

(No Model.)

3 Sheets—Sheet 1.

T. P. C. CRAMPTON.  
ELECTRIC ARC LAMP.

No. 442,018.

Patented Dec. 2, 1890.

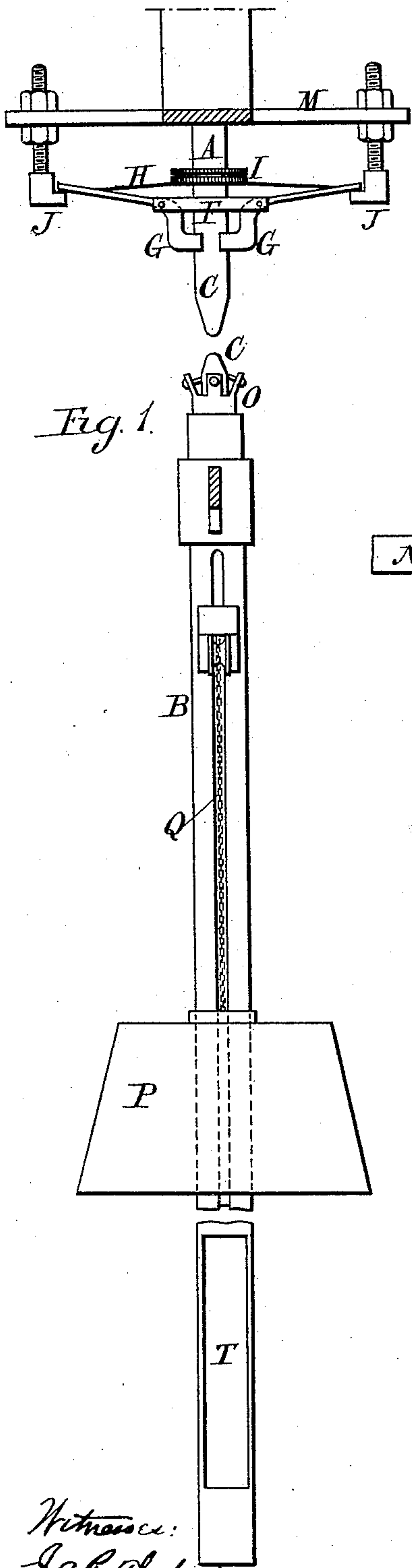


Fig. 1.

Fig. 3.



Fig. 3<sup>a</sup>.

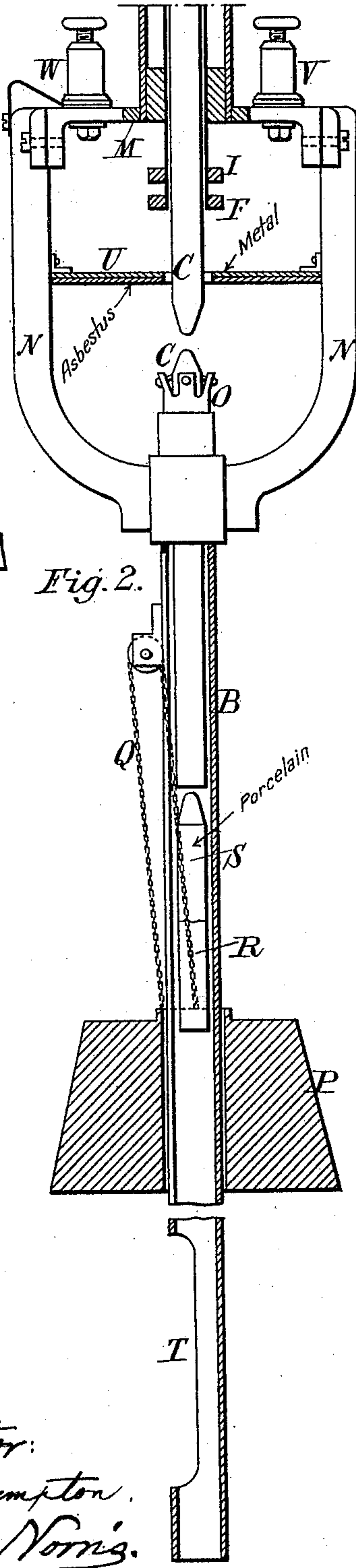
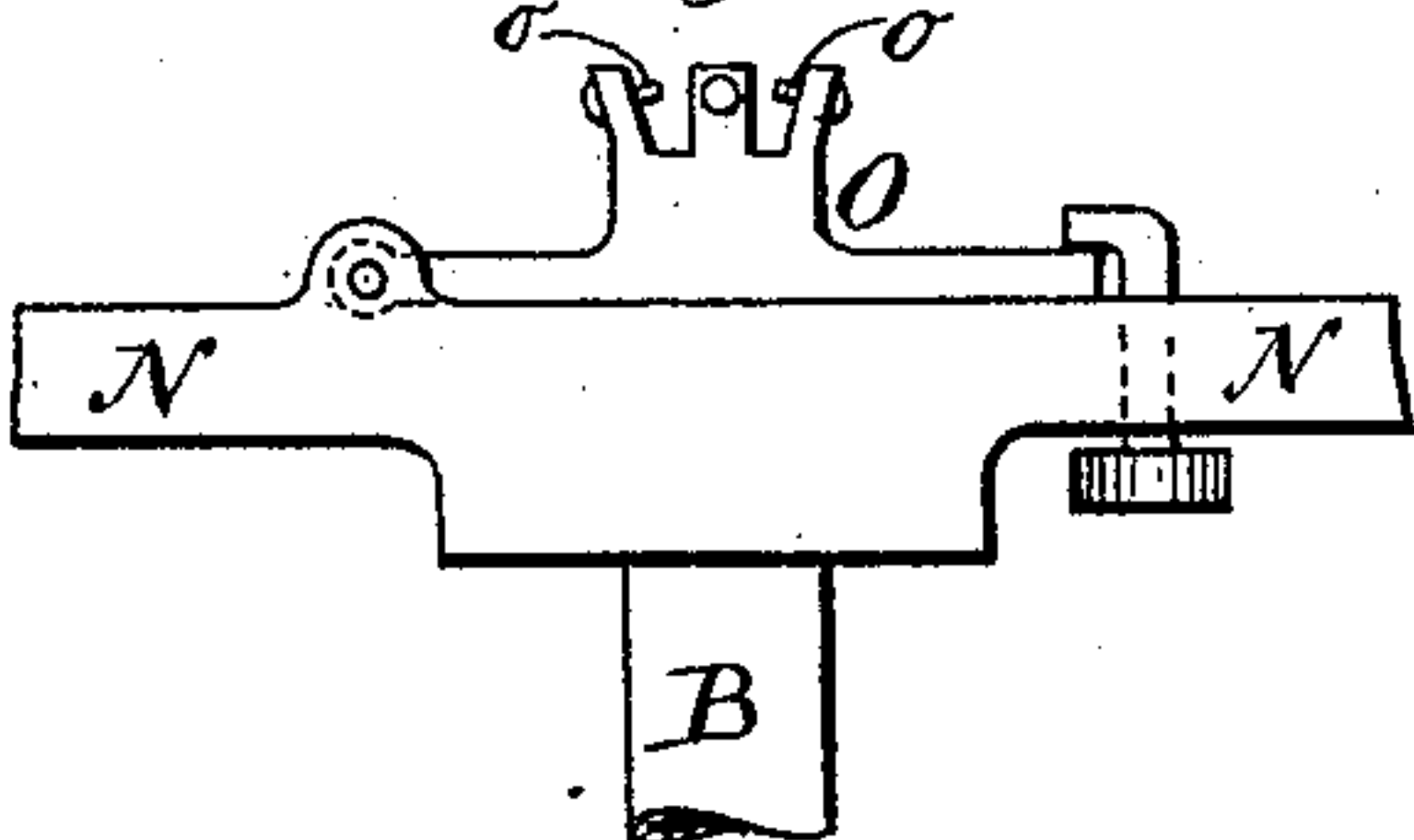


Fig. 2.

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Inventor:  
Thomas P. C. Crampton.  
By James L. Norris.  
Attorney

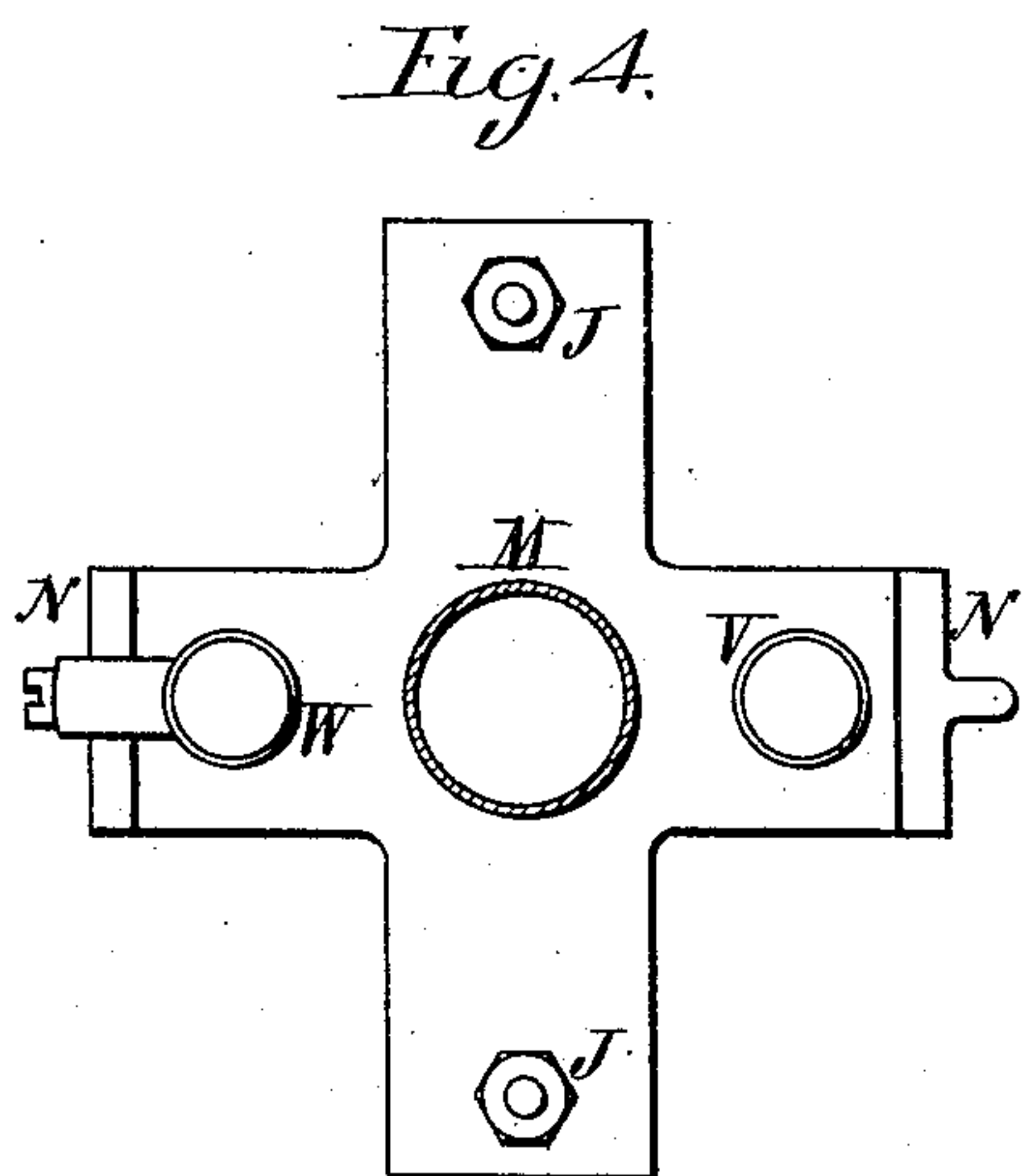
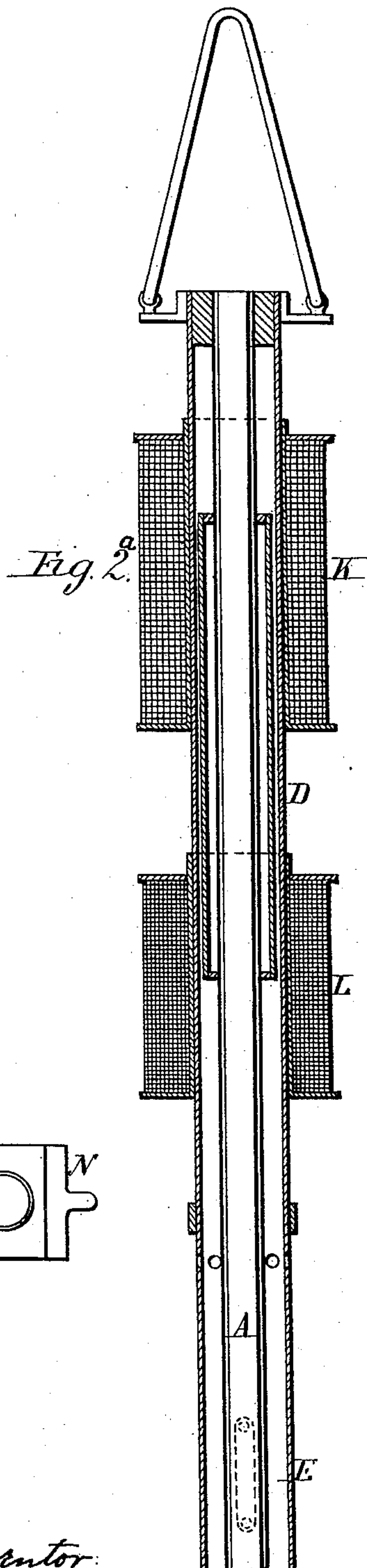
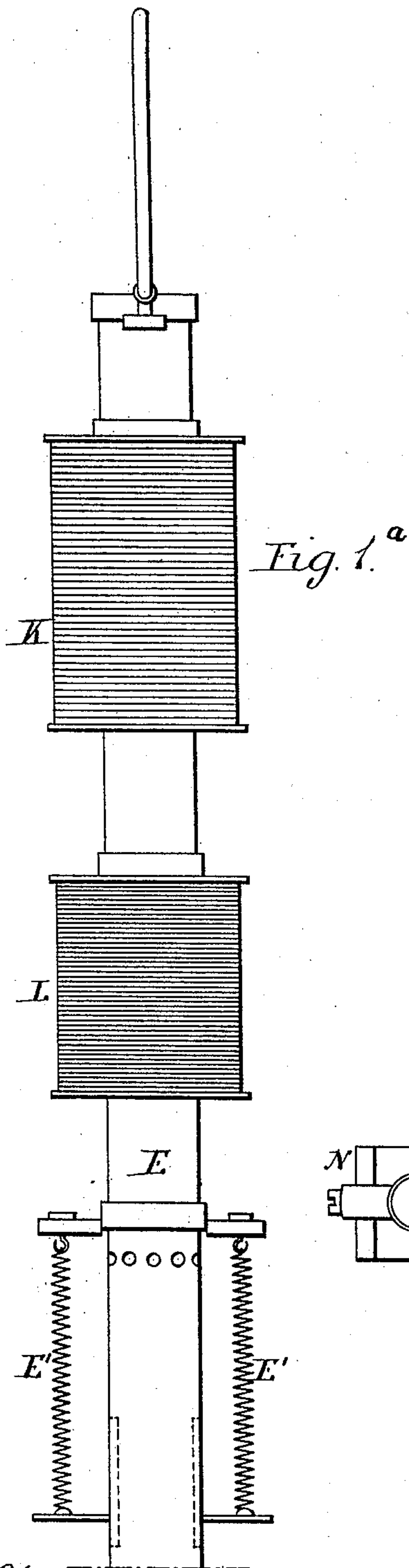
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3 Sheets—Sheet 2.

T. P. C. CRAMPTON.  
ELECTRIC ARC LAMP.

No. 442,018.

Patented Dec. 2, 1890.



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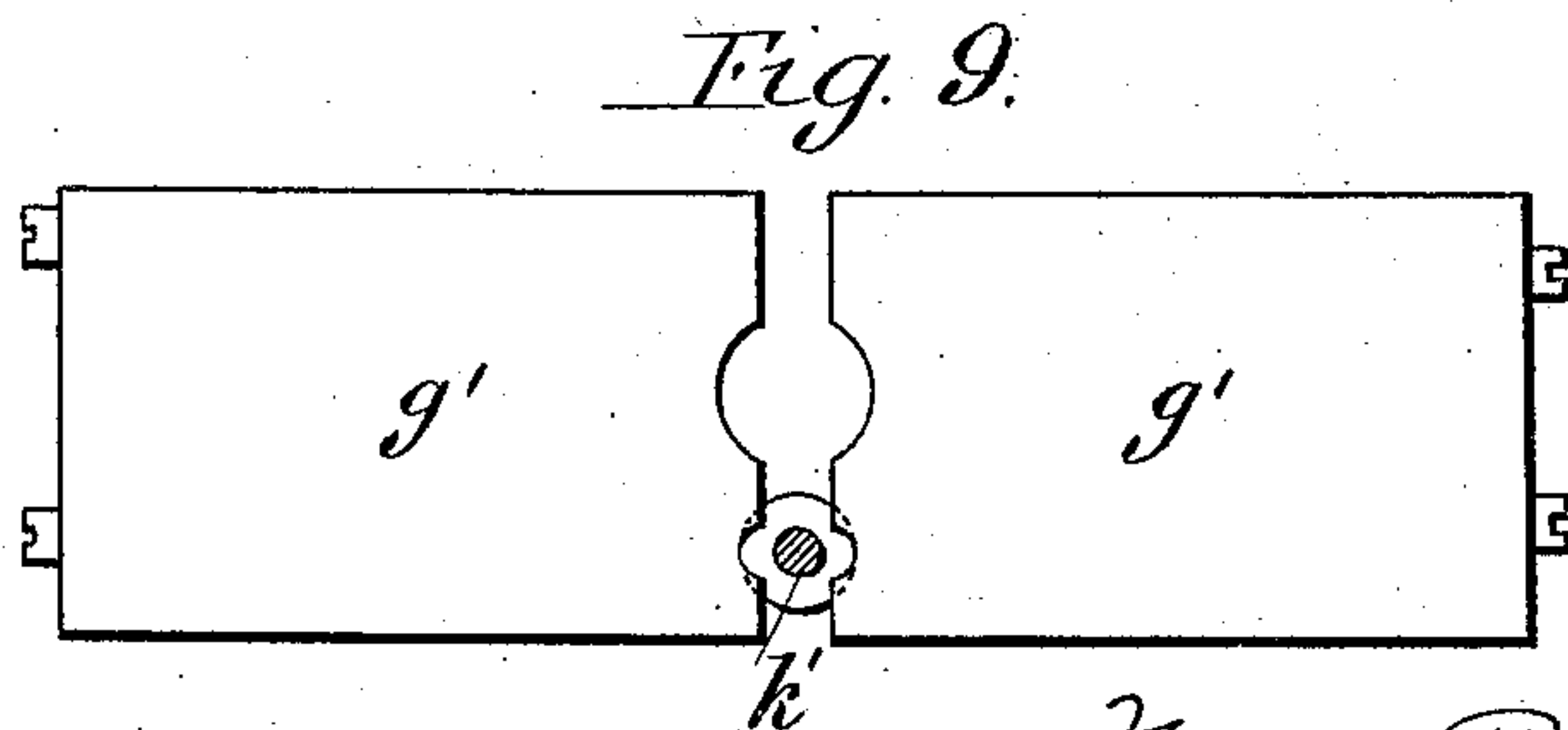
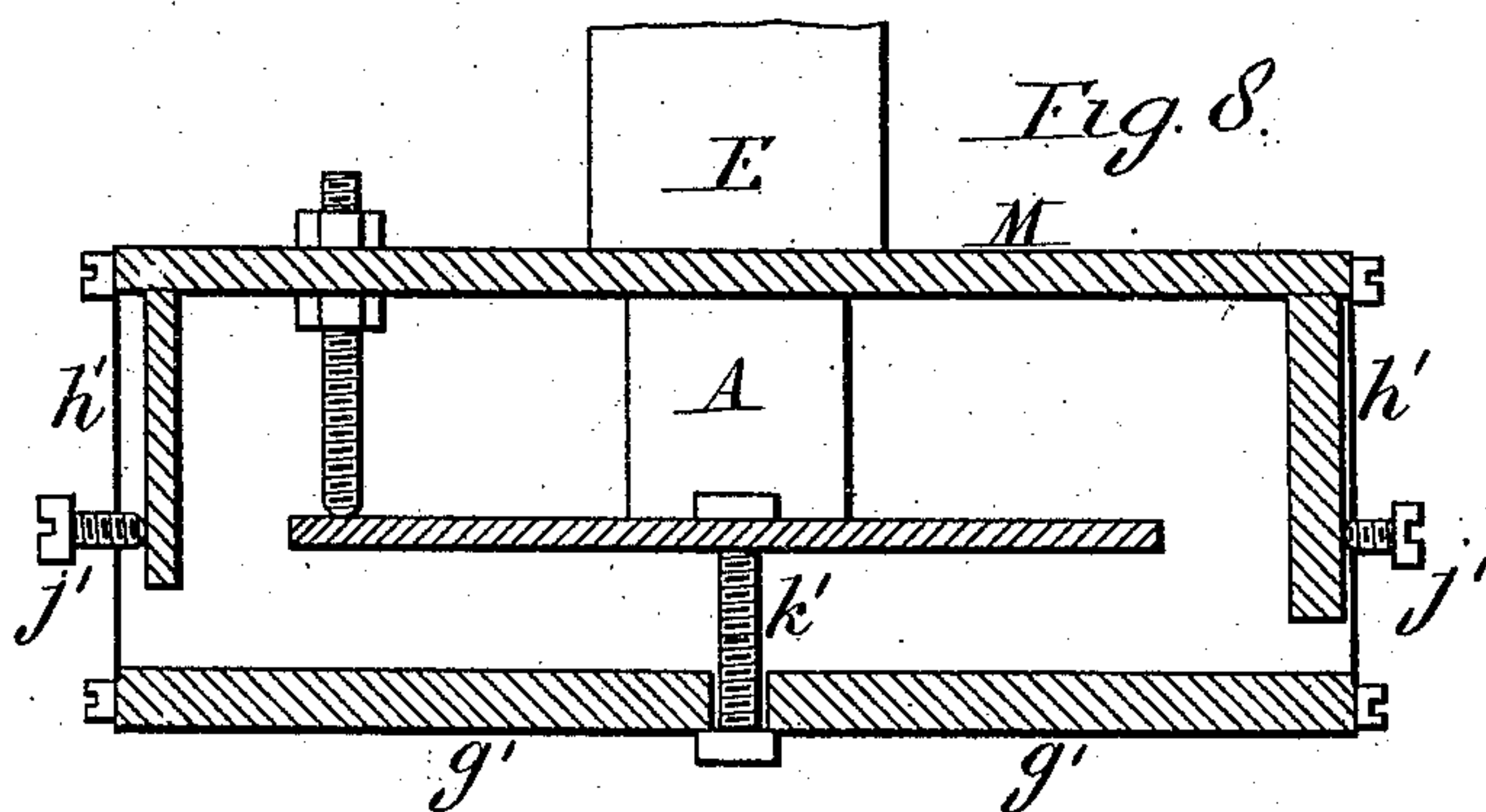
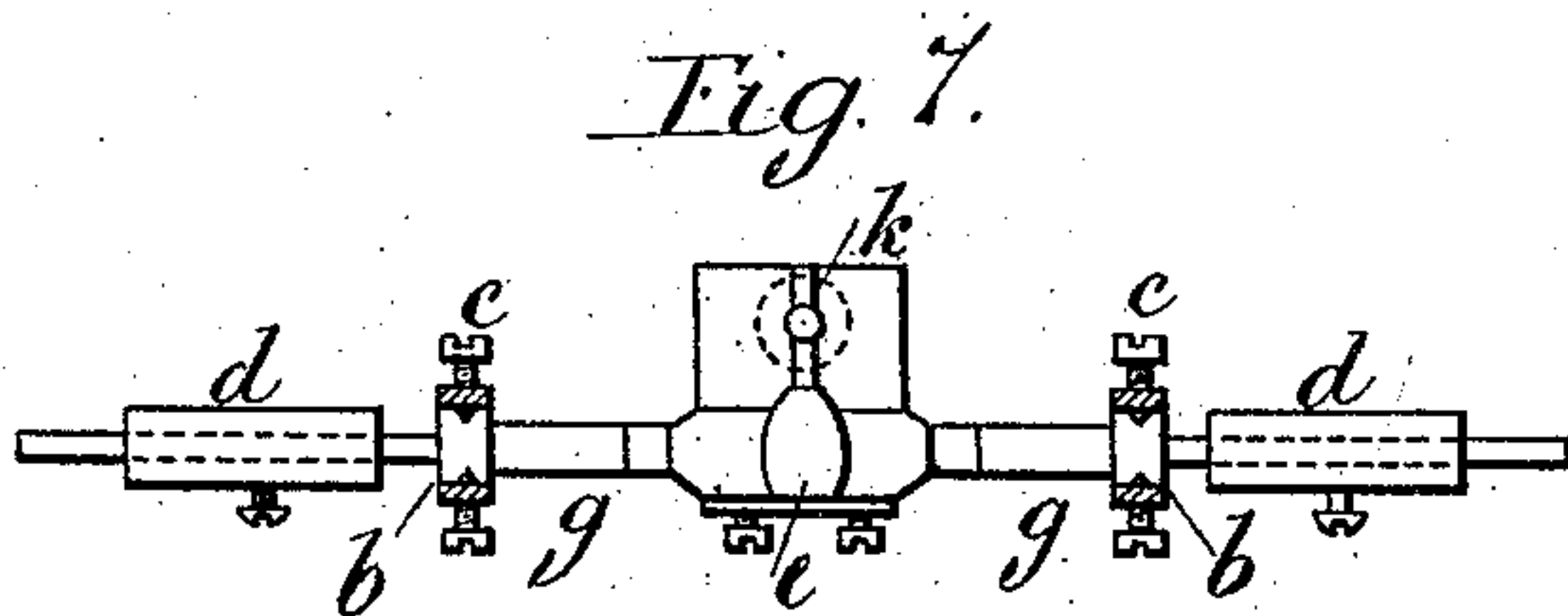
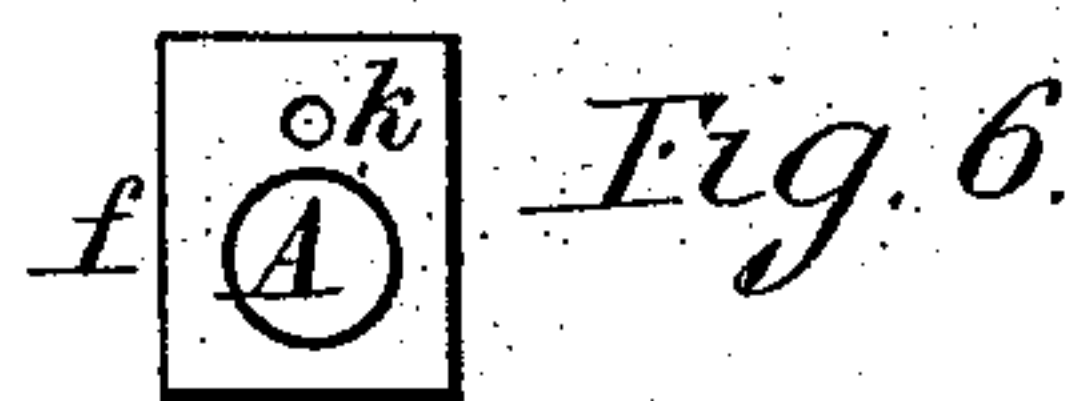
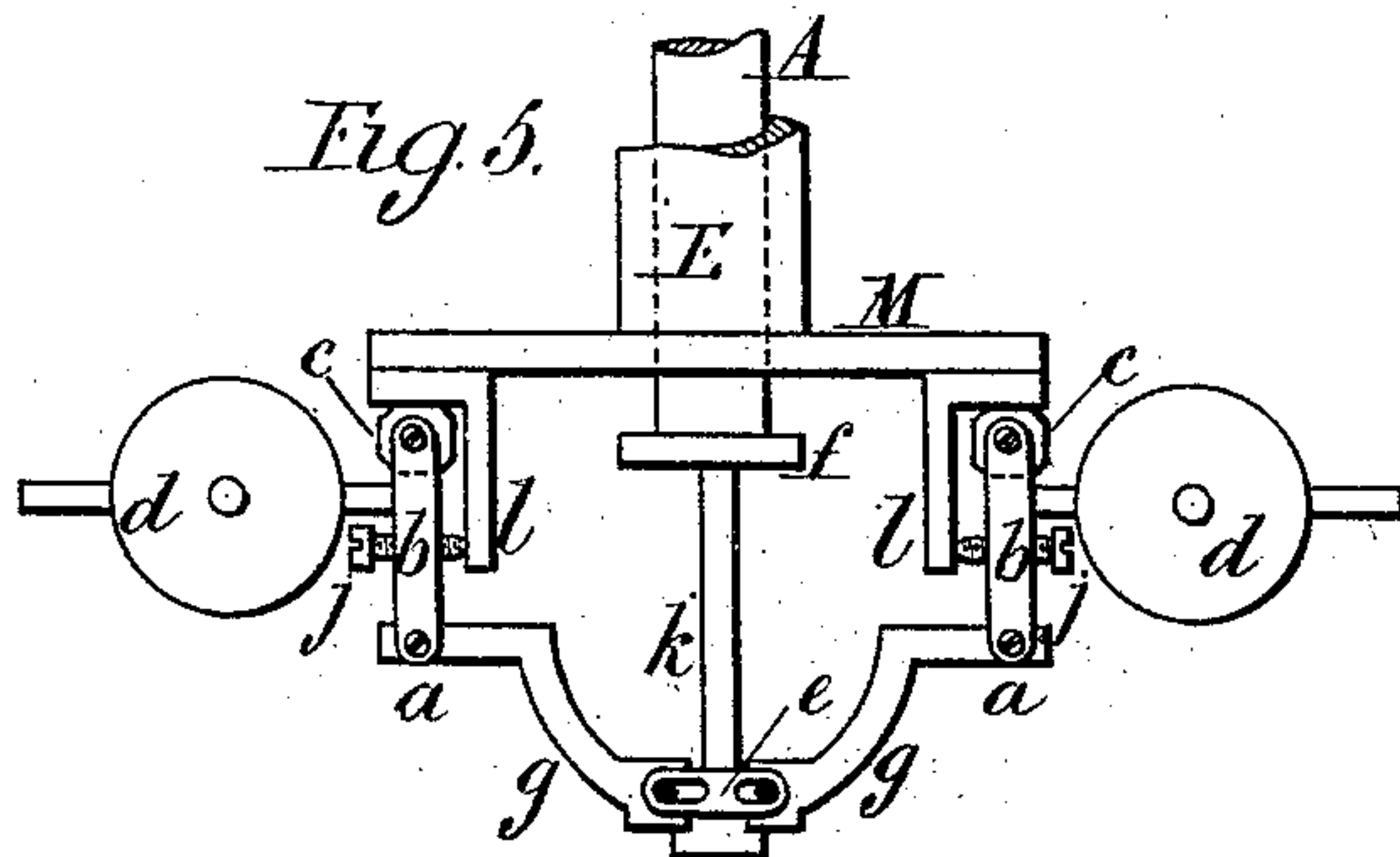
(No Model.)

3 Sheets—Sheet 3.

T. P. C. CRAMPTON.  
ELECTRIC ARC LAMP.

No. 442,018.

Patented Dec. 2, 1890.



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Attorney



# UNITED STATES PATENT OFFICE.

THOMAS P. C. CRAMPTON, OF LONDON, ENGLAND, ASSIGNOR OF ONE-HALF  
TO ALBERT ESSINGER, OF SAME PLACE.

## ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 442,618, dated December 2, 1890.

Application filed July 14, 1890. Serial No. 358,649. (No model.) Patented in England July 1, 1889, No. 10,640; in Belgium July 4, 1890, No. 91,138, and in Italy August 5, 1890, LIV, 425.

*To all whom it may concern:*

Be it known that I, THOMAS PHILLIP CHRISTOPHER CRAMPTON, a citizen of England, residing at 10 Cursitor Street, Chancery Lane, London, in the county of Middlesex, England, have invented certain new and useful Improvements in Electric-Arc Lamps, (for which I have obtained patents in Great Britain, dated July 1, 1889, No. 10,640; in Belgium, dated July 4, 1890, No. 91,138, and in Italy, dated August 5, 1890, Vol. LIV, 425,) of which the following is a specification.

This invention relates to the construction of a simple, cheap, compact, and efficient electric-arc lamp.

Figures 1, 2, 1<sup>a</sup>, and 2<sup>a</sup> are front and side elevations, respectively, of one form of my invention, certain parts being supposed removed for the sake of clearness.

It consists, essentially, of two tubes A and B, within which carbon or other electrodes slide freely. The upper one of these tubes A has fixed to it a hollow iron core D, which slides freely inside an outer tube E, the weight of the tube, core, and other attachments being counterbalanced by springs E' E'. The tube A carries at its lower end a cross-piece F, to the outer edges of which are pivoted clutch-pieces G G, and a spring H, regulated by a screw-nut I, presses the jaws of the clutch-pieces G G against the carbon C until the tube A, with the cross-piece F and the clutch-pieces G G, descends, so that the tails of the clutch-pieces rest on catch-hooks J J, whose length is regulated by the screws and nuts, as shown. When this occurs, the grip of the clutch-pieces G G is relieved and the carbon slides downward between them.

The descent of the tube A, as the upper carbon consumes and the consequent feed of the upper carbon, is effected in the ordinary way by the action of the differential coils K and L, suitably placed on the outer tube E, K being a coil of thick wire in circuit with the carbons, and L a coil of fine wire in shunt to the lamp-circuit. The increased length of arc due to the consumption of the carbons causes less current to pass through K and so weakens the upward attraction of the core D, while it causes more current to pass through

L and so strengthens the downward attraction.

The outer tube E has fixed to its lower end a cross-piece M, (see plan, Fig. 4,) to which are attached the hooks J J, and pieces N N of any suitable shape forming the frame of the lamp. The pieces N N are insulated from the cross-piece M, and are joined at their lower extremities to the lower-carbon tube B. When the lamp is put in circuit, the solenoid K lifts the upper carbon, striking the arc.

To the top of the carbon-tube B is attached by screwing or by a bayonet catch or hinge a ring or crown O, (shown in detail in Figs. 3 and 3<sup>a</sup>,) having a number (preferably three) of studs o o o of platinum, iridium, or other refractory alloy so adjusted that they rest outside of the arc on the cone formed at the top of the lower carbon as it consumes. The crown is slotted between the studs to allow escape of detached particles of carbon.

The upward feed of the lower carbon is effected by means of a weight P, connected by a chain Q, passing over a pulley to a metal piece R, sliding freely inside the tube B and pushing the lower carbon continually against the studs o o o. Between the metal piece R and the base of the carbon is interposed a conoidal piece S of porcelain or other insulating material, which can project through the studs o o o when the lower carbon is burned out, thus breaking the arc without damaging the studs.

The slot T of the tube B is for the purpose of withdrawing the piece R laterally, so that the lower carbon can be introduced or withdrawn through the open bottom of the tube B.

U is a guard-plate having a central hole, through which the upper carbon passes without contact. This plate prevents the passage upward of heat and particles of carbon. It is preferably made of two thicknesses of metal with asbestos between them, and it is attached to but insulated from the frames N N.

V and W are the terminals, which may be placed where convenient on the frame, both insulated from the cross-piece M, but one W in metallic connection with the frame N and so with the lower carbon.

The weight P may, if desired, be placed



above the frames N N as a ring outside the coils K and L, being connected by chains or cords passing over pulleys to the piece R.

Only one clutch-piece G, with one relieving-hook J, may be used in combination with a fixed jaw forming part of the cross-piece F. Any known clutch may be attached to the carbon-tube A, if it is so constructed that the grip is released when the tube descends below a certain point determined according to the desired length of arc. The arrangement may be reversed by fixing the clutch to the cross-piece M and attaching the releasing-gear to the tube A, as shown in Figs. 5, 6, 7, 8, and 9.

Fig. 5 is a side view. Fig. 6 is a plan of the plate *f*. Fig. 7 is a plan showing the clutches and counter-balance.

In Fig. 5, M is the cross-piece attached to the outer tube E, and *f* is the cross-piece attached to the carbon-tube A. *g g* are the clutch-pieces, which are pivoted at *a a* to arms *b b*, which are pivoted at *c c* and carry adjustable counterbalance-weights *d d*. The clutch-pieces *g g* are loosely jointed to slotted holes of a link *e*, which prevents them from separating. *j j* are adjustable releasing-studs. The connecting-piece *k*, attached to the cross-piece *f*, passes through corresponding half-holes in each clutch-piece. (See plan, Fig. 7.) The action of this clutch is as follows: While the arc is not too long, the clutch-pieces are drawn upward, resting on the head of the connecting-piece *k*, and the weights *d d* are raised upward, pressing the clutch-pieces against the carbon. When, on the contrary, the arc lengthens, the tube A descends until the releasing-studs *j j* bear against the arms *l l*, whereupon the grip on the carbon is released, allowing the carbon to descend, shortening the arc.

Another form of clutch attached to the cross-piece M is shown in section by Fig. 8, and in plan by Fig. 9.

The clutch-pieces *g' g'* are attached to the cross-piece M by flat springs *h' h'*, small studs *j' j'* limiting their range. The connecting-piece *k'* passes through the two half-holes in

*g' g'*, as shown in Fig. 9. When, then, the tube A rises, the connecting-piece *k'* draws up the clutch-pieces *g' g'* and the flexure of the springs *h' h'* causes *g' g'* to grip the carbon. When, on the contrary, A descends in consequence of the lengthening of the arc, the springs *h' h'* draw back the clutch-pieces *g' g'*, allowing the carbon to slip downward.

Having thus described the nature of my invention and the best means I know for carrying the same into practical effect, I claim—

1. In an electric-arc lamp, the combination, with a pair of differential solenoids and adjustable stops, of an upper-carbon-holding tube having at its upper end a tubular iron core sliding in the solenoids and provided at its lower end with spring-clutch jaws acted on by the adjustable stops to release the carbon, substantially as described.

2. In an electric-arc lamp, the combination, with the outer tube carrying adjustable stops, of the inner carbon-holding tube carrying pivoted spring-clutches having tail-pieces acted on by the adjustable stops to swing the clutches on their pivots and release the carbon, substantially as described.

3. In an electric-arc lamp, the combination, with an outer tube having a cross-piece carrying pendent stop-hooks, of the inner carbon-holding tube having a cross-piece carrying pivoted spring-clutches provided with tail-pieces which are acted upon by the stop-hooks to swing the clutches on their pivots and release the carbon, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 2d day of July A. D. 1890.

THOMAS P. C. CRAMPTON.

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