

(No Model.)

T. SPENCER.  
ELECTRIC ARC LAMP.

No. 534,086.

Patented Feb. 12, 1895.

Fig. 1,

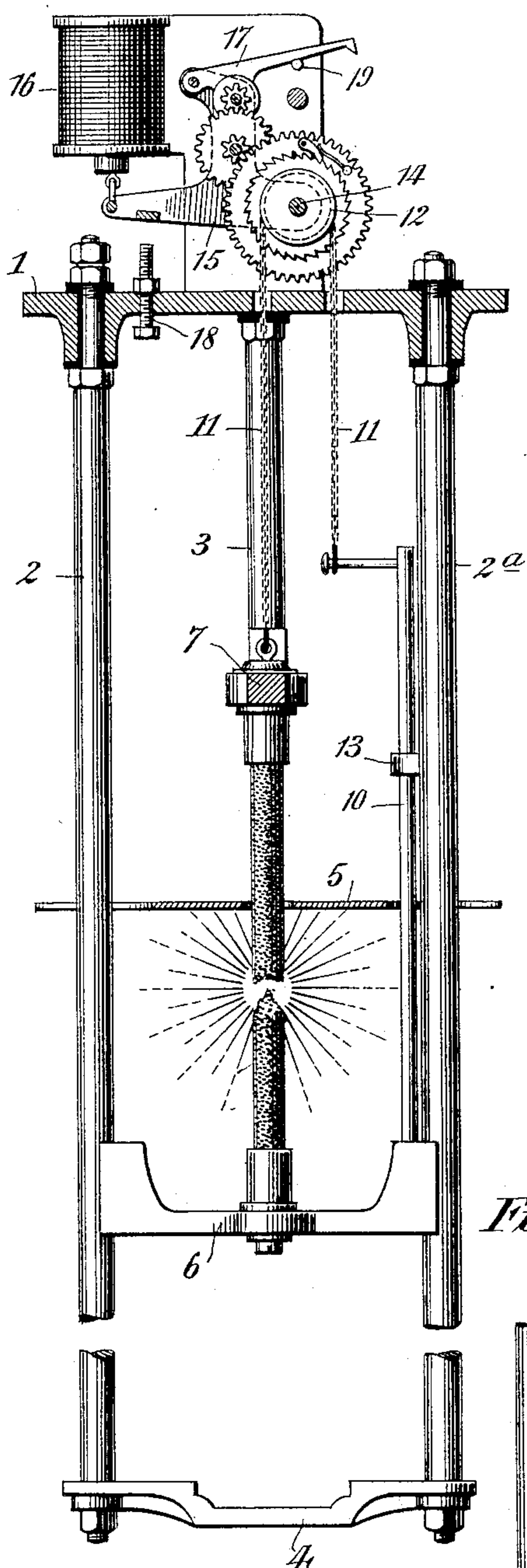


Fig. 2,

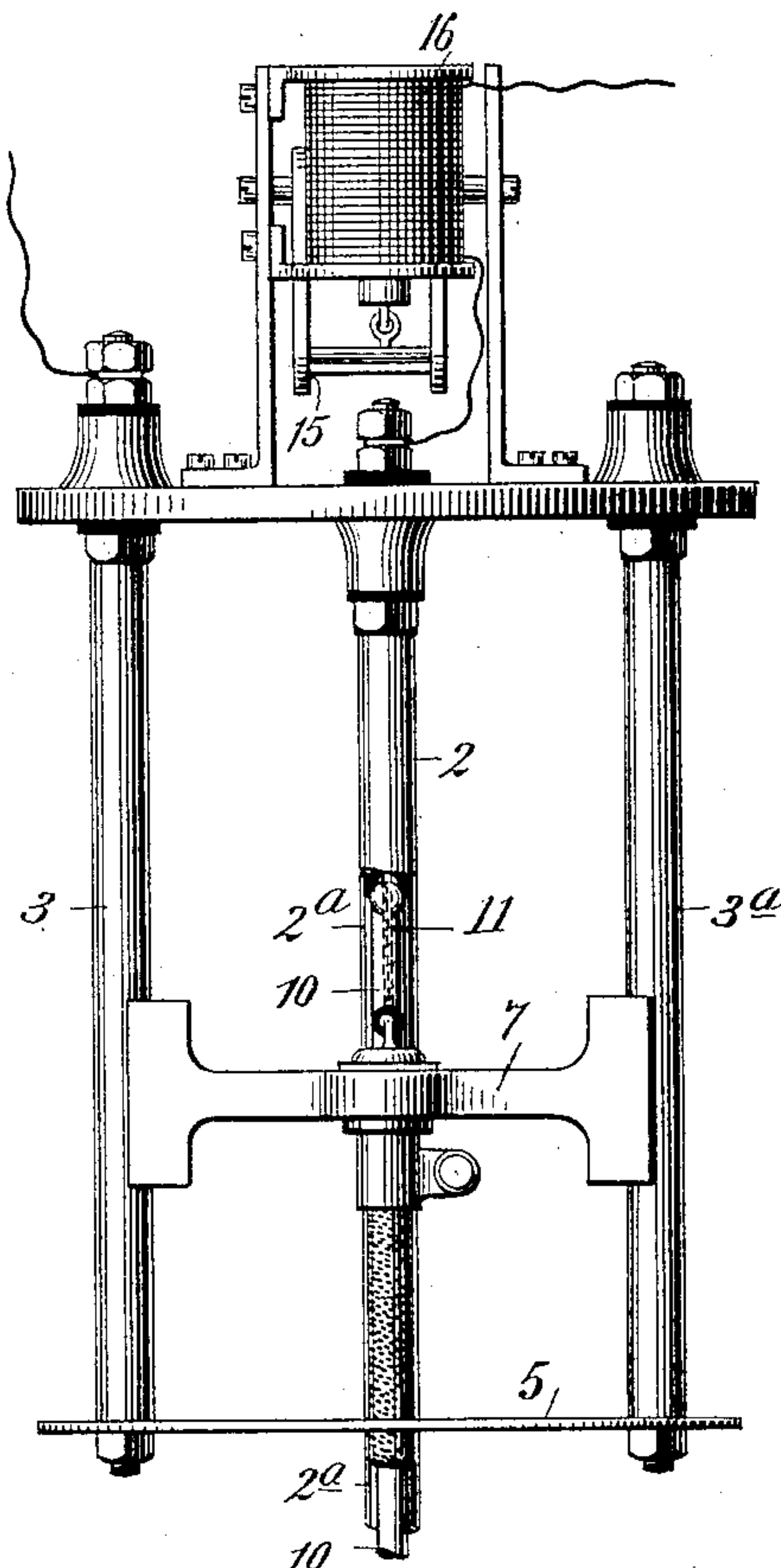


Fig. 3,

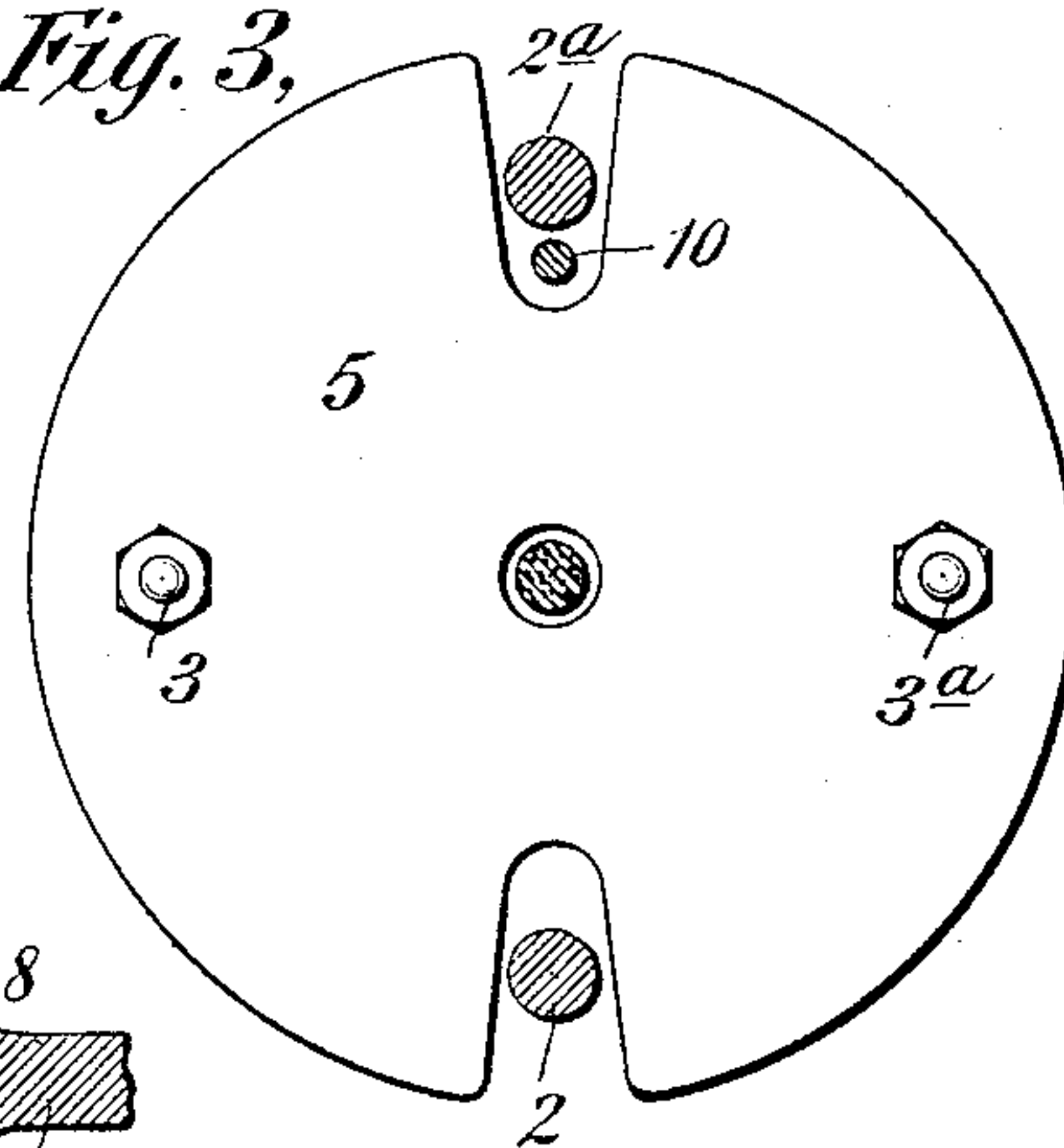
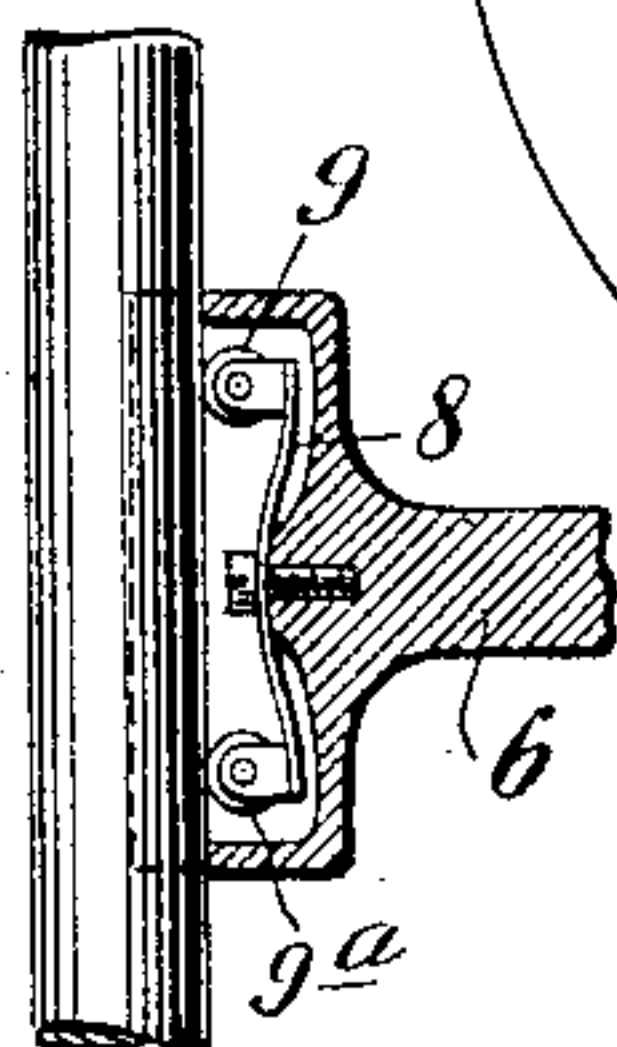


Fig. 4,



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# UNITED STATES PATENT OFFICE.

THOMAS SPENCER, OF PHILADELPHIA, PENNSYLVANIA.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 534,086, dated February 12, 1895.

Application filed June 6, 1894. Serial No. 513,627. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS SPENCER, a citizen of the United States, residing in the city and 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 electric arc lamps of that type in which both electrodes are movable and feed toward each other to compensate for the consumption of the electrodes by the action of the arc.

The invention relates more particularly to a type of arc lamp such as that described in a patent to Carl Coerper, No. 429,787, dated June 10, 1890, in which the electrodes are mounted in holders upon sliding plates mounted in a suitable guide frame. In the lamp just referred to the current is led to the movable carbon holders by means of flexible conductors. It is one object of my invention to dispense with these flexible conductors, which are a source of considerable annoyance in practice.

In carrying out my invention I provide guide ways for the movable carbon holders, and provide the latter with movable contact devices severally engaging rigid conductors extending parallel to the line of movement of the carbon holders, said rigid conductors forming part of the circuit. The invention involves, therefore, an arc lamp provided with carbon holders for its electrodes, independent guides for maintaining an accurate alignment of the carbon holders, movable contacts carried by the carbon holders and engaging independent rigid supply conductors, and regulating mechanism for causing a mutual approach of the electrodes.

The invention also involves other features which will be more particularly hereinafter described and which will be definitely indicated in the claims appended to this specification.

In the accompanying drawings, which illustrate the invention, Figure 1 is a vertical sectional elevation of an arc lamp embodying my improvements. Fig. 2 shows the upper part of the lamp on a vertical plane at right angles to that of Fig. 1, the wheel-work of the regulating mechanism being omitted for clearness of illustration. Fig. 3 is a bottom plan

view of Fig. 2, the guides for the negative conductor and electrode being shown in cross-section; and Fig. 4 is a detail view of the movable contact device or collector used in my lamp.

In the supporting plate 1 are mounted vertical pendent rods 2, 2<sup>a</sup>, 3, 3<sup>a</sup>. These rods are preferably all metallic and all insulated from the supporting plate 1, though, if desired, one pair, as 2, 2<sup>a</sup> or 3, 3<sup>a</sup>, may be in conductive relation to the plate. The two pairs of rods are preferably placed in planes at right angles to each other, as shown in the drawings. The guide conductors 2, 2<sup>a</sup> extend to the bottom of the lamp and are there united by a rigid yoke or cross-piece 4. The guide rods 3, 3<sup>a</sup> terminate on a plane above the arc and are united by a rigid cross plate 5, the under surface of which is preferably enameled to serve as a reflector. Between the rods 2, 2<sup>a</sup> and 3, 3<sup>a</sup>, respectively, are placed movable metallic cross-heads 6, 7, provided with devices for holding the upper and lower carbons. The reflector plate 5 is centrally pierced with an opening sufficiently large to permit transit of the upper carbon therethrough without contact with the walls of the opening. The cross-heads 6, 7 are grooved at the sides or otherwise constructed to permit along the guides a free yet true vertical movement. The preferable construction is illustrated in section in Fig. 4, where one of the cross-heads, as, for example, 7, is shown circularly recessed to embrace its guide rods and provided with a cavity in which is mounted a spring 8 carrying at its extremities metallic contact rollers 9, 9<sup>a</sup>. The spring may be secured to the cross-head by a metal screw, as shown. The lower cross-head 6 is provided with a vertical rod 10 connected with one end of a supporting chain 11 passing over a sheave 12 mounted in the regulator movement. The other end of the chain 11 is connected with the other cross-head 7. This chain may be metallic and at the points of attachment to the cross-head 7 and rod 10 is properly insulated. The reflector plate 5 is provided with two grooves at opposite diametrical points to prevent contact with the rods 2, 2<sup>a</sup>. Through one of these may pass rod 10 connected to the lower cross-head. The upper cross-head is sufficiently long in its surface of engagement with the rods 3, 3<sup>a</sup> to



provide a true vertical movement and the cross-head 6 may be similarly constructed, or, as preferred, may be made shorter and the rod 10 may move through a guide piece 13 5 mounted on rod 2<sup>a</sup>. It will thus be seen that a movement of the sheave 12 in one direction will cause the electrodes to recede from each other and in the other direction to approach each other. The rods 2, 2<sup>a</sup>, 3, 3<sup>a</sup> are preferably all metallic and serve as double conduc- 10 tors to lead current to their respective cross-heads. By this construction it will be evident that at any point at which the cross-heads may be positioned they will be in good 15 conductive relation to the current-leading guide rods.

The regulator movement is preferably mounted upon the top of plate 1 and may be of substantially the character described in 20 the patent to Coerper above referred to. It comprises a train of wheel-work journaled upon a pivot 14 and provided with an outwardly extending arm 15 linked to the core of a solenoid 16. The final wheel of the train 25 is provided with a weighted brake-lever 17 which rests upon the periphery of the wheel in the normal position of the apparatus. When no current is passing through the lamp the arm 15 is depressed under the weight of 30 the core of the solenoid and rests upon a stop 18. In this condition of adjustment the wheel-train is tilted upon its pivotal point 14, causing the brake-lever 17 to rise away from the periphery of its brake disk by reason of a 35 fixed pin 19. The sheave 12 over which the chain 11 passes is connected with the main wheel of the gear train by a pawl and ratchet. The upper carbon holder is made heavier than the lower so that when the brake-lever 40 is raised from the brake disk the wheel-train being free to act is operated, and the upper carbon holder 7 descends, lifting the lower carbon holder, until the carbons come in contact. The solenoid is placed in series relation to the 45 arc. The carbons being normally in contact as just described, if current be thrown upon the lamp the solenoid will lift its core, sepa-

rating the electrodes. As the carbon is consumed the arc lengthens, current strength in the solenoid weakens, its core is permitted to 50 descend, lever 17 is lifted from the brake wheel and the carbons are permitted to approach slightly and thus lower the resistance of the arc. This operation is repeated from time to time as long as the lamp is burning. 55

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

1. An arc lamp provided with movable carbon holders for its electrodes, independent 60 pairs of conducting guides for the respective carbon holders, regulating mechanism for causing mutual approach of the electrodes when the lamp is burning, and a plurality of movable elastically supported roller contacts 65 mounted upon arms of carbon holders and engaging the guides.

2. An arc lamp provided with a movable holder for each electrode, suspended to permit the carbons normally to gravitate together, a 70 regulating coil in series with the arc, metallic guide rods 2, 2<sup>a</sup> for the lower holder, rods 3, 3<sup>a</sup> having their lower extremities terminating above the arc for the upper holder, and contact brushes mounted on the respective 75 holders.

3. An arc lamp provided with a movable carbon holder for each electrode, suspended to permit the carbons normally to gravitate together, a regulating coil in series with the 80 arc, guide rods for the upper carbon terminating above the arc, a reflector uniting said rods, independent guide rods for the lower carbon extending below the arc, and connections for leading the current through the mov- 85 able carbon holders and their cooperating rods.

In testimony whereof I have hereunto subscribed my name this 23d day of May, A. D. 1894.

THOMAS SPENCER.

Witnesses:

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FRANK S. MARR.