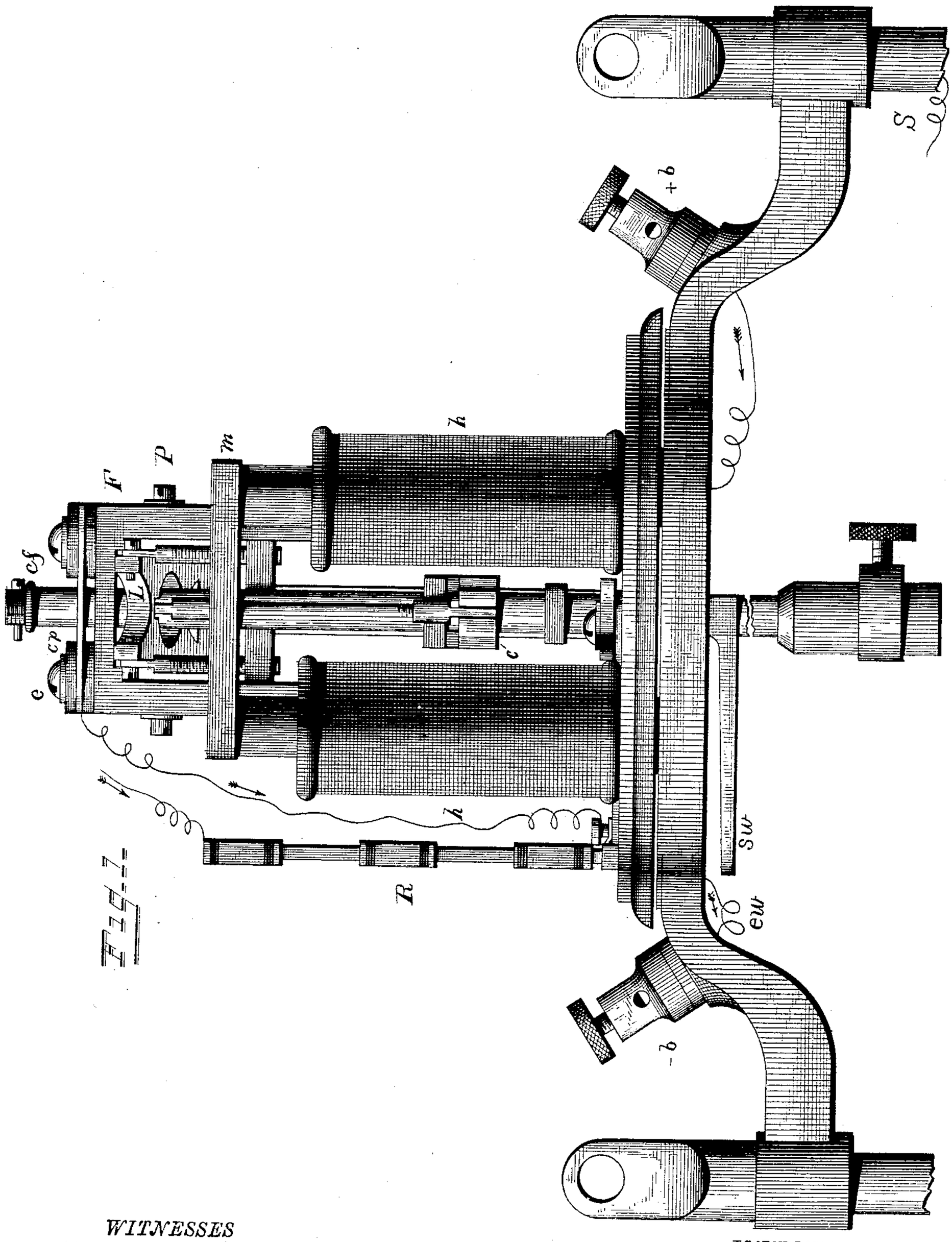
(No Model.)

3 Sheets—Sheet 1.

J. A. JENNEY.

ARC LAMP REGULATOR.

No. 334,023. Patented Jan. 12, 1886.



WITNESSES

F. L. Curand

J. F. Wing.

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(No Model.)

3 Sheets—Sheet 2.

J. A. JENNEY.

ARC LAMP REGULATOR.

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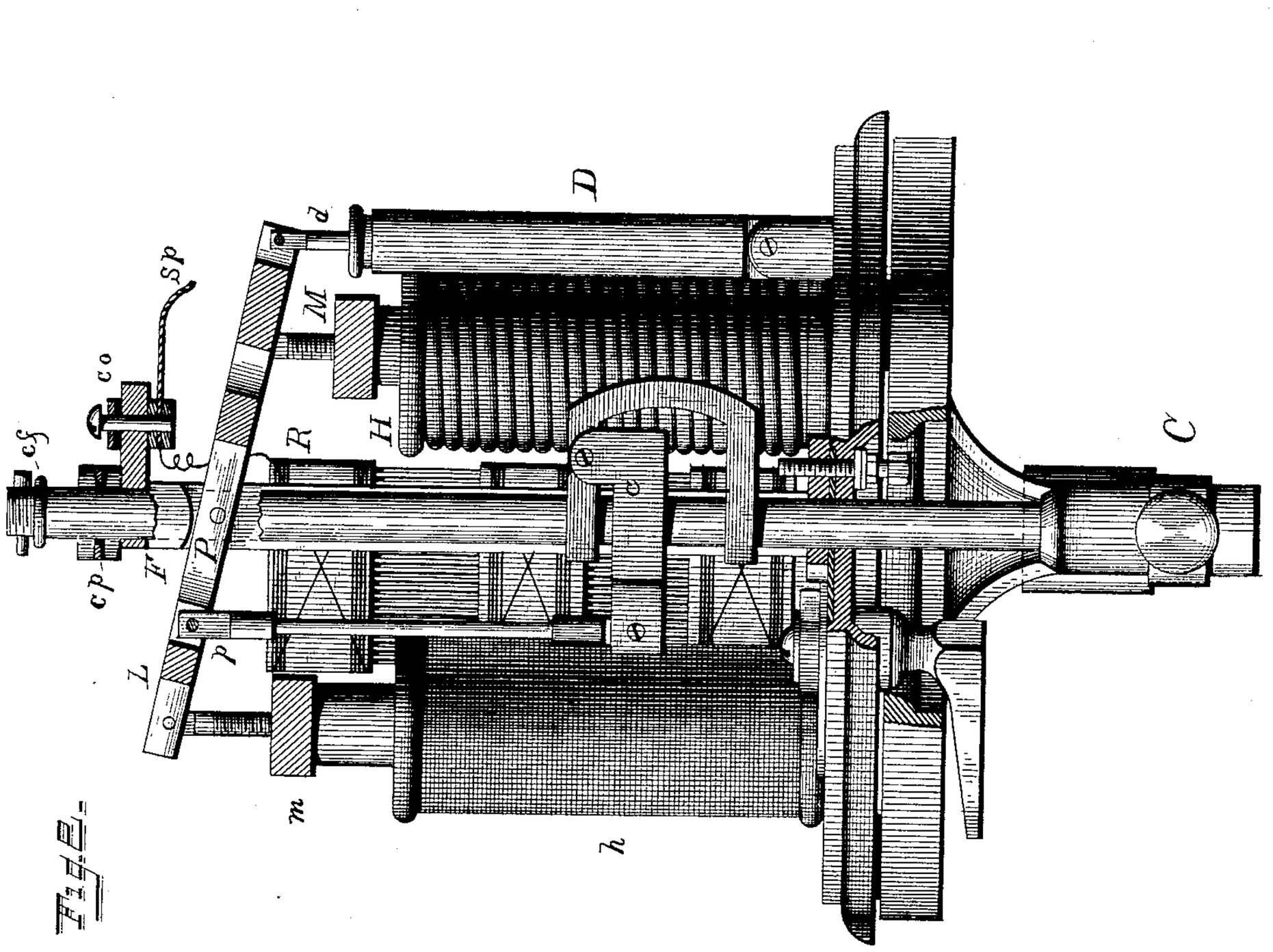

Fig. 2.

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3 Sheets—Sheet 3.

J. A. JENNEY.

ARC LAMP REGULATOR.

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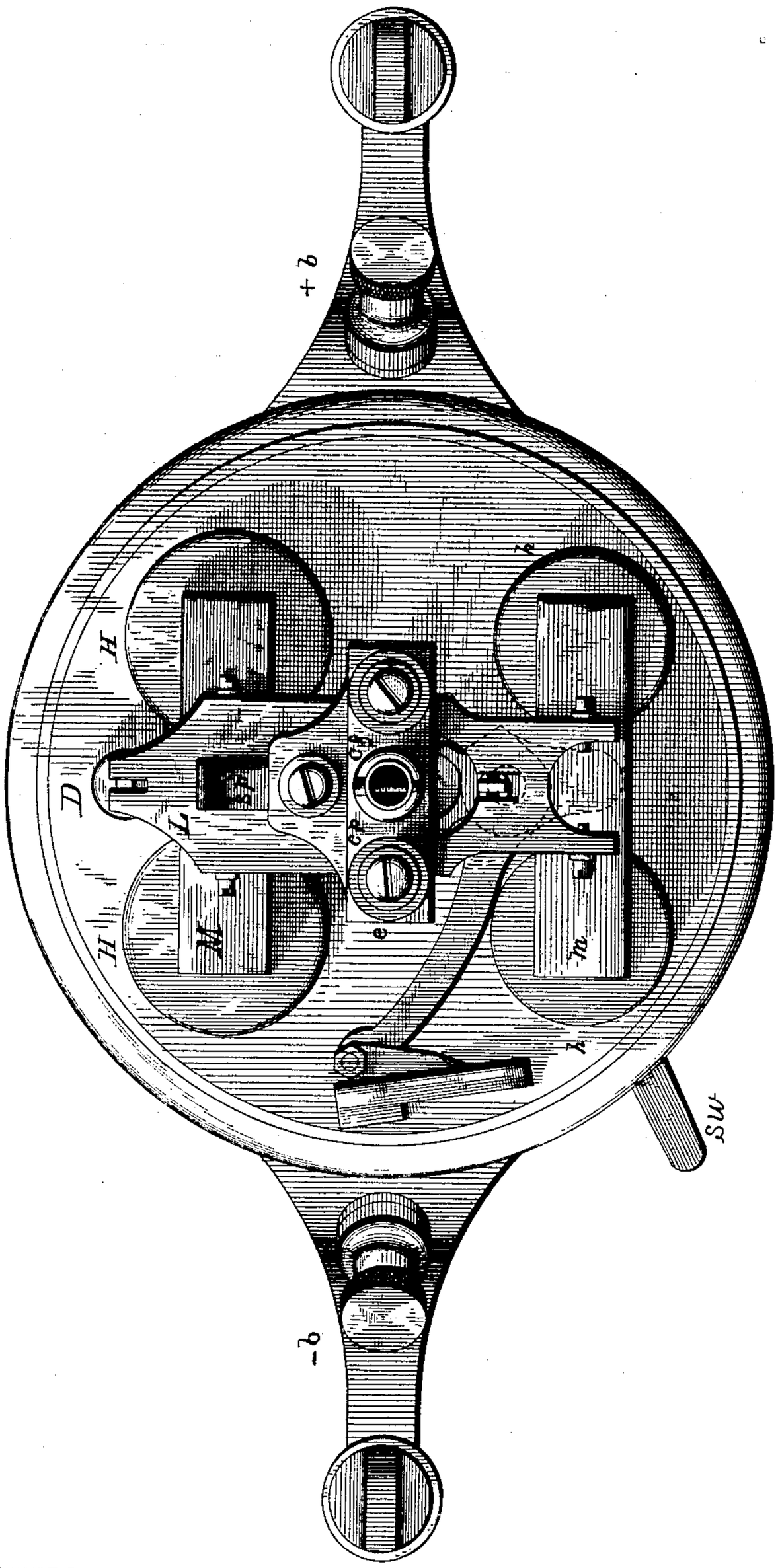

FIG. 3.

WITNESSES

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UNITED STATES PATENT OFFICE.

JAMES A. JENNEY, OF FORT WAYNE, INDIANA, ASSIGNOR TO THE FORT WAYNE ELECTRIC LIGHT COMPANY, OF SAME PLACE.

ARC-LAMP REGULATOR.

SPECIFICATION forming part of Letters Patent No. 334,023, dated January 12, 1886.

Application filed August 10, 1885. Serial No. 174,054. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. JENNEY, a citizen of the United States, residing at Fort Wayne, in the county of Allen, in the State of Indiana, have invented certain new and useful Improvements in Electric-Arc-Lamp Regulators; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form part of this specification.

My invention consists, substantially, in an improvement of the electric-arc-lamp regulator for which a patent was granted to me and Charles D. Jenney, jointly, on the 25th day of July, 1882.

In the accompanying drawings, Figure 1 is a side view of the regulator. Fig. 2 is another side view, and Fig. 3 is a plan view from above.

Identical parts are denoted by the same letters in all the figures.

The regulator consists, substantially, of two coarse-wire helices, H H, set in the main circuit, with currents flowing through them in contrary directions; two soft-iron cores playing freely in their hollow centers and joined in one piece at the top, so as to constitute a single soft-iron magnet, M, with its poles in said cores; two fine-wire helices set in a shunt-circuit, with currents flowing through them in contrary directions; two soft-iron cores playing freely in the hollow centers of the same and joined in one piece at the top, as the others, so as to constitute a single soft-iron magnet, *m*, with its poles in said cores; a lever, L, pivoted at P on the frame F, and carrying said soft-iron magnets M and *m*, the clutch *c*, and the piston *d* of the dash-pot D, and the resistance-stack R.

Fig. 1 shows the fine-wire helices *h h*, with their soft-iron magnet *m*, suspended from the lever L by two adjustable pivots and the resistance-stack R. Fig. 2 shows one fine-wire helix, *h*, with the soft-iron magnet *m* divided, one coarse-wire helix, H, with the soft-iron magnet M divided, the dash-pot D, with its piston-rod *d*, and the lever L with all its attachments; and Fig. 3 shows the arrangement of all the parts in a plan view from above.

The arrangement of the parts pivoted to the lever L is such that in the oscillation of the lever the greatest range of motion is in the piston of the dash-pot D, the next greatest in the soft-iron magnet *m*, playing in the fine-wire helices, the next greatest in the soft-iron magnet M, playing in the coarse-wire helices, and the least in the clutch *c*. The clutch may be in any form suitable to be attached to a link pivoted upon the lever L, as at *p*, and so constructed that upon the elevation of its sustaining-link it will grasp, lift, and hold suspended the carbon-holder C, and upon depression of the same relax its grasp and allow the carbon-holder to slide downward.

The frame F is preferably of brass and is securely fastened to the base of the regulator, and carries pivoted through its columns the lever L, and at its top the insulated contact-plate *cp*, and upon a projecting arm the cut-out contact-piece *co*, insulated from the frame. The carbon-holder C passes through the contact-plate *cp* by a large aperture, without touching it, being guided in its movement by closely-fitting apertures in the top and bottom of the frame F. On the carbon-holder, near its top, at *cf*, is a contact-flange wide enough to form an electrical contact with the plate *cp* when the carbon-holder slips down far enough to bring them together. The insulated contact-piece *co* forms an electrical connection through the brass spring *sp* whenever the said lever is made to touch said spring in the operation of the regulator, as hereinafter described. The resistance-stack R is made from a continuous brass strip folded in convenient and compact form, and having the folds insulated from each other, and it is electrically connected by one of its terminals with the exit-wire *ew*, and by its other terminal with the cut-out contact *co*. The entrance-connection of the shunt-circuit with the main circuit is at any part of the frame F, and its exit-connection is with the exit-wire *ew*. Between the exit-wire *ew* and the entrance-wire leading from the binding-post +*b* is a switch operated by the switch-lever *sw*, by which connection may be made direct from

+*b* to —*b* and the lamp cut out of the circuit.

The course of the electrical current through the lamp and regulator during their normal operation is as follows: The main current from the positive pole of the dynamo or battery enters the lamp at the binding-post +*b*, and passes thence by a wire into the base of the frame F, thence into the carbon-holder C by its contacts with the frame, and through the said carbon-holder and the carbons into the insulated lower holder, (not shown in the drawings,) and thence by an insulated wire through the hollow standard S, and through the coarse-wire helices H H and the exit-wire *ew* to the binding-post—*b*. The axial magnetism developed by the flow of the main current through the coarse-wire helices H H draws the soft-iron magnet M downward, and so by means of the lever L and the clutch *c* the carbon-holder C is lifted up and the carbons separated, upon which the electric arc is formed between them. Whenever the separation of the carbons becomes too wide, the resistance of the lengthened arc drives an increased current through the shunt-circuit, and in consequence the soft-iron magnet *m* is drawn into the fine-wire helices *h h*. By this antagonizing movement the grasp of the clutch *c* upon the carbon-holder C is relaxed and the carbon-holder is allowed to slide downward just enough to restore the normal arc-length, when its movement is arrested by the preponderating energy of the coarse-wire helices H H.

If by any accident the upper carbon should fail to feed until the arc becomes very long, the increased current driven through the shunt-circuit so increases the energy of the fine-wire helices *h h* that the lever L is tipped so as to form an electrical contact at *sp*. This gives the current a path from the frame through the lever L, by way of the resistance-stack R, to the exit-post —*b*. This position of the lever L opens the clutch wide and allows the carbon-holder to fall freely downward, and upon the carbons coming again into contact the resistance of the stack R drives through them a current sufficient to energize the coarse-wire helices H H to a degree sufficient to overcome the power of the fine-wire helices, and so break the contact at *sp*, and thus re-establish the main circuit in its proper path.

In the case of an accident, such as to cause the carbon-holder to stick fast in any way, so that it cannot slide downward far enough to bring the carbons into contact, the current flows continuously through the cut-out circuit described.

When, by the burning out of the carbons or other cause, the carbon-holder falls freely its whole length, the contact-flange *cf* makes an electrical connection between the carbon-holder and the plate *cp*, which gives the current a short path through the wire connection from *e* to *ew*.

As will be observed, the parts supported by the lever L are so placed that whenever there is no current passing through the lamp and all its parts are free the lever L will be tipped, so as to rest in contact with the cut-out spring *sp*, thus affording a path for the current through the cut-out circuit; but immediately upon the flow of the current through this circuit the resistance of the stack R, which is equal, substantially, to that of the carbons and connections in the lamp, not including that of the arc, compels the passage of a portion of the current through the carbons, and so brings the helices H H into action, in consequence of which the cut-out circuit is broken and the normal operation of the lamp established.

It is apparent that in the construction of the regulator described a single helix with a freely moving soft-iron core might be substituted in the place of either or both of the pairs of helices, with their compound cores or magnets, above described, without affecting the application of my invention; but the form which I have described is that which I regard as preferable. It is manifest, also, that the adjustment of the lever L so that it shall rest in contact with the spring *sp* at all times when there is no current passing through the carbons could be attained by a weight, spring, or other equivalent for the gravity of the supported parts.

Of the regulator thus fully described, that which I claim as new and as my invention, and desire to secure by Letters Patent, is—

In an electric-arc-lamp regulator, the fine-wire helices *h h* in the shunt-circuit, the coarse-wire helices H H in the main circuit, the soft-iron magnets or cores M and *m*, the lever L, the clutch *c*, the resistance R, the dash-pot D, the cut-out spring *sp*, and the cut-out circuit from *sp* through *co* and R to *ew*, each and all constructed, combined, and operated substantially as described and set forth.

In testimony whereof I do hereto subscribe my name, in the presence of two witnesses, this 21st day of July, 1885.

JAMES A. JENNEY.

Witnesses:
H. L. CRANDALL,
THOS. W. WILLIAMS.