

1,374,918.

Fig. I.

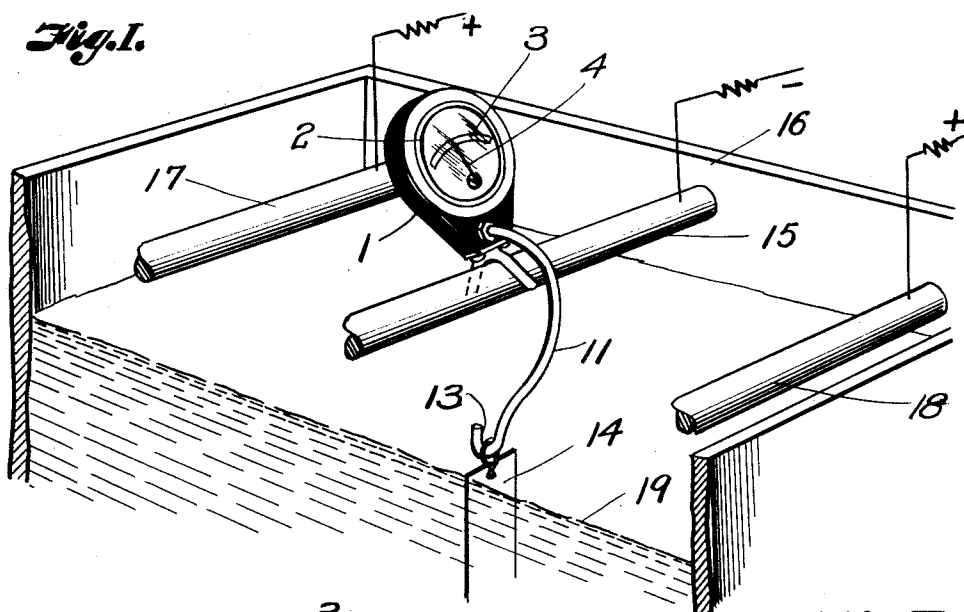


Fig. II.

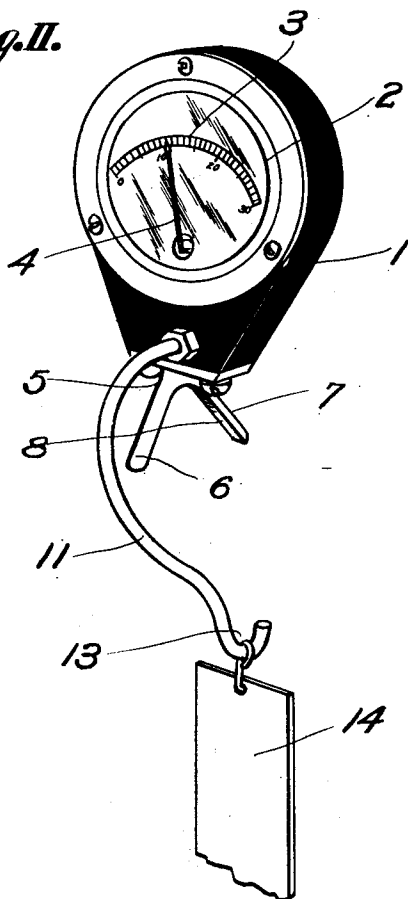
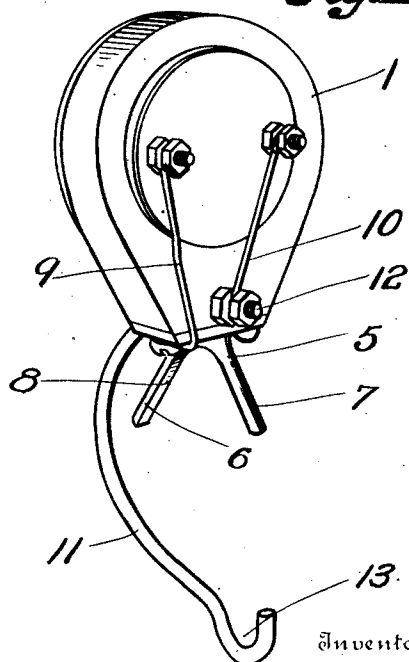


Fig. III.



Inventor
Edward Heil.

Arthur L. Brown,
Attorney

UNITED STATES PATENT OFFICE.

EDWIN HEIL, OF WICHITA, KANSAS.

CURRENT-DENSITY INDICATOR.

1,374,918.

Specification of Letters Patent.

Patented Apr. 19, 1921.

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To all whom it may concern:

Be it known that I, EDWIN HEIL, a citizen of the United States, residing at Wichita, in the county of Sedgwick and State of Kansas, have invented certain new and useful Improvements in Current-Density Indicators; and I do 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, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to a current density indicator, that is, to a device for indicating the number of amperes per surface unit passing through an electrode in the process of depositing or extracting metals by electrolysis, so that the attendant may determine whether or not the required density of current is passing through the electrodes.

In the process of electroplating it has been found that the best results are obtained by passing a given number of amperes per unit of surface through the cathode or the articles being plated. For example, in nickel-plating, five amperes per square foot of surface to be plated may be considered highly effectual but due to the irregular contours of the articles to be plated, it is often difficult to properly estimate the exact surface which is being treated and even though the total amperage passing through the bath may have been determined by suitable ammeters connected in the line, the operator has no convenient way of determining the number of amperes per unit of surface he is using. Therefore, in actual practice the density of the current employed is often too high or too low with the result that the plating operation is frequently unsatisfactory. To illustrate, if the cathode surface is over-charged, a nickel deposit would be hard and brittle and so liable to crack or peel; whereas, if the cathode surface is under-charged, there will not be sufficient deposit to present a properly finished surface unless the operation is continued much longer than is usually required.

I have provided means whereby the attendant may be accurately advised of the number of amperes per surface unit passing through the electrodes and this may be accomplished by the direct reading of a proportional measurement of the whole amount

of the current flowing through said unit of surface at any given time.

In order to present a comprehensive conception of the device constituting my invention and the method of using the same, I have illustrated its application in the accompanying drawings, in which,

Figure I is a fragmentary perspective view of an electro-plating tank showing my invention attached to the cathode bar.

Fig. II is a detail perspective view of the invention detached, and

Fig. III is a similar view of the rear side thereof.

In carrying out the invention, I provide an ammeter 1, of any approved construction, mounted in a case or frame, preferably of hard fiber or of some non-conducting material, the front face of which may be provided with a dial 2, having a scale or scales 3, suitably calibrated and an indicator or needle 4. The mechanism of the ammeter forms no part of my invention as various types of ammeter construction may be employed. The only essential change that is necessary is to suitably calibrate the scale on the dial and to apply a seating jaw 5 to the bottom of the case or frame, the seating jaw preferably to consist of two diverging members 6 and 7, having flat faces 8 adapted to rest upon the ordinary electrode rod generally forming part of the construction of a plating vat, the ammeter leads or conductors 9 and 10 being respectively connected with the jaw 5 and with the supporting hook 11 which has a terminal binding post 12 to which conductor 10 is secured. The hook 11 is provided with a supporting terminal 13 adapted to support a unit of surface or fractional part thereof, same preferably to be a plate 14, as best shown in Figs. I and III. This electrode, having a determined unit of surface or fraction thereof may be removable from the supporting hook 11 or it may be permanently attached thereto.

The terminal 13 is preferably slightly out of a perpendicular with respect to the seat 5 so that in actual practice, the device will be slightly inclined, as shown in Fig. I, to facilitate observation of the dial.

When it is desired to determine the number of amperes per unit of surface which are passing through an electrode, the device as shown in Fig. II may be hung upon the cathode 15 of the tank 16 which also carries the anode rods 17 and 18 so that the

plate 14 will be submerged in the electrolyte. Since the plate is accurately measured to represent a unit of surface as, for example, a foot or any fraction thereof, and since the dial 2 is provided with a calibrated scale 3 to provide a direct reading, it will be apparent that the current passing through the cathode will be fractionally measured; that is to say, a proportion of the current determined by the size of the plate 14 will pass through the ammeter 1 and indicate the number of amperes per unit of surface which are flowing through the cathode, which consists of the articles being plated. If it is determined that five amperes per square foot of surface will produce the best results and the dial on the ammeter 1 indicates less than that amount, more current may be supplied, for example, as varying the resistance in the line. If the ammeter indicates that an excess current is passing through, this can also be corrected by varying the resistance in a well understood manner.

A further use of this device is to determine the density of the current passing through the anodes. If the scale of the ammeter is calibrated to read both ways, no change is required. If the scale of the ammeter is calibrated to read one way only, it will be necessary to reverse the connection of the ammeter leads when the device is used to determine the density of the current passing through the anodes.

The usefulness of this application of the device will be apparent as it is well known to the art that deficient anode surface causes the electrolytic bath to be depleted of metal. A greater density of current flowing through the anodes than is flowing through the cathode indicates deficient anode surface.

From the foregoing it is also apparent that this device will be useful in the process of the refining and extraction of metals by electrolysis.

This device may be so constructed that it is permanent or portable but generally it will be made in its portable form so as to be capable of use with a number of tanks

conveniently situated. The time consumed in determining the exact amperage per unit of surface flowing through the electrodes will be negligible, but the importance of determining this exact amperage per unit of surface will be obvious from the foregoing description and from which it will also be apparent that the device is simple in construction, inexpensive to manufacture and well adapted to serve the purpose for which it is intended.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters-Patent, is:

1. A device for indicating the number of amperes per surface unit passing through an electrode which consists of a meter having a direct reading indicator, and means connected thereto for passing current through the meter proportional to a fixed unit of surface.

2. A device for indicating the density of current passing through an electrode, which device has an electrode engaging means, a supporting member and a unit surface member connected thereto.

3. A device of the class described comprising a case or frame supporting an ammeter, having a dial and an indicator thereon, a seating device, carried by the frame supporting the ammeter, for engagement with a rod and a hook member depending from the frame, the hook member being adapted to support an electrode.

4. A device of the class described comprising an ammeter having a direct reading indicator thereon, a seating device carried by the ammeter for engagement with an electrode, and an electrode supporting member depending from the ammeter.

5. A device of the class described comprising a meter having a direct reading indicator, a seating device carried by the meter for engagement with an electrode, and an electrode supporting member depending from the meter and in electrical connection therewith.

In testimony whereof I affix my signature.

EDWIN HEIT.