(No Model.)

H. M. PILKINGTON & R. S. WHITE.

ELECTRIC METER.

No. 454,949. Patented June 30, 1891.

Fig. 1.

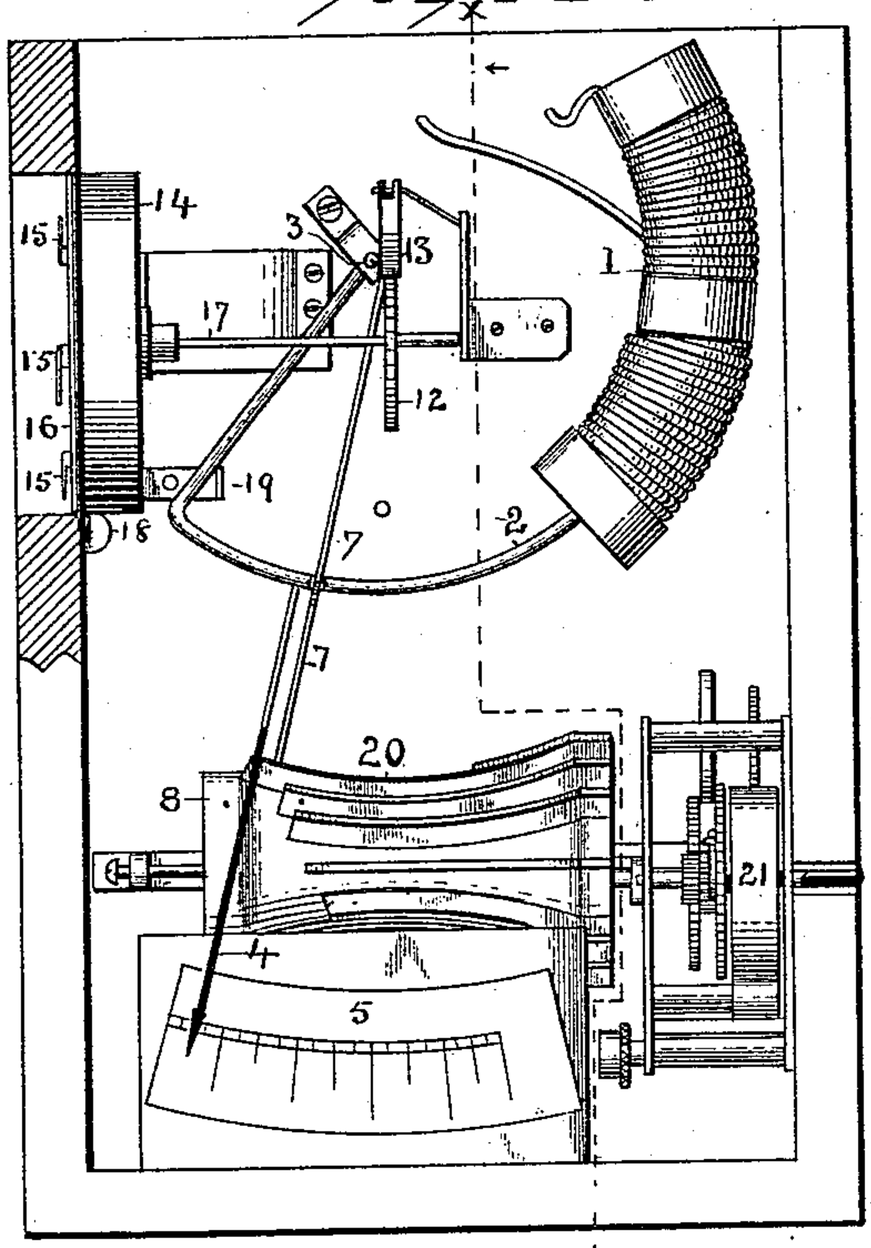


Fig. 2.

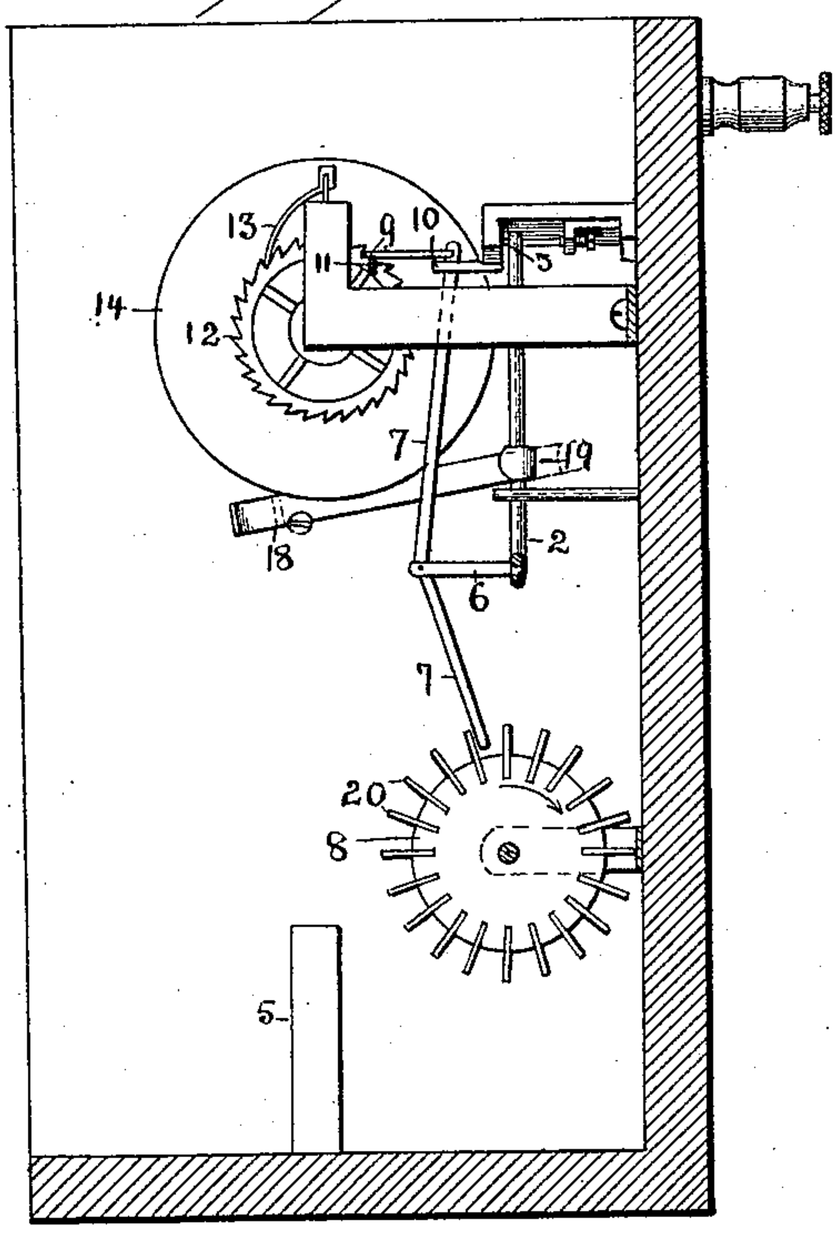


Fig. 3.

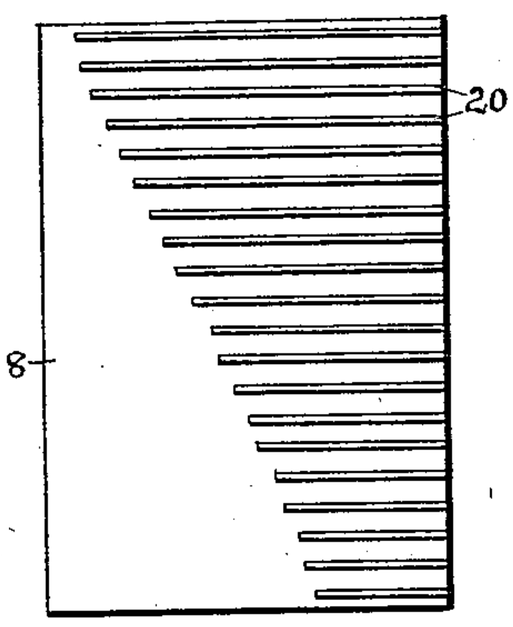


Fig. 4.

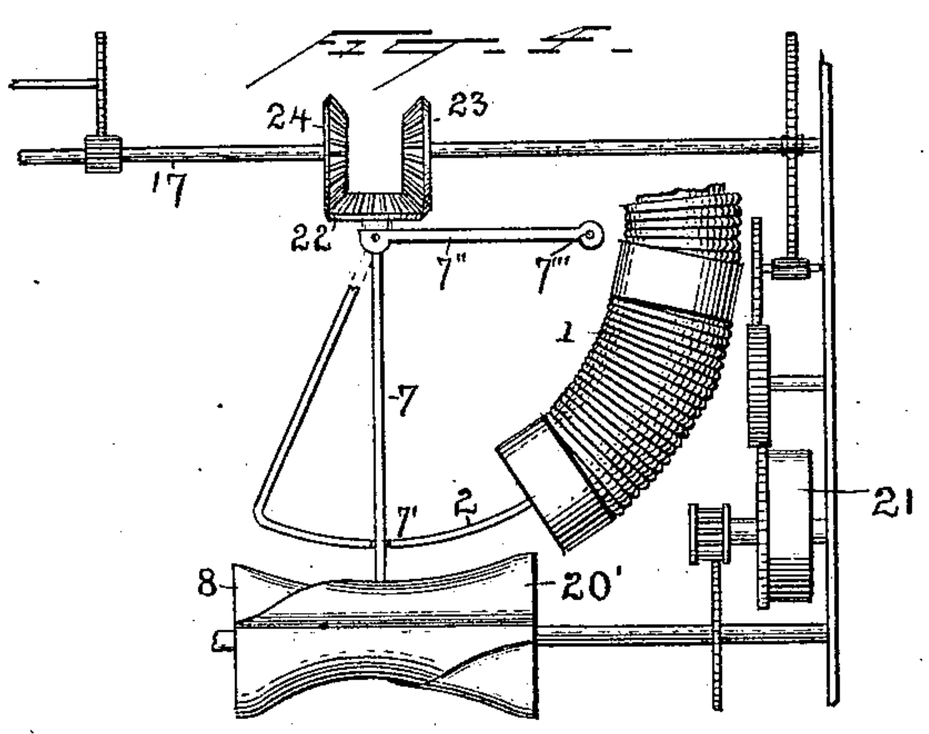


Fig. 5.

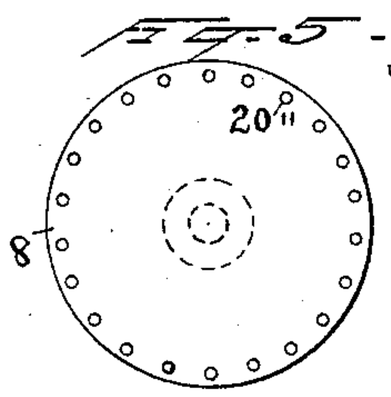
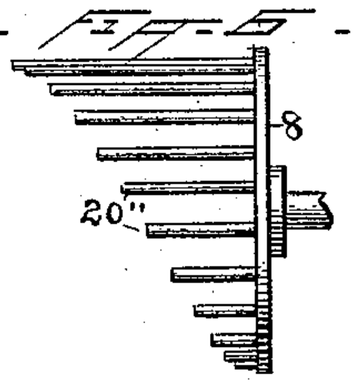


Fig. 6.



Witnesses
Norris A. Clark.
W. Pelzer

Inventors,
H. M. Pilkington
and R. S. White

By their Attorneys
Dyer & Seely.

UNITED STATES PATENT OFFICE.

HERBERT M. PILKINGTON AND ROGER S. WHITE, OF BROOKLYN, NEW YORK.

ELECTRIC METER.

SPECIFICATION forming part of Letters Patent No. 454,949, dated June 30, 1891.

Application filed September 26, 1890. Serial No. 366,205. (No model.)

To all whom it may concern:

Be it known that we, HERBERT M. PILKINGTON and ROGER S. WHITE, both citizens of the United States, and both residing at Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Electrical Meters, of which the following is a specification.

Our invention relates to mechanically-registering electric meters wherein an electrically-operating device determines the application of a source of motion to the register in accordance with variations in the electric current being measured; and our object is to produce an apparatus of this general character which will be accurate and efficient in use and not liable to get out of order.

The invention consists in the various novel devices and combinations, as will be fully hereinafter explained, and pointed out by the claims.

In the accompanying drawings, illustrating our invention, Figure 1 is a face view of a meter embodying our invention, part of the front being broken away. Fig. 2 is a section on line *x x* of Fig. 1 looking in the direction of the arrow. Fig. 3 is a view of the revolving ribbed body developed. Fig. 4 is a view of a modification of the apparatus; and Figs. 5 and 6 are end and side views, respectively, of a further modification hereinafter described.

In Fig. 1, 1 is a solenoid adapted to be connected directly to an electrical circuit. 2 is the core or armature of the solenoid or an extension thereof, which is supported on a suitable pivot at 3. This armature-extension also may, if desired, carry a pointer 4, which is movable over the graduated dial 5. Pivoted to the extension or to a standard 6 carried thereby is an arm 7, the lower end of which terminates adjacent to the revolving body 8. The arm 7 is not flexible, but is rigid, so that when it is struck by ribs 20, hereinafter described, it will move bodily on its pivot, but will not bend to snap by said ribs. The upper end of said lever carries a pawl 9 and is movable back and forth between guides 10. On each side of the pawl is a depending leg or extension 11 for holding the pawl in place on the ratchet-wheel 12. 13 is a pawl to prevent reverse motion of the ratchet-wheel. 14 is the back of a case inclosing the mechanism of any ordinary or suitable registering mechanism, the details of which need not be illustrated, since they are well known. The register used is supposed to have several indicating hands or pointers 15, separately and successively moved over graduated dials 16 in the ordinary manner. Motion is transmitted to the registering mechanism from the ratchet-wheel 12 by means of the spindle 17. 18 is a slide carrying at its rear end a hook 19, which, when forward in the position shown, locks the armature-lever 2 and prevents it swinging. When the apparatus is to be used, this lever is moved to the position indicated in dotted lines. Below the arm 7 is a revolving body 8, on the surface of which are several projecting ribs 20, the contact-surface of the ribs 20 being curved on an arc of a circle, the center of which is at or near the pivot of lever 2, as shown. These ribs vary in length, the longest occupying nearly the whole length of the body 8, while the shortest rib occupies a small portion thereof only. The several intermediate ribs decrease in length regularly, as shown in Fig. 3. This body 8 is revolved by means of a clockwork or other suitable motor 21, having a regulated motion, and may be adjusted to turn body 8 any desired number of times per hour. In practice we have found nine times an hour to be a convenient and satisfactory number. It is also preferable to have a motor which will not need winding oftener than once a month, or to have a self-winding clock or motor.

The instrument shown in Fig. 4 is similar to that already described. 1 is the solenoid adapted for connection in the circuit; 2, the armature-lever; 7, the arm connected to said lever by means of a loop or eye 7′ and having an extension 7″ pivoted at 7‴ and carrying a gear or a friction wheel 22, which, when raised, connects the wheel 23, which is regularly revolved by the motor 21 (which also revolves body 8) with the wheel 24, which, through the spindle 17, operates the register, as already described. Below the arm 7 is the revolving body 8, having on its surface a raised portion 20′, which is curved in the arc

of a circle, the center of which is at or near the pivot of the lever 2, which is narrow at the left end of the body 8 and grows wider regularly toward the right. This raised mechanical contact-surface corresponds to the discontinuous contact-surface formed by the ribs or pins of Figs. 1 and 6. The body 8 is regularly and constantly turned by the motor 21. The armature-lever 2 is pivoted independently of the arm 7.

In Figs. 5 and 6 the revolving body or structure 8, instead of being a body with a projecting rib or ribs, as in the other figures, is composed of a disk, with projecting pins 20″ of varying lengths, as already described, in connection with the ribs of Fig. 1. These pins may be curved, as described, for the ribs, if desired. It is obvious that this device might be constructed also in numerous other ways involving the same general principles. So, too, instead of using a curved solenoid, any other suitable electrically-operated device might be substituted, and different means might be used for transferring motion from the revolving device 8 to the registering mechanism.

The operation of the apparatus will now be described, considering first the form of the apparatus shown in Figs. 1, 2, and 3: When no current is passing through the solenoid or other electrically-operated device, the pointer will be at the extreme left of the dial, and the revolving body, which is supposed to turn, for example, nine times an hour, will not strike any of the ribs, pins, or other projections; but if a current of one-half ampère passes through the said device the pointer will be moved toward the right on the dial, and the arm 7 will be moved along the body 8, for example, to the position shown in Fig. 1, at which point the arm will be struck once for each revolution of the body 8. Each time that one of said ribs or projections strikes the arm 7 it moves the arm on its pivot, moving the pawl forward and turning the ratchet-wheel 12 and the register one space. If the apparatus is in operation one hour, therefore, the register will show nine movements, which will indicate one-half ampère-hour. Suppose, again, that a current of ten ampères were passing through the solenoid, the pointer would be moved along on the dial and the arm 7 over the body 8 to a position where it would be in the path of movement of, say, twenty of the ribs or projections. For each hour in the revolution of 8 therefore the pawl would be advanced one hundred and eighty times and the register would indicate ten ampère-hours. The operation would be the same for all currents from one-half ampère up to the limit of the apparatus.

The operation of the apparatus illustrated in Fig. 4 differs from that already described, in that the registering device is not advanced by a step-by-step motion, but is intermittently moved for a certain time, which time depends on the position occupied by the arm 7 in respect to the raised surface 20′, since the wheel 22 transmits motion from 23 to 24 as long as it is held against them, by reason of its lower end bearing on the said raised contact portion, as will be evident without further description. This form of the apparatus is not as advantageous as that shown in Fig. 1, since the intermittent or step-by-step action of the ribs 20 frees the electrically-operated device at each impulse and permits it to take a new position without retardation by friction.

The pins 20″ of Figs. 5 and 6 operate in precisely the same manner as the ribs 20 of Fig. 1.

Without confining ourselves to the exact constructions shown and described, what we claim as our invention is—

1. The combination of a coil or magnet adapted for connection in an electrical circuit, an armature moved thereby, a pivoted arm carried by the armature and moved thereby in one direction, a propelling-pawl carried by the arm, a register moved by the pawl, and means for moving said arm in a second direction to advance the pawl and through the pawl the register, substantially as described.

2. The combination, in an electric meter, of a coil or magnet adapted to be connected in a circuit, an armature therefor, the position of which is controlled by the current passing through the coil, a lever moved by said armature, a propelling-pawl at one end of said lever, a register operated thereby, and a body having an operative surface of varying extent and having a regular motion supported adjacent to the opposite end of the lever, substantially as described.

3. The combination, with a register, of a propelling-wheel therefor, a pivoted armature the position of which is controlled by a coil adapted to be connected to a circuit, a lever pivoted between its ends to said armature, a pawl for the propelling-wheel at one end of the lever, and a moving body having ribs or projections of varying extent adjacent to the opposite end of the lever, substantially as described.

4. The combination of a body having an operative surface of varying extent and moved regularly by a motor, a register, a propelling-wheel therefor, an operating device for said wheel, supported at one end of an arm or lever, the opposite end of which arm is actuated by the surface of a movable body, and an armature the position of which is controlled by the current in the circuit, connected with and moving said arm, substantially as described.

5. The combination of a body having an operative surface of varying extent and moved regularly by a motor, a register, a propelling-wheel therefor, an operating device for said wheel, supported at one end of an arm or lever, the opposite end of which arm is actuated by the surface of the movable body, a curved pivotally-supported armature connected with

and moving said arm, and a curved solenoid adapted to be connected in a circuit controlling the position of the armature, substantially as described.

6. The combination, with a register, of a movable body having an operative surface of varying extent, a rigid arm the position of which in relation to said surface is controlled by the current to be measured, moved by said body, and a mechanical actuating device for such register carried by said rigid arm, substantially as described.

7. The combination of a coil or magnet adapted for connection in an electrical circuit, an armature moved thereby, a pivoted arm carried by the armature and moved thereby in one direction, a propelling-pawl carried by the arm, said pawl having legs extending over the side of a ratchet-wheel to hold the pawl in place thereon, and a guide or steadying device for the arm, a register moved by the pawl, and means for moving said arm in a second direction to advance the pawl and through the pawl the register, substantially as described.

This specification signed and witnessed this 19th day of September, 1890.

HERBERT M. PILKINGTON.
ROGER S. WHITE.

Witnesses:
W. PELZER,
E. COURAN.