

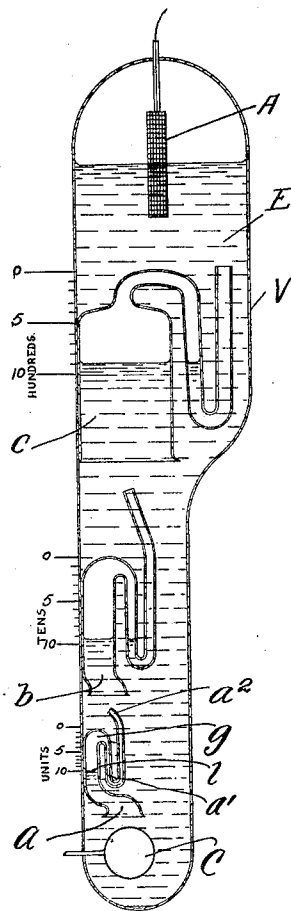
H. S. HATFIELD AND G. HOOKHAM.

ELECTROLYTIC METER.

APPLICATION FILED JUNE 2, 1919.

1,346,090.

Patented July 6, 1920.



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ELECTROLYTIC METER.

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Specification of Letters Patent.

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Application filed June 2, 1919. Serial No. 301,301.

To all whom it may concern:

Be it known that we, HENRY STAFFORD HATFIELD, a subject of the King of Great Britain and Ireland, and residing at Birmingham, England, and GEORGE HOOKHAM, a subject of the King of Great Britain and Ireland, and residing at 4, New Bartholomew street, Birmingham, in the county of Warwick, England, have invented certain new and useful Improvements in or Connected with Electrolytic Meters, of which the following is a specification.

A disadvantage which exists at present in electrolytic meters lies in the necessity of resetting from time to time. Thus if the body set free be heavier than the electrolyte, such for example as mercury, this mercury is deposited either finally or at an intermediate stage at the lower part of the instrument and has then to be transferred again to the anode chamber either by tilting, pumping, or otherwise. Again, if the body liberated be lighter than the electrolyte, as for example, a gas, it finds its way to the upper part of the instrument and has to be transferred by tilting or otherwise to the anode chamber which may be at a lower level.

The object of our present invention is to provide an electrolytic meter in which the necessity of resetting by hand is avoided.

The invention consists in an electrolytic meter including an electrolyte contained in a hermetically sealed vessel wherein the body liberated at the cathode positioned at the bottom of the vessel is caused to pass through one or more siphons immersed in the electrolyte from which it is delivered to the anode chamber at the top of the vessel, the anode, as is well known causing a formation of ions for insuring of a continuous operation and consequently obviating the necessity of resetting the meter by hand.

The invention also consists in an electrolytic meter in which measurement is effected by passing the liberated body through a series of graduated self-emptying siphons whose relative capacities are such that the indication of each siphon corresponds to an integer of the number or numbers expressing the measured quantity.

In our present invention we cause the body liberated to pass by gravity through one or more siphons from which it is delivered to the anode chamber.

Thus, if there be a single siphon and the body liberated be heavier than the electrolyte this body is delivered to the siphon (in this case a downwardly acting siphon) which when full will deliver the liberated body to the anode chamber. If there be a series of siphons the body will be delivered to the first siphon, which when full will empty itself into the second, and so on to the last siphon of the series from which the body will be emptied and delivered to the anode chamber.

In this case the electrolytic process will usually produce changes in concentration in the liquid, and the arrangement of the electrode at which the body is deposited above that at which it is dissolved (in the case of mercury anode and cathode respectively), will prevent the changes of concentration produced being equalized by natural convection. It may therefore be necessary to apply special means to equalize the concentration of the liquid.

Similarly, if the body liberated be lighter than the electrolyte (for example hydrogen) and there be only one siphon the body will be delivered to an upwardly acting siphon and then delivered to the anode chamber. Should there be a series of such siphons then the liberated body will be delivered to the first of the series, which when full will deliver it to the second of the series, and so on to the last of the series delivering to the anode chamber.

It will be seen that as the body liberated is always delivered to the anode chamber the necessity of resetting by hand is avoided.

In practice we find it convenient to employ a series of siphons, the first being graded in units, the second in tens, the third in hundreds, and the fourth in thousands, and so on if the instrument is to be calibrated for larger quantities. In some cases we may employ the first siphon to measure both units and tens.

We append a drawing diagrammatically illustrating our invention as applied in one form to an electrolytic meter, in which a gas is liberated at the cathode.

The electrolyte E is contained in a suitable vessel V preferably of the hermetically sealed type disclosed in the patent to Hatfield 876,641. C is the cathode positioned at the bottom of the vessel while A represents the anode arranged at the top of the vessel and preferably consisting of platinum coat-

ed with platinum black and immersed partly in hydrogen gas. As is well known the platinum black absorbs hydrogen gas and the latter goes into solution as ions just as the mercury does in the mercury meter, and the PtO_2 ions are not discharged until a very high overload is put on the cell. Three self-emptying siphons *a*, *b* and *c* are shown, suitably arranged in series inside the containing vessel and immersed in the electrolyte. Each siphon is in the form of a bent tube of N shape, open at both ends. The lower end of the N tube may be flared outward, or bent as shown, so as to suitably collect the bubbles of gas. The gas liberated at the cathode passes into the first siphon *a*, and is collected as shown at *g* displacing the electrolyte inside the two limbs *a* and *a'*; the surface level *l* giving an indication of the quantity of gas collected. As the gas accumulates in the siphon the surface level gradually falls, and ultimately gas flows from the descending limb *a'* into the ascending limb *a*².

The siphoning action is thereupon started, the gas flows upward through the ascending limb, bubbles through the electrolyte, and is again collected in the second siphon *b*. The collecting and self-emptying action is similar in all the siphons of the series.

The capacities of the three siphons are made in the ratio 1:10:100, when a decimal system of measurements is used; the capacity ratios may, however, be arranged to suit any desired system of measurement.

Each siphon is suitably calibrated and provided with scale graduations in such manner that the surface level of the electrolyte may be conveniently read off inasmuch as the containing vessel is made of glass or other transparent material.

Having now described our invention, what we claim as new and desire to secure by Letters Patent is:—

1. In combination with an electrolyte contained in a hermetically sealed vessel, a cathode arranged at the bottom of the vessel, an anode positioned at the top of the vessel, and a siphon immersed in the electrolyte and through which the body liberated at the cathode is passed and thus delivered to the anode chamber.

2. In combination with an electrolyte contained in a vessel, a cathode at the lower end thereof and an anode at the upper end of the vessel, of a series of graduated self-emptying siphons of tubular form open at both ends and flared at the lower end and immersed in the electrolyte between the cathode and the anode so that gas liberated from the cathode is ultimately delivered directly to the anode, and the capacities of the siphons being such that the indication of each siphon corresponds to an integer of the number or numbers expressing the measured quantity.

In testimony whereof we have signed our names to this specification.

H. STAFFORD HATFIELD.
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