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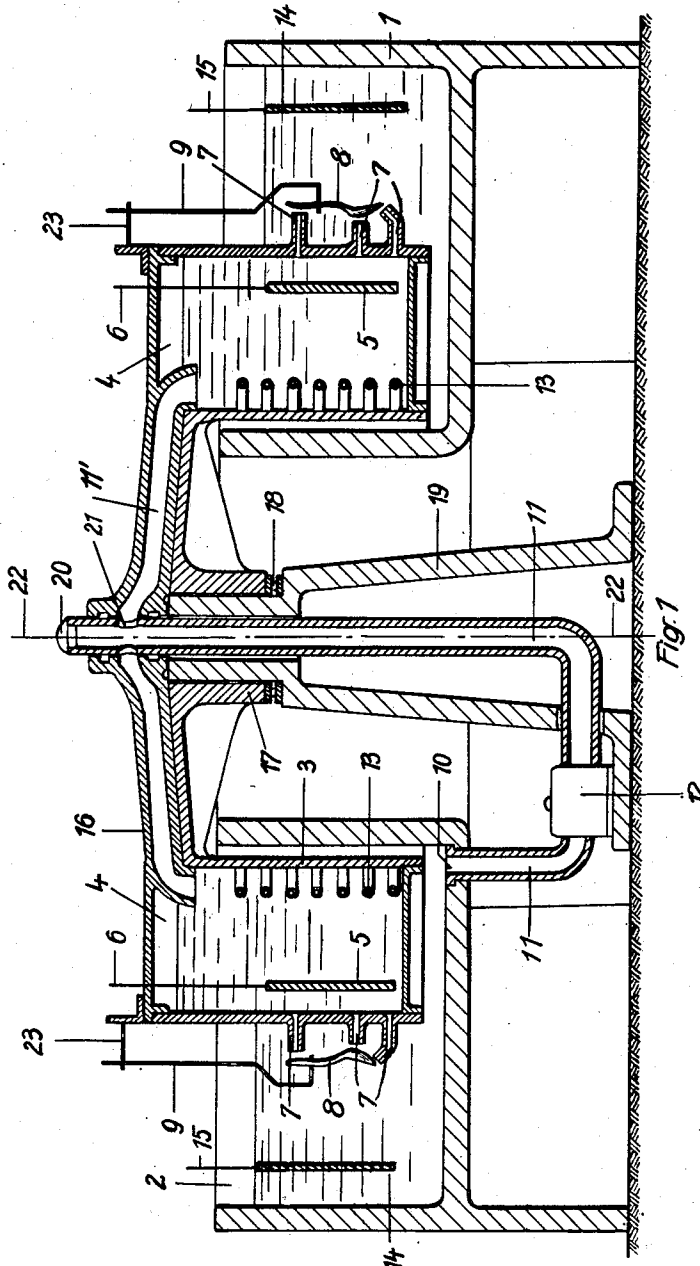
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APPARATUS FOR PRODUCING GALVANIC COATINGS

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2 Sheets-Sheet 1



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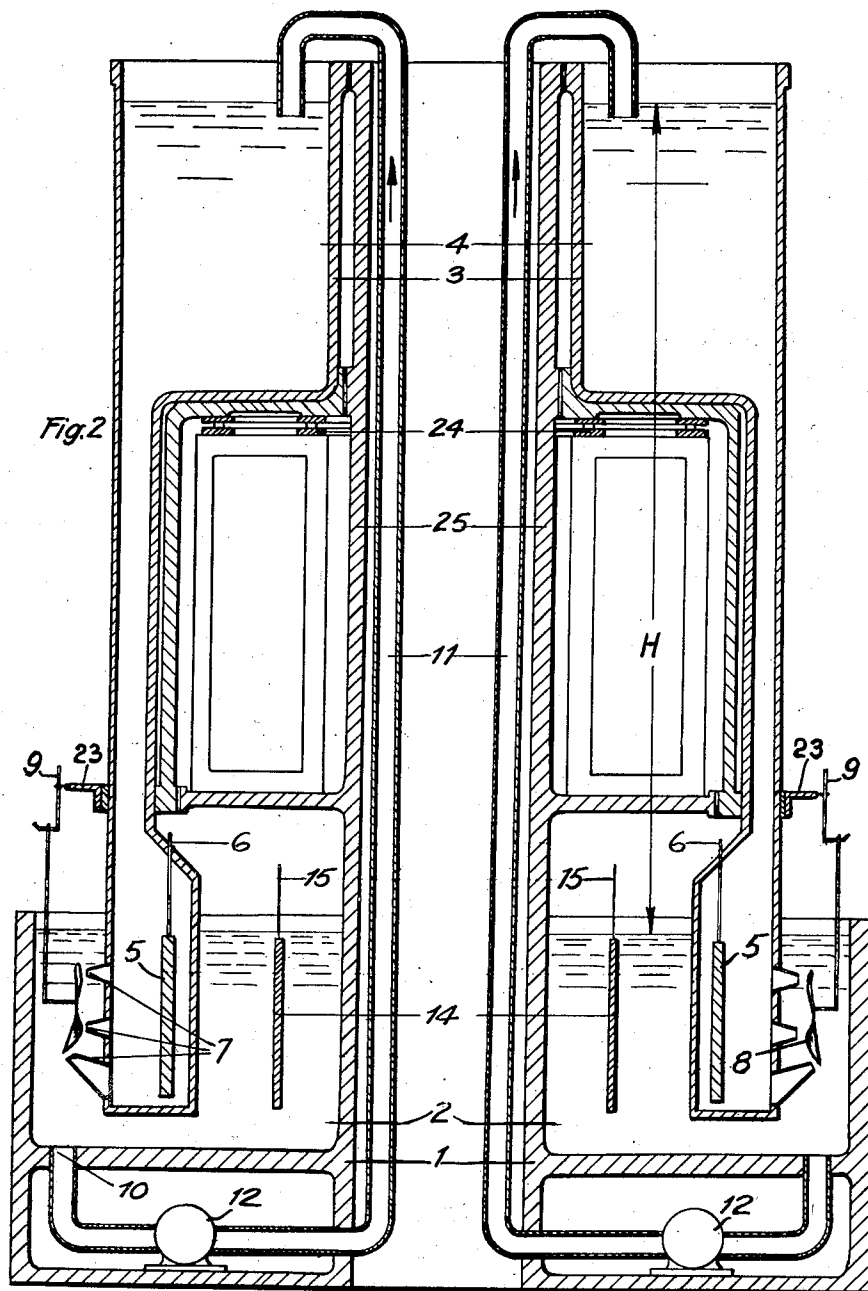
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APPARATUS FOR PRODUCING GALVANIC COATINGS

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1 Claim. (Cl. 204—199)

This invention relates to an apparatus for producing locally thicker galvanic coatings (electro-deposits) on objects of all kinds which for example are subject at certain places to a particularly intense wear and tear or which for other reasons are to be provided with a relatively thick coating of the deposited metal at localised zones, in particular table cutlery articles which are to be provided over limited areas with thicker silver coatings, than are other areas. In the apparatus of this kind a flow gradient is created between the anode chamber and the cathode chamber by which the electrolyte is driven at an increased speed through diaphragm openings or tubes provided in an insulated diaphragm opposite the places of the cathode which are to be made thicker, in order to concentrate the stream lines on such places. The necessary flow gradient can be created by increasing the hydrostatic pressure between the anode chamber and the cathode chamber e. g. by providing a difference of levels of these two chambers and/or for example by means of a pump, or by creating a preferably variable temperature gradient.

This apparatus, which is otherwise very convenient, has the disadvantage that the objects which are to be treated, and which are immersed in the electrolyte bath as cathodes, have to be kept stationary until the electro-deposition is completed.

Continuous processing, which is feasible in the annular baths known per se, cannot be performed, for the said reason, by means of the said apparatus, and the commercial efficiency of this method is therefore impaired. The object of the present invention is to eliminate this disadvantage.

The present invention consists essentially in the feature that, in carrying out a progressive, continuous or intermittent, movement through the cathode chamber of the objects which are to be treated, is produced in a manner known per se in connection with annular baths or plant for continuous electro-deposition, these objects being exposed at the places which are to be provided with thicker coating, to concentrated streamline fields produced by the electrolyte which is driven at an increased speed through openings in a screen disposed along its path of movement, thus achieving a progressive and continuous processing of the objects which are to be provided with locally thicker coatings.

According to the present invention, the anode chamber is mounted rotatably in relation to the cathode chamber, the screen openings and the objects, which are placed opposite the screen rotating along with the anode chamber. The charging of the device with the objects to be treated and the removal of the processed objects can thus take place at the same point.

The progression and rotary movement of the objects through the bath has, apart from the above-mentioned advantage of making continuous processing possible, the further advantage of producing some movement of the electrolyte, which movement has otherwise to be brought about by separate means.

2

These effects combine favourably with the increased speed of travel of the metal ions, such as silver ions, caused by the increased concentration gradient, with the result that the local thickening of the electro-deposited metal coating is achieved more effectively and quickly than by means of the previously known devices.

Two forms of apparatus according to the present invention are illustrated by way of examples in the accompanying drawings, in which:

Fig. 1 shows diagrammatically, in vertical longitudinal section, an electro-depositing apparatus with a rotatable anode chamber in the form of a pressure chamber;

Fig. 2 shows diagrammatically, in vertical longitudinal section, an electro-depositing apparatus with a rotatable anode disposed above the cathode chamber.

The apparatus shown in Fig. 1 comprises an annular tank 1 which encloses a cathode chamber 2 filled with a liquid electrolyte. A container 3, likewise annular, encloses an anode chamber 4 in which one or more anodes 5 are suspended from conductors 6. This anode chamber 4 is connected by screen openings in the form of nozzle-shaped tubes 7 with the cathode chamber 2 in which the objects to be processed, e. g. spoons 8, are suspended on brackets 9 which supply electric current. The various parts are so disposed that the outlet orifices of the nozzle-shaped tubes 7 are directed, at a distance which is preferably adjustable, against the parts of the surfaces of the objects 8 which are to be provided with a thicker coating.

The cathode chamber 2 communicates with the anode chamber 4 by means of an opening 10 in the bottom of the tank 1 and a duct 11 in which is included a pump 12 and preferably also a filter. The electrolyte which flows through the openings or nozzles 7 from the anode chamber 4 into the cathode chamber 2, is brought back into circulation in the anode chamber 4 by the pump 12 through the duct 11. A heating device, e. g. a heating coil 13, may be mounted with advantage in the anode chamber 4 in order to create a desired temperature gradient. Auxiliary anodes 14 with conductors 15 may be mounted in the cathode chamber 2 if desired; these auxiliary anodes not only produce the desired local thickening of the electro-deposited coating but also the general covering of the objects with electro-deposited metal coating.

The embodiment shown in Figure 2, likewise comprises essentially the above-described parts 1 to 12, 14 and 15, but differs in the following respects:

According to Fig. 1 the anode chamber 4 is pressure-tightly closed by a lid 16 which is placed on the container 3. The whole container unit 3 is immersed in the cathode chamber 2 and is rotatably disposed in the same; for this purpose it is angularly movable on the central part of the duct 11 which serves as an axle, and on a central standard 19 by means of a hub 17 and ball bearing 18. The duct 11 is closed at the top by a cap 20 and is provided underneath the lid 16 with openings 21, so that the liquid electrolyte can be pumped into the anode chamber 4 through the duct extension 11' while the anode chamber 3 rotates around the vertical axis 22 of the duct 11. The cathode holders 9 are, according to this embodiment, fastened to the tank 3 and/or its lid 16 by means of links 23, so that the objects 8 placed opposite the nozzle-shaped tubes 7 rotate along with the anode chamber 3. An over-pressure is created by the pump 12 in the anode chamber 4, through the lid 16 of which the anode current conductor 6 passes in pressure-tight manner. The electrolyte is thus driven at a flow speed corresponding to the said over-pressure through the openings or nozzles 7 into the cathode chamber 2 and against those parts of the surfaces of the objects 8 where the coating is to be thicker. These objects

3

rotate along with the anode chamber 3 round the axis 22 and can thus easily be put in and removed at any point on the circumference of the annular tub 1.

In the embodiment according to Fig. 2 the anode chamber 4 is disposed at such a distance above the cathode chamber 2 that a hydrostatic pressure is created owing to the difference H between the electrolyte levels of the higher anode chamber 4 and the lower cathode chamber 2. This pressure drives the electrolyte through the nozzles 7 at a corresponding flow speed, in the same way as in the embodiment according to Fig. 1, the cathode supports 9 being fastened to the rotatable container 3 by means of links 23. The desirable continuous processing can thus be achieved in this case also. The container 3 is mounted by means of a ball bearing 24 on a central standard 25.

The openings or nozzles and/or the orifices of the openings or nozzles can be arranged so that they can be exchanged and adjusted according to the shape of the object to be processed, and so that their size, breadth or length can be varied or adjusted.

I claim:

Apparatus for producing locally thickened galvanic deposits on at least one predetermined surface part of articles inserted in said apparatus as cathodes, said apparatus comprising an anode chamber enclosing at least one anode, a cathode chamber, means for supporting the said articles suspended as cathodes in said cathode chamber, electrical connections serving for connection of said anode and said cathode-supporting means to a source of electric current, an insulated diaphragm arranged between said anode chamber and said cathode chamber and adjacent said articles serving as cathodes in the said cathode chamber, said diaphragm having apertures sit-

4

uated opposite the parts of the surface of the articles which are to be provided with a thicker coating concentrating the flux of electrolytic current more strongly on said predetermined surface parts of the articles than on other parts thereof, means adapted to create a pressure drop between the anode chamber and the cathode chamber driving an electrolyte from said anode chamber into said cathode chamber at increased rate of flow through said apertures in said diaphragm in a direction to impinge against said predetermined surface parts of the articles, means adapted for returning the electrolyte from said cathode chamber to said anode chamber, said anode chamber being enclosed in a container provided with said diaphragm having said apertures, said container enclosing said anode chamber dipping into said cathode chamber and being journaled on a support for rotation about a central axis in relation to said cathode chamber, the electrolyte being circulated from said cathode chamber by means of a pump into said container, and said diaphragm having said apertures as well as the articles to be treated being arranged to rotate along with said container enclosing said anode chamber.

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