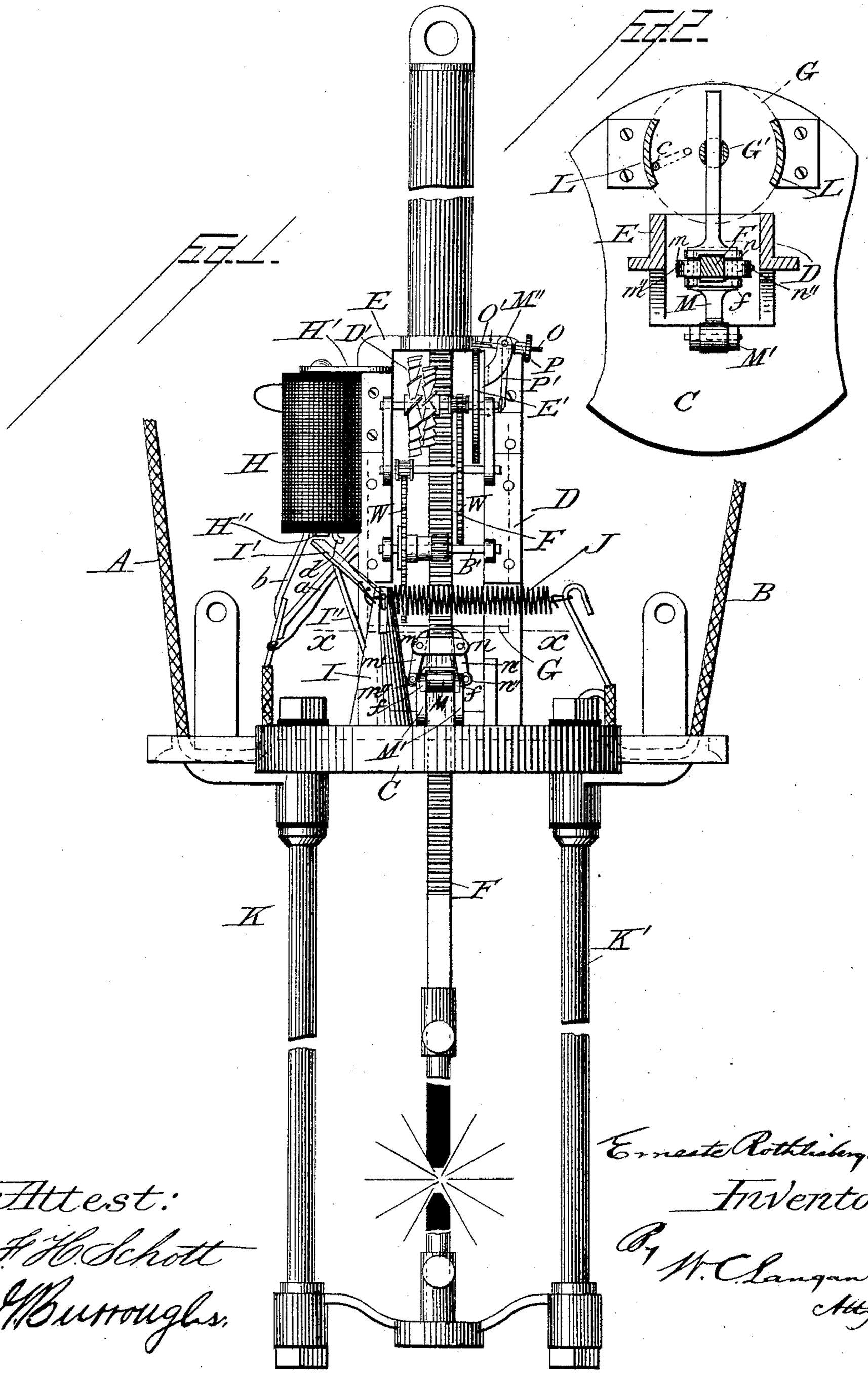
(No Model.) 3 Sheets—Sheet 1.

E. ROTHLISBERGER.

ELECTRIC ARC LAMP.

No. 435,248. Patented Aug. 26, 1890.



Attest:
F. H. Schott
P. Burroughs.

Ernest Rothlisberger
Inventor
By W. C. Langan
Atty

(No Model.) 3 Sheets—Sheet 2.

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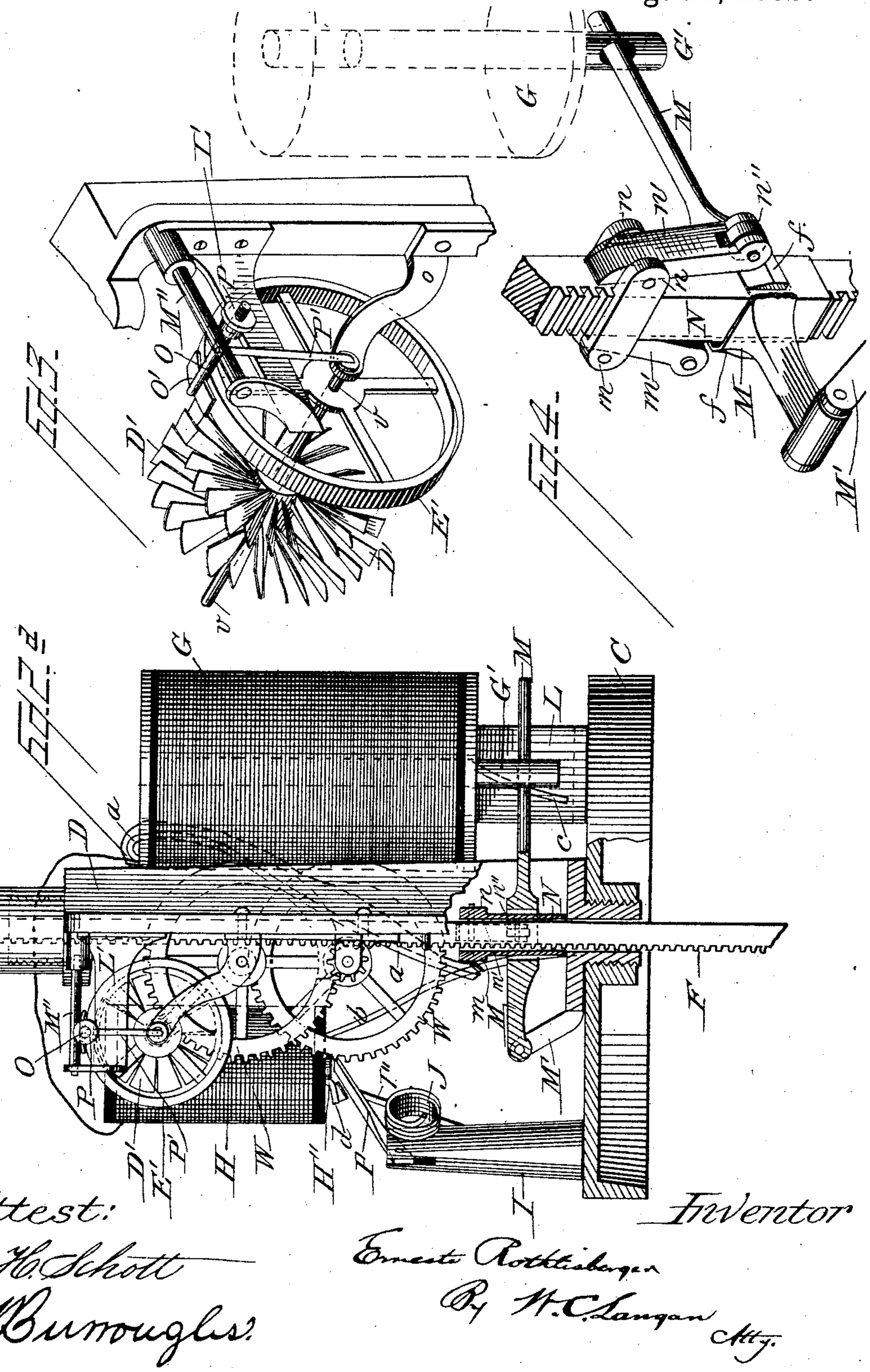

Attest:
H. H. Schott
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Inventor
Ernesto Rothlisberger
By H. C. Langan Atty.

(No Model.) 3 Sheets—Sheet 3.

E. ROTHLISBERGER.

ELECTRIC ARC LAMP.

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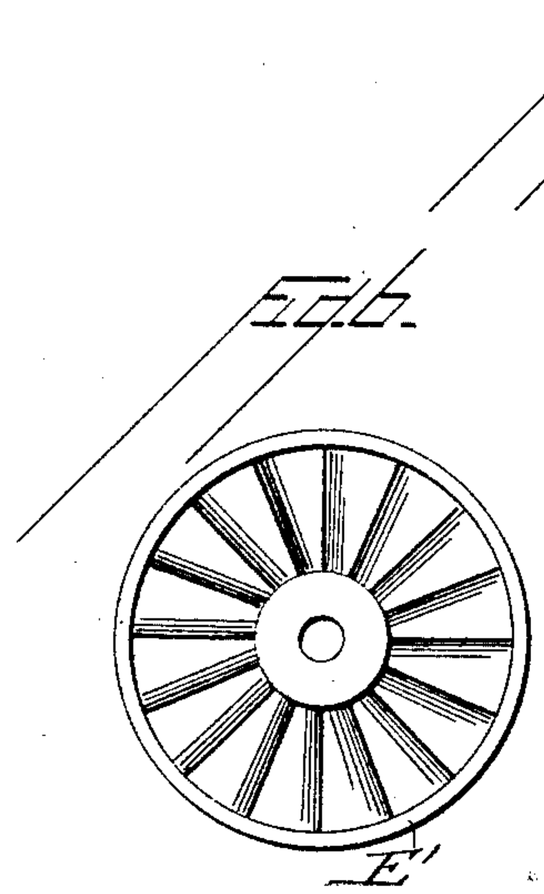

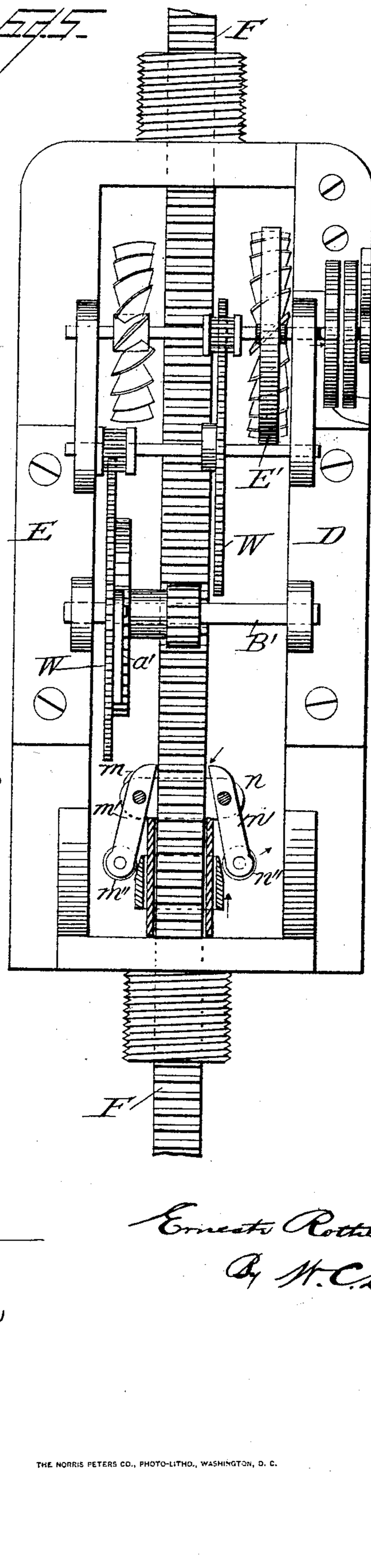

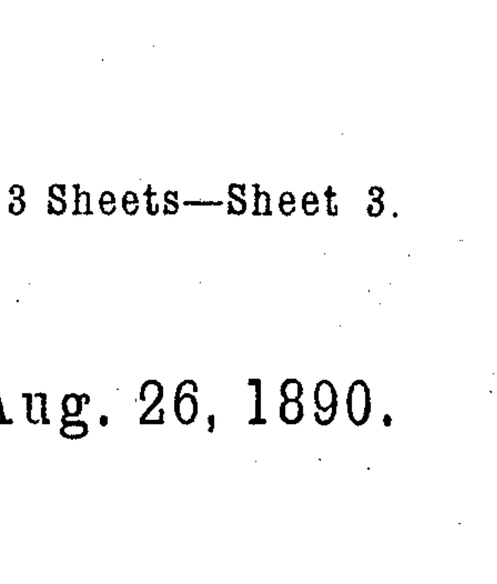

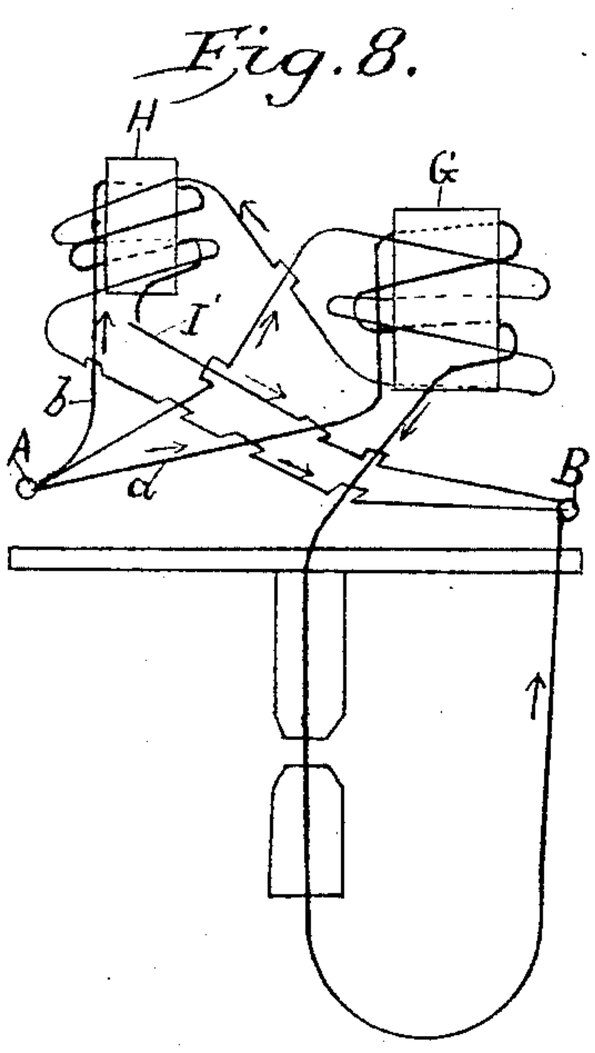

Attest:
F. H. Schott
W. Burroughs

Inventor:
Ernest Rothlisberger
By M. C. Langan Atty

UNITED STATES PATENT OFFICE.

ERNESTE ROTHLISBERGER, OF LIMA, OHIO, ASSIGNOR OF FORTY-NINE ONE-HUNDREDTHS TO JOHN W. WEGMAN AND GEORGE W. BUCHANAN, OF SAME PLACE.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 435,248, dated August 26, 1890.

Application filed March 28, 1890. Serial No. 345,678. (No model.)

To all whom it may concern:

Be it known that I, ERNESTE ROTHLISBERGER, a citizen of the United States, residing at Lima, in the county of Allen and State of Ohio, have invented certain new and useful Improvements in Electric-Arc Lamps; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to certain new and useful improvements in electric-arc lamps, and has for its object the construction of certain improvements in mechanism for regulating and controlling the movement of the carbons.

The invention has for its special object the construction of a clutch which will perform its function on the slightest upward movement of the armature of its operative magnet, and of a braking mechanism which will insure a gradual and regular feed of the carbons.

The invention further relates to the novel construction and arrangement of parts, as will be fully described hereinafter, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the accompanying drawings, in which similar letters of reference designate corresponding parts, Figure 1 is a front elevation of a lamp embodying the invention. Fig. 2 is a section on the line *x x* of Fig. 1. Fig. 2ª is a vertical section through the feed-regulating mechanism. Fig. 3 is a detail perspective view of the braking mechanism. Fig. 4 is a similar view of the clutch. Fig. 5 shows a modification of the braking mechanism. Fig. 6 is a side elevation of the propeller as shown in Fig. 5. Fig. 7 is a detail view of the wheel with which the friction-wheel engages and its supporting-bracket. Fig. 8 is a diagram showing the different circuits.

Referring to the drawings by letter, A and B designate the two terminals of the lamp, consisting of insulated wires attached in any suitable manner to the supporting-plate C and to the line-circuit to place the lamp in circuit with the dynamo.

Standards D and E, attached to the plate C, support the rack-feed F and the gear for regulating the feed of the same. A helix G is supported on the plate C by the standards L, and carries within it the soft-iron rod G′. This rod has a perforation in its lower end through which the lever of the clutch passes. The electro-magnet H is secured to the standard F by a bracket H′. The armature of this magnet is supported by a standard I of non-conductive material attached to the plate C. A resistance-spring J connects the armature with the terminal B. To support the armature I′ the proper distance from the core H″ of the electro-magnet, the brace I″ is provided. The rods K and K′, depended from the plate C and insulated from the same, support the lower carbon.

The inner helices of the magnets G and H are formed of coarse wire and have helices of much finer wire surrounding them. The fine wire of the magnet G is wound in the opposite direction to that in which the coarser wire is wound, while that of the magnet H is wound in the same direction with the coarser wire. One end *a* of the coarse wire of the helix G connects with the terminal A, as does one end *b* of the coarse wire of the magnet H. The other end *c* of the wire of the helix G is attached uninsulated to one of the standards L or to the plate C. The end *d* of the coarse wire of the magnet H projects a short distance below the bobbin on which the helix is wound. The fine wire passes around the helix G in the direction opposite to that taken by the coarser wire, and thence around the electro-magnet H in the same direction taken by the coarser wire to the terminal B.

Two circuits are presented to a current entering the lamp at the terminal A. The first is through the coarse wire to the helix G, around the same, and then to the plate C, thence through the rack-feed through the carbons, the rod K′, and then to the terminal B. The passage of this current makes a magnet of the helix G, which will raise the soft iron G′, which, by means of the clutch, will also raise the carbon and thereby form the arc.

The second current passes through the fine wire, around the helix G in the direction opposite to that taken by the current in the coarser wire, and acts as a regulator to the force of the inner helix, and thence around the electro-magnet H in the same direction as the current would pass through the inner helix of the same to the terminal B. The effect of this current ordinarily being much less powerful than the first, owing to the finer wire conducting it, is to limit to some extent the power exerted on the soft-iron rod by the helix G as it acts on said bar in the opposite manner. Should the circuit passing through the carbons be broken in any way, as by the arc becoming too long, a stronger current will pass through the second circuit in consequence. This would make the magnet H stronger and thereby attract its armature I′ and cause it to come in contact with the end of the coarse wire of the inner helix. This contact will form a third circuit between the terminals. In passing through this circuit the current will first pass through the wire *b* to the magnet H, through the inner helix of the same, and thereby making it stronger, to the armature I′, which has been raised so as to come in contact with the wire *d*, and thence through said armature and the resistance-spring J to the terminal B. This third circuit short-circuits the lamp and allows the current to pass on to the other lamps of the circuit. As all of the electricity will pass over the short circuit, the circuit through the carbons being broken, the helix G will be demagnetized and the iron rod allowed to descend. The rack-feed will also descend and the carbons again be brought together, if they had been separated too much, and the first circuit again completed. The lamp will again begin to operate. The opening of the first circuit will weaken the third circuit very much, and thereby weaken the magnet H, which will allow its armature to drop, and thus throw the whole current into the first circuit again.

The clutch (see Fig. 4) consists of the lever M, pivoted at one end to a support M′, secured in any suitable manner to the plate C, and is looped near the said pivoted end. This loop encircles the sleeve N, through which the rack-feed passes. Projecting laterally from the upper end of this sleeve are lugs *m* and *n*, between which are pivoted at their upper ends the levers *m′* and *n′*, respectively, the inner upper faces of which come in contact with the rack-feed. The lower ends of the levers are provided with the friction-rollers *m″* and *n″*, respectively. Between the lower ends of these levers and the sides of the sleeve N are the arms *f f* of the lever M. When the lever is raised by the action of the helix on the iron rod, the wedge-shaped arms of the loop are pressed upward and impinge against the friction-rollers, forcing the lower ends of the levers *m′* and *n′* outward, and causing them to grip at their upper ends the rack-feed and carry it with the clutch in its upward movement, and thus lengthen the arc. The lengthening of the arc will offer a greater resistance to the passage of the current, and thus weaken the strength of the magnet and allow the clutch to drop into position to be again operated.

The rack-feed meshes with a train of multiplying gear-wheels W W, which have their spindles journaled in brackets attached to the standards D and E. These wheels are so geared that the upper spindle *v* will be rotated very swiftly by a very slight movement downward of the rack-feed. A pawl and ratchet *a′* connects the shaft B′ with the lower of the wheels W, so that the feed-rack may be raised without effecting the rest of the gearing beyond this connection.

Upon the spindle *v* is keyed the propeller-wheel D′ and a friction-wheel E′, the object of which will be explained farther on. This spindle is loosely journaled in brackets attached to the standards D and E, so as to have play from side to side.

Projecting from the standard D is a bracket I′ supporting a rock-shaft M″, journaled in suitable bearings. An arm O is attached transversely to the rock-shaft, and carries upon its inner end a brake-shoe O′, directly over the friction-wheel E′, and on its other end the counterpoise P, which can be screwed in or out to regulate the delicacy with which the brake will operate. Downward from the rock-shaft extends the arm P′, so that its lower end will come in contact with the outer end of the spindle carrying the propeller-wheel. The gear on the spindle *v*, meshing with the upper of the gear-wheels *w*, is elongated so as to keep in mesh when the spindle is moved from side to side. If the rack should begin to feed too fast, the speed of the spindle *v* would be greatly accelerated by the multiplying gearing, and cause the propeller-wheel keyed thereon to revolve very swiftly in consequence, and which would, by the resistance of the air, force the spindle outward and impinge on the lower end of the lever P′ and force it outward. This movement of the lever would turn the rock-shaft and apply the brake-shoe to the periphery of the wheel E′. The slightest force applied to this wheel will have a tendency to stop the movement of the gearing, and thereby stop the downward inclination of the rack-feed.

To simplify the construction and to economize room, the propeller-wheel may form the spokes of the friction-wheel E′. By this means the blades of the propeller may be made broader, and consequently more powerful. A second propeller-wheel may be provided if one prove to be not strong enough.

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

1. In an arc lamp of the described class, a

sleeve surrounding the rack-feed, the levers secured to the upper part of said sleeve, and a lever pivoted at one end to a bracket of the supporting-plate of the lamp and having its other end passing through a perforation in the end of a soft-iron rod carried by the operating-magnet, part of said lever being formed into a loop surrounding the sleeve, and adapted when raised to cause the levers attached to the upper end of the sleeve to grip the rack-feed, substantially as and for the purpose specified.

2. In an arc lamp of the described class, a braking mechanism consisting of the multiplying gearing meshing with the rack-feed, the propeller and friction wheels keyed on the upper spindle of said gearing, and the brake operated by said propeller, substantially as specified.

3. In an arc lamp of the described class, the brake mechanism consisting of a propeller mounted upon a spindle journaled to move endwise, the friction-wheel keyed on said spindle, and the brake-shoe mounted upon a rock-shaft and operated by the spindle impinging upon a dependent arm of the rock-shaft, substantially as and for the purpose specified.

In testimony whereof I affix my signature in presence of two witnesses.

ERNESTE ROTHLISBERGER.

Witnesses:

EMERSON W. PRICE,

GEO. L. PARMENTER.