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METHOD OF AND APPARATUS FOR PLATING.

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1,280,249.

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Fig. 2.

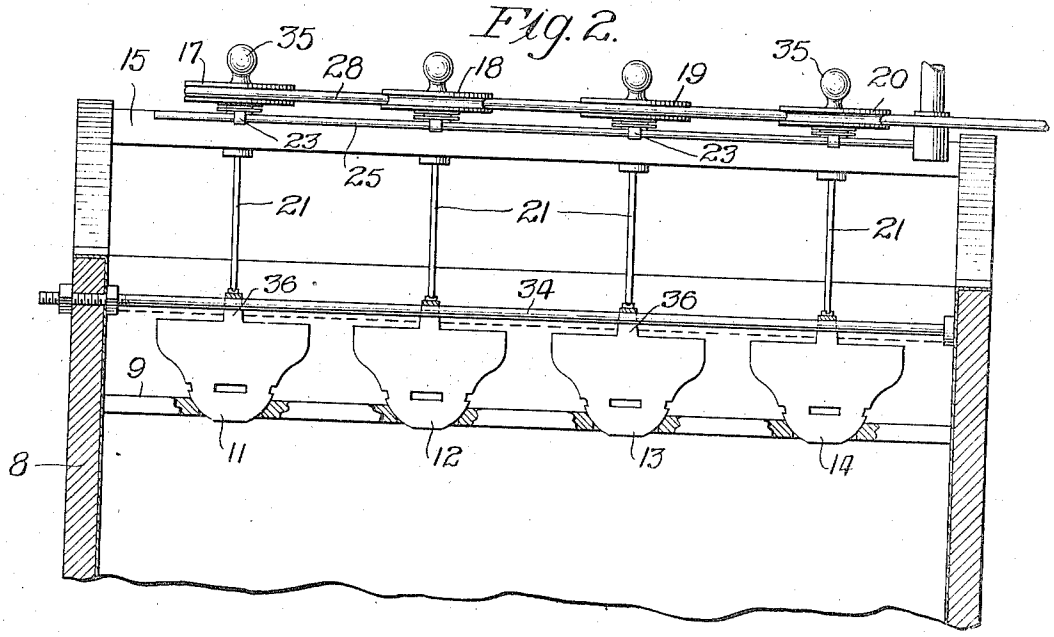


Fig. 1.

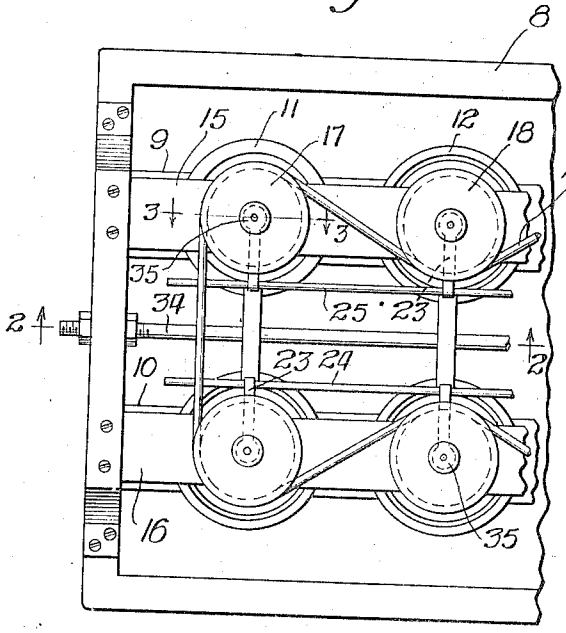
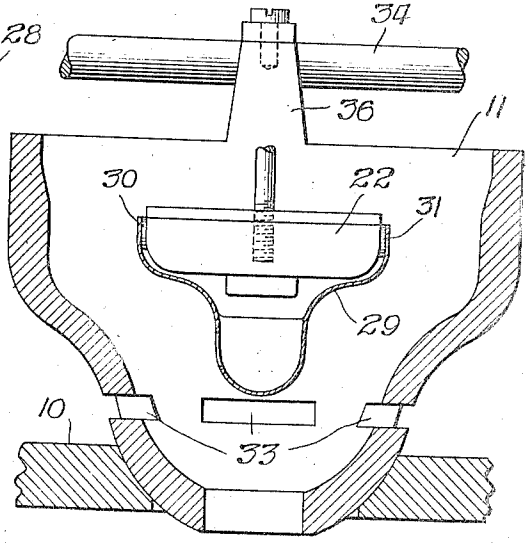


Fig. 3



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UNITED STATES PATENT OFFICE.

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METHOD OF AND APPARATUS FOR PLATING.

1,280,249. Specification of Letters Patent. Patented Oct. 1, 1918.

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To all whom it may concern:

Be it known that I, GEORGE ALBERT LANDRY, 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 Methods of and Apparatus for Plating, of which the following is a full, clear, concise, and exact description.

This invention relates to an improved method of and apparatus for plating, and more particularly to a method of and apparatus for controlling the amount of metal deposited on different parts of the surface of the article that is being plated.

In practically all electro-plating operations the amount of and speed at which the metal is deposited on the article to be plated depends upon the resistance of the electrolytic path between the cathode and the anode, and this resistance depends upon the amount of anode area for each unit of cathode area and the length of the electrolytic path between each part of the anode and the cathode. The amount of metal deposited also depends to a certain extent upon the shape of the cathode or article to be plated.

One of the objects of this invention, therefore, resides in an improved method of plating in which the anodes are shaped so as to control the metallic deposit on different portions of the surface of the cathode or article to be plated, the anodes being so shaped that the electrolytic resistance between the parts of the anode and those parts of the cathode which are to receive the heavy metallic coating will be less than the resistance between other portions of the anode and cathode. The anodes may also be shaped so that the electrolytic resistance between certain portions of the surface of the anode and the cathode can be gradually tapered with a consequent gradual tapering in the thickness of the metallic deposit due to the electro-plating operation. Likewise the anode may be readily shaped so as to conform substantially to the contour of the cathode or article to be plated, in which case a substantially even metallic coating will be deposited over the entire surface of the article to be plated.

When irregularly shaped objects are to be plated on which it is desired to obtain a plated metallic coating of substantially even thickness throughout, the anode is shaped so as to conform substantially to the irregular shape of the article to be plated whereby the electrolytic resistance between all portions of the surface of the article to be plated and the anode will be substantially equal and the plating operation will be uniform for the entire surface of the article. The use of such specially shaped anodes is beneficial because the metal is not wasted by over deposits on certain portions of the surface of the article and because the anode may be so shaped that the time required for plating an article can be reduced to a minimum since it will be limited substantially, in practically all commercial plating operations, by the time required to deposit the minimum weight of coating specified.

The invention is illustrated in the accompanying figures in which:

Figure 1 represents a plan elevation of a portion of a plating tank;

Fig. 2 is a section on the line 2—2 of Fig. 1 of the complete tank, and

Fig. 3 is a section on the line 3—3 of Fig. 1 and illustrates a preferred form of specially shaped anode.

In the preferred form of the invention as illustrated in the figures the anode has been shaped so as to give a substantially uniform coating to the surface of the cathode or article to be plated, but it will be evident that an infinite number of differently shaped anodes may be used for the same article or cathode, depending upon the manner in which it is desired to distribute the plated metallic coating.

The plating operations may be performed in any type of standard plating tank or receptacle such as 8 in which is contained the plating solution and in which are mounted the brackets or shelves 9 and 10, on which the anodes such as 11, 12, 13, and 14 are supported. Mounted in the tank directly above the brackets or shelves 9 and 10 are the shelves 15 and 16 on which are supported a series of pulleys such as 17, 18, 19, and 20, each of which is mounted on a downwardly extending shaft or spindle such as 21, to the lower end of which is attached the cathode supporting lugs 22. The spindles 21 are made of a material having a high electrical

conductivity, preferably copper, and are connected by conducting straps such as 23 to either one of the rods 24 and 25 which are in turn connected to one terminal of the electric circuit which furnishes the current for plating. The pulleys mounted on the shafts such as 21 are interconnected by the circular belt 28 which is driven by any suitable means and which serves to rotate the pulleys and their attached spindles 21, thereby rotating the cathode supporting lug 22.

The cathode or article to be plated 29 is attached to the supporting lug 22 by any suitable means such as the spring pressed pawls 30 and 31, by means of which the article 29 may be conveniently and speedily attached and removed from the lug 22. As clearly illustrated in Fig. 3, the article to be plated or cathode 29 is suspended in the center of one of the specially shaped anodes such as 11. The specially shaped anode 11 is equipped with a series of perforations such as 33 which permit and accentuate circulation of the plating solution so that the solution within the anode will be constantly replaced by the solution in the tank proper, the solution entering at the base and passing out over the top of the anode and thus eliminating any possibility of the solution in the anode becoming low in metal content. This circulation is stimulated by the rotation of the cathode which may be accomplished in any manner, said rotation being obtained in the specific embodiment herein illustrated through the agency of the spindles or shafts such as 21 and their associated pulleys and the driving belt 28. The anodes such as 11 are all connected by means of a lug 36 to a rod 34 which is electrically connected to the other terminal of the circuit which supplies the plating current.

When an article such as 29 is to be plated the lug 22 to which it is to be attached is raised out of the plating solution by lifting the spindle 21 by the spherical handle 35 attached to the upper end thereof. As the spindle is loosely mounted in the supporting shelf or bracket and its associated pulley, it can be readily drawn upward so that the lug 22 will be directly beneath the mounting bracket 15 or 16, as the case may be, in which position the article 29 can be easily slipped over the spring pressed pawls 30 and 31. When an article to be plated has thus been placed on the lug 22 it is lowered into the plating solution contained in the specially shaped anode 11 and held in this position by a flange on the spindle which engages with a shoulder on the pulley associated with said spindle. The frictional contact between said flange and shoulder serves as the driving means for rotating the spindle and the article 29 which is being plated.

When the article has been thus placed in the plating solution the plating current will flow by way of the rod 34 and a lug such as 36 associated with each anode, to the anode, through the plating solution in the anode to the cathode, or the articles 29 to be plated, and back to the other side of the circuit by means of a spindle 21, one of the conducting straps 23 and either one of the rods 24 or 25, as the case may be. The flow of this current will start the metal depositing action from the plating solution onto the cathode, the metal of the metallic salt dissolved in the solution contained within the anode being gradually deposited upon the cathode. To prevent the solution within the anode from becoming low in metal content the cathodes are rotated and thereby function to circulate this solution and draw fresh solution from the main body of the solution contained in the tank 8 into the anode, whereby the solution within the anode will always be rich in metal content, which is necessary for speedy, efficient, and satisfactory plating.

Since the plating solution within the anode is maintained rich in metal content and as the contour of the anode is such that the electrolytic resistance offered to the plating current is regulated for each part of the surface of the cathode or article to be plated, the speed of the plating operation can be very materially increased. Thus it requires approximately 30 minutes to deposit a certain average weight of plating metal on the article herein illustrated when the ordinary ingot form of plating anode is used; whereas it requires approximately 2½ minutes to deposit the same amount of metal on the same article with the improved method in which a specially shaped anode is used.

Obviously the invention is not limited to the specific embodiment herein shown and described, but is capable of many variations and applications without departing from its spirit and scope, as set forth in the appended claims.

What is claimed is:

1. In a device of the character described, the combination with a solution containing receptacle, of a cathode, a perforated cup shaped anode having an interior contour shaped to conform substantially to the shape of the cathode, means to suspend said anode beneath said cathode the cathode being completely inclosed in said cup shaped anode, a source of current supply connected to said cathode and said anode, and means for rotating said cathode in said anode to agitate the solution contained in said anode.

2. In a device of the character described, the combination with a solution containing receptacle, of a cathode, a perforated cup shaped anode having an interior contour shaped to conform substantially to the shape of the cathode and equipped with a plural-

ity of perforations, means to suspend said anode beneath said cathode the cathode being completely inclosed in the cup shaped anode, a source of current supply connected to said cathode and said anode, and means for rotating said cathode in said anode to agitate the solution contained in said anode and to stimulate circulation between the solution contained in the anode and the solution in said main receptacle.

In witness whereof, I hereunto subscribe my name this 4th day of Jan. A. D., 1917.

GEORGE ALBERT LANDRY.