

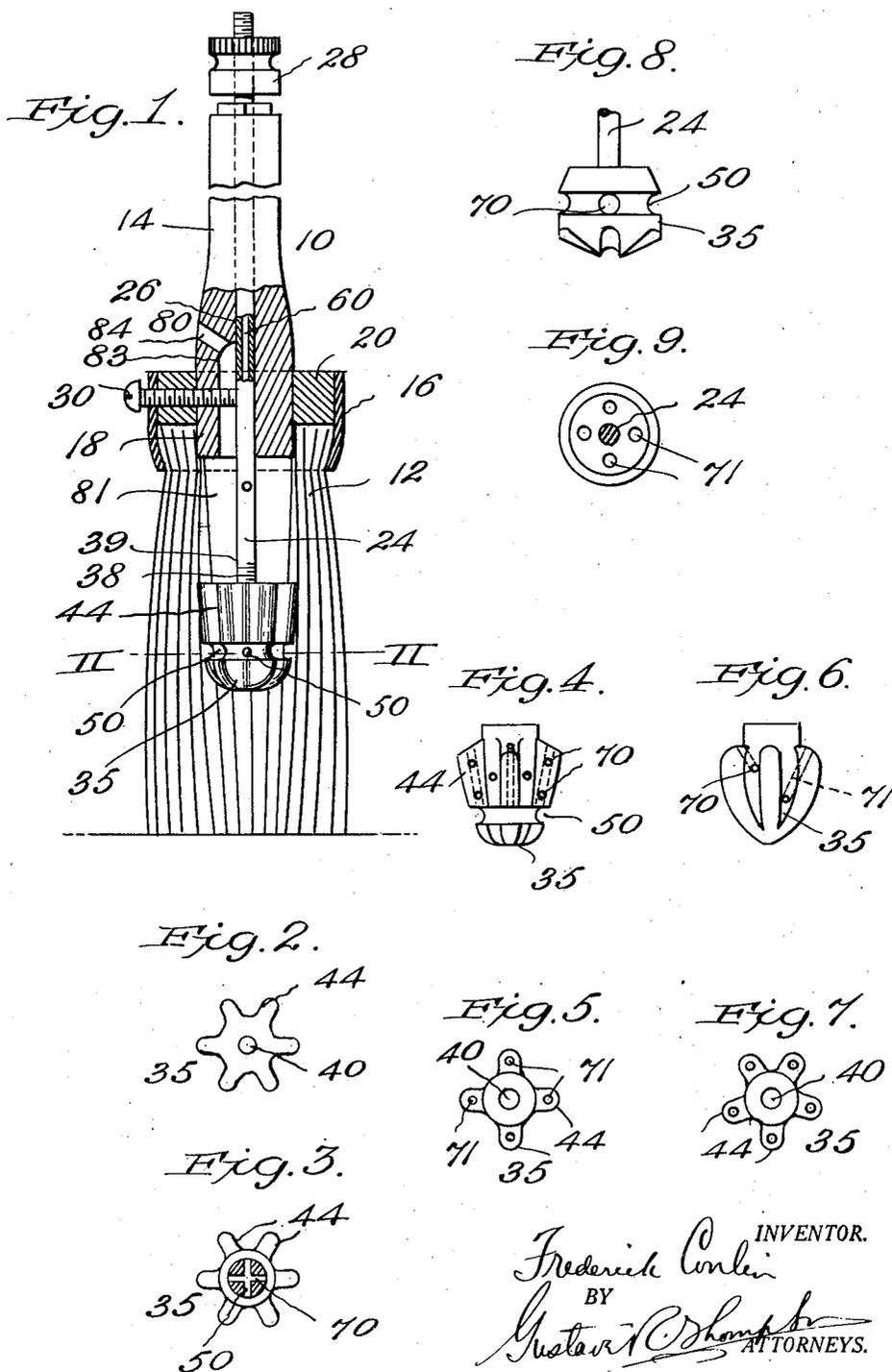
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F. CONLIN

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BRUSH FOR ELECTROLYTIC USE AND ELECTRODES THEREFOR

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INVENTOR.  
Frederick Conlin  
BY  
Gustav C. Thompson  
ATTORNEYS.

# UNITED STATES PATENT OFFICE

FREDERICK CONLIN, OF NEW YORK, N. Y.

BRUSH FOR ELECTROLYTIC USE AND ELECTRODES THEREFOR

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This invention relates to brushes for electrolytic use, such for example as used for electroplating or electrocleaning, and to electrodes therefor.

5 The invention provides improved devices of the character referred to, the devices being readily adaptable for substitution and replacement of electrodes, and having simple means for retaining the replaceable electrodes. The devices further embody features adapted for assisting in the retention of liquid in the vicinity of the electrode.

10 The invention further provides improved devices of the character referred to, comprising an electrode, and particularly a soluble anode, having a relatively large surface area, whereby the electrode area may be as large as or larger than the effective plating area of the brush in contact with the surface to be plated; and which may also cause a minimum displacement or distortion of bristles in the head of bristles.

15 The invention further provides improved devices of the character referred to wherein a large area of contact is provided between the electrode, and the filaments or films of electrolyte held between the bristles, and wherein a large and relatively uniform flow of current through the brush is permitted during manipulation.

20 The invention further provides an improved electrode for brushes of the character described.

25 Other features of improvement will be pointed out in the particular description which follows.

Several embodiments of the invention are illustrated in the accompanying drawing wherein:—

30 Figure 1 is a vertical sectional view of one embodiment of brush for electrolytic use.

Figs. 2 and 3 are respectively a top-plan view and a sectional view on line II—II, Fig. 1, of the electrode shown in Fig. 1.

35 Figs. 4 and 5 are respectively a side elevation, and a top plan view of another embodiment of electrode.

40 Figs. 6 and 7 are respectively a side elevation, and a top plan view of another embodiment of electrode.

Figs. 8 and 9 are respectively a side elevation and a top plan view of still another embodiment of electrode.

Referring to said drawing, numeral 10 designates the brush as a whole, comprising a head of filaments or bristles 12, and preferably also a handle 14, the head of bristles being secured to the brush in any suitable manner, as by means of a ferrule 16 clamped around a lower extension 18 of the handle. A filler 20 may be provided around the handle above the head of bristles, as usual. The bristles may be of any suitable material to best withstand the action of the electrolyte, but are ordinarily hog bristles.

55 Numeral 24 designates an electrode support which is preferably a rod of conducting material, extending through a longitudinal space 26 in the handle, one end projecting into the core or middle of the bristles-head and the other end preferably projecting from the upper end of the handle and having means 28, as a clamping nut having a screw-threaded engagement therewith, for fastening an electrical conducting wire thereto. The rod 24 may be made hollow and provided with outlets, within the head of bristles, where it is desired to furnish solution in this way to the head of bristles, as indicated at 60. The electrode support 24 is preferably adjustable longitudinally in the head of bristles, suitable means, as a binding screw 30 adapted to press at its end thereon, being provided for holding the electrode support in different positions of longitudinal adjustment in the head of bristles.

65 Numeral 35 designates the electrode which is carried by the electrode support 24. The electrode 35 is preferably detachably connected to the support 24 to permit of substitution or replacement, by a suitable connection 38. The connection 38 is preferably of the type in which connection and disconnection is made by a rotary movement of the electrode, being formed for example by threads on the end 39 of support 24 and reciprocal threads in a socket 40 in the electrode. The threaded end 39 of the rod 24 forms an electric terminal to which the electrode 35 is attached.

The electrode is provided with means for largely increasing the surface area within a relatively small space-volume, and also with means for coacting with the head of bristles to prevent detachment of the electrode 35 when formed as a detachable electrode, from its support. The means for preventing detachment of the electrode 35, is preferably a lateral projection 44. Furthermore, by increasing the number and length of these projections 44 the surface area of the electrode compared with its space volume is greatly enlarged, and the form of embodiment comprising a number of lateral projections is preferred as it combines the several functions above set forth, as well as the function of providing means for receiving or confining tufts of the bristles in such a way as to prevent lateral displacement of the bristles during manipulation of the brush and the forcing through and consequent exposure of the electrode during use, and the consequent liability of short circuits and arcing. Other means of increasing the surface area of the electrode in relation to its space volume, and in fact separate means for performing the functions above stated may be adopted in connection with the electrode. As will be readily understood, the lateral projections 44 are transverse to the bristles, and extend into the mass of bristles, and this interengagement of the bristles with the projections 44 acts to prevent turning of the electrode 35, and its detachment from the detachable connection 38 between it and its support 24. However, by parting the bristles so as to spread and expose the electrode 35, the said electrode may be rotated and readily detached and another substituted in its place. By allowing the bristles to re-assume their natural position, the new electrode is again locked against turning by the bristles pressing in against the electrode and on each side of the projections.

The electrodes are soluble or insoluble, and of material suitable for electrodes. The soluble electrodes are of metal (or alloys), and when used as an anode, the large area above referred to provides a large surface for the metal to enter the solution, the metal usually being chosen to correspond to the metal to be deposited.

In using the brush, the pressure by which it is applied, acts to squeeze the electrolyte between the bristles, particularly on the side facing the direction in which the brush is drawn over the surface being electroplated (or electrocleaned) and in order to prevent a paucity of the solution around the electrode and between the electrode and the bristles, means 50 forming pockets or channels for receiving solution when the bristles are pressed, are provided. These pockets 50 are conveniently formed as grooves which run horizontally around the electrode and trans-

versely of the bristles. The horizontal grooves permit of an accumulation of electrolyte therein and prevents a rapid flow of electrolyte down over the electrode.

The surface areas on the sides of the electrodes shown in the several embodiments, these being the practically important part of the electrode as regards transmission of current between electrode and solution, is approximately one-quarter to one-half greater than the area of a solid figure having the same space-volume. With a brush such as illustrated, the effective plating area is about two square inches. The surface area of the electrodes illustrated (area of the sides) is from approximately two and one-half to three square inches. There is a further advantage in the electrode having the area increased by the lateral projections, according to this invention, inasmuch as the bristles are enabled to approach the axis of the brush and to substantially fill the area at the free ends of the bristles in the head, whereas a solid electrode having the space-volume of the present electrodes would prevent the bristles approaching the axis of the brush at the ends thereof and leave a central space in the head of bristles at the free ends of the bristles.

The electrodes 35 with the lateral projection 44 may have a variety of forms, some of which are shown in the several embodiments illustrated. The projections 44 preferably extend longitudinally of the electrode, and preferably taper toward the axis of the electrode at its lower end, whereby the depth of penetration of the projections into the bristles at said lower end of the electrode is reduced, or eliminated as shown, whereby danger of the projections making contact with the surface being plated (or cleaned) is avoided.

Perforations 70 running through the projections 44 and/or through the body may be provided, to facilitate the supply of electrolyte around the electrode. These perforations act as pockets and also as conduits through which electrolytic solution may run from the side of the brush which is full of electrolytic solution to the side which is lean.

Vertical or upwardly inclined vents or passages 71 may also be provided, and these may open into the perforations 70. These vents or passages 71 provide a means for solution to run back and forth between the sides and top of the electrode, according to the pressure on the bristles due to the manipulation of the brush, and also afford a vent for gas.

Means 80 may also be provided for venting gas from the space 81 above the electrode. This means is conveniently a vertical channel 83 in the handle 10 with a lateral branch 84 to the atmosphere.

Experience in electroplating with brushes holding an electroplating solution, shows that difficulty was heretofore experienced in obtaining thick deposits, and in obtaining

5 a high current density at the cathode surface. By the present invention the conditions for larger current densities and thicker platings are materially bettered and improved results obtained.

10 The invention may receive other embodiments than those herein specifically illustrated and described.

What is claimed is:—

15 1. A brush for electrolytic use, comprising a head of bristles, and an electrode positioned within the bristles, said electrode comprising a body portion and relatively short projections thereon projecting into the surrounding mass of bristles, such projections being of such nature to resist parting of the mass of bristles during use and consequent exposure of said electrode. 80 85

25 2. A brush for electrolytic use, comprising a head of bristles, and an electrode positioned within the bristles, said electrode comprising a body portion and relatively short projections thereon projecting into the surrounding mass of bristles, such projections being of such nature to resist parting of the mass of bristles during use and consequent exposure of said electrode, and grooves having a transverse relationship to said bristles forming channels in said electrode for receiving liquid. 90 95

35 3. A brush for electrolytic use comprising a head of bristles, a terminal in the brush, an electrode positioned within the bristles, and a connection between said terminal and electrode of the type in which the parts are rotated to make and break the connection, and means on said electrode adapted to engage the bristles to prevent rotation of the electrode and disconnection thereof from said terminal. 100 105

45 4. A brush for electrolytic use, according to claim 1, further comprising means for venting gas through said electrode to the atmosphere. 110

50 5. An electrode for brush use, comprising a body and relatively short lateral projections extending around said body, of such nature, when placed in a mass of bristles, to resist the parting of the bristles and consequent exposure of the electrode. 115 120

6. An electrode for brush use, comprising a body and relatively short lateral projections extending around said body of such nature, when placed in a mass of bristles, to resist the parting of the bristles and consequent exposure of the electrode, said electrode having means for detachably connecting it to a support. 125

65 7. An electrode for brush use, comprising a body and lateral projections extending 130

around said body, said electrode having channels therein for liquid.

In witness whereof, I have hereunto signed my name.

FREDERICK CONLIN. 70