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G. L. GOWLLAND.

PREPAYMENT ELECTRIC METER.

(Application filed Aug. 21, 1901.)

(No Model.)

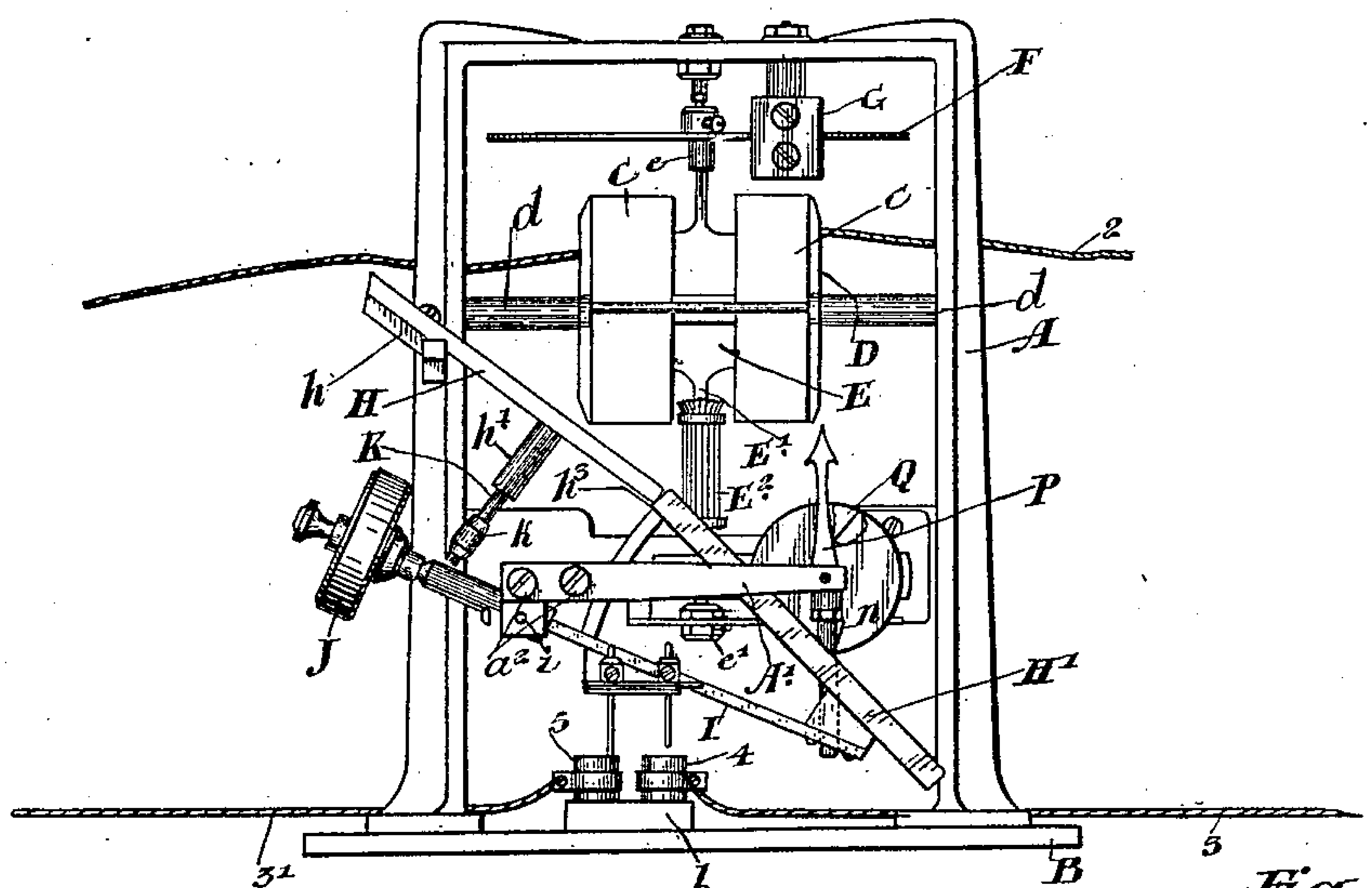

Fig. 1.

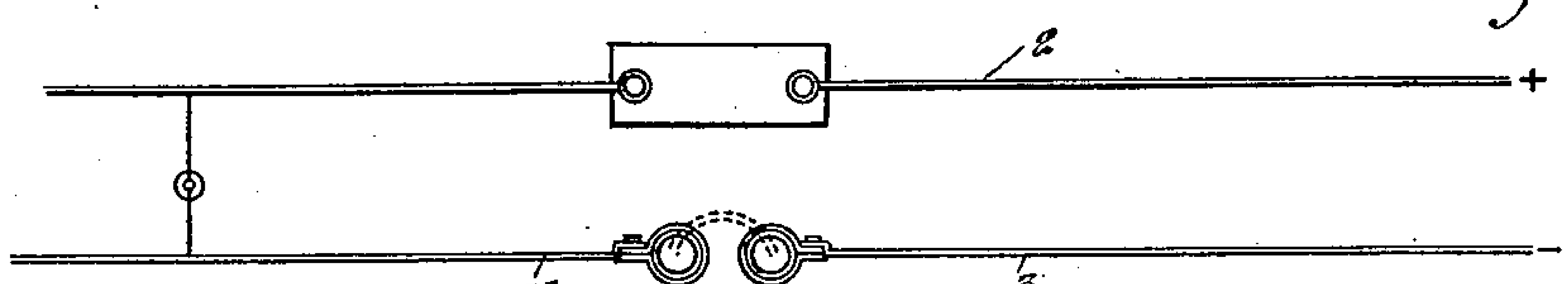

Fig 2

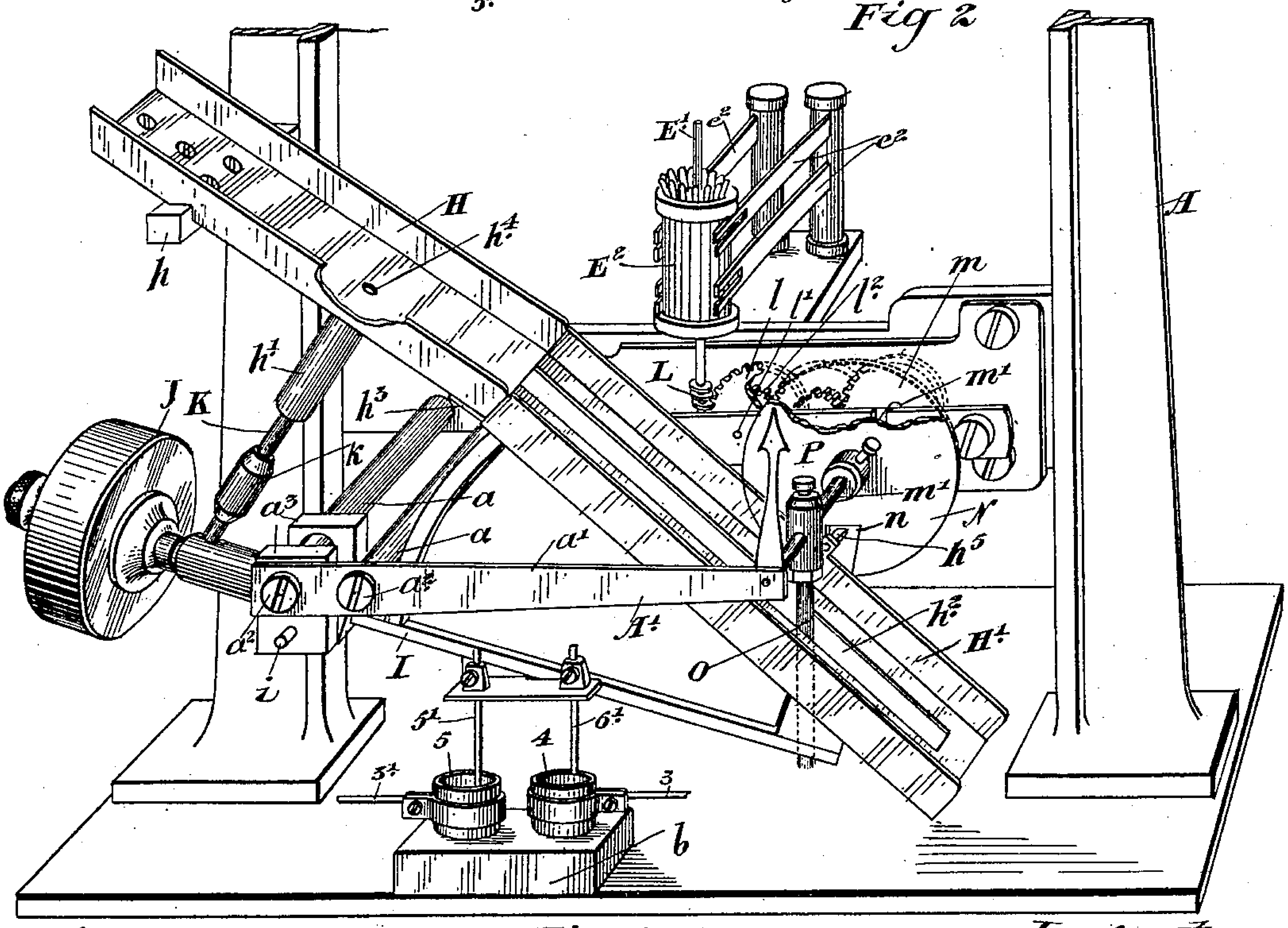

Fig. 3.

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UNITED STATES PATENT OFFICE.

GEORGE LEWIS GOWLLAND, OF PETERBOROUGH, CANADA.

PREPAYMENT ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 706,047, dated August 5, 1902.

Application filed August 21, 1901. Serial No. 72,737. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LEWIS GOWLLAND, mechanical engineer, of the town of Peterborough, in the county of Peterborough, in the Province of Ontario, Canada, have invented certain new and useful Improvements in Prepayment Electric Meters, of which the following is a specification.

My invention relates to improvements in prepayment electric meters; and the object of the invention is to provide a simple and cheap automatically-acting meter of this class which will furnish to the consumer electric current in exact proportion to the amount of money deposited in the meter and automatically show the exact value of electric energy remaining unused and paid for, in which the action of the meter will be stopped immediately the circuit is cut out and the balance of the current not already consumed, but paid for, may appear to the credit of the consumer and be utilized at any subsequent period, and in which the coin deposited will not interfere with the meter operating proportionately to the amount of current supplied, and, therefore, not interfere with the actual computation of the machine; and it consists, essentially, of a meter having a suitable stationary slide and a lever suitably pivoted and provided with the countervailing weight at one end and a coin-receiving slide at the opposite end, such lever having contact-points designed to complete the circuit through the main wire upon the depression of the coin-slide end of the lever, the depressing of the coin being controlled by means of an arm and a notched disk secured on a suitable spindle and coacting with a flattened pin on the side of the slide, and such disk receiving its rotation by a suitable chain of gearing from the armature-shaft of the motor, the parts being otherwise arranged and constructed in detail as hereinafter more particularly explained.

Figure 1 is a side elevation of my meter with the case removed. Fig. 2 is a diagrammatic view showing the wiring. Fig. 3 is an enlarged perspective view of the coin-controlled portion of the device.

In the drawings like letters of reference indicate corresponding parts in each figure.

A is the framework of the meter, which is supported upon a suitable base B.

C C are the field-coils, which are held on any suitable frame D, connected to the side bars of the main frame by the bars *d*.

E is the armature, which is secured on the shaft E′, and E^2 is the commutator, which is located on the armature-shaft E′ below the armature. The armature-shaft E′ is preferably arranged vertically and supported by suitable jeweled bearings *e e′* at the top and bottom, as indicated.

F is a drag-plate secured on the armature-shaft E′ and designed to revolve with it. The drag-plate F passes through an aperture in the permanent retarding-magnet G, which is suitably fastened to the top of the frame, as indicated.

2 is one of the main circuit-wires, which passes through the motor as indicated. The motor in the meter is preferably an ordinary series-wound motor with the armature having a resistance of any desired number of ohms placed in shunt across the circuit.

3 3′ is the other main circuit-wire, which extends to the amalgam-cups 4 and 5, which are supported on a suitable base *b*.

e^2 represents the brushes of the armature to which the main circuit-wires extend.

H is the coin-slide, which is provided with suitable sides, as indicated, and is supported on a suitable bracket *h*, attached to the frame A, and preferably at an angle, as shown.

h′ is a sleeve depending from underneath the coin-slide H.

A′ is a supplemental frame which comprises the cross-bars *a a*, to which is secured the end bar *a′* by suitable screws a^2.

a^3 represents bearing-blocks secured on one of the cross-bars *a*, as indicated.

I is a lever pivoted on the pivot-pin *i*, extending through the bearing-blocks A. The lever I has located at one end the counter-

vailing weight J and has secured to the opposite end the supplemental slide H′.

The slide H′ is provided with a longitudinal slot h^2 and a lip h^3, which extends underneath the lower end of the inclined coin-slide H.

K is a pin provided with a suitable weight k and designed to rest normally upon the weighted end of the lever I. The upper end of the pin extends into a hole h^4 in the stationary slide H′.

5′ and 6′ are pins suitably seeured to the lever I on its longer end, as indicated. The pin 5′ normally extends into the amalgam in the cup 5; but the pin 6′ is held from contact with the amalgam in such cup, so as to leave the circuit through the wire 3 3′ incomplete.

L is a worm-gear secured on the armature-shaft L′ and meshing with a worm gear-wheel l on the spindle l'. l^2 is a gear-wheel on the same spindle l', which in turn meshes with the gear-wheel m on the cross-spindle m', which is suitably journaled at one end of the main frame A and at the other end in the end bar a' of the supplemental frame A′.

N is a disk secured on the cross-spindle m' and provided with a dovetail-shaped notch n.

h^5 is a pin flattened at the top side and suitably secured to the side of the supplemental coin-slide H′ and extending laterally therefrom normally into the upper end of the notch n.

O is an arm secured to the spindle m' and set preferably approximately at an angle of sixty degrees to the normal incline of the supplemental slide H′.

P is a pointer which is secured at one end of the spindle m' and is preferably situated diametrically opposite to though not in the same plane with the notch n.

The pointer P is designed to indicate the monetary value of the amount of current left to the credit of the consumer at any time when the coin is in the machine, as will hereinafter appear.

Having now described the principal parts involved in my invention, I shall briefly describe the operation of my meter.

When it is desired to obtain electrical energy through the meter, I deposit a coin into a slot, from which it passes on to the slide H and thence downwardly along the supplemental slide until it strikes the checking-arm O. In so passing downwardly the weight of the coin on the slide necessarily depresses the long end of the lever I, and thereby forces the pin 6′ into the amalgam in the cup 4, thereby completing the circuit through the motor of the meter. At the same time the pin h^5 passes quickly downwardly out of the notch n, and as the pin is flat at the top it immediately passes underneath the end corner of the notch of the disk, which has been practically simultaneously set in motion in the direction indicated by arrow on account of the current being turned on and the armature-shaft communicating motion through the gears L, l, l^2, and m to the spindle m'. Upon the disk being set in motion necessarily the arm O also rotates in the same direction, and thus allows the coin to drop off the lower end of the supplemental slide. This rotary motion of the disk still continues, so that the periphery of such disk holds down the supplemental slide, and consequently the lever and pin 6′, until practically a complete revolution of the disk is accomplished. During all this time the current is on and the exact amount of current, whether for power or lighting purposes, is being measured. If upon the disk completing its revolution the pin h^5 rose into the notch n, the circuit would be, of course, incomplete by reason of the lever being caused to rise by the countervailing weight J and the pin 6′ consequently drawn from the cup 4, when the electrical energy would of course be shut off. In practice, however, it is preferable under ordinary circumstances that this pin should not rise into the notch n, especially when one wishes continuous lighting or power, and in order to avoid this I usually insert another coin into the slide H after the first coin has been deposited against the arm O. This second coin as the long end of the lever is depressed comes in contact with the pin K, which has been raised by the opposite end of the lever, and is held temporarily in this position during the period that the disk is rotating against the pin h^5; but immediately the pin h^5 rises but slightly into the notch the coin is released by the pin h^4 receding of its own gravity, and drops down against the arm O and throws the lever I downwardly again, so as to complete the circuit so quickly that practically but an infinitesimal make and break of the circuit is occasioned, which would of course result in no inconvenience. It will therefore be seen that it is in all cases preferable to keep the extra coin in the upper inclined slide.

The disk N is preferably provided with a countervailing weight Q, diametrically opposite the arm O, so as to form a balance for the same.

When the disk is caused to rotate, the pointer P rotates around an indicating-disk to the outside of the meter, which may be suitably divided, and it will thus be seen that as the current on the main circuit is consumed the pointer will stop and indicate exactly what monetary proportion of the coin is still to the credit of the consumer. This, it will be readily understood, is an important desideratum, as the consumer cannot, as in other meters, pay for current which he does not use.

In all other machines of which I am aware it has been the custom to use the armature or portion of the motive power or motor in order to free the coin from the receptacle into which it is deposited; but in my meter it will

be readily seen that the action is such that the motor continues to act as a measurer and the coin is freed without the necessity of employing any portion of the current which is being measured. The importance of this cannot be overestimated, as in other meters consumers have to pay for the electrical energy in freeing the coin from the machine.

What I claim as my invention is—

1. The combination with the motor supported on a suitable frame and having one circuit-wire extending therethrough and the other circuit-wire and contacts separating the ends of the same, of a gravitating coin-slide, a lever suitably pivoted and supporting the slide at one end, the countervailing weight at the opposite end of the lever, the contacts connected to the lever and rotatable current-indicating means interposed between the slide and the motor and operated from the latter whereby when the slide is depressed by the coin the contacts are thrown in and the measuring means set in motion as and for the purpose specified.

2. In a prepayment-meter, a motor with electric connections thereto, a switch included in said connections, a coin-slide adapted to swing downward under the weight of the coin, an indicator having driving connections with the motor, means whereby the coin-slide when in its elevated position holds the indicator against movement, but releases it on the depression of the coin-slide, and means whereby the depression of the coin-slide operates the switch to close the circuit through the motor, substantially as described.

3. The combination with the motor supported on a suitable frame and having one circuit-wire extending therethrough and the other circuit-wire and contacts separating the ends of the same, of a gravitating coin-slide provided with a longitudinal slot and a laterally-extending pin, a cross-spindle, an arm extending outwardly from the cross-spindle into the slot and designed to form a stop for the coin, a disk secured on the cross-spindle and provided with a notch to coact with the pin extending laterally from the slide and a suitable driving means from the motor to the cross-spindle and the contact-pins connected with the slide and designed to be depressed by the depression of the slide as and for the purpose specified.

4. The combination with the motor supported on a suitable frame and having one circuit-wire extending therethrough and the armature vertically disposed and supported in suitable bearings and the other circuit-wire and contacts separating the ends from the same, of a gravitating coin-slide, the contact-pins connected with the same and rotatable current-indicating means interposed between the slide and the motor and driving means connecting such aforesaid means to the armature-shaft whereby on the depression of the slide the circuit is completed and the measuring means set in motion as and for the purpose specified.

5. The combination with the motor supported on a suitable frame and having one circuit-wire extending therethrough and the armature vertically disposed and supported in suitable bearings and the other circuit-wire and contacts separating the ends of the same, of a gravitating coin-slide having a slot, the contact-pins connected to the same, the pin extending laterally from the slide, the cross-spindle, the disk secured on the same provided with a suitable notch to coact with the pin, the arm secured on the spindle and extending into the slot in the slide, the driving-gear connecting the armature-shaft and spindle, the said slide being designed to be depressed by the coin so as to throw in the contact-points and throw the pin on the periphery of the disk and the arm being designed to revolve so as to free the coin as soon as the pin has been started to ride upon the surface of the disk as and for the purpose specified.

6. The combination with the motor supported on a suitable frame and having one circuit-wire extending therethrough and the other circuit-wire and contacts separating the ends of the same, of a stationary slide, a supplemental gravitating coin-slide forming a continuation thereof, a circuit-closer operatively connected with said gravitating slide, a stop extending into the stationary slide and means whereby when the coin is deposited into the gravitating slide, so as to depress the same and the circuit is thrown in, the said slide operates upon the stop in the stationary slide, so as to form an obstruction to the passage of another coin as and for the purpose specified.

7. The combination with the motor supported on a suitable frame and having one circuit-wire extending therethrough and the other circuit-wire and contacts separating the ends of the same, of a stationary slide having a depending sleeve, a supplemental gravitating coin-slide forming a continuation thereof, a lever to which the gravitating slide is connected, a countervailing weight on such lever, a pin extending over one end of the lever through the sleeve into the stationary slide, the said gravitating slide when depressed by the coin, so as to throw in the circuit tilting the lever, so as to throw up the pin to form a stop on the slide as and for the purpose specified.

8. The combination with the stationary slide, and the balanced slide at one end thereof adapted to be depressed by the weight of a coin, of a pivoted lever supporting said balanced slide and a pin connected with and extending into the stationary slide, said pin being raised by the depression of the lever under the action of the balanced slide, substantially as described.

9. In combination with the stationary slide,

a lever connected to the same, a gravitating slide supported on the lever, a pin extending through one end of the lever into the stationary slide and raised by the depression of the lever, substantially as described.

10. In a device of the class described, the combination with the gravitating slide suitably supported and having a slot therein, of the cross-spindle suitably driven from the motor, the arm secured to the same and extending through said slot in the gravitating slide and designed to form a temporary stop for the coin when deposited and the disk also secured to the same and provided with the countervailing weight to balance the arm as and for the purpose specified.

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Witnesses:
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