No. 733,602. PATENTED JULY 14, 1903.

H. E. STARRETT.

METAL ANODE.

APPLICATION FILED DEC. 19, 1901.

NO MODEL. 2 SHEETS--SHEET 1.

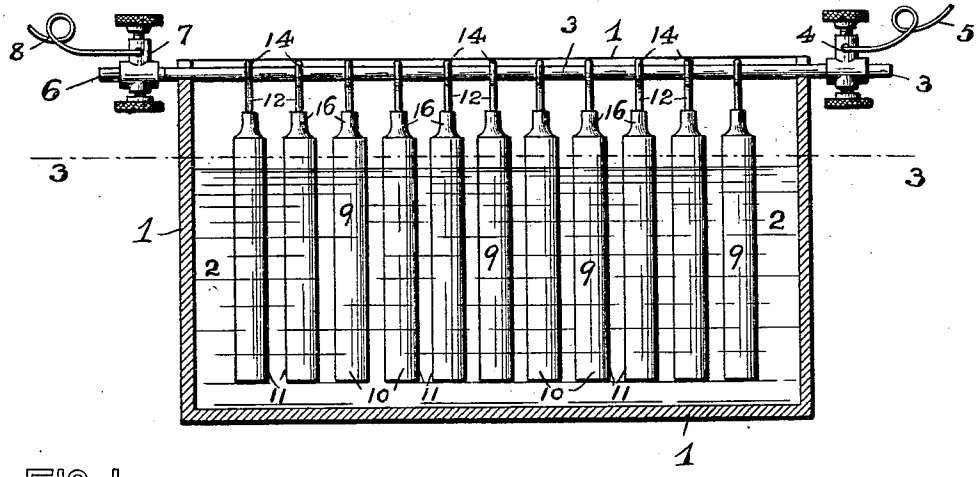


FIG. 1

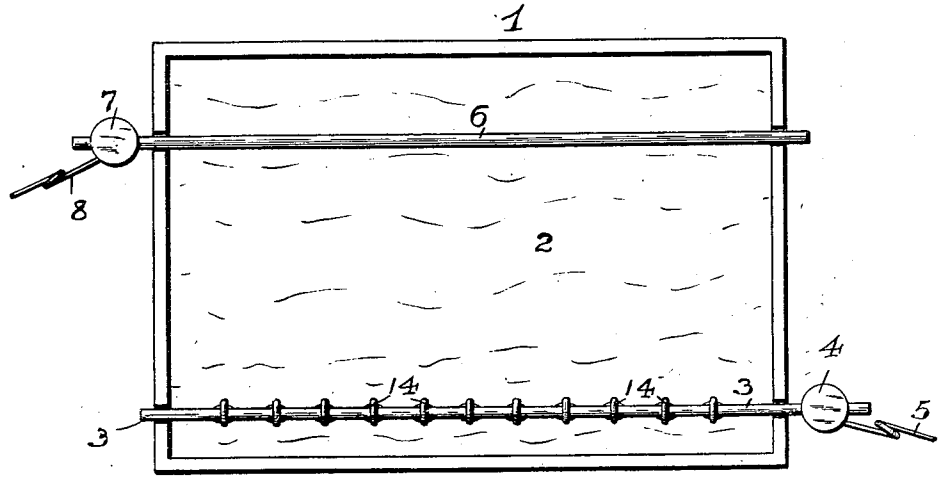


FIG. 2

WITNESSES:

Geo. L. Richards

Susan Blewett

INVENTOR:

HARRY E. STARRETT,

BY

Fred'k C. Fraentzel,

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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NO MODEL. 2 SHEETS—SHEET 2.

FIG. 3

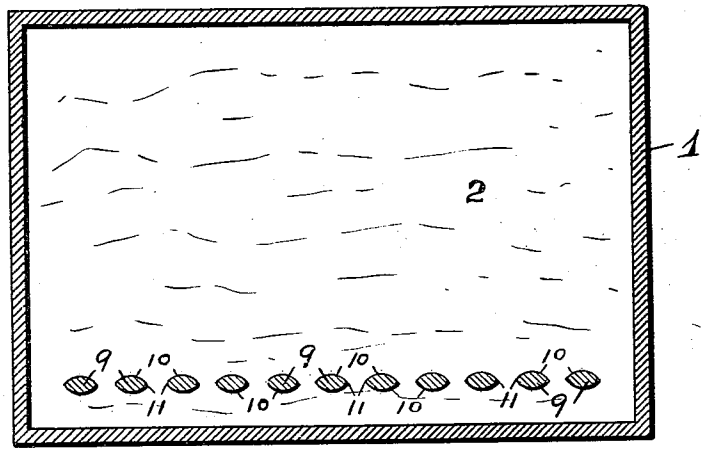


FIG. 4

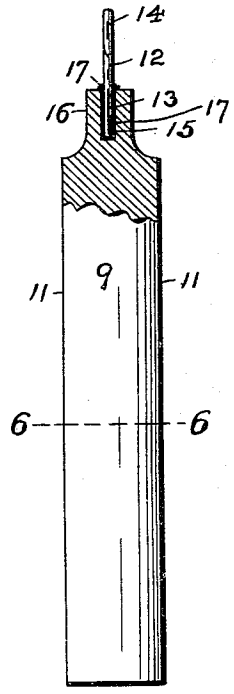
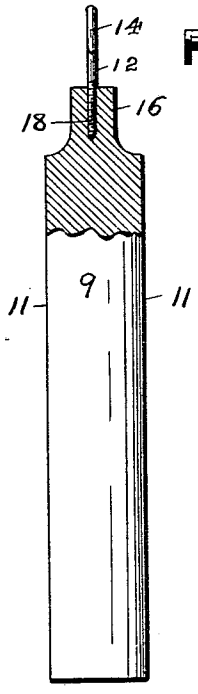


FIG. 5



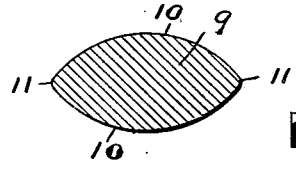


FIG. 6

WITNESSES:

Geo. L. Richards

Susan Blewett

INVENTOR:

HARRY E. STARRETT

BY

Fred'k C. Fraentzel,

ATTORNEY

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

No. 733,602. Patented July 14, 1903.

UNITED STATES PATENT OFFICE.

HARRY E. STARRETT, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE HANSON & VAN WINKLE COMPANY, A CORPORATION OF NEW JERSEY.

METAL ANODE.

SPECIFICATION forming part of Letters Patent No. 733,602, dated July 14, 1903.

Application filed December 19, 1901. Serial No. 86,477. (No model.)

To all whom it may concern:

Be it known that I, HARRY E. STARRETT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Metal Anodes; 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, reference being had to the accompanying drawings, and to numerals of reference marked thereon, which form a part of this specification.

This invention has reference to improvements in the art of electroplating; and the invention relates more particularly to a novel construction of metal anode which is made of nickel or any other suitable metal and which may be cast, pressed, or otherwise formed in the preferred shape of anode, hereinafter more particularly set forth.

The primary objects of this invention are, first, to provide a metal anode of an elliptical cross-section so as to be free from sharp angles and corners at the edges, the adjacent anodes when suspended from the anode-bar presenting toward each other in the vertical plane through the longitudinal central axis of the anode-bar proportionately-narrow faces, especially free from sharp edges, so as to allow for frequent passages between the adjacent anodes and for a free circulation of the electrolyte; secondly, to provide an anode of sufficient length and of such cross-section that the sharp and obstructing edges, as in a flat or square anode, are entirely avoided or are reduced to a minimum, and, thirdly, that the narrow width of the anode is approximately from one-third to one-half the maximum width of the anode, whereby when these anodes are arranged side by side upon the anode-bar a sufficient space may be left between the adjacent anodes for a better circulation of the electrolyte.

It is well known in the art of electrometallurgy that flat and rectangular anodes are corroded and dissolved more readily at their edges and corners than at other places on their surfaces and that the cathodes suspended opposite such anodes receive the deposits of the metal of the bath more rapidly and therefore thicker in a given time at the places on their surfaces which are nearest to the said edges and corners of the anodes, thus producing a coating of unequal thickness. This can be overcome by the use of my novel form of anode, having an elliptical cross-section or an active surface of a comparatively flat but convex curvature, because this convex surface is brought nearer to the cathode, which decreases the resistance, and thus allows the passage of a current to equal that which passes through the solution from the parts near the edge of the anode, and thereby insuring a deposit of even thickness upon the cathode.

I have found in practice that an anode having its cross-section of elliptical form—say that having a long diameter two or three times its short diameter—is best for the average plating-bath. Of course these dimensions may be varied in special cases, the essential requisite being to present to the cathode a flat but convex surface of the anode to compensate for the otherwise greater flow of current from the edges of the anode, as heretofore.

The present invention therefore consists in the novel construction of metal anode hereinafter more fully set forth, as well as in the novel arrangements and combinations of the various devices employed in connection with the same, all of which will be described in detail in the following specification and then finally embodied in the clauses of the claim.

My invention is clearly illustrated in the accompanying sheets of drawings, in which—

Figure 1 is a vertical representation of a tank containing the electrolyte and a side view of the anode-bar, a portion of the cathode-bar, and the electrical connections, with a series of anodes, which embody the principles of my invention, suspended from the said anode-bar by means of suspension-hooks, the said anodes and hooks being represented in side elevation. Fig. 2 is a plan or top view of the various parts embodying the features of my invention, and Fig. 3 is a horizontal section taken on line 3 3 in said Fig. 1. Figs. 4 and 5 are two edge views of a pair of anodes such as are employed with my invention, the upper portions of the said anodes being represented in vertical section and illustrating

in connection therewith two modes of connecting and securing the suspension-hooks to the said upper parts of the anodes. Fig. 6 is a horizontal section of the anode, said section being taken on line 6 6 in Fig. 4.

Similar characters of reference are employed in all of the said above-described views to indicate corresponding parts.

Referring to the said drawings, the reference character 1 represents a tank or box in which is contained the electrolyte or solution 2.

The anode-bar is indicated by the number 3 and is provided at the one end with a suitable connection, as 4, for the attachment thereto of the electrical conductor 5, the said connection 4 forming the positive pole, as will be understood. From this bar 3 may be suspended, in the manner to be hereinafter more fully set forth, any suitable number of anodes of the constructions to be presently set forth more in detail.

The metallic bar or rod 6 is the cathode-bar from which the cathode or the work which is to be plated is suspended, and this rod or bar is connected to the negative pole of the generator by means or the connection 7 and the electrical conductor 8, as illustrated in Figs. 1 and 2 of the drawings.

The preferred form of anode employed is indicated by the reference character 9 and is indicated more particularly in Figs. 2, 3, 4, 5, and 6, the same being of an elliptical cross-section, as illustrated in Fig. 6, having the two wide and convex sides 10 and the rounded edges 11, so as to avoid all possibility of sharp edges and angles which are readily liable to irregular disintegration from the electrolytic solution when the said acid is set free, and thereby providing a large and increased active surface of a flat curvature. From an inspection of the said figures of the drawings it will be clearly evident that an anode of an elliptical cross-section presents an anode which is free from angles and sharp edges and which is made of a width of about one-third to one-half of that of an ordinary anode, and when the anodes are suspended from the rod or bar 3 in the manner represented in said Figs. 1, 2, and 3 a sufficient space may be left between the curved edges 11 of the two adjacently-suspended anodes 9 to permit of a free and rapid circulation of the electrolyte between the anodes, and the deposit produced upon the cathode will be of an even, perfect, and uniform character for the reasons previously stated.

The means of suspension for each anode is preferably a suspension-hook 12, which is made with a shank or stem 13 and a preferably flattened hook end 14, as illustrated in Fig. 10. The shank or stem 13 of the suspension-hook is arranged in a receiving-socket 15 in the upper end portion 16 of the anode, into which it is secured by solder 17, as illustrated in Fig. 4 of the drawings, or into which socket 15 the said shank or stem 13 can be screwed when provided with a screw portion 18, as represented in Fig. 5 of the drawings. Owing to the construction of the flat surface of the hook end 14 it will be evident that each anode 9 is more positively connected with the anode-bar to make a better electrical contact between the parts and to prevent any swinging motion of the suspended anode, as is often the case where a hook made from round wire is employed. When required, the upper tapering portion of the said anode 9 and its end to which the suspension-hook is secured may be painted with a solution-proof varnish or resist that the whole anode can be immersed without danger of contamination with the salts of solution that are formed by contact with the solution. Moreover, it will also be evident that with the form of anode hereinabove described the metal of which the anode is made is uniformly dissolved all around the anode-surfaces and there will be comparatively little undissolved anode left to sacrifice as scrap metal.

Having thus described my invention, what I claim is—

1. A metal anode of an elliptical cross-section having a comparatively flat but convex curvature adapted to be placed opposite a cathode to compensate for the otherwise greater flow of current at the edges of the anode, substantially as and for the purposes set forth.

2. A metal anode of an elliptical cross-section having comparatively flat but convex curvature and rounded edges all arranged and adapted to be placed opposite a cathode to compensate for the otherwise greater flow of current at the edges of the anode, substantially as and for the purposes set forth.

3. A metal anode of an elliptical cross-section, the maximum diameter of said cross-section being double the minimum diameter of said section, substantially as and for the purposes set forth.

In testimony that I claim the invention set forth above I have hereunto set my hand this 17th day of December, 1901.

HARRY E. STARRETT.

Witnesses:
FREDK. C. FRAENTZEL,
GEO. D. RICHARDS.