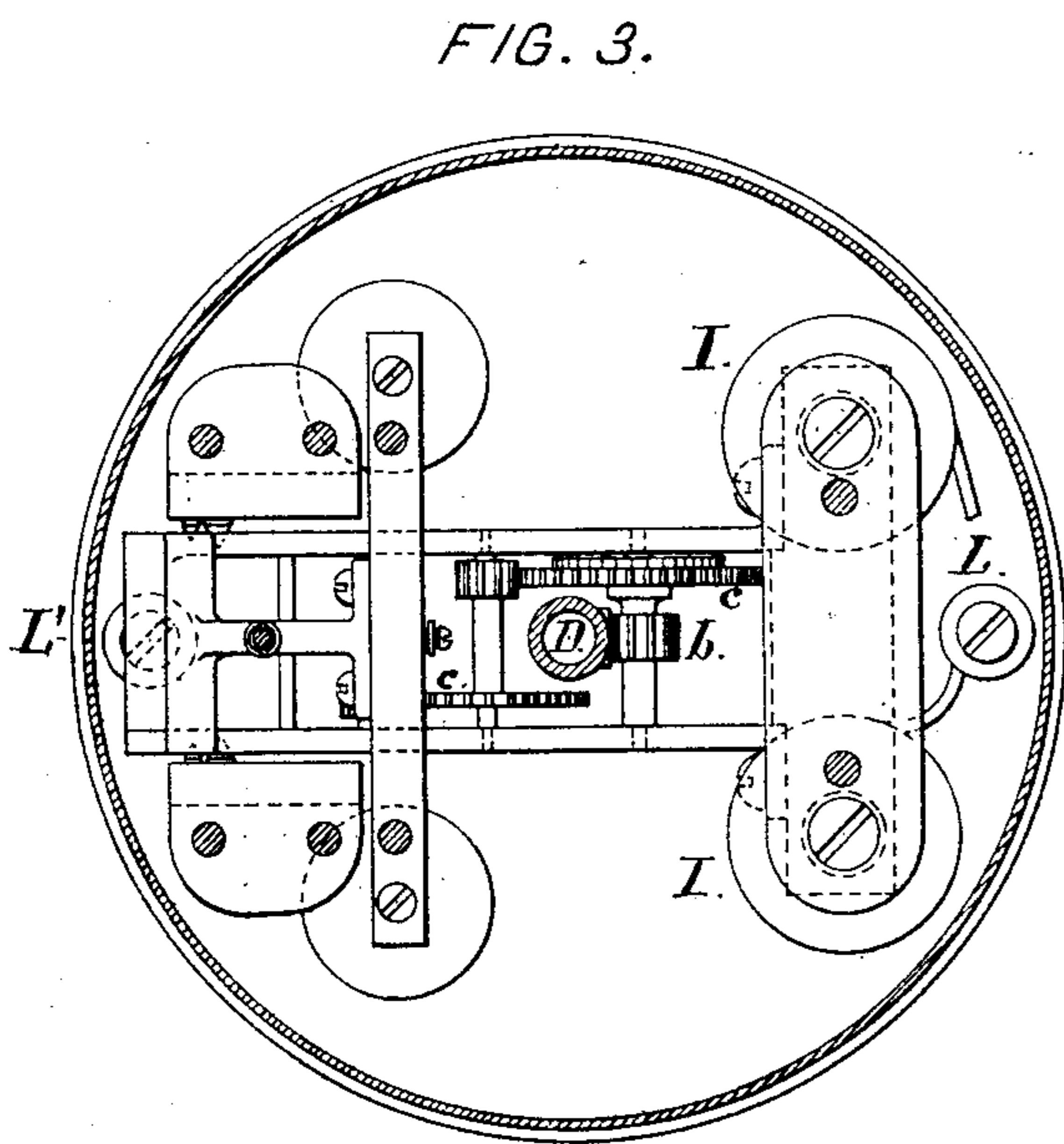
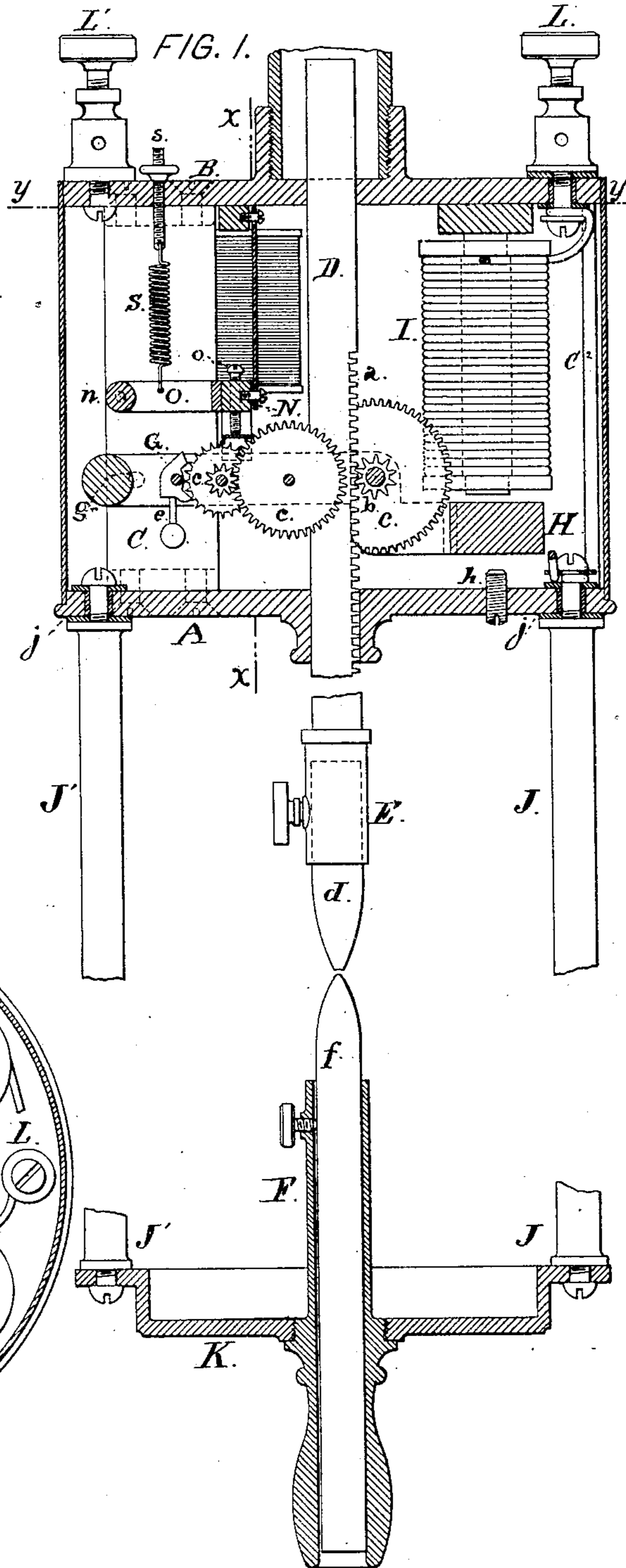
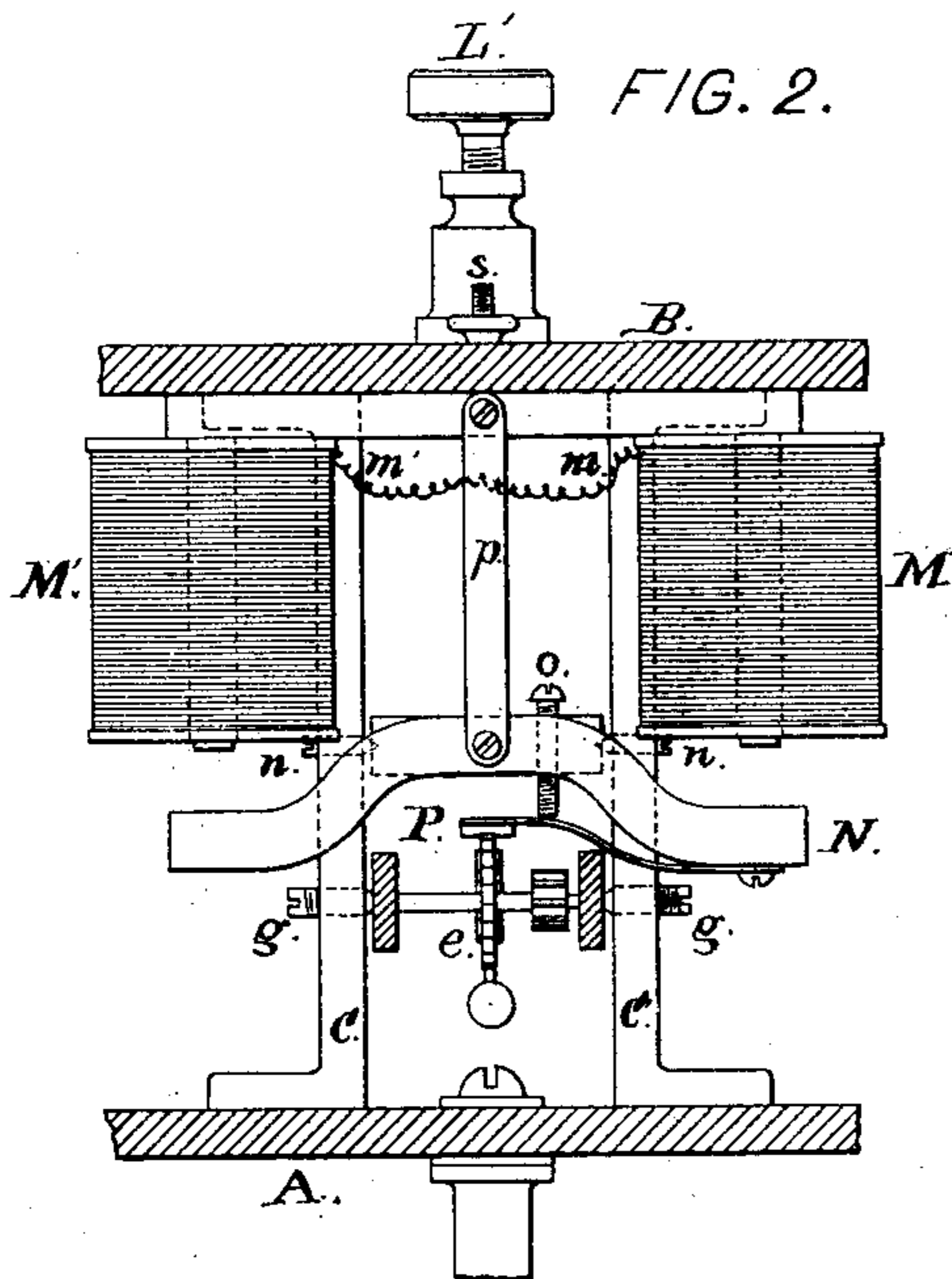


N. S. KEITH.
ELECTRIC LIGHT REGULATOR.

No. 255,795.

Patented Apr. 4, 1882.



WITNESSES:
Sam. Trofsmith
L. Twitchell.

INVENTOR:
A. S. Keith

UNITED STATES PATENT OFFICE.

NATHANIEL S. KEITH, OF NEW YORK, N. Y., ASSIGNOR TO THE FULLER ELECTRICAL COMPANY, OF SAME PLACE.

ELECTRIC-LIGHT REGULATOR.

SPECIFICATION forming part of Letters Patent No. 255,795, dated April 4, 1882.

Application filed February 26, 1880.

To all whom it may concern:

Be it known that I, NATHANIEL S. KEITH, of the city of New York, State of New York, have invented a new and useful Electric Lamp or Light Regulator, of which the following is a specification.

My invention relates particularly to improvements in electric lamps or light regulators in which the light is produced by means of the voltaic arc, but may be applied also to electric lighting by incandescence.

The objects of the invention are to operate two or more lights on a single circuit in such manner that any interference with the current at the arc of any one lamp or light regulator shall not operate to disturb the lights at the other lamps or light-regulators on the same circuit, and to regulate the feeding of the carbons by means of a derived current, instead of depending upon the direct action of the main current. To attain these objects I have constructed the mechanism illustrated in the accompanying drawings.

Figure 1 is a vertical section of the entire machine, except portions of the standards, which are represented as wanting. Fig. 2 is a vertical section of a part of the machine on the line *x x*, Fig. 1; and Fig. 3 is a plan view of the machine after the removal of the top plate on the line *y y*, Fig. 1.

Similar letters refer to similar parts throughout the several views.

The table A, the top plate, B, and the standards C C' C² constitute the frame-work of the machine.

D is the upper-carbon carrier, arranged to play in bearings in the center of the table A and top plate, B, provided at its lower end with a clamp, E, to grasp the carbon *d*. It is provided with a toothed rack, *a*, which meshes with a pinion, *b*, which forms the terminal of a train of gears, *c c c*, which engage at the other terminal with an escapement-lever, *e*. When the lamp or regulator frame is in a vertical position the carbon-carrier D will descend by the force of gravity, its descent being retarded only by the action of the train of gears and escapement, and thus carry the carbon *d* downward until it meets the lower carbon, *f*, which is firmly fixed in the lower-carbon holder F. To avoid the backward rotation of the train

when the carbon-carrier D is pushed upward, the large wheel on the shaft, with the pinion *b*, is so arranged as to turn loosely, and provided with an ordinary ratchet and pawl, which engage when the downward motion commences.

The gears *b c* and escapement *e* are mounted on a metal frame, G, hung on pivots at *g*, the free end of which is provided with an armature, H.

Attached to the top plate, B, is an electro-magnet, the helices of which, I I, are over the armature H, which, when the magnet is charged, is attracted to the helices, and thus in its upward movement raises the carbon-carrier D.

The lower-carbon carrier F is connected with the table A by means of the pendent rods J J', properly insulated, which are attached by means of screws at *j j'*, and are provided at the lower end with a frame, K, arranged to support the lower-carbon holder F.

The wires from the generator (which may be a magneto-electric machine) are attached at the binding-posts L L'. The binding-post L is insulated from the top plate, B, and its lower end is secured to one end of the conducting-wire of the helices, the other end being electrically connected with the carbon *f* through the rod J of the pendent frame. The binding-post L' contacts with the top plate, B, and through it and the carrier D electrical connection is established with the carbon *d*.

On the opposite side of the frame, and attached to the top plate, B, is another electro-magnet, the helices of which, M M', are wound with an insulated wire of high electrical resistance, one end of which, *m*, is connected electrically with the main circuit at the binding-post L, and the other, *m'*, at the binding-post L', thus forming a derived circuit which is always closed, through which a small portion of the current of electricity is constantly passing, the amount of which is regulated or determined by the amount of resistance met with in the main circuit. This electro-magnet, the helices of which are shorter than the helices I I, is provided with an armature, N, which is attached to a frame, O, which is hung by means of pivoted screws *n n* between the standards C and C' above the bearings of the frame G.

To the lower side of the armature N is at-

tached by one end a spring, P, the loose end of which is arranged as a detent to engage the teeth of one of the wheels of the train of gears *c*, when properly adjusted by means of the screw *o*. The upward and downward movement of the armature N is limited by means of a rigid bar, *p*, having a slot of the proper length; or this object may be accomplished by means of a clamp or gage attached to the standard C, or in any other suitable manner.

To the upper side of the armature N is attached a compensating spring, S, the tension of which is regulated by the screw *s*, by means of which the gravity of the frame O and armature N may be neutralized to the desired degree.

When the lamp or light regulator is ready for use the operation is as follows: The positive wire from the generator having been attached to the binding-post L', and the negative wire to the binding-post L, the circuit is established, and the helices I I of the electro-magnet in the main circuit being charged, the armature H is attracted to the helices I I, and in rising carries with it the carbon-carrier D, and thus separates the carbons, forming the electric arc, which is limited by the screw *h*, which has been previously adjusted. This separation produces the light, which continues uniform so long as the resistance remains the same at the arc. This resistance would be lessened by the descent of the carbon *d* by force of gravity, but for the operation of the electro-magnet in the main circuit, which in raising the train of gears has caused one of the wheels *c* to engage the detent P, thereby putting an end to the downward motion of the carbon. As the combustion at the arc continues, the space between the carbons increases, and the resistance is thereby proportionally increased. The attracting power of the electro-magnet in the derived circuit, as compared with the resistance of the armature N, having been adjusted by means of the spring S and the screw *s*, and the detent P having been adjusted by the screw *o*, the increase of the current in the derived circuit caused by the increased resistance in the main circuit gives the electro-magnet in the derived circuit more attracting power, and the armature N is attracted toward the helices M M', thus disengaging the detent P and the train *c*, and the carbon-carrier D, freed from restraint, descends until the length of the arc is decreased sufficiently to lessen the resistance to its normal standard, when the magnet in the derived circuit loses its increased power of attraction, and the armature N again falls to its proper position, stopping the downward motion of the carbon *d* until the widening of the arc again calls the mechanism into play.

By this device the feeding of the carbons is

regulated entirely by the magnet in the derived circuit, and the main current is left undisturbed, except by the slight changes of resistance at the arc, caused by the combustion of the carbons, which are so quickly and delicately felt and regulated by the derived circuit as to be almost imperceptible at any given light on the circuit.

I do not confine myself to the exact construction of any specific portion of the device herein described, but have used the elements which I prefer, although any other substantially similar elements or mechanical devices may be used. Neither do I confine myself to the specified location where the derived circuit shall leave or unite with the main circuit, as these points may be anywhere between the positive and negative poles of the generator, having the electric-light arc between them.

I am aware that electro-magnets in the main circuit and in derived circuits have been used in electric lamps and light-regulators, and that trains of gears and swinging levers are also found in various forms, and I do not claim any of these as my invention; but

What I do claim, and desire to secure by Letters Patent, is—

1. In an electric-light regulator, a releasing or feeding train mounted upon the armature-lever of an electro-magnet in the main or light circuit with the carbons, in combination with a detent controlled by an electro-magnet in a derived circuit to the carbons, substantially as described.

2. In an electric lamp or light regulator, the combination of an electro-magnet in the main circuit, having an armature, H, attached to a swinging frame, G, carrying a train of gears, *c*, and a carbon-carrier, D, with its attachments, for the purpose of making the arc and holding it while the lamp is in operation, and an electro-magnet in a derived circuit, having an armature, N, attached to a swinging frame, and carrying a yielding or spring detent, P, and the screws *o* and *s*, and spring S, so arranged that it can be adjusted to the desired current of electricity and limited in its movements by the slotted bar *p*, all so arranged as to automatically regulate the feeding of the carbons to supply the demand caused by the combustion of the carbon at the light-arc, substantially as herein described and shown.

3. The combination, with a vertically-moving gear-train and escapement-wheel carried by the armature-lever of an electro-magnet in the main or light circuit, of a vertically-moving detent controlled by an electro-magnet in a derived circuit, substantially as described.

N. S. KEITH.

Witnesses:

SAM. TRO. SMITH,
L. TWITCHELL.