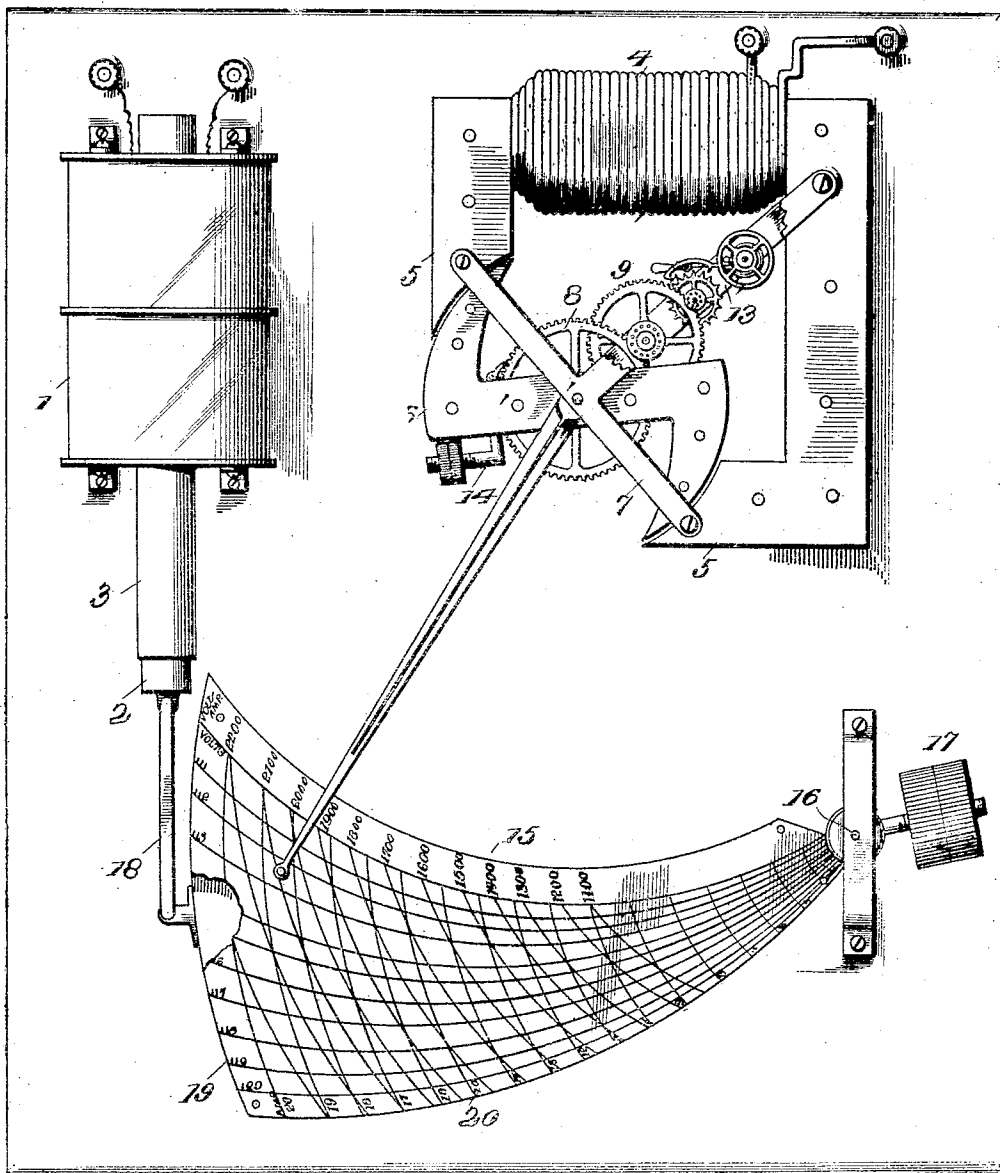


R. A. WILLSON.
ELECTRIC METER.
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Inventor

Witnesses

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ELECTRIC METER.

1.031,500.

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To all whom it may concern:

Be it known that I, RUSSELL A. WILLSON, of Spokane, in the county of Spokane and State of Washington, have invented certain new and useful Improvements in Electric 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 make and use the same.

The primary object of this invention is to provide an electric maximum demand meter which will record the maximum demand in volt-amperes as well as indicate the volts and amperes separately.

So far as I am aware in known meters for indicating volt-amperes two separate instruments are required, one for recording volts, or a volt-meter, and the other for recording amperes, or an ampere-meter, both having clock movements so that by computation kilovolt-amperes may be known. Such instruments are open to many objections; accuracy of results requires that the two clocks agree, and this not always being possible the result is that the instrument might either indicate increase or decrease of the actual consumption, as a higher consumption might be required at a time when the voltage is high, or vice versa, thereby doing an injustice to either the consumer or the seller. By means of my invention these difficulties are entirely overcome, and this is accomplished, in brief, by separately controlling the two cooperating recording elements of a single instrument by the voltage and amperage, enabling a direct reading of the volt-ampere without the necessity of computation.

The invention will be hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawing, the figure is an elevation of one form of embodiment of my present invention.

Referring to the drawing, 1 designates a potential coil having an iron core 2 which is guided in its movements by a tube 3. This coil is connected in multiple with the line wires, and hence is controlled by the voltage.

4 is a current coil which is connected in series with one of the line wires; 5 is the field pieces, which are preferably laminated; 6 is a laminated armature; 7 a yoke supporting the armature and shown as mounted on the

field pieces; 8 a gear wheel on the shaft of the armature; and 9 a train of gearing between gear wheel 8 and an escapement 10 with which coöperates a balance wheel 12, said gearing 9, the escapement, and the balance wheel being mounted on a fixed support 13. The gear wheel 8 is engaged by a weighted pawl 14 when the armature moves clockwise.

The armature 6 carries a marker in the form of a radially extending arm or needle carrying at its free end a pencil or other suitable agency for marking on a chart. This marker is controlled wholly by the amperes, and hence is moved as the armature is influenced, but its movement, when the amperes increase, is limited by the escapement or any other suitable governor capable of being set to any desirable speed of adjustment. The means employed for this purpose may be varied widely, the escapement being shown merely by way of illustration. Whatever means is employed is intended to limit the movement of the marker only when there is an increase in the current and does not interfere with the movement of the marker when there is a decrease in the current.

15 is a chart whose holder I have shown as being pivoted at 16 and having an adjusting weight or weights 17. At its outer end the chart, or its holder, is connected by a link 18 to the core 2 of the volt coil. The chart is preferably in the shape of a segment of a circle, the volt lines 19 being drawn from the pivot of the chart to its outer edge on a radius struck from the center of the armature which is actuated by the amperes. The ampere lines 20 are struck on different radii from the pivot of the chart holder. Volt-ampere lines may also be drawn through equal volt-ampere points on the chart. If desired, the latter may be made in the form of a complete circle and capable of being moved around its central pivot to enable several records to be taken on one chart.

From what has been said it will be understood that the chart is controlled wholly by the potential coil 1, which latter may be provided with any suitable means for checking the movements of its core and thus limit the effects of minor fluctuations in the voltage and avoid their being recorded. The marker or recording needle is actuated

wholly by the current or amperes, and the chart is moved practically in a right angular direction to that of the marker, the result being that the volts and the amperes are all recorded simultaneously and neither of the coöperating elements, the chart or the marker, has any influence on the other. Thus by means of my invention I am enabled to obtain a recording, indicating and direct reading volt and amperes and volt-amperes meter.

While I prefer to have a chart and marker controlled, respectively, by the instrumentalities actuated by the volts and amperes, yet it is manifest that the same results may be obtained if the arrangement be reversed, and such change is to be considered within the scope of my invention. The instrument may be employed to operate on either alternating current or direct current. In both instances it is accurate and reliable; it is not affected by heat or cold, as is the case with some demand meters heretofore known; and its use dispenses with the necessity of making computations in order to learn the volt-amperes recorded by the instrument.

While I have shown a very simple form of mechanism for carrying out my invention, the attainment of the desired results do not depend upon any special construction, since any mechanism now used in alternating or direct current ampere-meters and having sufficient torque could be applied in lieu of what has been illustrated for operating the chart and the marker.

Various ways of carrying out the invention may readily suggest themselves to those skilled in the art. The object in every instance is to obtain, in effect, a volt-ampere meter by combining a volt-meter and an ampere-meter, one for influencing the movements of the chart, and the other for influencing the marker, and neither having any influence on the other.

I claim as my invention:

1. A maximum demand electrical recording instrument, comprising a movable voltage operated member, a movable current operated member, a marker movable by one of said members, and a chart movable by the other of said members and adapted to form a recording surface for said marker, the said chart comprising a series of volt-indicating lines and a series of current-indicating lines, the position of said marker on said chart at any time during the operation of the instrument indicating both current and voltage separately.

2. A maximum demand electrical recording instrument, comprising a movable voltage operated member, a movable current op-

erated member, a marker movable by one of said members, and a chart movable by the other of said members and adapted to form a recording surface for said marker, the said chart comprising a series of volt-indicating lines, a series of current-indicating lines and a series of volt-ampere indicating lines, the position of said marker on said chart at any time during the operation of the instrument indicating current, voltage and volt-ampereage separately.

3. An electric recording maximum demand instrument comprising, in combination with record-forming means including a pivoted chart having voltage lines radiating from its pivot and ampereage lines struck on radii from such pivot, a volt-controlled instrumentality for moving said chart, a marker for the chart, and an ampere-controlled instrumentality for moving the marker.

4. A maximum demand electrical recording instrument, comprising a movable voltage operated member, a movable current operated member, a marker movable by one of said members, and a chart movable by the other of said members and adapted to form a recording surface for said marker, the said chart comprising a series of volt-indicating lines, a series of current indicating lines, and a series of volt-ampere indicating lines, the position of said marker on said chart at any time during the operation of the instrument indicating current, voltage and volt-ampereage separately, and means for governing the movement of the current operated member.

5. A maximum demand electrical recording instrument, comprising a movable voltage operated member, a movable current operated member, a marker movable by one of said members, and a chart movable by the other of said members and adapted to form a recording surface for said marker, the said chart comprising a series of volt-indicating lines, a series of current-indicating lines and a series of volt-ampere indicating lines, the position of said marker on said chart at any time during the operation of the instrument indicating current, voltage and volt-ampereage separately, and means for retarding the movement of the marker on an increase in current but not on a decrease of current.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

RUSSELL A. WILLSON.

Witnesses:

A. J. SCHULTHESS,
L. E. SHEARS.