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(54) **Method and apparatus for manufacturing gravure cylinders**

(57) A method for manufacturing a gravure cylinder and a manufacturing line for performing said method is provided. The method comprises the steps of providing a relatively soft surface on a cylinder, coating said relatively soft surface with a hard coating and engraving said hard coating to provide a desired print pattern. The rel-

atively soft surface is preferably mechanically attached or electroplated copper and the relatively hard coating is preferably an electrolessly plated nickel/boron coating.

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EUROPEAN SEARCH REPORT

Application Number
EP 01 12 2133

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X A	DE 42 12 582 A (HELL AG LINOTYPE) 21 October 1993 (1993-10-21) * column 1, line 57 - column 2, line 7 * * column 3, line 45 - column 4, line 44; figures 2,3 *	1-3,9-11 4-6, 12-14,17	B41N1/06 B41N1/20 B41C1/02 B41N3/00 C25D3/56 C23C18/50
X A	DE 30 35 714 A (DAINIPPON PRINTING CO LTD) 16 April 1981 (1981-04-16) * page 9, line 4 - page 14, line 9; figures 1,2 *	1-3,9-11 4-6, 12-14,17	
X A	US 4 556 610 A (VAN HEUVELEN JAN H) 3 December 1985 (1985-12-03) * column 4, line 67 - column 5, line 3; claims 1-5 *	1,9 2,3,10, 11	
X	EP 0 686 509 A (PECHINEY EMBALLAGE ALIMENTAIRE) 13 December 1995 (1995-12-13) * page 5, line 50 - page 6, line 29; figures 7A-7E *	1,9	
D,A	WO 99/58741 A (MCCOMAS IND INTERNATIONAL INC ;MCCOMAS EDWARD (CA)) 18 November 1999 (1999-11-18) * page 3, line 33 - page 5, line 27; claim 6 *	4-6, 12-14	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 4 September 2003	Examiner Balsters, E
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- ☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

- ☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-6, 9-14, 17



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LACK OF UNITY OF INVENTION
SHEET B

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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-6,9-14,17

Claims 1 to 6 refer to a method of manufacturing a gravure cylinder and claims 9 to 14 to a manufacturing line for manufacturing a gravure cylinder whereby a relatively hard surface is plated onto a relatively soft surface then engraving of the two layers together is performed. This addresses the problem that in the making of gravure cylinders it is normal to first engrave the soft layer, then plate with harder layer with the result that errors can occur during the plating, which render the more costly engraving step useless. This problem is avoided by the present method and production line. Prior art processes apparently did not work in this way as the harder surface would tend to flake off if subjected to engraving. The problem addressed by these claims can be seen as avoiding the possibility for the plating step to damage an engraved cylinder, the technical solution thereto is the performing of the plating step before the engraving step, the materials to be used to form the gravure cylinders are not critical to these claims.

Claim 17 is directed to a gravure cylinder with an engraved nickel/boron coating, as the skilled man would understand that a nickel/boron coating is a hard coating, and as the wording of the claim is interpreted as meaning that the coating of nickel/boron has been subjected to an engraving process, the cylinder of claim 17 is considered to be a result of a process according to claim 1 and hence to form part of a common inventive concept with claims 1 to 6 and 9 to 14, sharing the common technical feature of engraving after plating with wear resistant coating.

2. claims: 7,8,15,16



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LACK OF UNITY OF INVENTION
SHEET B

Application Number
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The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

In claims 7 and 8 methods are described for making gravure cylinders whereby a nickel/boron layer is provided as plating over a copper surface which may be engraved first or not, and which may be formed around a cylinder first or not. Claims 15 and 16 provide manufacturing lines to allow such processes to be carried out. The common technical features of these claims are the use of a nickel/boron coating bath and a copper first layer. The problem addressed by these claims appears to be the provision of a gravure printing cylinder with an alternative wear resistant coating composition to the chromium layer commonly used in the prior art. These claims thus share no particular common technical feature with the other claims presented by the application in that the order of the plating and engraving steps is unimportant, but the materials used are essential. A different problem is addressed and solved in a different way.

3. claims: 18-20

Claims 18 to 20 are directed to any article having a nickel/boron hard coating. These claims thus share no common inventive concept with the production of gravure cylinders per se. The problem addressed by these claims can be seen as relating to the art of plated articles whereby as an alternative to the provision of a plated article having an undeformed surface between the original article surface and the plated article surface, now a deformed article surface is provided. No common technical features can be seen between such teaching and the teaching of the other claims of the application.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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04-09-2003

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