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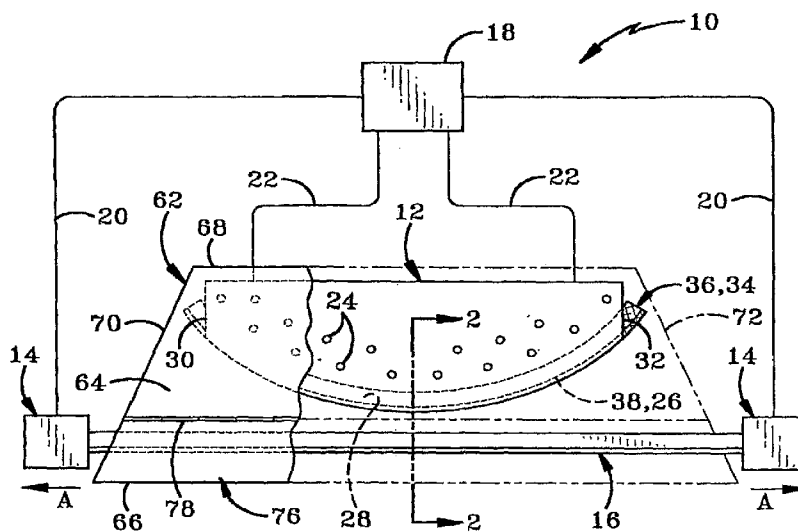
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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, ZA, ZM, ZW.
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[Continued on next page]

(54) **Title:** CREEP FORMING AND STRESS RELIEVING IN METAL BAR



(57) **Abstract:** A hot creep stretch wrap forming method includes heating a metal bar (16) to a forming temperature within a temperature range suitable for creep deformation thereof, applying a stretching force to the metal bar at a strain rate no greater than 0.05 inch/inch/second, And wrapping the metal bar around a die (12), preferably having a thermally and /or electrically insulative work surface (34, 36). The stretching force is typically applied to a strain ranging from 0.5% to 15.0%. The metal bar (16) most preferably is a titanium alloy with a forming temperature ranging from 0.45 to 0.60 of its melting temperature. The wrapped metal bar is held in position and its temperature maintained within the temperature range typically for 5 to 120 minutes for stress relief. Preferably, the metal bar (16) is held substantially at the forming temperature throughout the process. Thermal insulation (62) around the die and metal bar reduce heat loss form the metal bar.

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Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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INTERNATIONAL SEARCH REPORT

International application No. .

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A. CLASSIFICATION OF SUBJECT MATTER
 IPC: **B21D 11/02(2006.01),37/16(2006.01)**

USPC: 72/296,342.96
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 72/296, 302, 342.1, 342.7, 342.92, 342.96

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 3,927,817 A (HAMILTON et al) 23 December 1975 (23.12.1975), see Figures 2 and 3 or Figures 7 and 8 and column 4, lines 34-43 and lines 13-24, and column 6, lines 9-14.	1-5, 9, 17 and 18 ----- 6-8, 10-16 and 19
Y	US 4,354,369 A (HAMILTON) 19 October 1982 (19.10.1982), see Figure 1.	6-8 and 20
A	US 3,722,068 A (MANCHESTER et al) 27 March 1973 (27.03.1973), see all Figures.	1-20
A	US 3,920,175 A (HAMILTON et al) 18 November 1975 (18.11.1975), see all Figures.	1-20
A	US 4,030,172 A (GENTRY) 21 June 1977 (21.06.1977), see all Figures.	1-20
A	US 4,117,970 A (HAMILTON et al) 03 October 1978 (03.10.1978), see all Figures.	1-20

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"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
"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)	"&"	document member of the same patent family
"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		

Date of the actual completion of the international search 24 March 2008 (24.03.2008)	Date of mailing of the international search report 15 APR 2008
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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,819,572 A (KRAJEWSKI) 13 October 1998 (13.10.1998), see all Figures.	1-20