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(54) **Title:** RESISTANCE ANNEALING FURNACE TO ANNEAL AT LEAST ONE METAL OR METAL ALLOY WIRE, STRAND, STRING, WIRE ROD OR STRIP

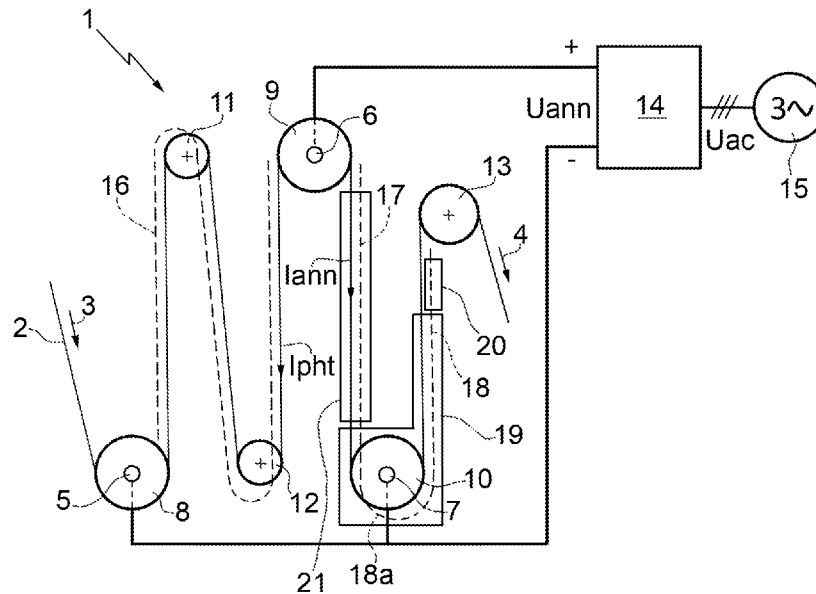


FIG.1

(57) **Abstract:** Resistance annealing furnace to anneal at least one metal or metal alloy wire, the annealing furnace (1) having at least two electric axles (5-7) provided with respective electric contact rings (8- 10) for conveying the metal or metal alloy wire (2), strand, string, wire rod or strip, and a DC voltage generator (14), which can be supplied by an AC voltage (Uac) to generate an annealing voltage (Uann) applied between the two electric axles (5-7) so as to produce an electric current in the portion (16, 17) of the metal or metal alloy wire (2), strand, string, wire rod or strip extending between the two electric axles (5-7), which provokes an annealing due to the Joule effect. At least one of the electric contact rings (8-10) is made of a non-metal electric conductor material, for example graphite.



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C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | WO 2015/063748 A2 (SAMP SPA CON UNICO SOCIO [IT]) 7 May 2015 (2015-05-07) page 8; claim 1; figures 1-2 ----- | 1-7 |
| A | DE 25 33 288 A1 (ROTH GMBH & CO KG MASCHF) 17 February 1977 (1977-02-17) page 3 - page 4; claim 1; figure 4 ----- | 1-3 |
| A | US 7 064 291 B1 (LOHMUELLER BERND [DE] ET AL) 20 June 2006 (2006-06-20) the whole document ----- | 1-7 |
| A | WO 2015/063749 A2 (SAMP SPA CON UNICO SOCIO [IT]) 7 May 2015 (2015-05-07) the whole document ----- | 1-7 |
| | -/-- | |

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|---|---|
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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 | EP 0 658 635 A1 (PRAXAIR TECHNOLOGY INC [US]) 21 June 1995 (1995-06-21) the whole document ----- | 1-7 |
| A | US 4 118 617 A (MOREAU MARC) 3 October 1978 (1978-10-03) the whole document ----- | 1-7 |
| A | US 3 989 923 A (LEES JOHN ET AL) 2 November 1976 (1976-11-02) the whole document ----- | 1-7 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

| |
|---|
| International application No PCT/IB2017/051858 |
|---|

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date | |
|--|------------------|-------------------------|------------------|------------|
| WO 2015063748 | A2 | 07-05-2015 | CN 106133156 A | 16-11-2016 |
| | | | EP 3066224 A2 | 14-09-2016 |
| | | | JP 2017500452 A | 05-01-2017 |
| | | | US 2016281191 A1 | 29-09-2016 |
| | | | WO 2015063748 A2 | 07-05-2015 |
| ----- | | | | |
| DE 2533288 | A1 | 17-02-1977 | NONE | |
| ----- | | | | |
| US 7064291 | B1 | 20-06-2006 | DE 19939399 A1 | 22-02-2001 |
| | | | EP 1206583 A1 | 22-05-2002 |
| | | | ES 2242633 T3 | 16-11-2005 |
| | | | JP 2003507577 A | 25-02-2003 |
| | | | PT 1206583 E | 30-09-2005 |
| | | | US 7064291 B1 | 20-06-2006 |
| | | | WO 0114603 A1 | 01-03-2001 |
| ----- | | | | |
| WO 2015063749 | A2 | 07-05-2015 | CN 106062219 A | 26-10-2016 |
| | | | EP 3066225 A2 | 14-09-2016 |
| | | | JP 2017500453 A | 05-01-2017 |
| | | | US 2016273068 A1 | 22-09-2016 |
| | | | WO 2015063749 A2 | 07-05-2015 |
| ----- | | | | |
| EP 0658635 | A1 | 21-06-1995 | CA 2135510 A1 | 11-05-1995 |
| | | | DE 69417367 D1 | 29-04-1999 |
| | | | DE 69417367 T2 | 26-08-1999 |
| | | | EP 0658635 A1 | 21-06-1995 |
| | | | ES 2129098 T3 | 01-06-1999 |
| | | | JP 3065219 B2 | 17-07-2000 |
| | | | JP H07197133 A | 01-08-1995 |
| | | | SG 49600 A1 | 15-06-1998 |
| ----- | | | | |
| US 4118617 | A | 03-10-1978 | CA 1059883 A | 07-08-1979 |
| | | | DE 2546448 A1 | 22-04-1976 |
| | | | DE 7532959 U | 22-04-1976 |
| | | | FR 2288152 A1 | 14-05-1976 |
| | | | GB 1530278 A | 25-10-1978 |
| | | | IT 1043416 B | 20-02-1980 |
| | | | SE 424449 B | 19-07-1982 |
| | | | US 4118617 A | 03-10-1978 |
| ----- | | | | |
| US 3989923 | A | 02-11-1976 | NONE | |
| ----- | | | | |