Title: IMPROVEMENTS RELATING TO DIRECT WRITE AND ADDITIVE MANUFACTURING PROCESSES

Fig. 1.

Abstract: A Direct Write method of forming components on a substrate by deposition of inkybly thermally curing the inklis, which method overcomes the need for curing by placing the substrate in an oven. The curing is performed in a preferred embodiment using an induction coil (6) through which an oscillating current is passed. The coil (6) is placed above the region in which Direct Write ink has been deposited. The oscillating current induces eddy currents in the ink, thus heating the ink and thus fixing the ink by curing, sintering, etc.
### INTERNATIONAL SEARCH REPORT

**International application No**

PCT/GB2008/050390

---

#### A. CLASSIFICATION OF SUBJECT MATTER

<table>
<thead>
<tr>
<th>INV.</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>H05K3/22</td>
<td>H05K3/12</td>
</tr>
<tr>
<td>B29C67/00</td>
<td>B41M7/00</td>
</tr>
</tbody>
</table>

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)

B29C C09D B41M H05K

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 practical, search terms used)

EPO-Internal, WPI Data

---

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 4 278 702 A (JENG CHENG-YIH) 14 July 1981 (1981-07-14)</td>
<td>1, 3, 4, 12, 13, 19, 21, 24, 27, 28</td>
</tr>
<tr>
<td></td>
<td>column 2, line 24 - line 57</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>DE 101 55 713 A1 (SIEMENS AG [DE]) 22 May 2003 (2003-05-22)</td>
<td>1, 3, 4, 12, 13, 21, 24, 27, 28</td>
</tr>
<tr>
<td></td>
<td>paragraphs [0010], [0015]; claims 1, 9</td>
<td></td>
</tr>
</tbody>
</table>

---

**Further documents are listed in the continuation of Box C.**

**See patent family annex.**

---

* 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 in which the priority is claimed 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 when the document is taken alone.

**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.

**S** document member of the same patent family.

---

**Date of the actual completion of the international search**

27 May 2009

**Date of mailing of the international search report**

06/10/2009

**Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tnl. (+31-70) 340-2040. Fax: (+31-70) 340-3016**

Authorized officer

Van Wallene, Allard
**Box No. II Observations where certain claims were found unsearchable (Continuation of Item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. □ Claims Nos.: because they relate to subject matter not required to be searched by this Authority, namely:

2. □ Claims Nos.: because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. □ Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of Item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

*see additional sheet*

1. □ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. □ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. □ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. □ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

   1–7, 12–14, 19–22, 24, 25, 27, 28

**Remark on Protest**

- □ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

- □ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

- □ No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7, 12-14, 19-22, 24, 25, 27, 28
   A method and apparatus for forming a component of a structure on a substrate where a magnetic flux generated by inductive heating means has an effective diameter at the substrate generally equal to the width of a line generated by the Direct Write Method

2. claims: 8, 9, 15, 16, 23, 26
   A method and apparatus for forming a component of a structure on a substrate where the height of an inductive heating means above the Direct Write ink is controlled

3. claim: 10
   A method for forming a component of a structure on a substrate where the current through the inductive heating means is monitored for controlling the heating of the ink

4. claim: 11 and 17
   A method and apparatus for forming a component of a structure on a substrate where the rate of application of the direct write ink is controlled

5. claim: 18
   An apparatus for forming a component of a structure on a substrate where an inductive heating coil is attached to ink deposition means
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 4278702 A</td>
<td>14-07-1981</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>DE 10155713 A1</td>
<td>22-05-2003</td>
<td>NONE</td>
<td></td>
</tr>
</tbody>
</table>