



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>(51) International Patent Classification <sup>6</sup>:</b><br><b>B21D 26/02</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <b>A1</b> | <b>(11) International Publication Number:</b> <b>WO 99/03616</b><br><b>(43) International Publication Date:</b> 28 January 1999 (28.01.99)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>(21) International Application Number:</b> PCT/CA98/00671<br><b>(22) International Filing Date:</b> 13 July 1998 (13.07.98)<br><b>(30) Priority Data:</b><br>60/053,060      18 July 1997 (18.07.97)      US<br><b>(71) Applicant:</b> COSMA INTERNATIONAL INC. [CA/CA]; 337 Magna Drive, Aurora, Ontario L4G 7K1 (CA).<br><b>(72) Inventor:</b> HORTON, Frank, A.; 1993 Chalmers Drive, Rochester Hills, MI 48309 (US).<br><b>(74) Agent:</b> IMAI, Jeffrey, T.; Magna International Inc., 337 Magna Drive, Aurora, Ontario L4G 7K1 (CA). |           | <b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BE, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).<br><br><b>Published</b><br><i>With international search report.<br/>         Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i> |

**(54) Title:** HYDROFORMING OF A TUBULAR BLANK HAVING AN OVAL CROSS SECTION AND HYDROFORMING APPARATUS

**(57) Abstract**

The present invention relates to a method and apparatus for forming an elongated tubular metal member from a tubular metal blank. The method comprises: i) placing a tubular metal blank having a generally oval cross section into a die cavity and orienting the tubular metal blank such that a relatively larger cross-sectional dimension of the generally oval cross section extends generally in a direction of the relatively larger cross-sectional dimension of the die cavity and such that a relatively small cross-sectional dimension of the generally oval cross section extends generally in a direction of the relatively small cross-sectional dimension of the die cavity; ii) engaging and sealing opposite ends of the tubular metal blank; and iii) injecting fluid under pressure into the tubular metal blank so as to expand the tubular metal blank into conformity with the surfaces defining the die cavity and thereby transform the tubular metal blank into the elongated tubular metal member.

