



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/EP92/00462 (22) International Filing Date: 3 March 1992 (03.03.92) (30) Priority data: P 41 06 829.7 4 March 1991 (04.03.91) DE (71) Applicant (for all designated States except US): POLYCHROME CORPORATION [US/US]; 137 Alexander Street, P.O. Box 817, Yonkers, NY 10702 (US). (72) Inventor; and (75) Inventor/Applicant (for US only) : MEISSNER, Manfred [DE/DE]; Polychrome GmbH, Seesener Straße 11, D-3360 Osterode/Harz (DE). (74) Agent: VOSSIUS & PARTNER; Siebertstr. 4, P.O. Box 86 07 67, D-8000 München 86 (DE).</p>		<p>(81) Designated States: AT (European patent), BE (European patent), CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, LU (European patent), MC (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i></p>
<p>(54) Title: DEVICE FOR CONTINUOUS ELECTRODELESS ELECTROCHEMICAL TREATING OF AN ELECTRICAL- LY CONDUCTIVE WEB IN AN ELECTROLYTE CELL AND ITS USE</p> <p>(57) Abstract</p> <p>A device for continuous electrochemical treating of an electrically conductive web in an electrolyte cell is provided. The invention permits an electrodeless treatment of wide webs with high uniformity and low power consumption without additional electrodes, bars or cables and conductive means.</p>		

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DEVICE FOR CONTINUOUS ELECTRODELESS ELECTROCHEMICAL TREATING
OF AN ELECTRICALLY CONDUCTIVE WEB IN AN ELECTROLYTE CELL AND
ITS USE

This invention relates to a device for continuous electrodeless electrochemical treating of an electrically conductive web in an electrolyte cell, in particular for anodizing or graining of an aluminium web. The anodizing or graining of aluminium webs is used in the production of offset printing plates. In this connection, treating of relatively wide webs with high accuracy is necessary.

A method for producing an aluminium base sheet for printing plates by graining and anodizing in an electrolyte cell is known from the U.S. Patent 3,935,080 (Gumbinner et al.). Thereby, an aluminium web is moved through several treating baths. Electrodes are placed in confrontation with the web causing anodizing or graining of the web. The current applied to the electrodes can be an alternating or direct current. This method allows the treating of wide webs, however the use of electrodes and high current conductors requires additional investment costs and power consumption compared with this invention. The higher power consumption of the conventional process is caused by a voltage-drop in the conductors and the electrolyte and the excess voltage at

the electrodes; in contrast, the present invention allows a two-fold treatment of the web surface with the same cell length.

The German Patent 684,267 (Rummel et al.) discloses an electrodeless method for the electrolytical treatment of an electrically conductive wire or web moved through an electrolyte cell, wherein a current is generated by induction in the wire or web. The electrolysis takes place between portions of different potentials of the wire or web. In this case, the wire or web is passed through the transformer core several times and constitutes the secondary coil; this excludes the use of wide webs.

The object of this invention is to provide a device for continuous electrodeless electrochemical treating of wide webs as well.

This object is solved with the features of the claims.

The advantages of the invention are that no electrodes, bars or cables carrying high current and no contact cells or contact rollers for the web are necessary. The invention reduces investment costs, power consumption and requires less space.

Nowadays, high current transformers are available which are capable of inducing sufficient voltage for the electrolysis to one single secondary turn at feasible dimensions. Such a transformer is used in this invention.

The invention will now be described with reference to the accompanying drawings:

Figure 1 shows a schematic side view of an apparatus according to a first embodiment of the invention;

Figure 2 shows a top view of the transformer core; and

Figure 3 shows a schematic side view according to a second embodiment of the invention.

According to Fig. 1, an electrically conductive web 1, e.g. an aluminium web, is transported over a roller 8 vertically into an electrolyte cell 2. A first roller 4 turns the web 1 again to the top of the electrolyte cell 2. Then the web 1 is transported over several turning rollers 9 to 11 to the transformer 3 wherein a current is induced in the web 1. This current flow leads to potential differences over the length of the web 1. Then, the web 1 is again transported vertically downwards into the electrolyte cell 2, is turned by a second roller 5 and is transported vertically to the top of the electrolyte cell over the roller 12. The roller 5 is located vertically above the first roller 4 and has a smaller diameter than the roller 4. Therefore, there is a constant distance d between the two portions 1A and 1B and between the two portions 1C and 1D of the web 1 being transported through the electrolyte cell. In this way, the potential difference of the web before and after passing through the transformer gives rise to an uniform electrochemical treatment, e.g. anodizing or graining of the web which takes place in the hatched areas.

Also, the passage for the web 1 in the transformer 3 is constructed to allow the passing of a relatively wide web 1, e.g. up to a width of 160 cm.

Fig. 2 shows slots 6 in the transformer core 7 for the passing of the web 1 through the magnetic field of the transformer 3. A single slot or more than two slots are also possible according to the invention.

With the embodiment of Fig 1. the upper web surface 1u can be treated (the upper web surface 1u is defined with respect

to the horizontal path upstream of the roller 8 and downstream of the roller 12 in Figs. 1 and 3).

The electrochemical treating of the lower web surface 11 is performed by a second embodiment as shown in Fig. 3. The web 1 is then transported over two horizontally arranged rollers 4' and 5'. The transporting over the rollers 8 to 12 corresponds to the embodiment of Fig. 1. The web 1 is transported over the first roller 4' before passing through the transformer 3 and over the second roller 5' after passing through the transformer 3. Between the two rollers 4', 5' and the top of the electrolyte cell 2 are two portions 1A and 1B of the web 1 with different potentials and a constant distance d between each other. In this way, a uniform electrochemical treatment of the lower web side 11 is achieved in the hatched area.

For treating said two web surfaces 1u and 1l, the first and the second embodiment according to the invention should be arranged subsequently.

In the above-mentioned embodiments, a constant distance between the portions 1A-1D of the web is realized by transporting the web along parallel straight lines, but a transport along curved lines with a constant distance is also possible.

CLAIMS

1. Device for continuous electrochemical treating of an electrically conductive web (1) with an electrolyte cell (2), a transformer (3) and means (4, 5, 8-12; 4', 5', 8-12) for transporting the electrically conductive web (1) through the electrolyte cell (2) and the magnetic field of the transformer (3), wherein a current is generated by the transformer (3) on the surface of the web (1) and at least two portions (1A-1D) of the web (1) with different potentials are spaced to each other in the electrolyte cell (2), characterized in that the transformer (3) comprises at least one slot (6) in the core (7) allowing the passage of wide webs.
2. Device as claimed in claim 1, characterized in that the transformer (3) is located outside of the electrolyte cell (2).
3. Device according to claim 1 or 2, characterized in that the distance (d) between said portions (1A-1D) is constant.
4. Device as claimed in claim 1, 2 or 3, characterized in that the portions (1A-1D) of the web (1) with different potentials are spaced to each other by subsequently transporting the web (1) over a first (4, 4') and second (5, 5') roller in the electrolyte cell (2) before and after passing the transformer (3), respectively.
5. Device as claimed in claim 4, characterized in that the second roller (5) is arranged vertically above the first roller (4) and that the diameter of the first roller (4) is greater than that of the second roller (5).

6. Device as claimed in claim 4, characterized in that the first roller (4') is arranged horizontally beside the second roller (5').
7. Device according to claims 1, 2 or 3, characterized by the subsequent arrangement of the devices as claimed in claims 5 and 6.
8. Use of the device as claimed in any one of claims 1 to 7 for anodizing of aluminium webs.
9. Use of the device as claimed in any one of claims 1 to 7 for graining of aluminium webs.

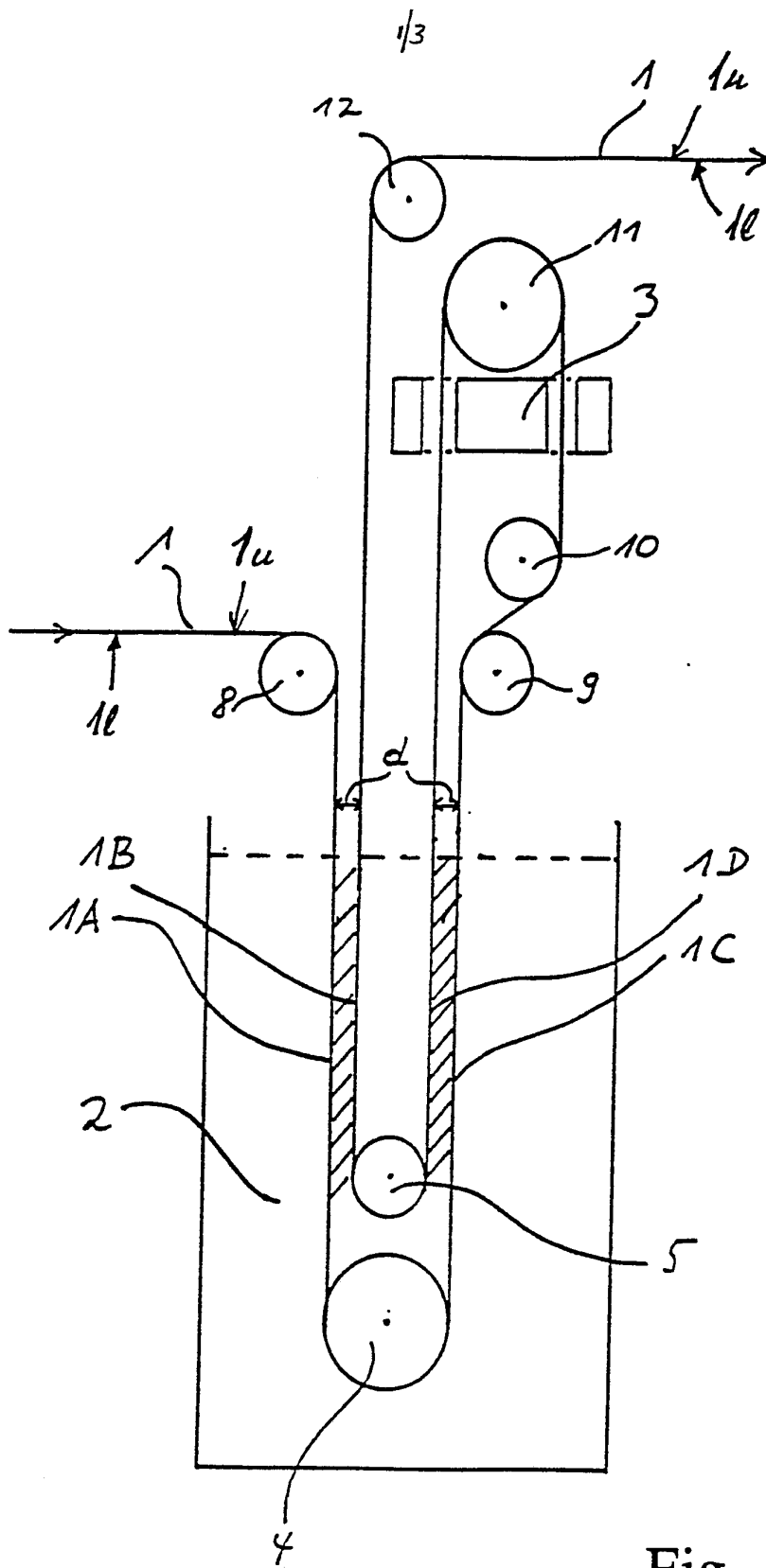


Fig. 1

2/3

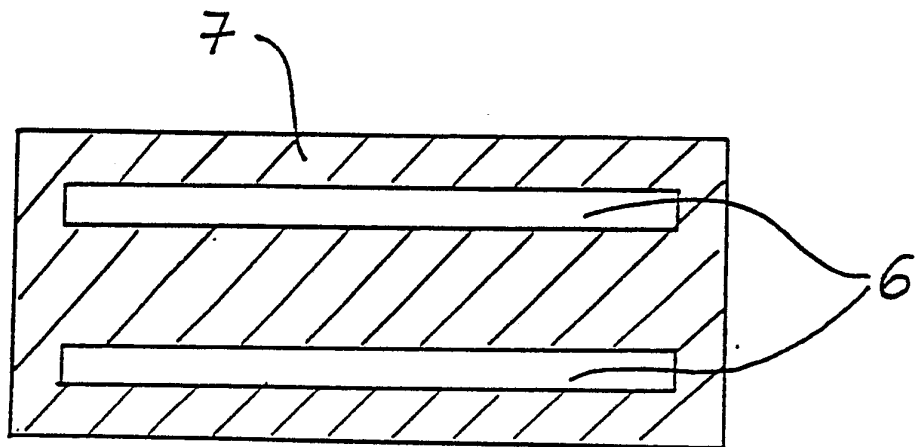


Fig. 2

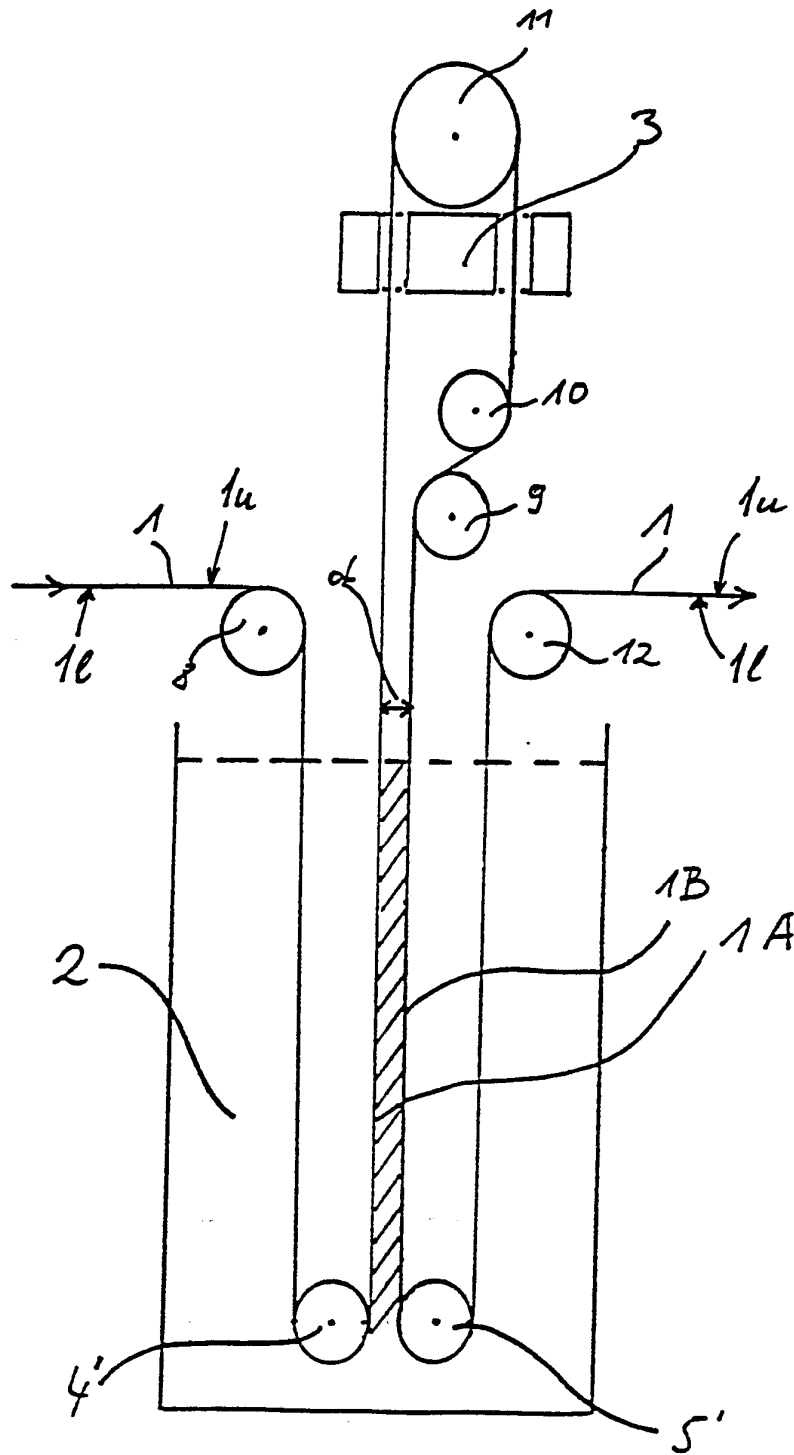


Fig. 3

INTERNATIONAL SEARCH REPORT

PCT/EP 92/00462

International Application No.

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶				
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 C25D11/02; B41N3/03				
II. FIELDS SEARCHED				
Minimum Documentation Searched ⁷				
Classification System	Classification Symbols			
Int.Cl. 5	C25D ; B41N			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸				
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹				
Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³		
X	DE,C,729 701 (ROTAPRINT AG) 21 December 1942 see figures 1,6 ---	1,2,3,4		
(Empty space for other relevant documents)				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> ¹⁰ Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; border: none; vertical-align: top;"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "A" document member of the same patent family </td> </tr> </table>			¹⁰ Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "A" document member of the same patent family
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IV. CERTIFICATION				
Date of the Actual Completion of the International Search <div style="text-align: center; font-size: 1.2em;">21 MAY 1992</div>	Date of Mailing of this International Search Report <div style="text-align: center; font-size: 1.2em;">11.06.92</div>			
International Searching Authority <div style="text-align: center; font-weight: bold;">EUROPEAN PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center; font-weight: bold;">NGUYEN THE NGHIEP N. </div>			

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. EP 9200462
SA 56896**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.
The members are as contained in the European Patent Office EDP file on
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-C-729701		None	