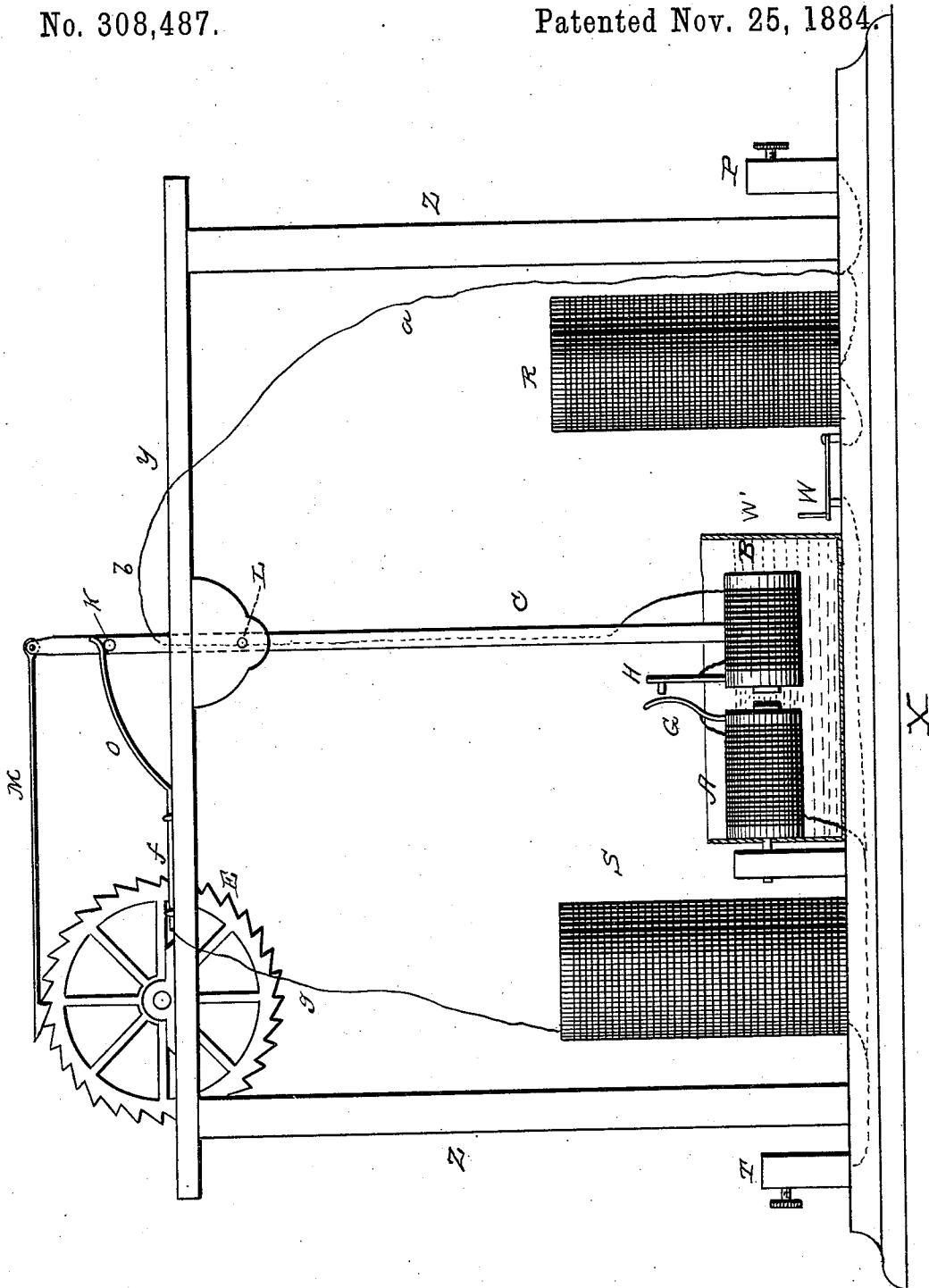


(No Model.)

J. & H. M. GOODMAN.
ELECTRICITY GAGE.

No. 308,487.

Patented Nov. 25, 1884.



WITNESSES
E. A. Bates,
John D. Morrow.

INVENTORS
John Goodman
H. M. Goodman,
by *Auderson & Smith*
their ATTORNEYS

UNITED STATES PATENT OFFICE.

JOHN GOODMAN AND HENRY M. GOODMAN, OF LOUISVILLE, KENTUCKY.

ELECTRICITY-GAGE.

SPECIFICATION forming part of Letters Patent No. 308,487, dated November 25, 1884.

Application filed December 4, 1883. (No model.)

To all whom it may concern:

Be it known that we, JOHN GOODMAN and HENRY M. GOODMAN, citizens of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Electricity-Gages; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention has relation to means for estimating the amount of electric energy that traverses a given circuit; and it consists in the construction and novel arrangement of devices, as hereinafter set forth, and particularly pointed out in the appended claims.

The accompanying drawing is made somewhat diagrammatic in order to display the different parts more clearly and render the construction of the instrument and the principle of its action plain to the understanding.

In the drawing, the letters X, Y, and Z indicate the frame of the instrument.

A represents a stationary electro-magnet fixed to the base X, and B a movable electro-magnet attached to the beam C, which is pendent, being pivoted at the point L, so that it is capable of vibratory motion. The cores of the two electro-magnets A and B approximate, and their opposing extremities are of the same polarity, so that when a current is passed through the circuit they repel each other.

G indicates a spring-arm upon one of these electro-magnets, said spring-arm being connected with the wire of the electro-magnet. To the wire of the other electro-magnet is attached an arm, H, which is designed to make contact with the spring-arm G.

R and S indicate resistance-coils.

W is a switch, whereby the coil R may be thrown in or out of circuit.

K is a projection upon the upper portion of the vibratory beam C, designed to make contact with the spring O at certain times.

M is a catch connected to the vibratory beam C and adapted to work the ratchet-wheel

E. When the current of electricity enters at the binding-post P, it ascends in the course indicated by the line *a b*, which may represent a wire or other conductor, to some part of the vibratory beam C, near the fulcrum thereof. It there descends along C to its lower part, where it is diverted to the wire of the magnet B, which terminates in the upright H. The magnet B being at rest and H in contact with G, the current continues on through the wire of the magnet A and passes out at the binding-post T. At the moment the current passes the electro-magnets A and B repel each other, and the swinging or pendent magnet B recedes, breaking the contact between the arms G and H, and then the pendent magnet B returns by its force of gravity, to be again repelled. The force of the repulsion and the length of the arc described by the magnet B will be with certain restrictions proportionate to the strength of the current.

It is not necessary for the perfection of the instrument that G shall be a spring, as a rigid arm will answer very well. Nor is it essential that the circuit be made and broken through arms or projections, as in some cases it may be even advantageous to conduct the current through the magnets, allowing the extremities of the magnets to constitute the contact-surfaces. The action, however, which has been described would result in an interrupted current, which in some cases might be objectionable, and in order to obviate it a second contact-maker, represented at K O, has been devised.

K represents a projection or knot on the beam C, and O is a spring so arranged as to come in contact with said projection or knot at the moment that the arms H and G of the electro-magnets are separated, thus continuing the current through wires or other conductors in the direction indicated at *f g* to the binding-post T. A variable current will, however, still result, as at one moment the resistance in the helices of the electro-magnets A and B will be encountered and at the next only the resistance of the line *f g*. To obviate this the coil S, which involves a resistance equal to that in circuit through the magnets A and B, is interposed between the spring O and the binding-post T. The to-and-fro movement of the beam C is propa-

gated by means of a ratchet-wheel, as shown, or other common mechanical device to appropriate clock-work actuating a register.

5 In the drawing, R represents a coil of any desired resistance, said resistance serving to conduct a portion of the current around the instrument.

10 Although the current may be made and broken between the extremities of the magnets A and B, it has been found that the noise made by the striking together of the magnets was disagreeable, and that the ends of the magnets were battered, and the whole mechanism injured by the concussions. These ob-
15 jections have, however, been surmounted, and the working of all the parts of the apparatus has been rendered more uniform by immersing it in a vessel, W', containing some non-conducting liquid—such as oil or chloroform—
20 as shown.

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

1. The combination, with an automatic electric motor adapted to operate a recording-in-
25 strument, of the stationary and pendent mag-

nets, the circuit making and breaking devices, and a vessel containing a non-conducting liquid in which the magnets are operated, substantially as specified.

2. An electric meter having a suspended 30 vibratory electro-magnet actuated on one hand by the force of gravity and on the other hand by the repellent force of a second electro-magnet in the same circuit, the current making and breaking devices, and recording 35 mechanism, substantially as specified.

3. The combination, with a pendent vibratory electro-magnet, B, of mechanical devices adapted to operate clock-work to register the vibrations of the pendent electro-magnet, and 40 the arms G and H, for making and breaking the electric circuit, substantially as shown and described.

In testimony whereof we affix our signatures in presence of two witnesses.

JOHN GOODMAN.

HENRY M. GOODMAN.

Witnesses:

HENRY N. BRILEY,

GEO. C. STAUBER.