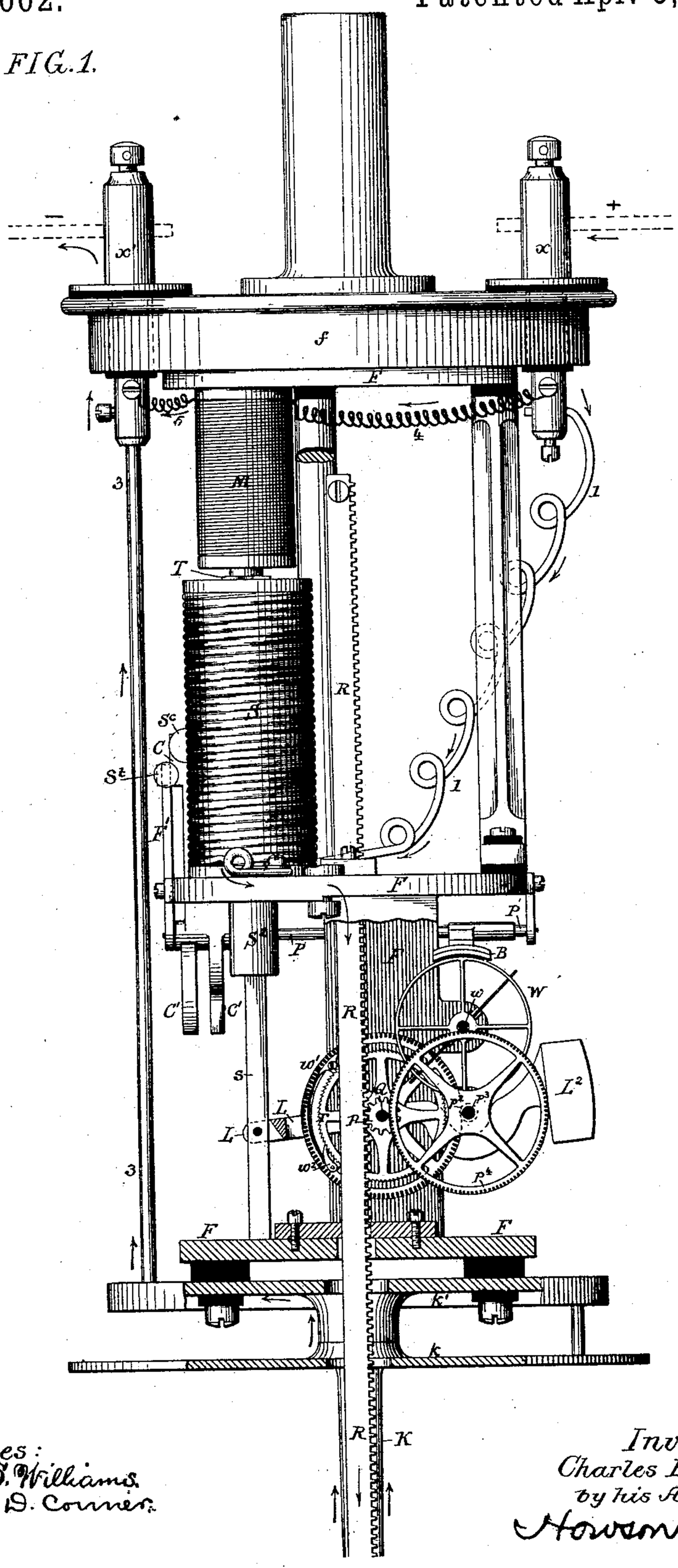
(No Model.) 4 Sheets—Sheet 1.

C. F. COOKE.

ELECTRIC ARC LAMP.

No. 360,662. Patented Apr. 5, 1887.

FIG. 1.



Witnesses:
David S. Williams.
William D. Conner.

Inventor:
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by his Attorneys
Howson and Sons

(No Model.) 4 Sheets—Sheet 2.

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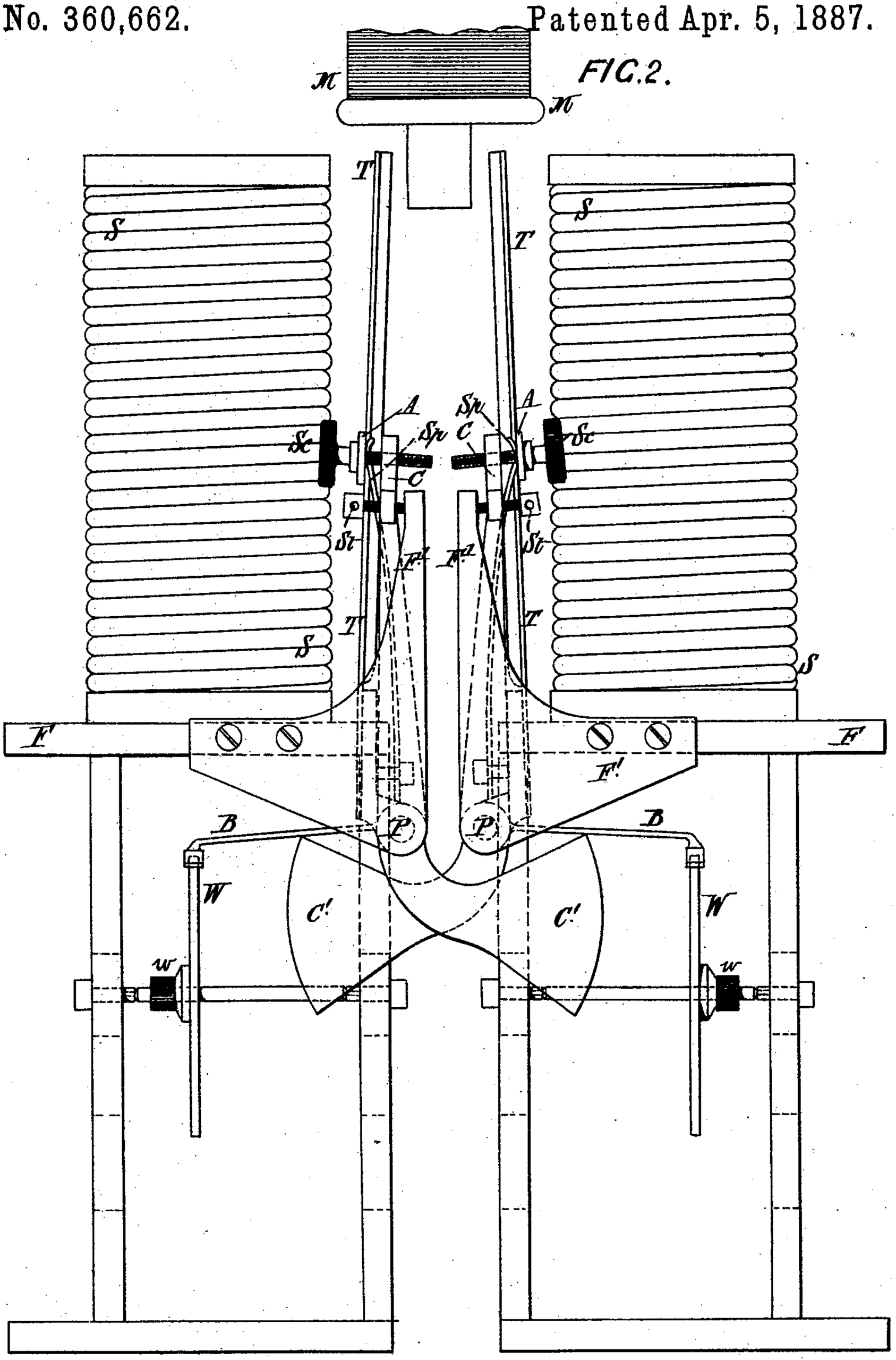
FIG. 2.



Witnesses:
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(No Model.)

4 Sheets—Sheet 3.

C. F. COOKE.

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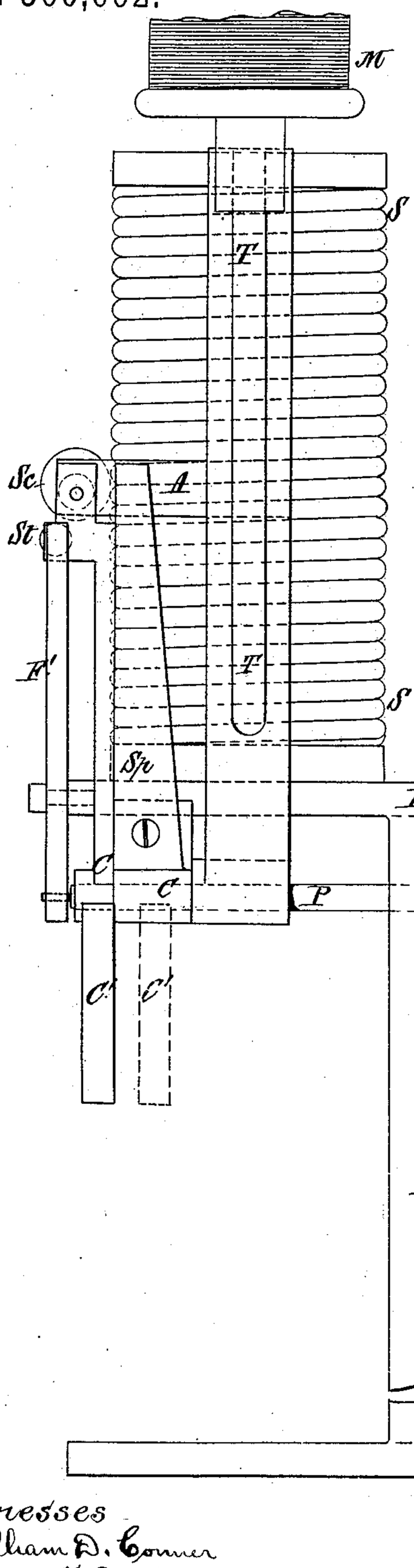

FIG. 3.

Witnesses
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William F. Davis

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(No Model.)

4 Sheets—Sheet 4.

C. F. COOKE.

ELECTRIC ARC LAMP.

No. 360,662. Patented Apr. 5, 1887.

FIG. 5.

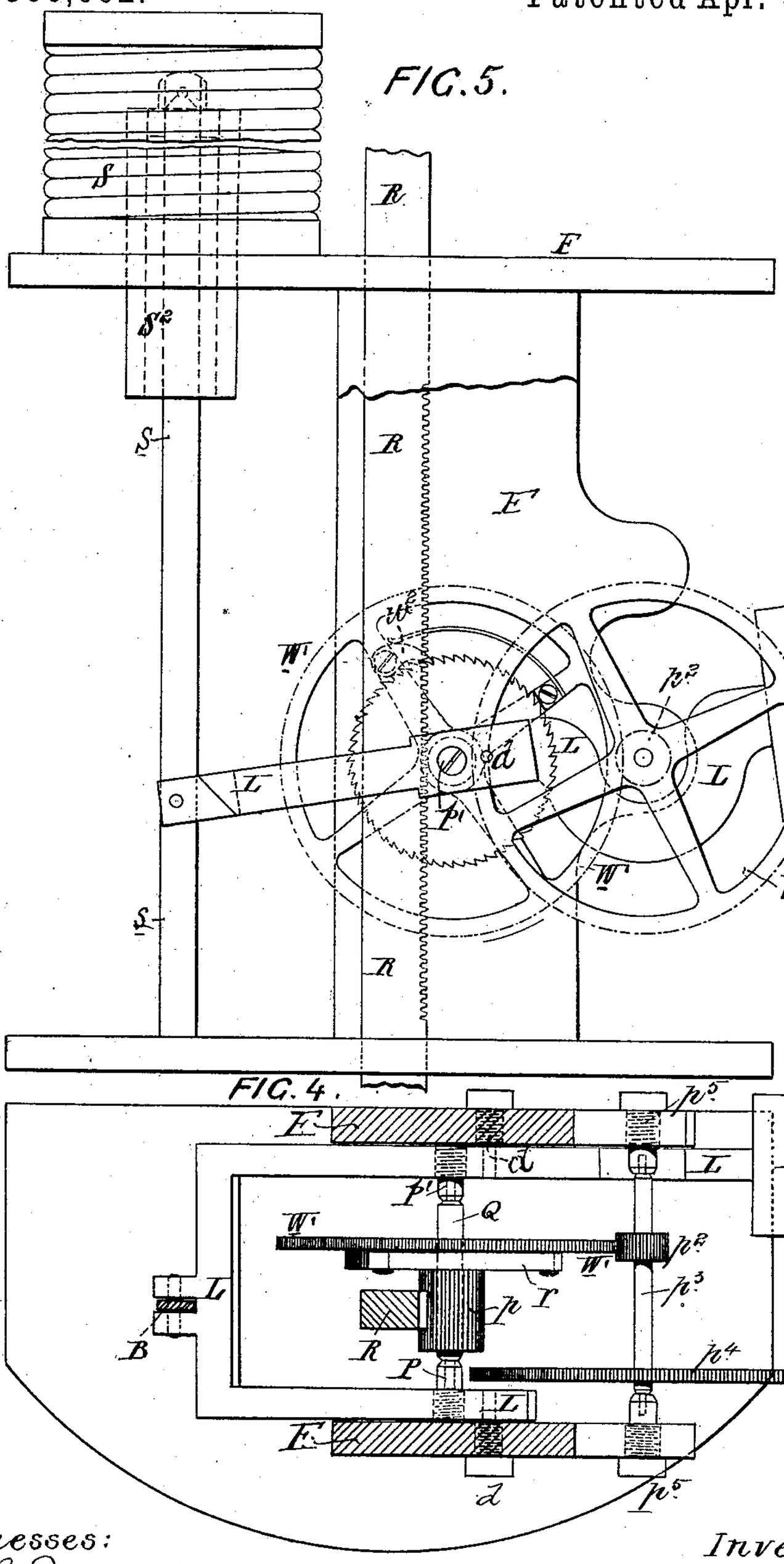

FIG. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES FREDERICK COOKE, OF BUCKINGHAM WORKS, COUNTY OF YORK, ENGLAND.

ELECTRIC-ARC LAMP.

SPECIFICATION forming part of Letters Patent No. 360,662, dated April 5, 1887.

Application filed March 9, 1886. Serial No. 194,584. (No model.) Patented in England July 2, 1885, No. 8,049, and September 19, 1885, No. 11,175.

To all whom it may concern:

Be it known that I, CHARLES FREDERICK COOKE, a subject of the Queen of Great Britain and Ireland, and residing at Buckingham Works, York, in the county of York, England, have invented certain Improvements in Electric-Arc Lamps, (for which British Letters Patent No. 8,049, dated July 2, 1885, and No. 11,175, dated September 19, 1885, have been obtained,) of which the following is a specification.

My invention consists of certain improvements in the construction of regulating mechanism for electric-arc lamps, as fully described hereinafter.

In the accompanying drawings, Figure 1 is a side view, partly in section, of sufficient of an electric-arc lamp to illustrate my invention. Fig. 2 is an elevation of part of the same, drawn to an enlarged scale and part of the mechanism being removed for the sake of simplicity. Fig. 3 is an elevation corresponding to Fig. 2, but taken at right angles thereto. Fig. 4 is a sectional plan view illustrating the arc-striking devices, (not shown in Figs. 2 and 3;) and Fig. 5 is a side view of the devices shown in Fig. 4.

F F is the frame of the lamp, which carries the arc-regulating mechanism, and which consists of plates connected by pillars, and on top of this frame-work F is a plate, *f*, preferably of wood or other insulating material, which carries the binding-posts *x x'* for the line-wires. The lamp illustrated in the drawings is a twin lamp, in which two sets of carbons are used; but as the two sets of regulating devices for the two sets of carbons are alike in their construction and operation, a description of one will suffice for both.

S is one of the solenoid-coils of the regulating mechanism, and which is wrapped with coarse wire in the main circuit.

R is the rack or rod which carries the upper movable carbon, and which is suitably guided in the frame. This rack, as shown more fully in Figs. 4 and 5, gears into a pinion, *p*, mounted on, but not keyed to, a spindle, Q, carried between centers *p' p'* on a rocking frame, L. This rocking frame is pivoted at *d* to the frame-work F of the lamp, and is connected at one end by a rod, *s*, with the core s^2 of the solenoid S, while at the opposite end it is counterbalanced by a weight, L^2.

A ratchet-wheel, *r*, is formed in one part with or secured to the pinion *p*, and with this ratchet-wheel engages a spring-pawl, w^2, carried by a spur-wheel, *w'*, which is secured to the spindle Q, so that the carbon-carrying rod *s* cannot descend without turning the spur-wheel *w'*, as well as the pinion *p;* but the pinion *p* can revolve in the opposite direction without turning the spur-wheel *w'*. The latter gears into a pinion, p^2, on a spindle, p^3, mounted on centers p^5 on the frame F, and on the same spindle is secured a spur-wheel, p^4, which, as illustrated in Fig. 1, gears into a pinion, *w*, on the spindle which carries the brake-wheel W. In connection with this brake-wheel I make use of a brake, B, Figs. 1, 2, and 3, carried on the arm of a spindle, P, mounted in suitable bearings in the frame. On this spindle is mounted loosely an armature, T, the upper end of which extends alongside the solenoid to its upper pole, and on the other side of this armature, at its outer end, is the pole of a fine-wire magnet, M, in the shunt-circuit, so that this armature can have a limited vibrating motion between the poles of the two magnets.

To the spindle P is secured an arm, C, which is connected to the armature T by means of an adjusting-screw, S*c*, passing through a lug, A, on the armature and into a corresponding lug on the arm C, there being an intervening spring, S*p*, between the two, Fig. 2.

An adjustable set-screw, S*t*, in the arm C is adapted to come into contact with a stop, F', on the frame when pulled over by the counter-weight C' on the armature-spindle P or by any other suitable retractor.

The main circuit from the binding-post *x* is through a conductor, 1, to the coil S, thence to the frame F, rod R, upper carbon, lower carbon, and then through a central post, K, of the frame, Fig. 1, plates *k k'*, which are insulated from the portion F of the frame, and conductor 3 to the exit binding-post *x'*. The shunt-circuit is from the binding-post *x*, conductor 4, coil M, and conductor 5 to the exit binding-post *x'*.

The fine-wire magnet M may, as illustrated in Fig. 2, serve for both sets of regulating devices. In the drawings I have not illustrated the mechanism for transferring the circuit from one set of carbon-regulating devices to the other when the upper carbon of the first set is burned out, as that forms no essential part of my present invention.

The operation of the regulating devices described is as follows: When the lamp is thrown into circuit the core of the solenoid is raised, and this raises with it the lever-frame L, the pivot-pins of the latter being out of line with the center of the axis Q. The elevation of the lever will cause the carbon rod R and upper carbon to be raised, because the wheel-work cannot rotate, since the brake B is held on the brake-wheel by the attraction of the armature T toward the pole of the solenoid-coil S. As the carbon points burn away and the length of the arc increases, the consequent increased resistance in the working-circuit will cause a decrease of current passing through the coils of the solenoid S and an increase of current through the shunt-circuit and coil of the armature-magnet M until the magnetism of the poles of the two electro-magnets is about balanced, when the counter-weight C′ of the armature T will pull the armature away from the pole of the solenoid S toward the pole of the armature-magnet M and raise the brake B off the wheel W. The carbon rod R will then descend, since the wheels are free to turn, until, by the approach of the carbon points, the excess of current in the solenoid S and main circuit is increased, to cause the attraction of the armature T and the application of the brake B to the wheel W, to arrest the descent of the carbon rod at the proper point.

It will be seen that the same electro-magnet or solenoid in the main circuit which serves to form the arc also serves to control the brake-lever, the latter lying substantially parallel with the said electro-magnet.

I claim as my invention—

The combination of a rack carrying the movable carbon of an electric-arc lamp, a pivoted lever carrying a pinion geared to the rack, and an electro-magnet in the working-circuit controlling the said lever with an electro-magnet in a shunt, an armature-lever vibrating between the poles of the two magnets, a brake carried by the armature-lever, and a brake-wheel mounted on the fixed frame of the lamp and geared to the said pinion, all substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHARLES FREDERICK COOKE.

Witnesses:

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Nunthorpe, York, Spinster.