March 3, 1942. R. R. SIZELOVE 2,275,194

ELECTRODE

Filed Feb. 1, 1940

Fig. 1.

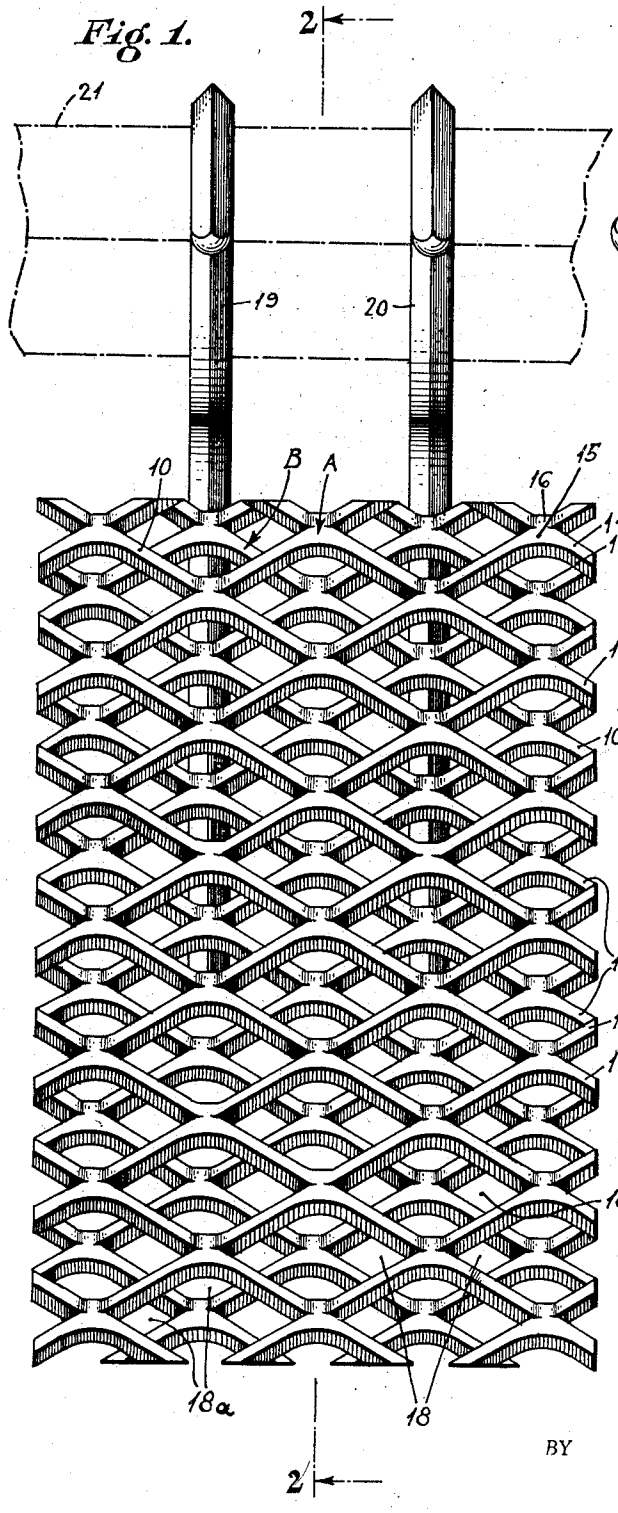
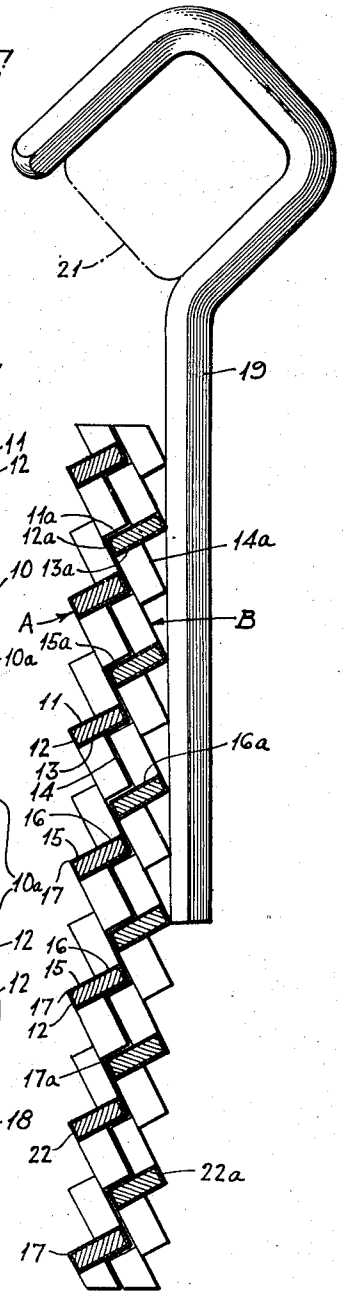


Fig. 2.



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ELECTRODE

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1 Claim. (Cl. 204—284)

This invention relates to electrodes and, more particularly, to electrodes used in the processes of electroplating and electrocleaning which are adapted to be immersed in and conduct electrical current to an electrolytic bath.

In the past, electrodes in the form of a flat plate usually rectangular in shape, having a flat surface were used. Some of these electrodes now in use have apertures therethrough, their surfaces, however, are flat. When such an electrode is immersed in an electrolytic bath, the gas bubbles formed by the reaction taking place in the bath adhere to the flat surface and prevent the electricity from being admitted to the bath from the surface of the electrode. In such electrodes, electrical current tends to follow the outside edges or perimeter of the electrode which allows the current to be distributed to a very small portion of the bath. With such electrodes, a comparatively strong solution is required and a comparatively great amount of electricity is required to create the proper reaction in the electrolytic bath.

It is an object of the present invention to provide an electrode in which electrical current is distributed throughout the surface area thereof.

A further object of the present invention is to provide an electrode from which electrical current will flow into an electrolytic bath from the surface area of the electrode.

Another object of the present invention is to provide an electrode to which gas bubbles will not adhere and interfere with the flow of electrical current into the electrolytic bath.

Still another object of this invention is to provide an electrode which is economical in use and simple and inexpensive in construction.

Other objects of the invention will become apparent in the course of the following specification.

The above and other objects of the invention may be realized by providing an electrode adapted to be placed in an electrolytic bath facing another electrode, the body of said electrode being in the form of a grille of electrical current conductive material comprising a series of oblique ridges, the tops of which are in a common vertical plane on one face of said electrode and the bottoms thereof are in a common vertical plane on the opposite face thereof. The sides of the ridges are inclined upwardly and downwardly away from the plane of the peaks of the ridges. In the embodiment of the invention shown in the drawing, the ridges are formed by transversely connected and extending bars shaped so as to form a grille having diamond-shaped spaces between the bars, forming a diamond-shaped mesh. The cross bars may be so shaped to provide square, rectangular or other shaped openings therebetween, if so desired. Means for holding the electrode in suspension in the bath and for connecting it to an electrical source are provided.

The invention will appear more clearly from the following detailed description when taken in conjunction with the accompanying drawing, showing by way of example a preferred embodiment of the invention.

In the drawing:

Figure 1 is a front elevational view of the electrode of this invention.

Figure 2 is a sectional view on the line 2—2 of Figure 1.

Like numerals refer to like parts throughout the several views.

In the embodiment of the invention shown in the drawing, the letter A designates a front grille while a rear grille is designated by the letter B which grilles are fastened together preferably by welding and comprise the main body portion of the electrode. Each grille A and B is identical in construction to the other.

While it is possible to use only one of such grilles in the electrode of this invention, it is desirable to use two fastened together and so positioned in relation to one another that the adjacent diamond-shaped meshes of the rearward grille meet in the center of the diamond-shaped aperture of the front grille. In this manner, a greater number of ridges from which electricity may flow into the solution is provided, as will hereafter be more fully described.

The grille A is formed of a plurality of vertically disposed transversely extending bars 10. The bars 10 are rectangular shaped having a top surface 11, a front surface 12, a bottom surface 13 and a rear surface 14.

The cross bars 10 are shaped longitudinally to form alternately peaks 15 and valleys 16. The front surface 12 of one cross-bar is connected at the valley 16 thereof to the rear surface 14 of the succeeding bar 10 at its peak 15, the bars 10 thereby bearing a stepped relation to one another.

The bars 10 are turned so that the front surface 12 and the rear surface 14 of the bars 10, which surfaces are parallel to each other, are at an angle to the vertical plane of the grill A, so that a plurality of oblique ridges 17 are formed which ridges are in a common vertical plane.

The sides of the ridges are inclined obliquely upwardly and downwardly away from the peaks.

A diamond-shaped aperture 18 is thus formed, the top half of which bears a stepped relation to the bottom half. The rectangular shaped bars 10 form a border around said diamond-shaped apertures. None of the flat surfaces of the sides of the bars 10, which form the sides of the diamond-shaped apertures, are in alignment with the vertical plane of the grill. The ridges 17 and the edges formed by the meeting of the adjacent surfaces of the bar 10 are in vertical planes which are in alignment with the vertical plane of the grill each of said edges being in a different horizontal plane.

In this manner, a large number of edges are provided along which the electrical current will travel, each edge being so positioned as to directly communicate with the electrolytic bath when immersed therein. All the flat surfaces are inclined upwardly or downwardly at an angle to the various edges.

The grill B is constructed similarly to the grille A and has a plurality of vertically disposed transversely extending bars 10*a* which, like the bars 10, are rectangular shaped. The bars 10*a* have a top surface 11*a*, a front surface 12*a*, a bottom surface 13*a* and a rear surface 14*a*. The bars 10*a* are also shaped longitudinally similarly to the bars 10 and form peaks 15*a* and valleys 16*a*. The plurality of bars 10*a* are connected in the same manner as the bars 10 and form a grille having a stepped surface similar to the surface of the grille A with a plurality of adjacent diamond-shaped apertures 18*a*.

The grilles A and B are fastened together one to the rearward of the other in such a position that the connecting points between the adjacent bars 10*a* of grille B are substantially adjacent the center of the aperture 18 of the grille A and the connecting points between the adjacent bars 10 of the grille A are substantially adjacent the center of the aperture 18*a* of the grille.

Supporting hooks 19 and 20 of electrical conductive material are fastened to the electrode formed by the grilles A and B and are adapted to engage a bus bar 21 which is connected to one pole of an electrical source. The bus bar 21 is adapted to hold the electrode in a vertical position in relation to an electrolytic bath.

The cross bar 10 and 10*a* of the grilles A and B, respectively, are preferably nickel plated, as indicated by the numeral 22, so that gas bubbles from the electrolytic bath will not adhere to the surfaces thereof.

When the electrode of this invention is immersed in an electrolytic bath, and positioned on the bus bar 21, all of the flat surfaces of the various bars 10 and 10*a* are at an angle to the horizontal and vertical planes of the electrolytic bath. The edges formed by the joining of the adjacent surfaces of the bars 10 and the joining of the surfaces of the bars 10*a* are presented to the electrolytic bath in different horizontal planes closely adjacent but separated from one another. In this manner, the electrical current, which it has been found more readily follows the edge of a conductor, is communicated to the electrolytic bath from the edges of the bars 10 and 10*a*, the current entering the bath at closely adjacent horizontal planes of the bath. Since the surface of the bars are inclined and also have a shiny smooth nickel surface no bubbles from the reaction taking place in the bath will adhere to the surfaces, nor will bubbles adhere to the edges of the bar. Electrical current, therefore, will have a free unobstructed passage along the various edges of the diamond-shaped mesh network of the grilles forming the electrode. In this manner, electrical current is more evenly distributed throughout the electrolytic bath. The desired reaction in the solution may thereby be secured with a much weaker solution than heretofore.

The electrode of this invention may be used as either an anode or cathode and may be used in a solution for cleaning plates or may be used in a solution for depositing metal on material being plated.

It is apparent that the specific illustration shown has been given by way of illustration and not by way of limitation and that the structure above described is subject to wide variation and modification without departing from the scope or intent of the invention, all of which variations and modifications are to be included within the scope of the present invention.

What is claimed is:

An electrode for an electrocleaning bath, said electrode comprising two superposed interconnected grills extending parallel to each other in vertical planes, each of said grills comprising a plurality of transverse bars, each bar having the form of a rectangle in cross section which has shorter front and rear sides and longer top and bottom sides and which is obliquely inclined to said vertical planes, the edges of the bars between said front and top sides being situated in one vertical plane and the edges of the bars between said rear and bottom sides being situated in another single vertical plane, each bar comprising a plurality of peak portions, a separate valley portion situated between each pair of peak portions, and obliquely inclined side portions of equal size connecting the valley portions with the peak portions, each peak portion of a bar being connected to a valley portion of an adjacent bar, whereby said bars enclose diamond-shaped apertures; the bars of one grill being shifted in relation to the bars of the other grill to locate each peak portion and the valley portion connected thereto of the underlying grill substantially in the middle of an aperture of the upper grill, whereby the side portions of the two grills engage each other and are connected to each other substantially in the middle of the side portions.

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