

No. 725,708.

PATENTED APR. 21, 1903.

F. HOLDEN.  
ELECTRIC METER.

APPLICATION FILED OCT. 23, 1901.

NO MODEL.

2 SHEETS--SHEET 1

Fig. 1.

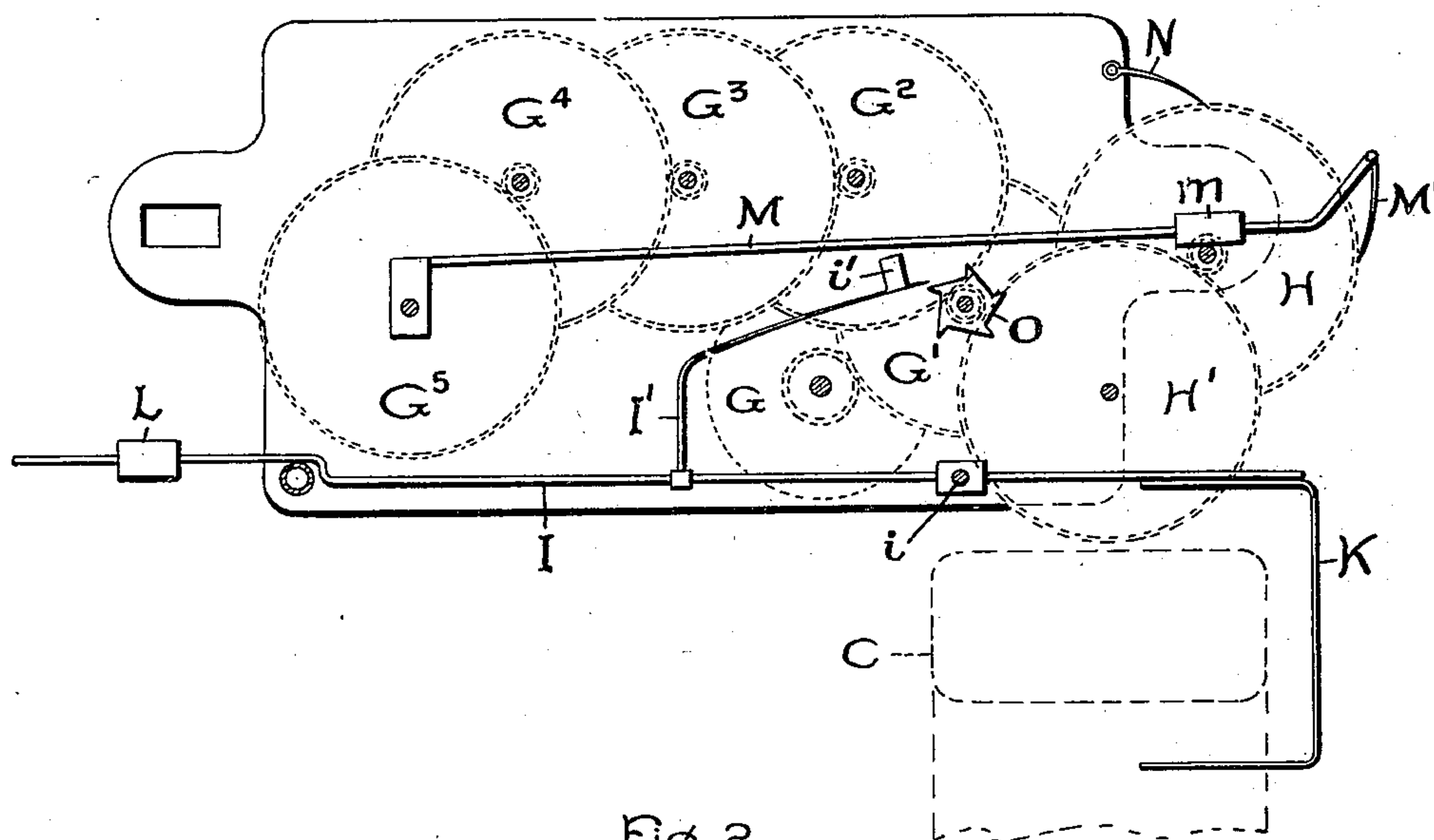
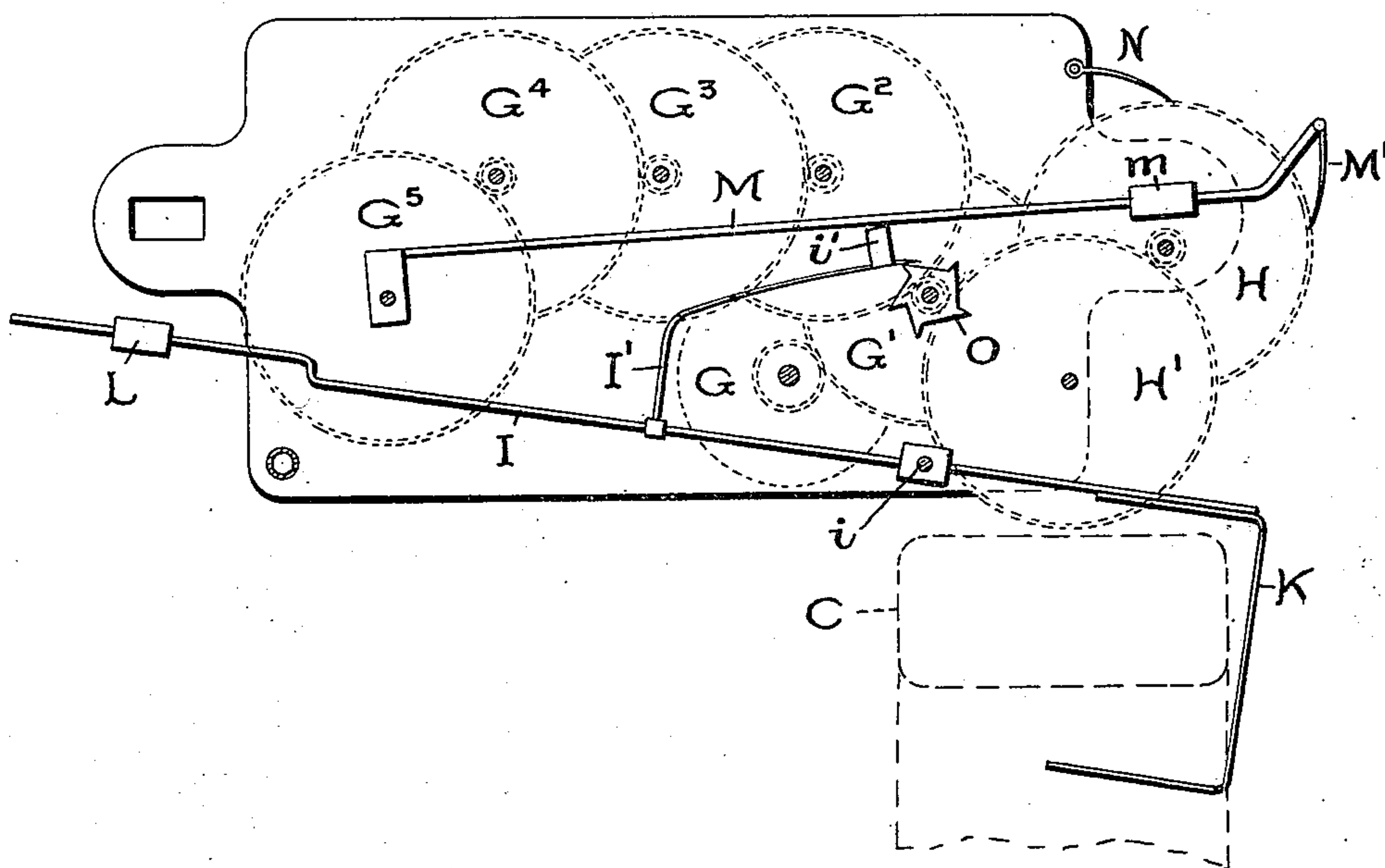


Fig. 2.



Witnesses:

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Inventor:  
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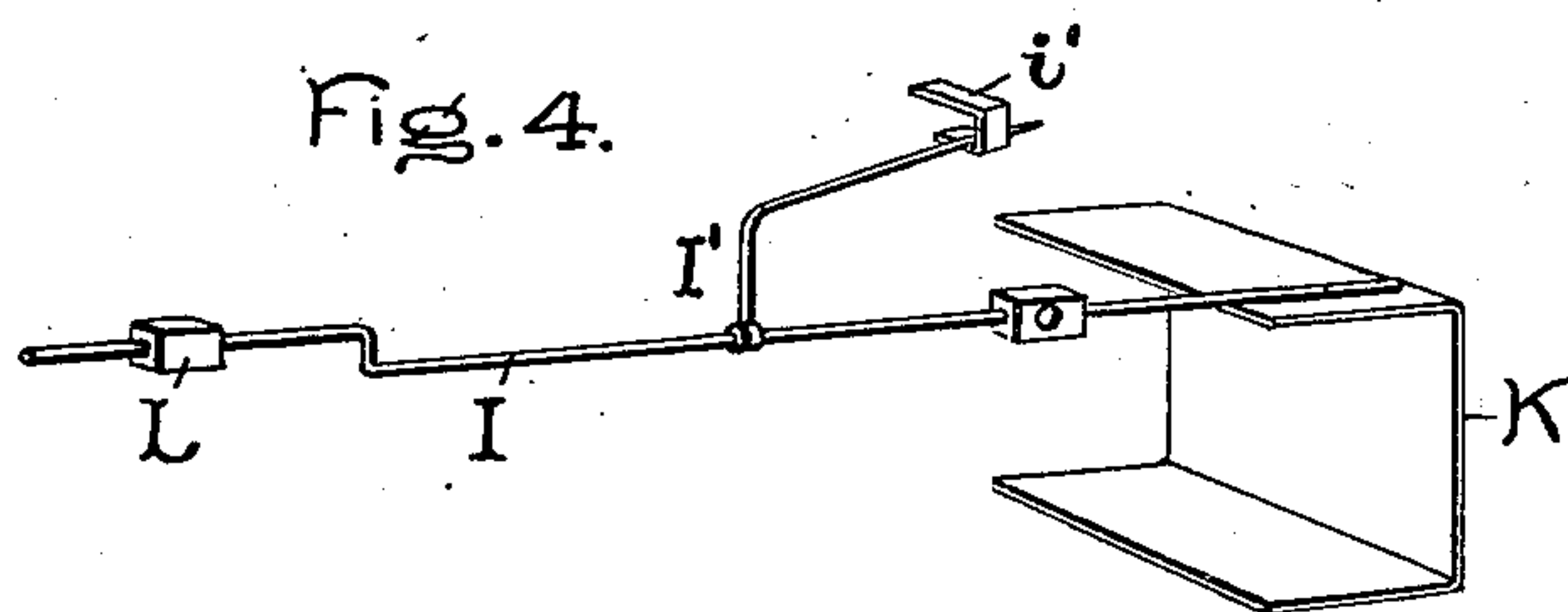
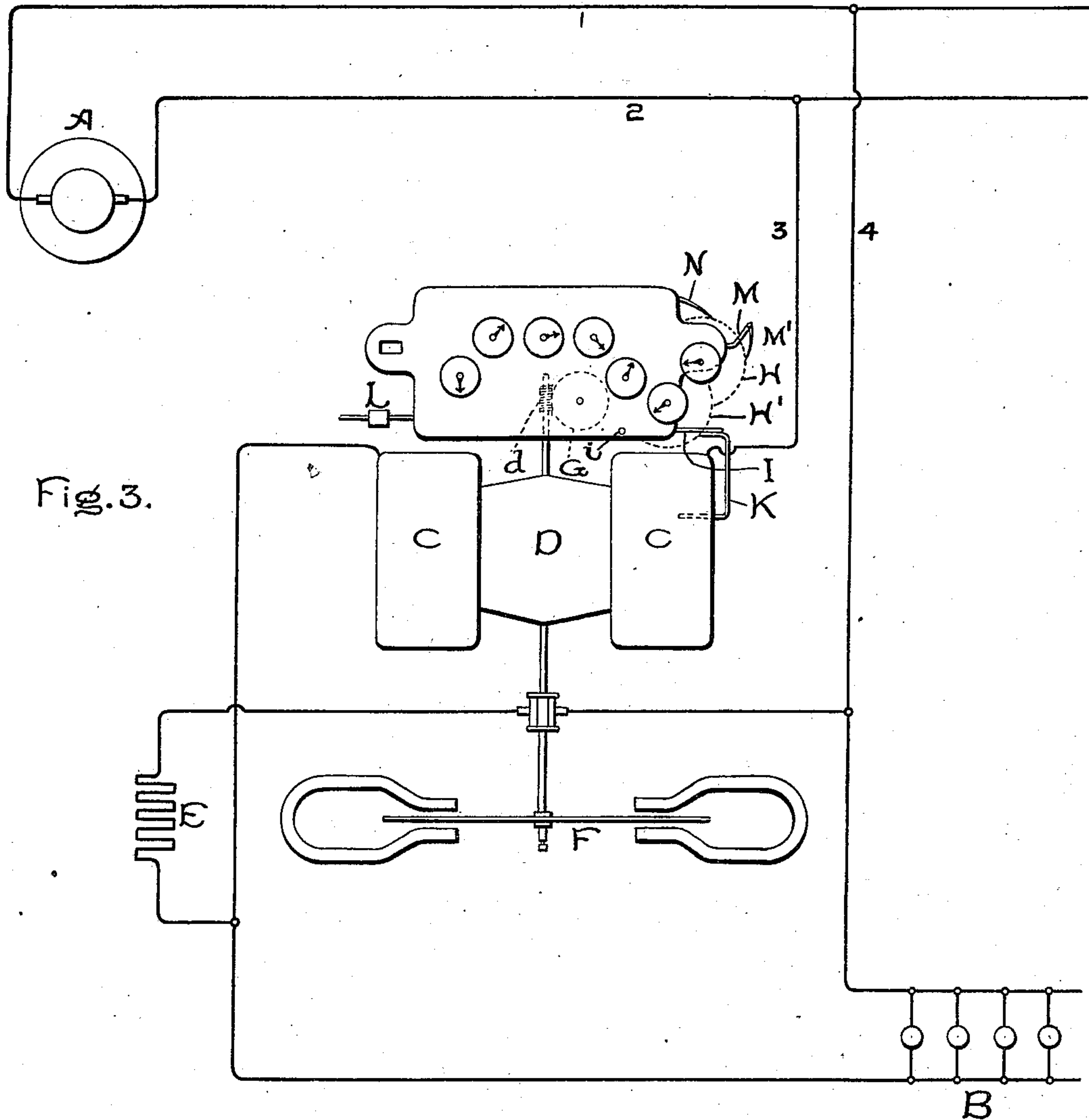
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2 SHEETS—SHEET 2.



Witnesses:  
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Inventor:  
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# UNITED STATES PATENT OFFICE.

FRANK HOLDEN, OF LONDON, ENGLAND, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

## ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 725,708, dated April 21, 1903

Application filed October 23, 1901. Serial No. 79,667. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK HOLDEN, a citizen of the United States, residing at London, England, have invented certain new and useful Improvements in Electric Meters, of which the following is a specification.

This invention relates to indicating apparatus for use in connection with electric meters; and its object is to register not only the total consumption of energy, but also indicate separately the energy consumed above a predetermined rate.

To this end the invention consists in two registering-trains, a main train constantly in gear with the armature of the meter and an auxiliary train provided with means for automatically setting it in operation when the rate of consumption rises above the predetermined rate. The means for effecting this consists, preferably, of a freely-movable magnetic body lying in the field of force generated by the field-coils of the meter and operatively connected with devices for mechanically connecting the auxiliary registering-train with the main registering-train when said field of force becomes abnormally strong and attracts the movable magnetic body.

In the accompanying drawings, Figure 1 is a sectional elevation of the two registering-trains, the connecting devices being inoperative. Fig. 2 shows the two trains connected. Fig. 3 is a diagram of circuits. Fig. 4 is a perspective view of the device for connecting the two trains.

Referring to Fig. 3, let 1 2 be main leads connected with a generator A, and 3 4 branch leads supplying current to the lights B. The wattmeter shown is of the well-known Thomson type, having field-coils C in series with the lead 3 and a rotating armature D connected across the leads 3 4 through a resistance E and provided with a damping-disk F. The armature-shaft has a worm  $d$ , meshing with the worm-wheel G of the main registering-train  $G' G^2 G^3 G^4 G^5$ , as usual. In addition to the train I provide an auxiliary registering-train H H' and means for connecting it with the main train, preferably as follows: Fulcrumed at some convenient point  $i$  in the frame of the registering mech-

anism is a beam I, carrying at one end a magnetic body K, preferably a U-shaped piece of sheet-iron. This body is located adjacent to one of the field-coils of the meter, preferably straddling it, as shown. A counterweight L may be used to balance the sheet-iron K. The beam is provided with an arm I', preferably a spring-arm, adapted to come in contact with a lever M when the beam is tilted. For this purpose the arm preferably carries a cross-piece  $i'$ , of sheet metal. The lever M is fulcrumed at one end and at the other end carries a pawl M', engaging with the wheel H of the auxiliary train. A detent-pawl N prevents backward movement of said wheel. To actuate the lever M, and so drive the wheel H, there is provided on one of the arbors of the main train a ratchet-wheel O, between which and the lever the spring-arm I' is thrust in when the beam is tilted.

The operation is as follows: When the rate of current consumption does not exceed a given quantity per hour, the mechanism stands as shown in Fig. 1, and only the main registering-train is in service; but as soon as and whenever the consumption goes above said rate the stronger field of the meter attracts the magnetic body K, tilting the beam I and pushing the arm I' forward between the ratchet-wheel O and the lever M, as shown in Fig. 2. The rotation of the wheel O causes the spring-arm to rise and fall at regular intervals, lifting and lowering the lever M, which is preferably weighted at  $m$  to cause the pawl M' to drive the wheel H. This operation continues so long as the excessive consumption is kept up, the main registering-train indicating the total consumption and the auxiliary train the excess above the given rate.

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

1. An electric meter having a main registering-train and an auxiliary registering-train, and means controlled by the field-coil of the meter for connecting said trains when the rate of consumption exceeds a given amount.

2. An electric meter having two registering-trains, a movable magnetic body adjacent to



the field-coil of the meter, and operative connections whereby said body can connect the two trains when attracted by said coil.

3. An electric meter having two registering-trains, and means for connecting them comprising a tilting beam, and a magnetic body carried by said beam in proximity to the field-coil of the meter.

4. An electric meter having two registering-trains, a movable magnetic body adjacent to the field-coil of the meter, a pawl-lever for actuating one of said trains, and means whereby said magnetic body brings said pawl-lever into operation when attracted by said coil.

5. An electric meter having a constantly-driven main registering-train, and an auxiliary train adjacent thereto, a pawl-lever for actuating the auxiliary train, and electromagnetic means for causing the main train to actuate said pawl-lever when the current consumption exceeds a given rate.

6. An electric meter having a constantly-driven main registering-train, a ratchet-wheel on an arbor of said train, a pawl-lever adjacent to said ratchet-wheel, an auxiliary registering-train actuated by said lever, and electromagnetic devices responsive to an ex-

cessive current for causing said wheel to operate said lever.

7. An electric meter having a constantly-driven main registering-train, a ratchet-wheel on an arbor of said train, a pawl-lever adjacent to said ratchet-wheel, an auxiliary registering-train actuated by said lever, a tilting beam carrying an arm adapted to be thrust in between the wheel and the lever, and an electromagnetic device responsive to an excessive current for moving said beam.

8. An electric meter having a constantly-driven main registering-train, a ratchet-wheel on an arbor of said train, a pawl-lever adjacent to said ratchet-wheel, an auxiliary registering-train actuated by said lever, a tilting beam carrying an arm adapted to be thrust in between the wheel and the lever, and a magnetic body on said beam adjacent to the field-coil.

In witness whereof I have hereunto set my hand this 27th day of September, 1901.

FRANK HOLDEN.

Witnesses:

HUGH HUGHES,  
PERCY E. MATTOCKS.