

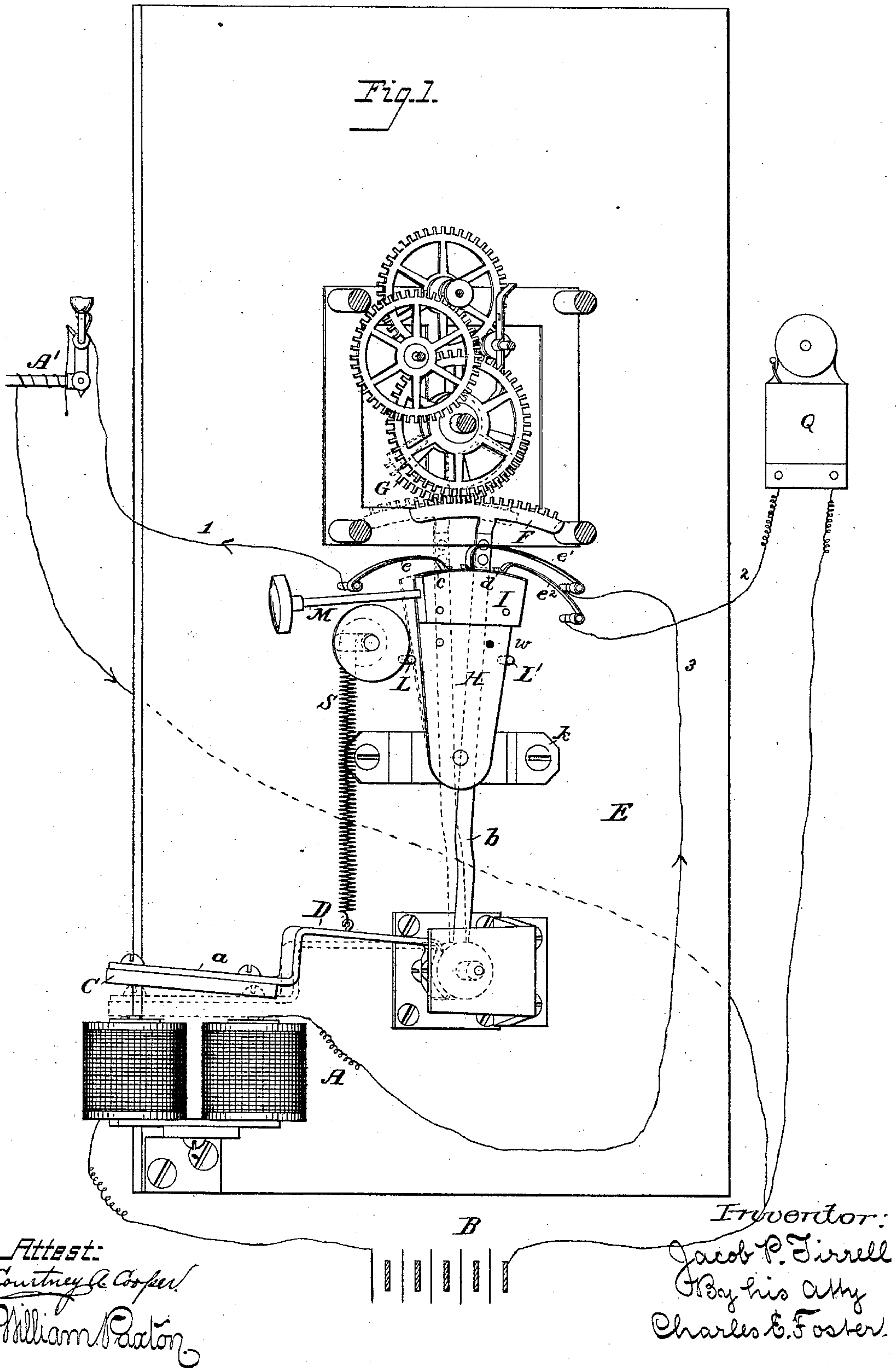
(Model.)

3 Sheets—Sheet 1.

J. P. TIRRELL.
AUTOMATIC CIRCUIT OPENER.

No. 283,303.

Patented Aug. 14, 1883.



Attest:
Courtney C. Cooper
William Paxton

Inventor:
Jacob P. Tirrell
By his Atty
Charles E. Foster.

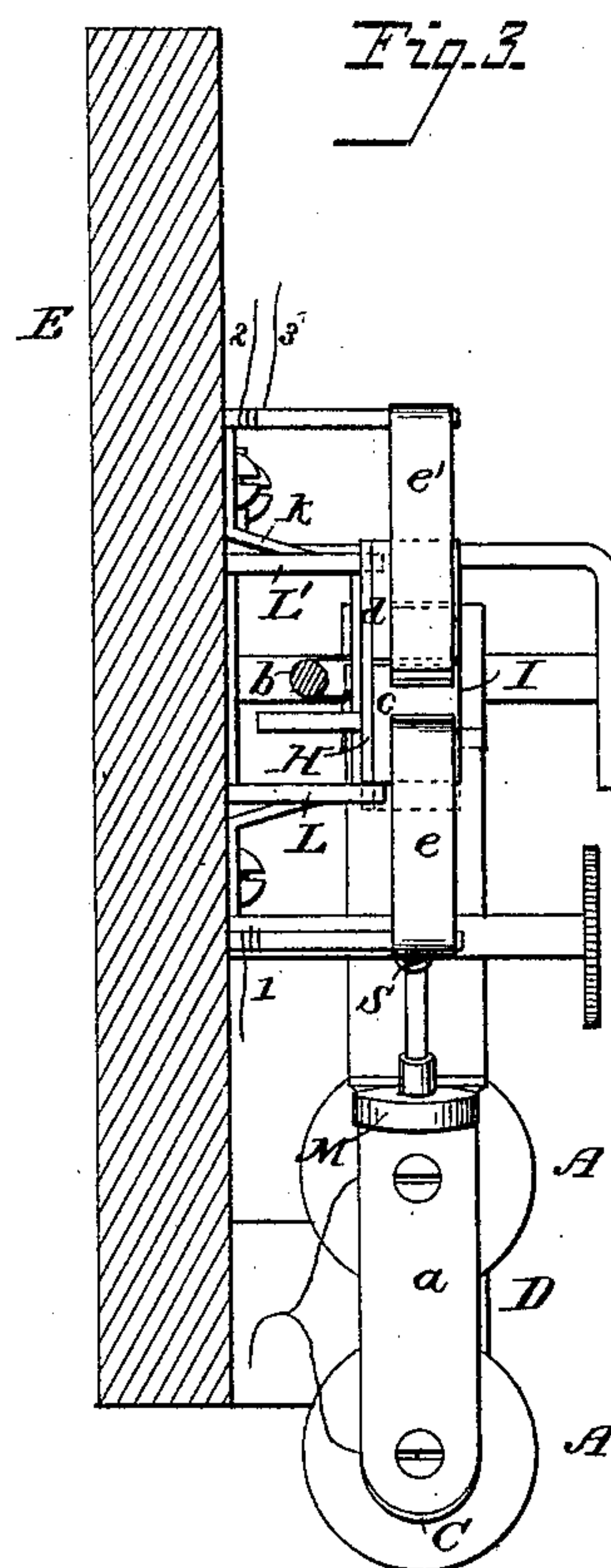
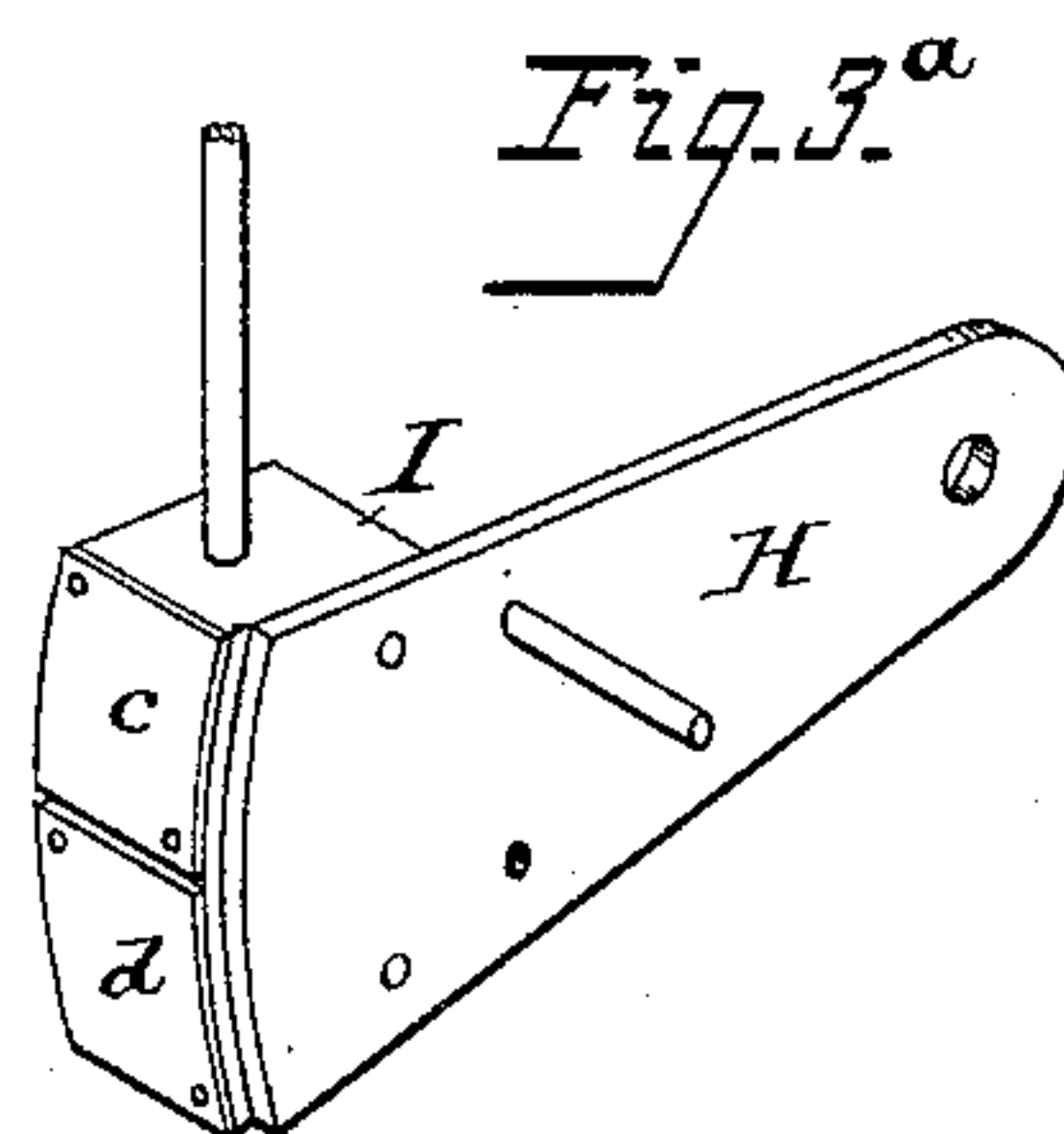
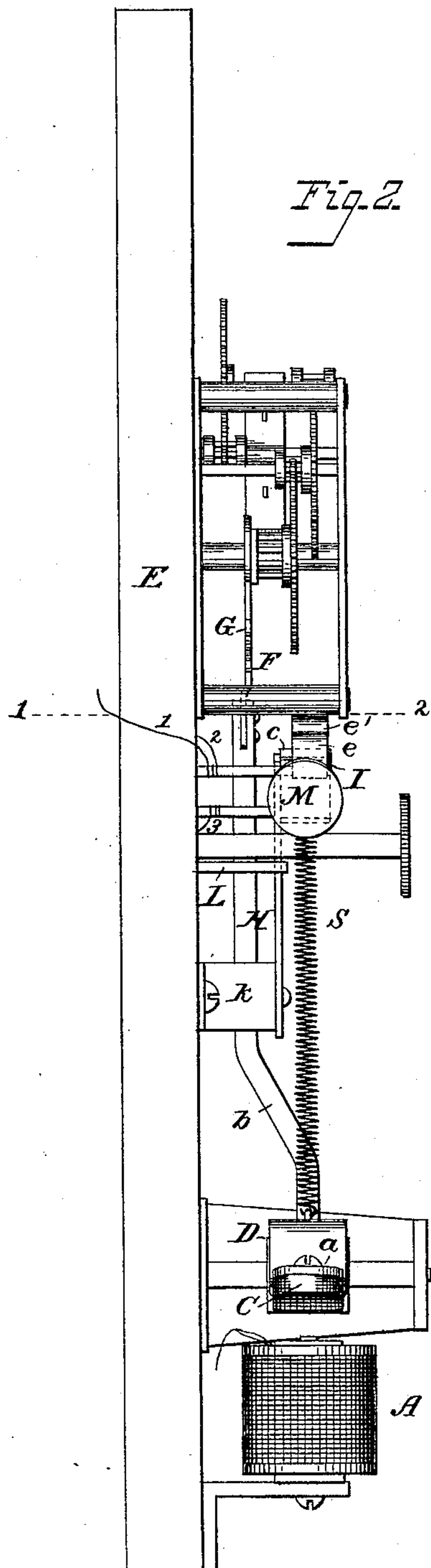
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J. P. TIRRELL.
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No. 283,303.

Patented Aug. 14, 1883.



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(Model.)

3 Sheets—Sheet 3.

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Fig. 4.

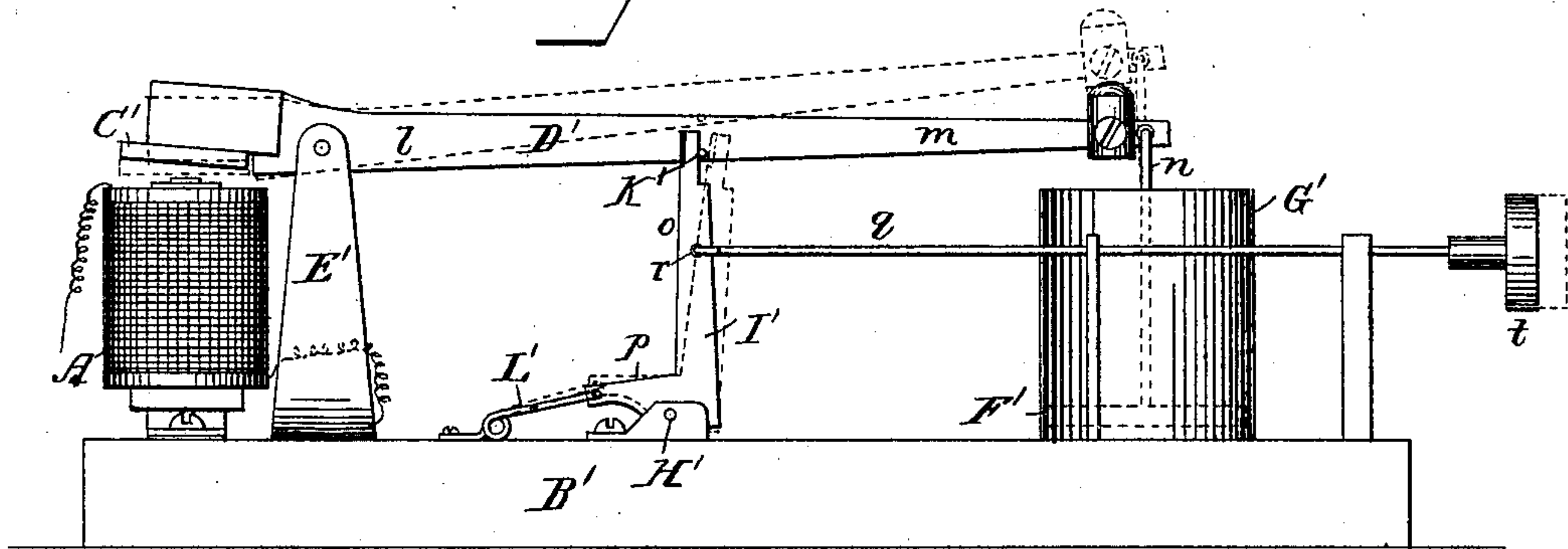
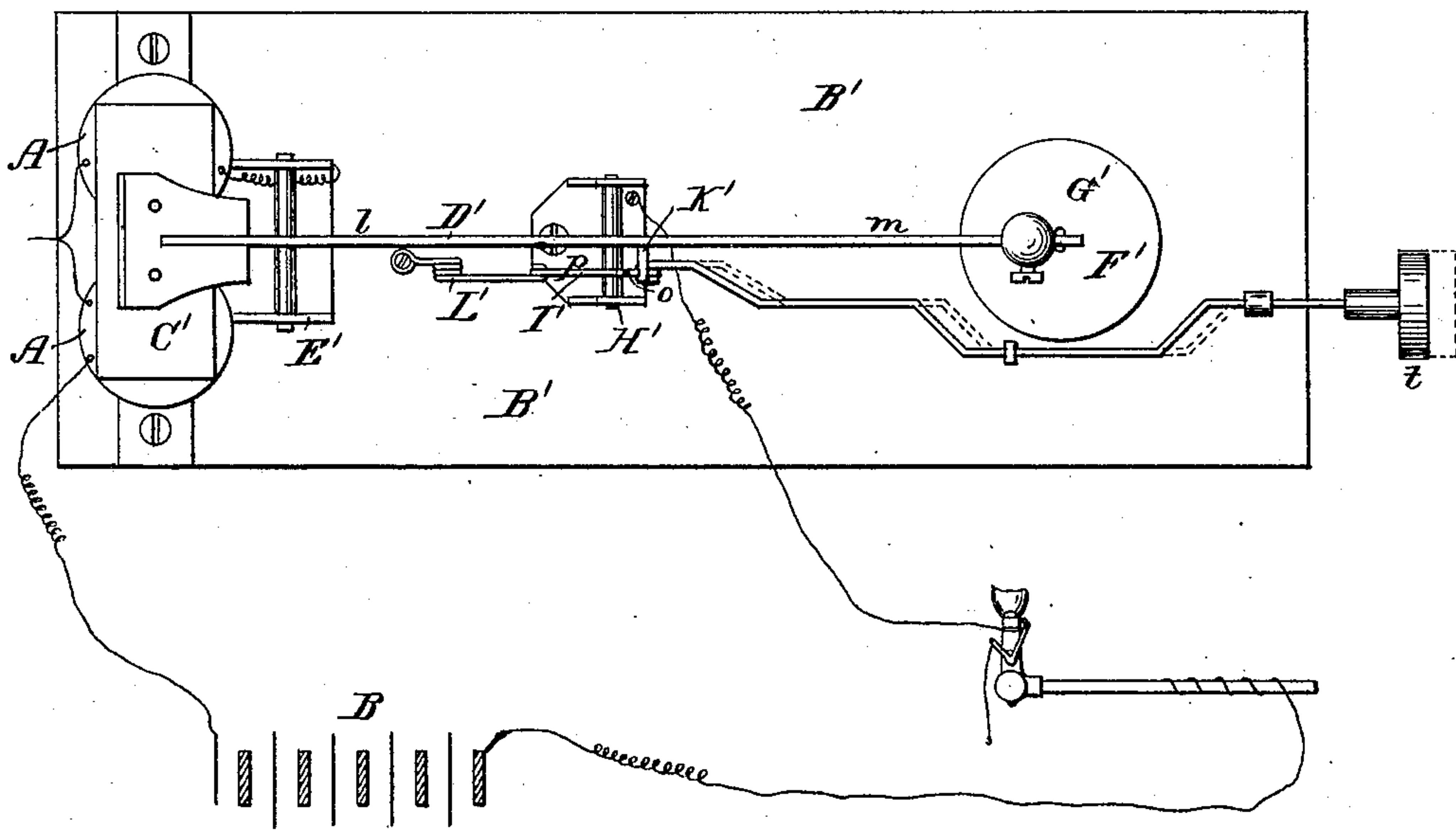


Fig. 5.



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UNITED STATES PATENT OFFICE.

JACOB P. TIRRELL, OF SOMERVILLE, ASSIGNOR TO WILLIAM R. NUTTING,
OF BOSTON, MASSACHUSETTS.

AUTOMATIC CIRCUIT-OPENER.

SPECIFICATION forming part of Letters Patent No. 283,303, dated August 14, 1883.

Application filed March 3, 1881. (Model.)

To all whom it may concern:

Be it known that I, JACOB P. TIRRELL, of Somerville, county of Middlesex, State of Massachusetts, United States of America, have invented a new and useful Automatic Circuit-Opener, of which the following is a specification.

This invention is intended, mainly, to be used in connection with apparatus where the desired effect is produced by a short or temporary current from an open-circuit battery, as in apparatus where the gas is ignited by the spark produced at the tip of the burner; but the invention is adapted to be used with apparatus for ringing bells, hotel-annunciators, &c., to effect the breaking of the circuit automatically, if desired, and the establishment, in case of accident to the primary current, of another circuit through a suitable alarm apparatus in case said lighting-circuit should remain closed by the circuit closing and breaking arms accidentally remaining in contact with each other after having been brought together.

To carry out these objects various mechanical devices may be employed; but I have shown the invention, in the present instance, in combination with a lighting device and an electro-magnet placed in the lighting-circuit, a train of wheels put in motion by the vibrations of the armature, and tending to lessen the number of vibrations, of a device, as hereinafter explained, which, on approach of the armature to the poles of the magnet, breaks the main lighting-circuit and establishes a circuit through the alarm bell or device.

My invention further consists in the employment, in combination with the electro-magnet placed in the lighting-circuit, of a device adapted and operating to retard the movement of the armature, in order that the latter shall not be attracted until the current has been established for a predetermined time.

In the accompanying drawings, Figure 1 is a front view, in elevation, of this apparatus. Fig. 2 is a side view, in elevation, of the same; and Fig. 3 is a transverse sectional view through the line 1 2, Fig. 2. Fig. 3^a is a detached perspective view of the block I and its connections. Figs. 4 and 5 are views illustrating modifications.

In these several figures the same letters refer to the same parts.

A is an electro-magnet one pole of which is connected to one pole of a battery, B, the other pole of said battery being connected to the gas-pipe A'. C is the armature of this electro-magnet, which armature is attached to one arm, *a*, of a bell-crank lever, D, pivoted to a frame, E. To the other arm, *b*, of the lever D is attached a segmental rack, F, which gears with another segmental rack, G, which is connected to a train of wheels, the rotation of which train is regulated by a suitable escapement.

H is a plate of metal narrower at one end than the other, and pivoted near its narrow end to a bridge, *k*, extending over the arm *b* of the bell-crank lever D. Upon the upper end of this plate is a block, I, of some suitable insulating material, upon which are placed two plates of metal, *c* and *d*, which are separated from each other by an insulating-space. Upon the plate *c* bears a spring, *e*, which is connected by a wire, 1, with the vibrating arm of the circuit closing and breaking apparatus of the burner A'. *e'* *e*² are two other similar springs, one of which, *e*², is always in contact with the plate *d*, and is connected by a wire, 2, with one pole of an electro-magnetic alarm-bell or other alarm apparatus, Q, and the other, *e'*, is connected by a wire, 3, with the electro-magnet A, and rests either upon the plate *c* or *d*, according to the position of the block I and plates *c* and *d*. The other pole of the said magnet in the alarm apparatus is connected to the battery at the pole opposite to that which is connected to the magnet A.

The plate H vibrates between two stops, L L', and when the arm *b* of the lever D is brought to either side to its full extent it will strike one of the two pins *w* at the rear of the plate H, which will be moved to the same side. Thus when the armature descends the plate H will be caused to move to such an extent that the spring *e'* will break contact with the metal plate *c* and make contact with the plate *d*, thus breaking the lighting-circuit and establishing a new circuit, including the alarm apparatus. When the armature C is retracted by its retracting-spring S, on the breaking of the circuit through the magnet A the plate H and block I will remain

in the position to which they had been moved by the movement of the arm *b* of the lever *D*. When the circuit through the magnet *A* is momentarily closed at the burner, by the movement of the circuit closing and breaking arm, for the purpose of producing the spark for lighting the gas, the electro-magnet *A* will not be able, owing to the time required for the train of wheels to be moved by the arm *b* sufficiently far, to change the position of the circuit-changer *I*; but if the lighting-circuit through the electro-magnet *A* is closed from any cause for a time sufficient to permit the arm *b* to complete its movement, the lighting-circuit will be broken and a new circuit will be established through the electro-magnet of the alarm-bell, thus causing the sounding of an alarm, while the battery is prevented from being exhausted by the continuation of its lighting-current. A rod, *M*, is used for returning the circuit-changer *I* to its original position after having been moved.

In Figs. 4 and 5 of the accompanying drawings I have shown a modification of the device for retarding the movement of the armature. In this instance the armature is secured to the extremity of the shorter arm *l* of a metallic lever, *D'*, pivoted to the upper part of a standard, *E'*, upon the plate *B'* of the apparatus. The end of the longer arm *m* of this lever is pivoted to the upper end of a rod, *n*, the lower end of such rod being secured to a piston within a dash-pot, *F'*. *I'*, in the said Figs. 4 and 5, represents a bell-crank lever pivoted at its corner to the base plate or tablet *B'*, as shown at *H'*, the upright arm *o* of such lever *I'* bearing against a spur or stud, *K'*, projecting from the side of the lever *D'*, while the horizontal arm *p* of said lever *I'* is raised by the pressure of spring *L'*, thus forcing its upright arm against the spur *K'*. One pole of the battery (shown at *B*) is connected to the electro-magnet *A*, and the other pole to the circuit closer and breaker on the burner, and from thence a wire leads to the lever *I'*. So long as the armature remains isolated from the poles of the magnet, the end of the upright arm of the lever *I'* will be in contact with the projection *K'* on the lever *D'*, and consequently the circuit through the said lever *D'*, the standard *E'*, and the electro-magnet *A* will remain intact at that point, and when the circuit is completed at the burner by the contact of the circuit closing and breaking arms thereon in the act of generating the spark with which to ignite the gas, the contact of the arms will not be of sufficient duration to permit the electro-magnet to attract the armature, for the reason that it requires some time for the oil contained in the cylinder *G* (it being understood that the piston is below the body of oil) to pass through the perforations in the piston, or between the piston and the base of the cylinder, and the end of the vertical arm of the lever *I'* remains in contact with the stud or stop *K'* of the lever *D'*; but should the circuit remain closed at the closing and breaking arms,

or be closed in any other manner, then the magnet *A* will be permitted to fully attract its armature, and the long arm *m* of the lever *D* will be raised, and the end of the upright arm *o* of the lever *I'* will be separated from the stud *K'* of the lever *D'* by the action of the spring *L'*, and the circuit will be broken. The arm *o* is subsequently restored or returned to contact with the stud by pulling upon a rod, *q*, which is connected at one end to the upper part of such arm *o*, as shown at *r*, and at its opposite end provided with a knob or button, *t*.

The same retarding device may be employed for retarding the armature of each magnet of a series of lighting-circuits.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. An electrical circuit for gas-lighters provided with means for making and breaking the circuit, and with an electric motor device in said circuit, in combination with a circuit-breaker operatively connected with said motor device and controlling said circuit, and arranged to permanently break said circuit through the action of said motor devices when energized beyond a normal period, substantially as herein set forth.

2. An electrical circuit for gas-lighters provided with means for making and breaking the circuit, and with an electro-magnet in said circuit, in combination with a circuit-breaking device operatively connected with the same, and arranged to permanently break the circuit after a predetermined time through the action of the electro-magnet when energized beyond a normal period, substantially as set forth.

3. In an electric circuit for gas-lighters or equivalent devices, the combination of an electro-magnet arranged in the circuit, a retarding device connected with the armature thereof, and a circuit-breaker forming part of the circuit operatively connected with the aforesaid, whereby the prolonged energizing of the magnet will continue to move said armature against the resistance of the retarding mechanism until the circuit is broken, substantially as described.

4. The combination of the electro-magnet *A*, battery *B*, armature *C*, spring *S*, bell-crank lever *D*, segmental racks *F* and *G*, a train of wheels connected to the rack *G*, plate *H*, pivoted to a support, stops *L* *L'*, insulating-block *I*, plates *c* and *d*, springs *e* *e'* *e''*, gas-lighting apparatus and alarm-bell, and the circuits through the same, substantially as and for the purpose set forth.

In witness I have hereunto set my hand on this 21st day of November, 1879, in presence of the subscribing witnesses.

JACOB P. TIRRELL.

Witnesses:

ALEX. L. HAYES,
GEO. F. PINKHAM.