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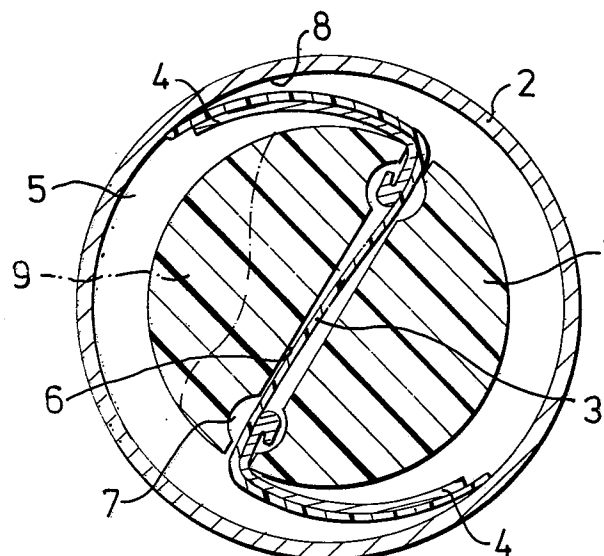
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⑤④ **An anode for brush-plating.**

⑤⑦ There is provided an anode for electrolytic brushplating processes. The anode comprises a body (1) made of an electrically non-conductive material. Arranged on the anode body are anode plates (4) of electrically conductive material. The anode plates are exchangeable. The anode plates carry a resilient, electrically insulating strip or net of, for example, polypropylene, which forms the brush of the anode. The anode plates (4) are resilient, so as to enable them to conform to the surface of the object (2) which functions as a cathode and which is to be plated. The anode plates and the insulating strip or net (vira) are carried by the anode body.



An anode for brush-plating

10 The invention relates to an anode for electrolytic
brush-plating processes, comprising an anode body made of
an electrically non-conducting material.

 Known anodes for electrolytic plating according to .
the brush-plating method comprise an electrically conduc-
15 tive central body, which is preferably made of graphite
and which is wound with polypropylene-wool, whose function
is to act as a carrier for the electrolyte and to serve
as a spacer between anode and cathode.

 With such an anode the rate at which plating can be
20 effected is limited by the formation of gases at the anode
when a higher current strength is to be used. Another
disadvantage is that the graphite disintegrates, causing,
among other things, the anode to lose its shape and its
mechanical strength.

25 Considerably higher current densities can be used
when using anodes of the kind described in U.S. patent
specifications 4 210 497 and 4 235 691, resulting in a
considerable increase in the plating rate. With respect
to the electrically conductive part of the anodes described
30 in the aforementioned U.S. patent specifications, said
anodes are to be considered as disposable anodes, in other
words anodes for one-time use only. When using anodes of
this latter embodiment, on a large scale, however, said
anodes have been found unsuitable from, inter alia, the
35 cost and handling aspect. In those cases where plated
steel anodes are used, the plating layer has been worn
away in a short period of time and the electrolyte
destroyed. Further, localization or centering has been a

restricting factor (with respect to the wish for a uniform layer thickness), i.e. it has been found impossible to maintain a constant distance between the anode and the cathode.

5 An object of the present invention is to provide an anode for electrolytic brush-plating processes by means of which the aforementioned disadvantages encountered when using known anodes are eliminated.

10 The anode according to the present invention is characterized by an anode body of electrically non-conductive material, whereat on the anode body is arranged at least one anode plate of electrically conductive material, and a spacer in the form of an electrically non-conducting strip or net which forms the brush of the anode.

15 The anode is constructed of anode elements, each of which can be replaced. This affords the technical advantage whereby the plating rate can be increased up to ten times while increasing the reliability of the method, due to the fact that the anode is self-centering in the
20 cathode, or vice versa. Because the body of the anode is constructed of elements of an electrically non-conductive material, it has been possible to increase the electrolyte conversion from two to four times, because the electrolyte obtains greater space, without disturbing the distance
25 between the anode and the cathode. The distance between the anode and cathode should, namely, be as small as possible, thereby to reduce the resistance in the liquid so that the increase of temperature is minimal. Further, one and the same anode can be re-adjusted, thereby
30 enabling the anodes to be used with cathodes of mutually differing diameters.

 So that the invention will be more readily understood and further features thereof made apparent two
35 embodiments of the invention will now be described in more detail with reference to the accompanying schematic drawings.

 Figure 1a illustrates in a plan view part of an anode according to the invention having a rod-like anode

body, whereat part of the work-piece whose inner surfaces are to be plated is cut away.

Figure 1b is a sectional view taken on the line B-B in Figure 1a.

5 Figure 2a illustrates part of an anode according to the invention having a tubular anode body.

Figure 2b is a sectional view taken on the line 2B-2B in Figure 2a.

10 Illustrated in Figures 1a and 1b is a rod-like anode body 1 made of an electrically non-conductive material and movably arranged in a tube 2 whose internal surface is to be plated and which acts as a cathode. The anode body has a diametrically extending groove 6 in which there is arranged a wire 3 (i.e. a polypropylene net) in a manner
15 such that said wire covers an anode plate 4, which is electrically conductive. Plating of the inner surface of the tube 2 is effected within the area 8 between the anode plate 4 and the tube 2, where the least possible distance therebetween is obtained. This distance is only dependent
20 on the wire 3. At high current strengths heat and gases are generated as by-products during a plating operation and are accommodated in a transport space 5 located between the anode body and the tube. This space can be greatly increased by arranging a recess 9 in the anode body. In
25 addition to the technical advantages mentioned in the introduction to the description, the invention enables worn parts, i.e. the anode plate 4 and the wire 3, to be replaced. In addition, one and the same anode body 1 can be used together with cathodes of widely varying diameters,
30 and the change of electrolyte requiring another grade of material in the anode plate 4 can also be effected in a rational and simple fashion. The extent to which the anode plate 4 extends in the longitudinal direction of the anode is selected with regard to the length of the plated
35 workpiece (the tube), and may be straight or of helical configuration. In the Figure 1b embodiment of the invention, the anode comprises two plates 4, which are suspended in cavities 7 in the diametrically extending

groove 6.

Figures 2a and 2b illustrate a tubular anode body 21 of electrically non-conductive material, said body being arranged for movement about the workpiece 22 to be plated (for example a rod). The anode body is provided with slots 26 through which tongues 28 of an anode plate 24 and a wire 23 extend into the anode body 21. The wire 23 lies between the anode plate 24 and the plated workpiece 22. The illustrated embodiment has two anode plates 24 and associated wires 23.

Although Figures 1a, 1b and 2a, 2b illustrate two preferred embodiments of the invention, it will be understood that other embodiments of the invention are conceivable. Thus, for example, in the case of anodes intended for the plating of cathodes of small diameters, the anode plates may be joined together while the wire comprises two separate parts. It is also possible for both the anode plate and the wire to be joined together, the essential feature being that the anode plates are located relative to the workpiece to be plated with the least possible distance between the anode and the cathode.

An anode according to the invention can also be used for plating flat sheet-like pieces, the main principal feature being the same as that for the external and internal plating of tubular workpieces, the one difference being that the anode body is not curved. Surfaces which exhibit double-curves can also be plated, the main feature being that the anode plates are resilient. The anode may be so journalled that when it rotates the anode body moves forwards and backwards. In this way, the anode plates follow a curved surface and the plated sheet-like workpiece is held in position with the aid of suitable grooves.

In the embodiments illustrated in Figures 1a, 1b and 2a, 2b, the anode body is suitably movable relative to the plated workpiece, although it is also possible for the anode body to be stationary, whereat an electrically insulating material, for example a wire comprising poly-

propylene net, moves between the anode and the cathode (the plated workpiece), said wire being passed around, for example, an arm. The electrically conductive anode plates may, for example, comprise titanium.

CLAIMS

1. An anode for electrolytically brush-plating processes, characterized by an anode body (1;21) of
5 electrically non-conducting material which carries at least one exchangeable anode plate (4;24) of electrically conducting material, whereat said at least one anode plate has an adjacently lying electrically non-conducting strip or net (3;23), which forms the anode brush and
10 which acts as a spacer between anode and cathode.

2. An anode according to claim 1, characterized in that the anode body (1) is rod-shaped and has at least one groove or cavity (6) in which the at least one anode plate (4) and the non-conducting strip or net (3) are
15 replacably arranged.

3. An anode according to claim 1, characterized in that the anode body (21) is of tubular configuration and has at least one through-passing slot (26) in the wall thereof, through which slot at least one anode plate (24) and the non-conducting strip or net (23) projects into the
20 tube in a replacable fashion.

4. An anode according to any one of claims 1 - 3, characterized in that the at least one anode plate (4;24) is resilient so as to adapt to the surface of the work-
25 piece (2;22) to be plated, i.e. the cathode.

5. An anode according to claim 2, characterized in that the cavity (6) extends diametrically through the anode body (1), whereat an anode plate (4) is suspended at each edge of the cavity (6) and supports the non-conduct-
30 ing strip or net (3) extending through said cavity (6) from one side of the anode body to the other side thereof.

6. An anode according to claim 3, characterized in that the tubular anode body (21) has at least two mutually diametrical slots (26), each of which carries a respective
35 anode plate (24) with associated non-conductive strip or net (23).

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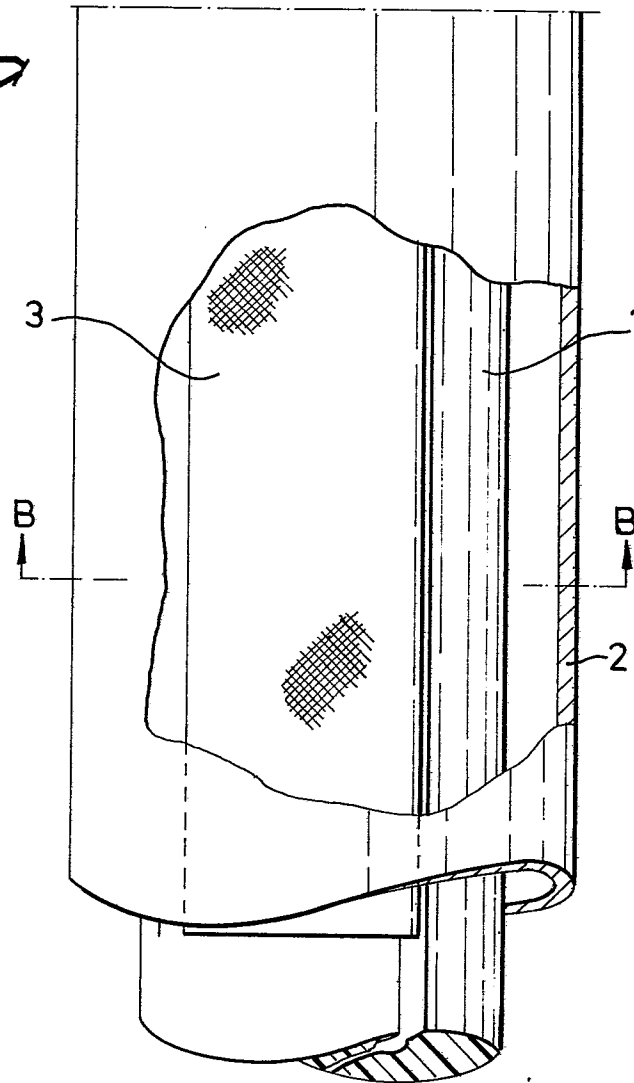
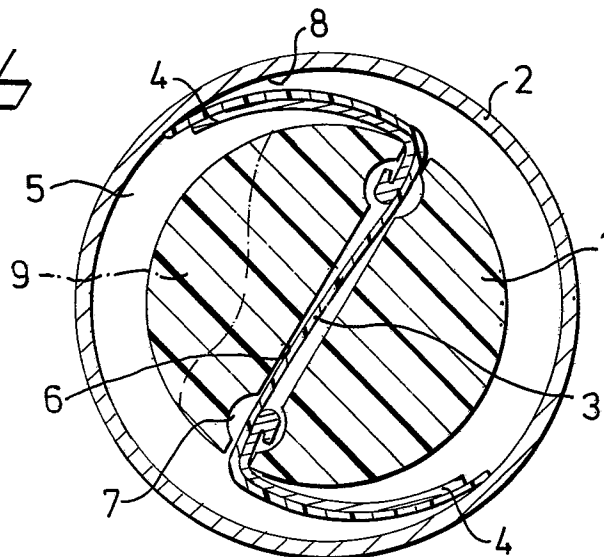
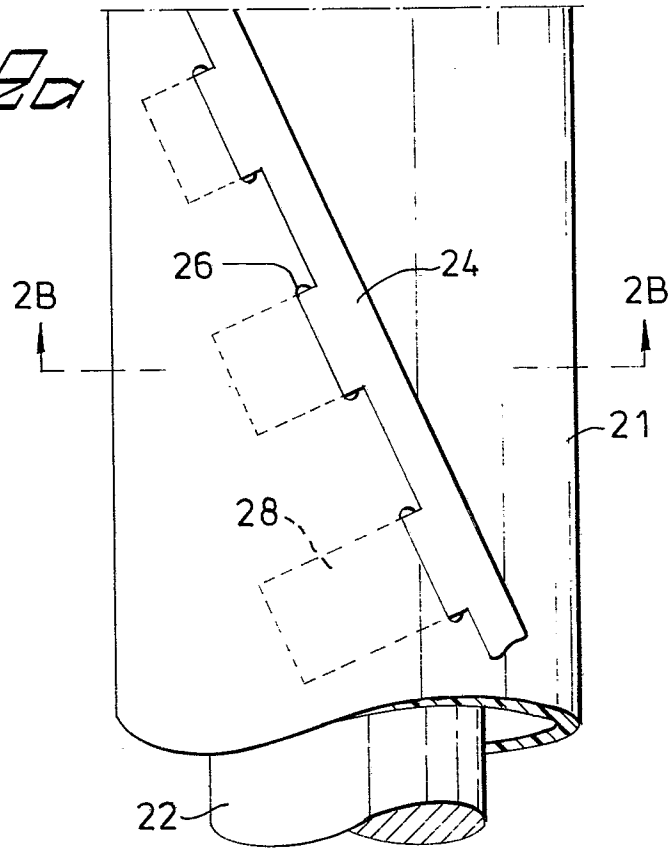
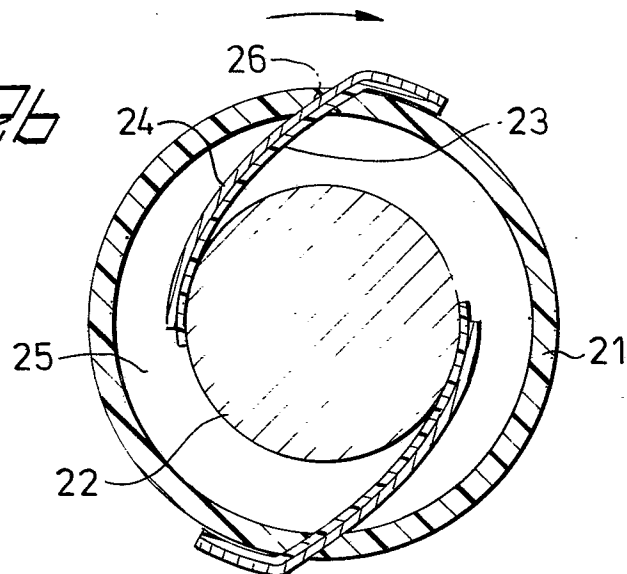
Fig. 1a*Fig. 1b*

Fig. 2a*Fig. 2b*



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
D	<u>US - A - 4 235 691</u> (K-R. LOQVIST) * Fig. 1,2; claims * --	1	C 25 D 17/12 C 25 D 5/06 C 25 B 11/02
D	<u>US - A - 4 210 497</u> (K-R. LOQVIST et al.) * Fig.; claims 1-8 * --	1	
	<u>US - A - 3 951 773</u> (P.L. CLAESSENS) * Fig.; claims * ----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.)
			C 25 D C 25 B
			CATEGORY OF CITED DOCUMENTS
			X particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
X	The present search report has been drawn up for all claims		&: member of the same patent family. corresponding document
Place of search VIENNA		Date of completion of the search 30-12-1981	Examiner SLAMA