J. W. T. OLAN.

ELECTRIC CURRENT METER.

No. 462,504. Patented Nov. 3, 1891.

Fig. 1.

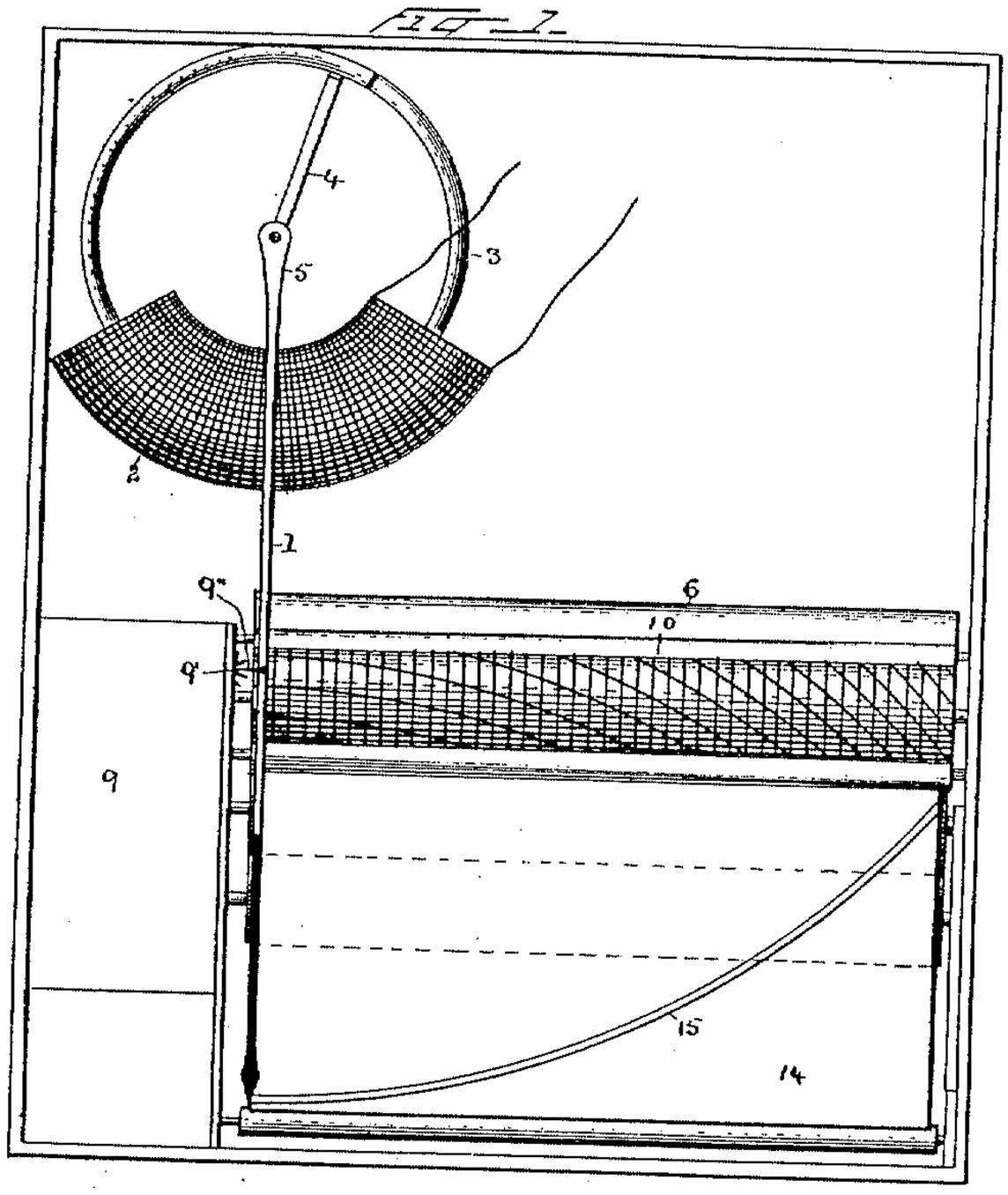


Fig. 2.

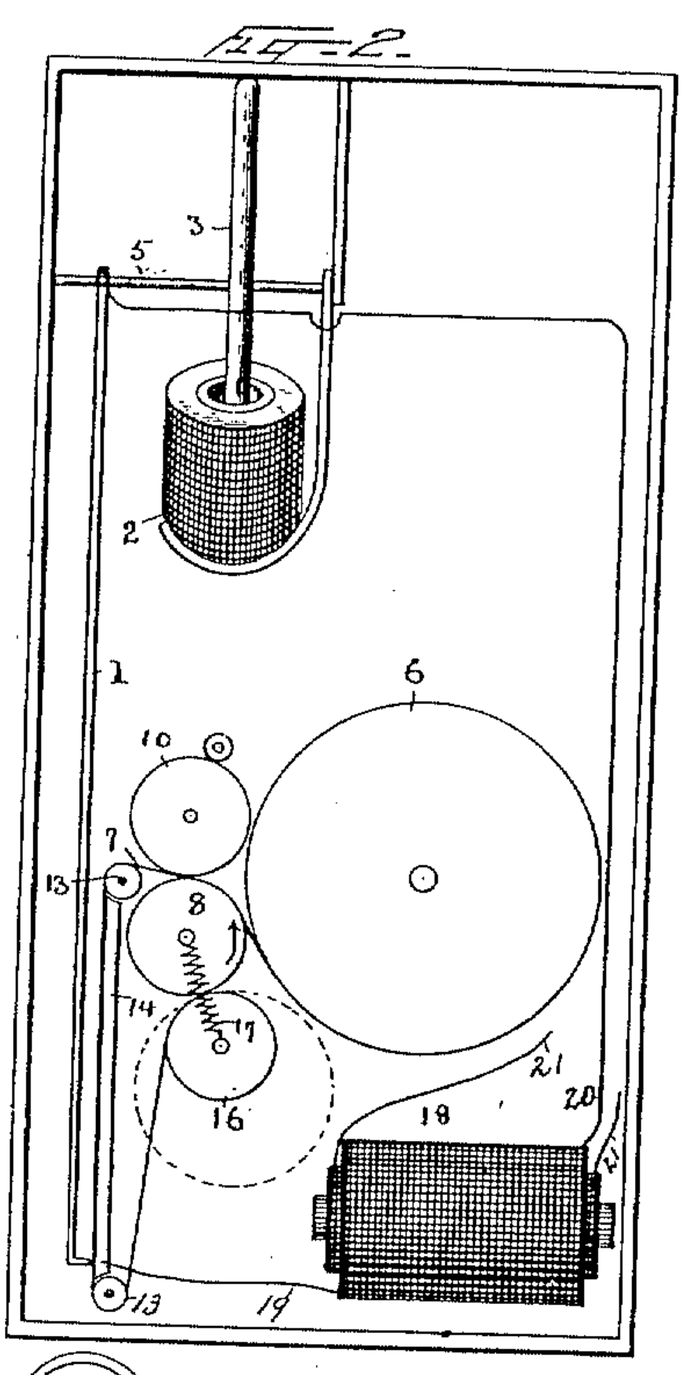


Fig. 3.

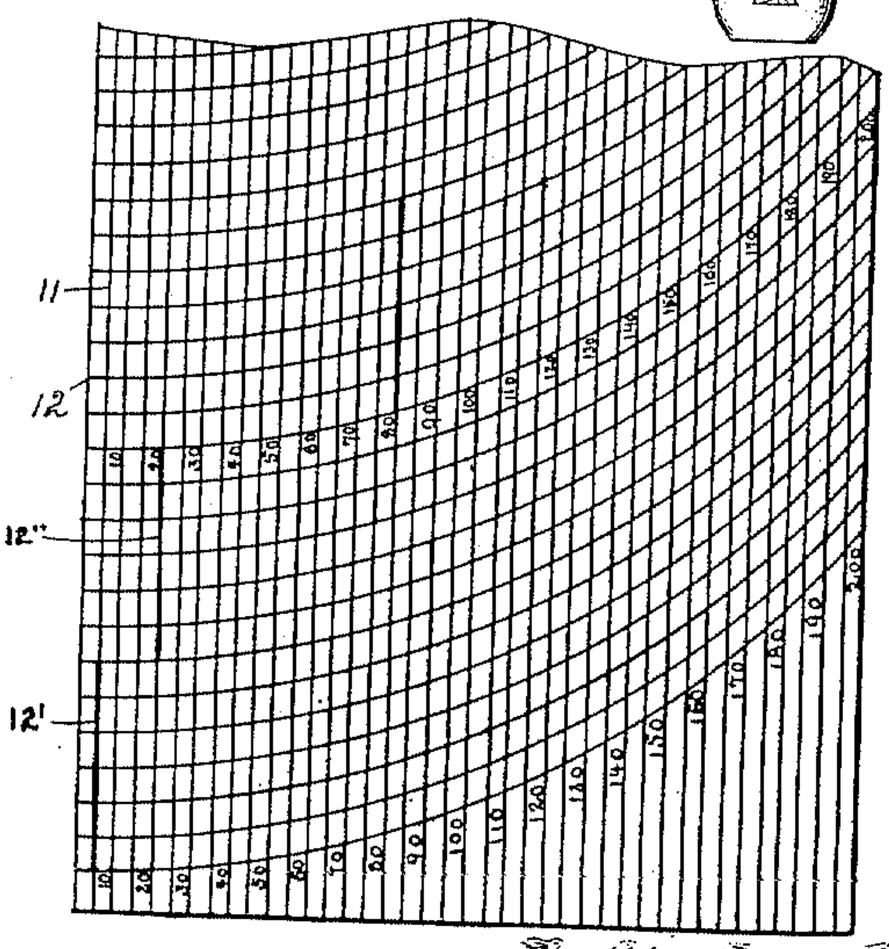
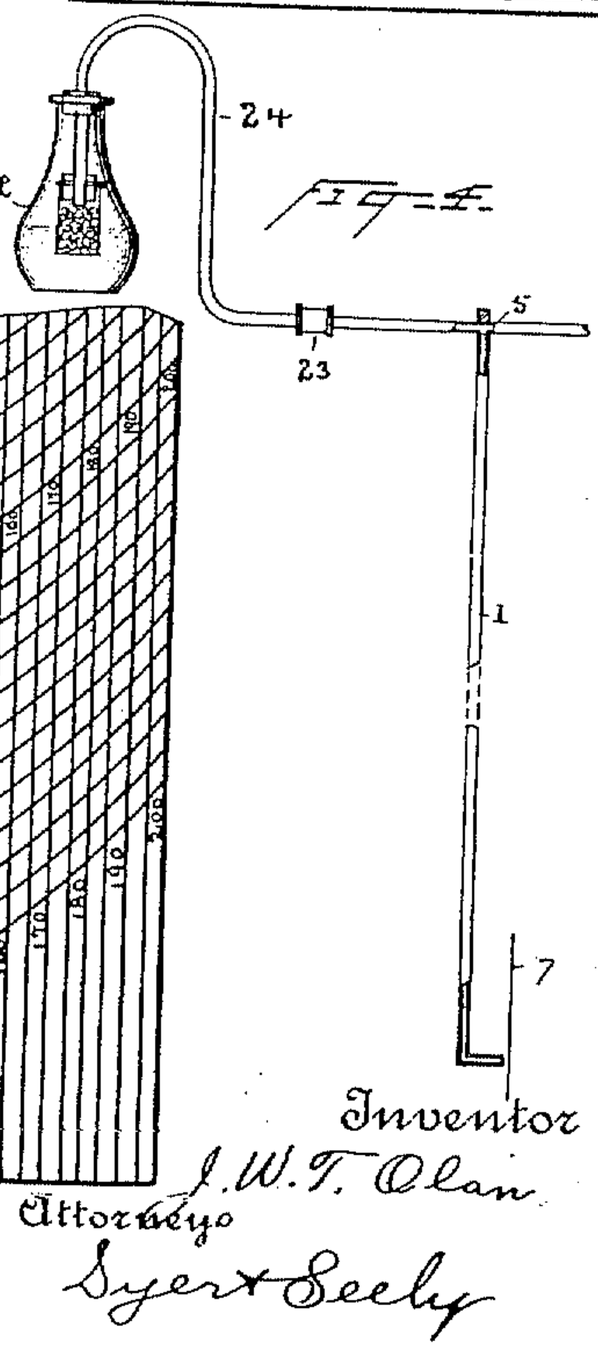


Fig. 4.



Witnesses

Morris A. Clark.

W. E. Oberly

Inventor

J. W. T. Olan

By his Attorneys

Dyer & Seely

UNITED STATES PATENT OFFICE.

JOHAN W. TH. OLAN, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO EDWARD H. JOHNSON, OF SAME PLACE.

ELECTRIC-CURRENT METER.

SPECIFICATION forming part of Letters Patent No. 462,504, dated November 3, 1891.

Application filed April 16, 1891. Serial No. 389,153. (No model.)

To all whom it may concern:

Be it known that I, JOHAN W. TH. OLAN, a subject of the King of Sweden, residing at New York, county and State of New York, have invented a certain new and useful Improvement in Electric-Current Meters, of which the following is a specification.

The present invention relates to apparatus for measuring and recording the current used in any particular circuit.

The object of the invention is to provide such an apparatus which shall be accurate and at the same time shall be simple and cheap in construction; and the invention consists in the improved meter and in the several combinations of parts hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a face view of the meter, the front plate being removed. Fig. 2 is a view at right angles to Fig. 1, looking from the right, the side plate of the casing being removed. Fig. 3 shows a section of the record-sheet, and Fig. 4 shows a means for marking the record-sheet.

1 is a needle or pointer moved back and forth over a regular arc of a circle by a coil or magnet 2, which is connected to the circuit, the current in which is to be measured in any well-known or suitable manner. (Not necessary to be herein described.)

3 is an armature for the coil, supported by the arm 4, which is pivoted concentrically with the needle 1 at 5. The needle when in its normal position—that is, when no current is passing through the coil 2—rests in the position shown in Fig. 1. This is called the "zero" position.

6 is a roll on which is wound a plain paper or other record-sheet 7.

8 is a roll which is moved in the direction of the arrow by the clock-work or time mechanism 9. The connection between these parts is preferably such that the roll 8 is rotated once an hour. The clock is provided with a detent-wheel or device 9', normally engaged by the co-operating detent-pin 9'' on the needle to arrest movement of the clock. Just above the roll 8 is a printing-roll 10, on the surface of which are suitable means for marking the sheet, as indicated in Fig. 3, with longitudinal lines 11 at regular intervals and curved transverse lines 12, also at regular intervals. The roll also marks said longitudinal lines with suitable numbers, as 10 20 30, &c. The lines 12' in Fig. 3 indicate the position occupied by the point of the needle at different times.

13 in Fig. 2 are small rolls over which the record-sheet passes.

14 is a plate between the rolls, over the face of which the record-sheet moves. This plate may be entirely of metal; or it may be of insulating material and have a metal plate or wire set into it flush upon the surface, as indicated at 15 in Fig. 1.

16 is a roll onto which the record-sheet is wound as it is moved forward. This roll is also advanced by the time mechanism, it being in frictional engagement with roll 8. The roll 16 is held against the roll 8 by a yielding connection. (Shown as coiled springs 17 between the axes of the two rolls.)

18 is an induction-coil, the secondary of which is connected to the metal plate 14 or to the metal strip 15 by wire 19, and the opposite terminal of which is connected by wire 20 to the pointer 1. Said pointer is moved over, but is permanently out of contact with the record-sheet. The primary of the induction-coil is connected by wire 21 to any suitable source of alternating or intermittent current. The circuit 21 may be a shunt, including a suitable resistance from the main circuit, and a vibrator may be used at the induction-coil for interrupting the primary current, if necessary.

The operation of the apparatus above described is as follows: When the circuit is first closed to coil 2, the pointer is moved toward the right, thus carrying the detent-finger 9'' away from the detent-wheel 9' of the clock, releasing the clock and allowing it to turn the roll 8, the printing-roll 10, and the roll 16, thereby advancing the record-sheet, at the same time marking the longitudinal and transverse lines and the figures thereon, as indicated in Fig. 3. At the same time one of the longitudinal lines 12' is made on the sheet as it is fed forward by perforating the paper by means of electrical sparks passing between the end of the pointer and the metal plate under the paper or sheet, the marking being

done without bringing the needle into contact with the sheet. The distance between the longitudinal lines is graduated to indicate electrical units. For example, when the circuit is closed, if the needle comes to rest over the first line, it will indicate a certain number of units—say five ampères. If it comes to rest over the second line, it will indicate ten ampères, &c. If a line of perforations 12′ is made on the sheet for a distance equal to one-half the circumference of the time-roll 8, as shown at the left in Fig. 3, the record shows two and a half ampère-hours. If then more current is thrown through the coil, so that the needle comes to rest over line 20 and continues in this position while the sheet is being advanced for another half hour, as indicated at 12″ in Fig. 3, the record shows ten ampère-hours, and so on for the other indications, and a true record will be made of every increase or decrease in the current used. The perforated record-sheet may be used as a stencil to print from in a well-known manner if several copies of the record are desired. Since the needle is moved back and forth without touching the record-sheet, and since the marking is done without touching the sheet, the resistance or friction is reduced to a minimum, and is so small that it may be disregarded, and since the record-sheet is marked with the indicating-lines just before it is used and always marked by the same apparatus there can be no question as to the proper spacing of the lines.

In Fig. 4 is shown a second means for marking the paper without contact between the needle and paper.

22 is any suitable apparatus for generating a gas adapted to discolor the record-sheet, which is preferably chemically prepared by treatment with a metal salt, such as a lead or silver salt. The gas used may be H_2S, and a small quantity will escape or stand continually at the end of the needle and mark the position. At the needle-point 1′ is the hollow needle.

23 is a joint between the pipe 24 and the hollow axis 5 of such nature that the latter can move without retardation.

What I claim is—

1. The combination, in an electrical meter, of a needle or pointer, a coil or magnet for moving it, through which the current to be measured passes, a plate over which the needle moves in a regular arc, a record-sheet between the plate and the needle, mechanism for advancing the sheet, and means operating through the needle while it is out of contact with the sheet for marking on the sheet the position of the needle, substantially as described.

2. The combination, in an electrical meter, of a needle or pointer, a coil or magnet for moving it, a plate over which the needle moves in a regular arc, said plate being of conducting material in the arc over which the end of the needle moves, a record-sheet between the plate and needle, mechanism for advancing the sheet, and means operating through the needle while it is out of contact with the sheet for marking the position of the needle, substantially as described.

3. The combination, in an electric-current meter, of a needle or pointer movable in a regular arc, a coil or magnet for moving it, a plate over which the needle moves, a record-sheet between the plate and needle, mechanism for advancing the sheet, and a source of high-tension current connected to said conducting-plate and to the needle, whereby the sheet is perforated, substantially as described.

4. The combination, in an electric-current meter, of a needle or pointer movable in a regular arc, a coil or magnet for moving it, a plate over which the needle moves, a record-sheet between the plate and needle, mechanism for advancing the sheet, and an induction-coil the primary of which is connected to a source of current and the secondary of which is connected to the needle and to said conducting-plate, substantially as described.

5. The combination of a needle and means for moving it, a roll on which is wound a record-sheet, a roll moved by a time mechanism for advancing the sheet, said sheet passing under the point of the needle, a printing-roll, and a roll onto which the sheet is wound, substantially as described.

6. The combination of a needle and means for moving it, a roll on which is wound a record-sheet, a roll moved by a time mechanism for advancing the sheet, said sheet passing under the point of the needle, a second roll onto which the sheet is wound, and a yielding connection between the latter roll and the roll moved by the time mechanism, substantially as described.

7. The combination, in a meter, of a record sheet or surface, a motor for advancing the same, means for regularly ruling or marking the surface as it advances, a current-indicating device movable over the surface, and means operating through said indicating device for marking the surface, substantially as described.

8. The combination of a needle or pointer, a coil or magnet for moving it, a record-sheet over which the needle moves, a motor for regularly advancing the sheet, and a printing-roll having means for marking the sheet, substantially as described.

9. The combination of a needle or pointer, a coil or magnet for moving it, a record-sheet over which the needle moves, a motor for regularly advancing the sheet, a printing-roll having means for making longitudinal lines on the sheet at intervals and for marking said lines to indicate electrical units, and means for marking transverse curves on the sheet at intervals, substantially as described.

10. The combination of a needle or pointer, a coil or magnet for moving it, a record-sheet over which the needle moves, a motor for advancing the sheet, means for ruling or marking the sheet as it advances, and a detent-

wheel or device for the motor, said wheel or device being held by a co-operating detent moved into engagement by the needle when the latter is in its zero position, substantially as described.

11. The combination of a needle and means for moving it, a roll on which is wound a record-sheet, a roll moved by a time mechanism for advancing the sheet, said sheet passing under the point of the needle, and a printing-roll advanced by the time mechanism, the sheet passing between the time-roll and the printing-roll, substantially as described.

12. The method of measuring electricity, which consists in moving a pointer or needle in a regular arc over a graduated sheet by the current to be measured, advancing said sheet by time mechanism, and passing a marking medium from the pointer to the sheet through a small intervening air-space, substantially as described.

This specification signed and witnessed this 13th day of April, 1891.

JOHAN W. TH. OLAN.

Witnesses:
CHARLES M. CATLIN,
J. A. YOUNG.