

(No Model.)

3 Sheets—Sheet 1.

J. HARRIS.
ELECTRIC METER.

No. 583,900.

Patented June 8, 1897.

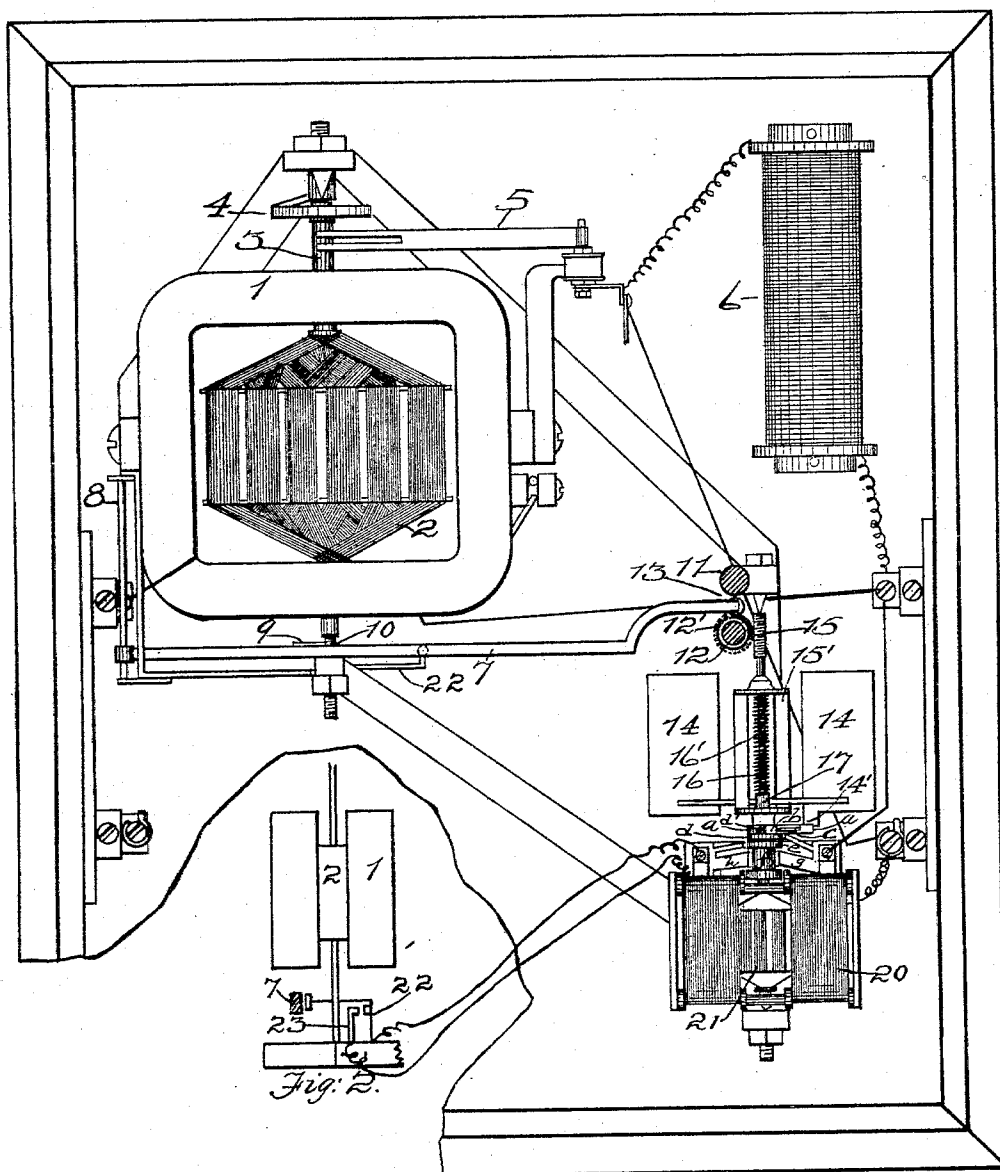


Fig: 1.

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INVENTOR

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ATTORNEY

(No Model.)

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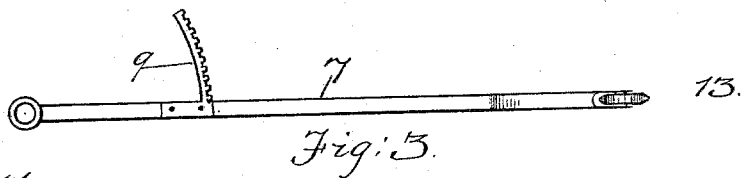


Fig. 3.

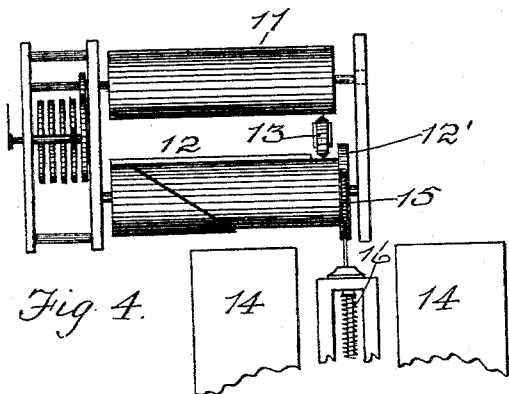


Fig. 4.

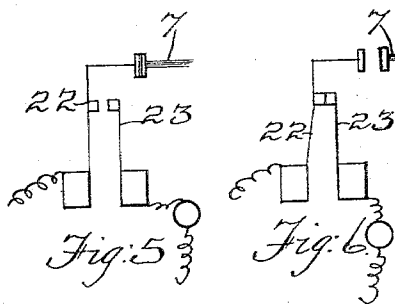


Fig. 5.

Fig. 6.

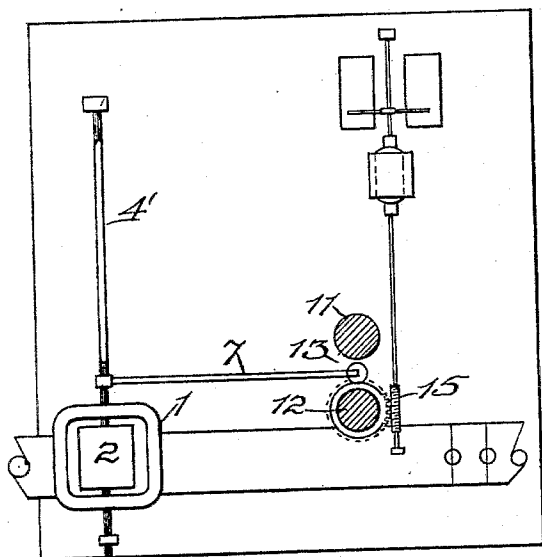


Fig. 7.

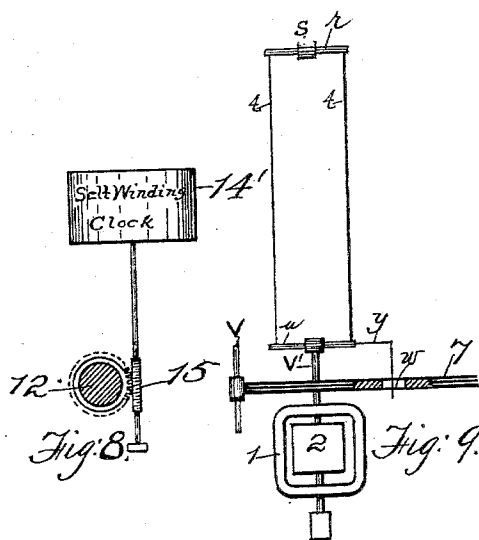


Fig. 8.

Fig. 9.

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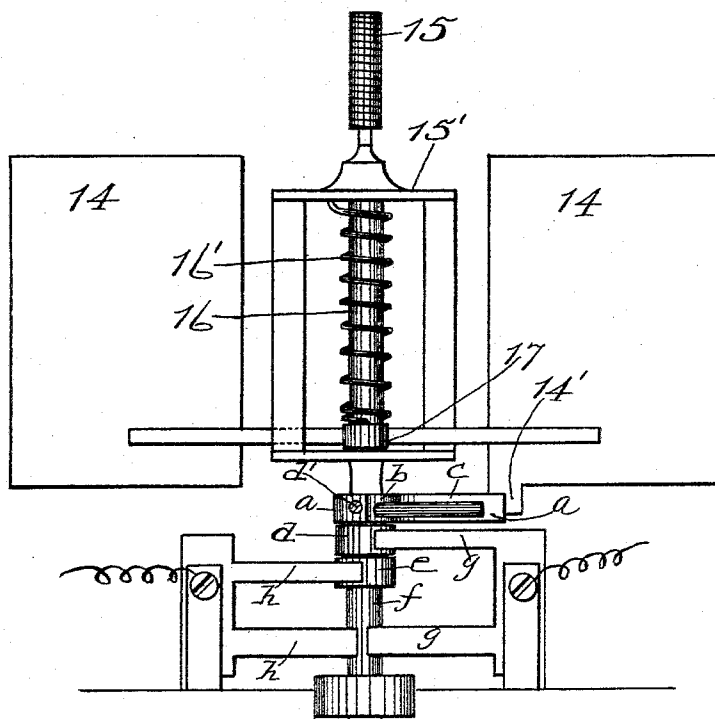


Fig: 10.

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UNITED STATES PATENT OFFICE.

JESSE HARRIS, OF LYNN, MASSACHUSETTS.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 583,900, dated June 8, 1897.

Application filed November 25, 1895. Serial No. 570,061. (No model.)

To all whom it may concern:

Be it known that I, JESSE HARRIS, a citizen of the United States of America, residing at Lynn, Massachusetts, have invented certain
5 new and useful Improvements in Electrical Meters; and I do hereby 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
10 make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The object of my invention is to provide a
15 new and improved recording watt-hour meter for the measurement of electrical currents.

In the drawings, Figure 1 shows a front elevation of my device with a portion of the clockwork-indicator removed; Fig. 2, an edge
20 view of the current and pressure coils and the switch; Fig. 3, a side elevation of the arm which assists in actuating the registering device; Fig. 4, a side elevation of a portion of the registering device and speed-regulator;
25 Fig. 5, a diagrammatical view of the switch open; Fig. 6, a similar view showing the switch closed; Fig. 7, a similar view of another form of my meter; Fig. 8, a similar view of a portion of the registering device
30 attached to a self-winding clock; Fig. 9, a similar view of another form of a portion of my device; Fig. 10, a front elevation of the fan-governor, enlarged to clearly show the same.

35 The numeral 1 shows the field-coils, and 2 a pressure-coil arranged in the field on a shaft, so as to have a certain amount of rotation. On the shaft is a commutator 3 with its brushes 5, the rear brush not being visible in this figure. On the shaft is a coil-spring 4, made fast at one of its ends to the frame, the other end being attached to the shaft or a collet thereon, so that as the shaft
45 rotates with the pressure-coil the spring will be wound or unwound in accordance with the direction of the rotation of the pressure-coil and shaft. Connected electrically in series with the pressure-coil is the resistance-coil 6, both of which are connected in series across
50 the line.

At 7 is seen an arm swinging on a pivot 8 and having an idler-wheel 13 at its free end,

said idler-wheel having its periphery in shape, preferably, of an inverted V, said idler moving lengthwise on the rollers 11 and 12 and
55 rotating on or against them when in contact with raised portion on roller 12, the movement of the arm 7 being communicated by means of a toothed segment 9 on said arm meshing with a gear 10 on the shaft on which
60 the pressure-coil 2 rotates. Rollers 11 and 12, between which the idler-wheel 13 operates, are a portion of the indicator, as seen in Fig. 4, wherein it will be seen that roller 12 has a raised or irregular surface, formed,
65 preferably, by cutting away a portion of the surface, leaving said surface at one of its ends preferably, so that the idler 13 when over this portion will not touch it or be rotated by it when the roller 12 rotates, and when the
70 idler 13 is in this position it is at what I denominate its "zero" position, as seen in Fig. 4. Meshing with the gear 12' on the end of the roller 12 is a worm 15 in connection with
75 the shaft of the armature 21. On said shaft are the revolving fans 14 14, connected by arms to a movable sleeve or collet 17, which moves or rotates with the central pivot 16, which is pivoted in the frame 15', then passing through the opening in the frame 15',
80 which forms a portion of said shaft, the arms of the fan and also the collet being limited in their movements on the shaft by the sides of said frame.

On the shaft and connected with the collet
85 or sleeve 17 at one of its ends is a spring 16', the other end being made fast, preferably, to the frame 15', so that as the fan-blades 14 14 are acted upon by the air as they rotate said spring will balance the air-pressure, or if the
90 speed be increased the air-pressure will overbalance the spring. On the said shaft is a flat spring *a*, preferably partly coiled about an insulating-ring *b*, set on the shaft, the insulating-ring not affecting said spring, it being
95 coiled about it for convenience only, said spring *a* having one of its ends standing out at practically right angles to the shaft and making contact with the ear 14' on the fan-blade 14. In front of the projecting end of
100 spring *a* is a contact-piece *c*, preferably in form of a small pin or wire, said pin *c* passing through the insulation *b*, preferably, and behind and insulated from a metal ring *d*,

also set on the shaft, and is electrically connected to a second metal ring *e*, set also on the shaft below ring *d*, said rings *d* and *e* being insulated from each other. Below the rings *d* and *e* and insulated therefrom is the commutator *f* of the motor. The flat spring *a* is electrically connected with the ring *d* by means, preferably, of the screw *d'*. The brush *g* is connected with ring *d* and the commutator, while brush *h* is connected with ring *e* and the commutator. By this arrangement I am able to short-circuit the armature as needed. While I have shown this method of short-circuiting the armature, I do not confine myself thereto, as it may be done in many ways that will suggest themselves readily to electricians.

In Fig. 2 I show an arm 7 in cross-section and a switch consisting of a stationary contact, preferably 23, and a movable contact 22, said contacts being arranged so that when the arm 7 moves laterally to its zero position it will strike the movable spring-contact 22 and force it away from contact 23, and the motor-circuit will be opened, and when the arm 7 recedes from the contact 22 its resilience causes it to make contact with stationary contact 23, when the motor-circuit will be closed. While I have shown this form of switch, I do not confine myself thereto, as other forms will readily present themselves to those skilled in the art.

In Fig. 7 I show diagrammatically another form of my device, in which the coil-spring 4 is replaced by a spring 4', connected to pressure-coil 2 at one end, while the other end is made fast to a stud, so as to suspend coil 2. The arm 7 is made fast to the coil 2, and as the torque of the coil 2 causes a torsion strain or twist in spring 4' the arm 7 is caused to have a lateral motion, causing idler 13 to move lengthwise of and between the rollers 11 and 12, while the motor causes worm 15 to operate, thus operating roller 11, producing the results hereinafter described.

In Fig. 8 I show a self-winding clock 14' in connection with worm 15, whereby roller 12 is rotated, thus operating the registering device. In Fig. 9 I show another substitute for the springs 4 and 4', consisting of a bar *r*, attached to a stud *s* and having cords or wires or other flexible connections *t*, connected to a bar *u*, said bar *u* being connected to pressure-coil, forming what is commonly known as a "bifilar suspension." To the stem *v* is attached the arm 7 by a rotatable sleeve, and as the torque of the coil 2 produces a torsion on the rod *v* the cords or wires *t* are turned or partly twisted, raising the coil 2, thus offering a resistance to the torque of the coil, the arm 7, having a slot *w* therein, in which moves a pin or wire *y*, connected to the bar *u*, causing a lateral movement in the arm 7 without lifting it out of its position.

The operation is as follows: Referring to Fig. 1, when the current passes through field-coil 1 and pressure-coil 2 a torque is produced

in coil 2, which revolves it against the spring 4, the gear 10 on the shaft of the pressure-coil 2 meshing with the toothed segment 9, causing the arm 7 to move laterally between the rollers 11 and 12 and to move away from its zero-point, said point being at that point where the idler 13 does not come in contact with the raised or irregular surfaces of the roller 12 and is at that point shown in Fig. 4 where idler 13 is seen to rest in that figure. As the arm 7 and idler 13 move away from the zero-point idler 13 comes in contact with the irregular surface of roller 12, when the idler is revolved and also pressed against the under surface of roller 11, and as the journal of that roller is set in a slot instead of a circular opening it has a slight vertical upward and downward movement, allowing it to accommodate itself to the upward pressure of idler 13. As idler 13 presses against roller 11 and revolves because of the revolutions of roller 12, roller 11 rotates and communicates its motion to the train of wheels in the recording mechanism, causing the hands to rotate and shows the result on the face of the dial precisely as the record is shown in a common gas-meter. Motion is communicated to roller 12 by means of gear 12', meshing with the worm 15, said worm being driven by the motor formed by its fields 20 and armature 21. As motion is communicated to worm 15 it is also communicated to fan-blades 14 14, causing them to revolve, and as they so revolve they meet resistance from the air, and when a certain speed is acquired the air-pressure will overcome the spring 16' and force the ear 14' of blade 14 against the contact-spring *a* and make contact between spring *a* and pin *c*, thus controlling the speed of the motor, the current passing when this contact is made through brush *g* to ring *d* through screw *d'* to spring *a*, through contact to pin *c*, to metal ring *e*, to brush *h*, then through switch (seen in Fig. 6) to field-coils 20, to the opposite side of the line. The fan by thus being made to make and break the contact between *a* and *c* controls the speed of the motor and makes its speed practically constant. As the arm 7 moves laterally from its zero position it leaves spring 22 of the switch and allows it to make contact with contact 23 of said switch, thus completing the motor-circuit, and when the arm 7 moves against spring 22 it opens the motor-circuit, thus starting and stopping the motor, and as the arm 7 is moved to and from said spring 22 because of the torque of the armature 2 and resistance of spring 4 whereby the torque is balanced a record of the balancing of the torque is made on the registering device reduced to watt-hours. In Fig. 7, 2 shows a simple helix used as a pressure-coil instead of the armature 2, as shown in Fig. 1. When the self-winding clock 14' is used, it takes the place of the motor and fan-governor shown in Fig. 1.

Having described my invention so that those skilled in the art to which it appertains may

know how to make and use the same, what I claim, and desire to secure by Letters Patent, is—

1. A speed-governor for an electric meter
5 consisting of a rotatable fan connected to a spindle and a source of power, and arranged to turn on the spindle by reason of the force of the air-pressure on the fan-blades as the fan and spindle revolve, the spindle having
10 a movable contact-piece arranged to revolve with the spindle, the fan-blades being arranged to press against the movable contact-piece and operate the same and to recede therefrom at predetermined speeds in order
15 that the electric circuit may be opened and closed and the speed governed substantially as described.
2. A speed-governor for an electric meter consisting of a rotatable fan connected to a
20 source of power and a movable contact arranged so that at predetermined speeds the fan will press against the movable contact and operate it and recede therefrom whereby the electric circuit is opened and closed and the
25 speed governed substantially as described.
3. In an electric meter the combination of

an integrator and a motor arranged to operate the same and means for stopping and starting the motor together with an electric dynamo-meter operatively connected with said
30 stopping and starting means and an automatically-operating device arranged to throw the motor into and out of circuit at predetermined speeds, in order that the current may be controlled, the motor governed and the speed
35 kept practically constant substantially as described.

4. An electric meter consisting of a system of coils arranged at an angle to each other and being free to move, said movement being
40 limited by a resilient device and having a movable fan-like device connected to a source of power and a movable contact arranged to be operated by the fan-like device that the circuit may be automatically opened and closed
45 substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JESSE HARRIS.

Witnesses:

HARRISON NEWHALL,
LEON E. THOMPSON.