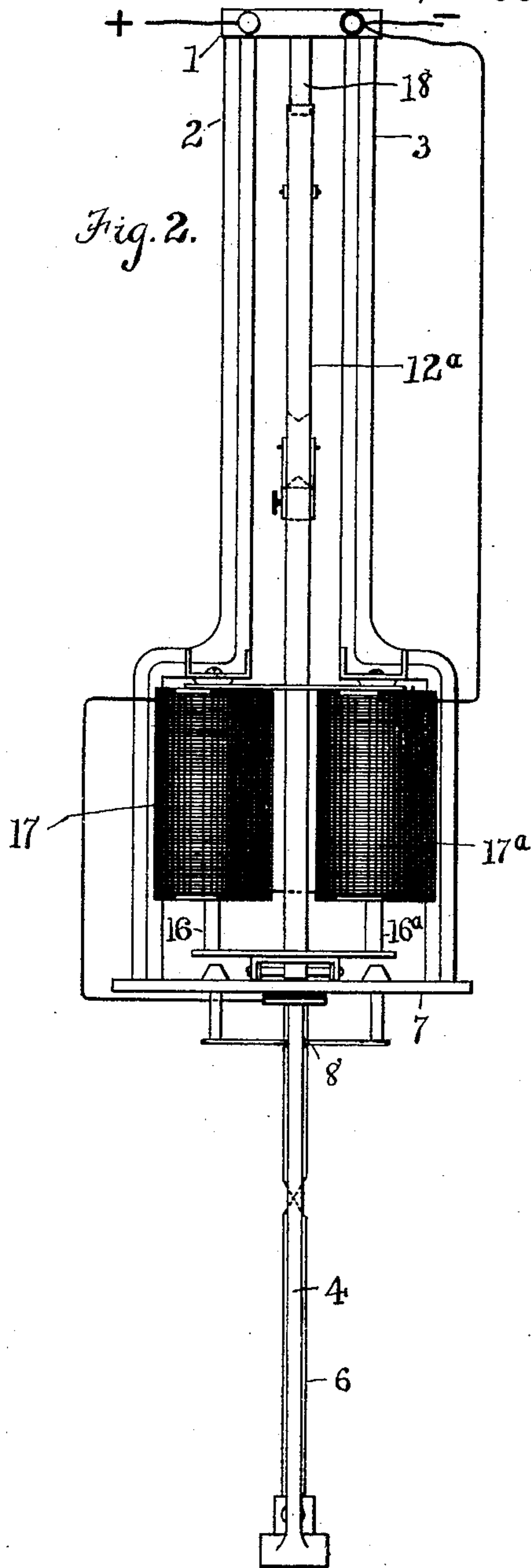
Fig. 1.



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Fig. 2.



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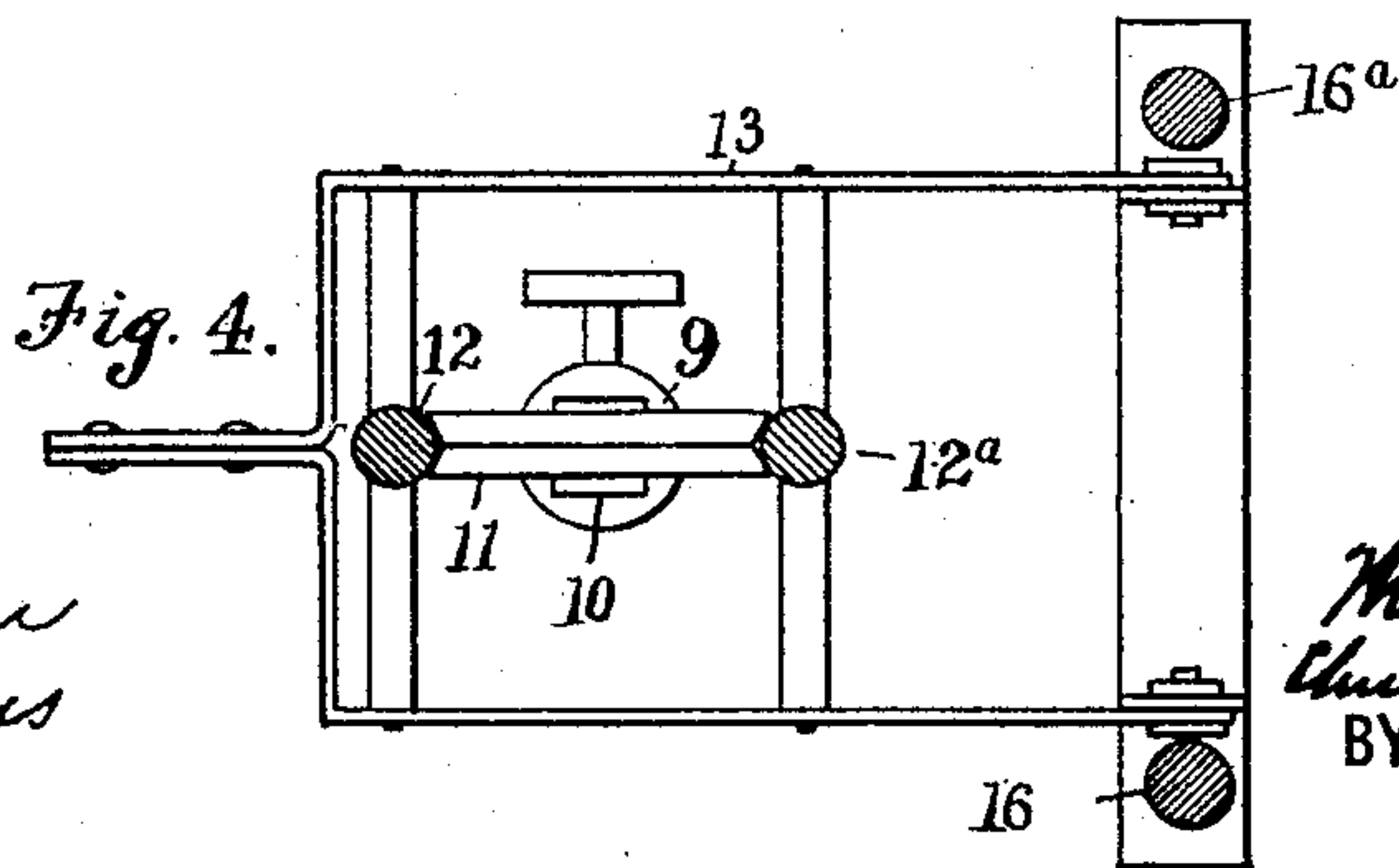
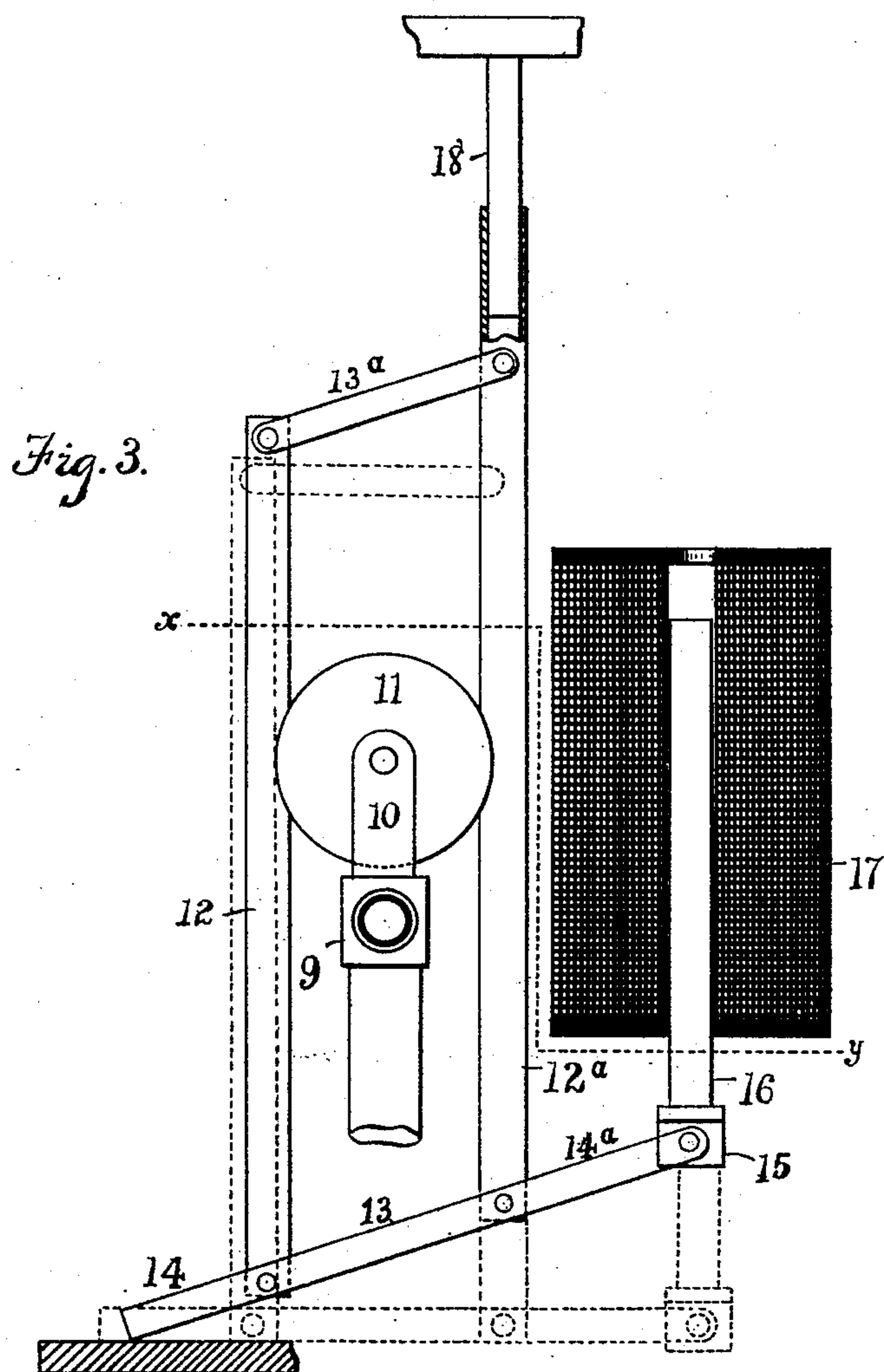
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**INVENTORS:**

Thomas Spencer and  
Christian Topping Jr.  
BY Ross H. Heath  
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# UNITED STATES PATENT OFFICE.

THOMAS SPENCER AND CHRISTIAN TOERRING, JR., OF PHILADELPHIA,  
PENNSYLVANIA, ASSIGNORS TO THE HELIOS ELECTRIC COMPANY, OF  
SAME PLACE.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 572,777, dated December 8, 1896.

Application filed May 6, 1896. Serial No. 590,407. (No model.)

*To all whom it may concern:*

Be it known that we, THOMAS SPENCER and CHRISTIAN TOERRING, Jr., citizens of the United States, residing in Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Electric-Arc Lamps, of which the following is a specification.

This invention relates to feed-regulating devices for arc-lamps, the object being to provide a sensitive organization of this kind which will maintain its accuracy of operation for a long period of continuous service and in which the working parts will not deteriorate by repeated action of the clutching devices.

In carrying out the invention we support the movable electrode between guides or rails pivoted or otherwise connected together, so as to be capable of relative movement, and provide electromagnetic means for causing the rods to approach or recede from each other, thereby increasing or decreasing the distance between them when the current flowing through the lamp fluctuates in strength and permitting a movable cross-head to be locked against or freed to the action of gravity. We preferably mount the rods parallel to one another and make both movable by the electromagnetic controlling devices, but in different degrees, thus serving to strike the arc when both are raised and to permit feed by increasing or decreasing their distance apart.

Our invention comprises a feed-regulator having connected rods or guides capable of relative movement to and from one another, an electromagnetic controlling device connected to them for moving them to vary their distance apart, and a carbon-carrier suspended between them.

It comprises also parallel rods capable of relative longitudinal movement in opposite directions in combination with a carbon-carrier.

The several features of novelty will be hereinafter fully described, and will be definitely indicated in the claims.

In the accompanying drawings, which illustrate the invention, Figure 1 is a side elevation, part broken away, of an arc-lamp embodying our improvements. Fig. 2 is an ele-

vation on a plane at right angles to that of Fig. 1. Fig. 3 is a detail view of the feed-regulating devices, the parts and their positions being exaggerated for purposes of clearer illustration; and Fig. 4 is a horizontal section on the plane indicated at  $x y$ , Fig. 3.

1 2 3 4 5 represent the frame of an arc-lamp, a negative carbon or electrode 6 being supported in a socket formed in a support secured to the lower part 4 5 of the frame. A shelf or plate 7 separates the feed-regulating mechanism from the arc and serves as or may be provided with a reflector on its under side. It is provided centrally with a hole to permit transit of the positive carbon or its carrier, and a guide 8 is fixed to the under side to center the movable carbon. The movable carbon is secured in a clamp 9, above which are two posts 10 10<sup>a</sup>, which form bearings for a grooved roller 11. For the roller may be substituted a sliding cross-head, if desired. It is confined in place by rods or guides, which may for the sake of lightness be tubular. (See 12 12<sup>a</sup>.) In the drawings two guide-rods are shown, but more than two may be employed, if desired. The guides are preferably pivoted together after the fashion of a parallel-ruler by rigid links 13 13<sup>a</sup>, though they may be otherwise connected to permit them to be drawn together or apart to permit feed of the positive carbon. As shown, they are mounted to move in opposite directions. Such a movement, as is evident, will cause them to recede from each other when the links approach a horizontal position, and approach when the obliquity of the links is increased.

The action is fully shown in the full-line and dotted-line positions indicated in Fig. 3. The range of movement indicated in said figure is grossly exaggerated to render the action more apparent. In practice the play will be enough only to loosen the grip of the guides on the roller or cross-head when feed is required, and to lock the same when the arc is sprung or feed arrested. The links 13 are provided with extension 14 14<sup>a</sup>, the latter of which bears on the plate 7, and the former is pivotally connected to a yoke 15, rigidly secured to cores 16 16<sup>a</sup> of solenoids 17 17<sup>a</sup>. The latter are supported on brackets projecting from the side rods of the lamp-frame.



A pin 18, secured to the top of the frame, forms a guide for the movable rod 12<sup>a</sup>. The solenoids may be placed in series with the arc or in shunt relation thereto. The organization is shown adapted for series working. If the coils were put in shunt relation, the cores should be arranged to be drawn downwardly against the action of a spring, or two sets of solenoids might be arranged to act differentially, one set being in shunt relation to the arc and the other in series. The lower part of the frame 4 5, which carries the negative carbon, may be insulated, or other insulating provisions be made to cause the current to traverse the arc and solenoids. As shown in the drawings, current enters at binding-post + and passes thence to the frame, guide-rods 12 12<sup>a</sup>, positive carbon, the arc, the negative carbon, the solenoids, and thence out by the binding-post -. When the lamp is cut into circuit, the solenoids raise their cores, thereby lifting guide-rod 12<sup>a</sup> over a longer arc than the rod 12 and causing the two to approach, thus gripping the wheel 11 and springing the arc. When the arc lengthens from consumption of carbon, current strength decreases and the cores descend slightly, thus spreading the rods and permitting the lamp to feed.

The lamp may be operated with direct or alternating currents, the cores being formed of soft iron or thin laminæ when the lamp is to be used with an alternating current.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A feed-regulator for an arc-lamp comprising parallel pivotally-connected rods, a carbon-carrier mounted between the rods, and engaging its facing sides only, a carbon pivotally supported thereby, a fixed guide-plate near the lower extremity of the carbon,

and electromagnetic devices for causing the rods to approach or recede from one another under fluctuation of current.

2. A feed-regulator for an arc-lamp comprising parallel rods pivotally connected by transverse, rigid links, a roller engaging the rods and guided thereby, a carbon-holder mounted on the axis of the roller, and a fixed guide-plate near the lower extremity of the carbon for centering it relatively to the co-operating carbon.

3. A feed-regulator for an arc-lamp comprising two parallel rods forming a guideway for a carbon-carrier, rigid links pivotally connecting the rods, arms 14, 14<sup>a</sup> secured to the rods, the latter bearing on a fixed part of the lamp and the former being connected to an armature controlled by a regulating-magnet.

4. A feed-regulator for an arc-lamp comprising two parallel rods pivotally connected by rigid links, arms 14, 14<sup>a</sup> the latter bearing on a fixed part of the lamp and the former being connected to an armature controlled by a regulating-magnet, roller 11, and carbon-carrier supported thereby.

5. A feed-regulator for an arc-lamp comprising two parallel rods pivotally connected by rigid links, arms 14, 14<sup>a</sup> the latter bearing on a fixed part of the lamp and the former being connected to an armature controlled by a regulating-magnet, a roller 11, carbon-carrier supported thereby, and a guide near the arc for centering the movable carbon.

In testimony whereof we have hereunto subscribed our names this 28th day of April, A. D. 1896.

THOS. SPENCER.  
C. TOERRING, JR.

Witnesses:

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THOS. J. JOHNSON.