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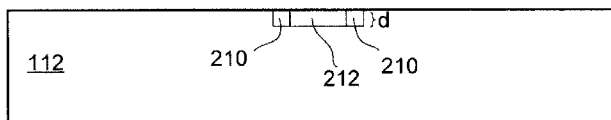
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(54) Title: LASER MACHINING OF FIRED CERAMIC AND OTHER HARD AND/OR THICK MATERIALS

FIG. 2A



(57) Abstract: Laser machining fired ceramic and other hard and/or thick materials includes scribing a workpiece with a laser beam along a sequence of parallel laser paths within a cutout region of the workpiece. The scribing creates a kerf in the cutout region that widens as the laser beam advances along the sequence. The sequence may begin with an inner portion of the cutout region and end with an outer edge thereof such that debris is directed away from the laser paths to increase throughput and create a high quality opening in the workpiece. High quality structures may also be cut out from the workpiece. The method includes directing a high velocity stream of gas to an interface of the laser beam and the workpiece to redirect the flow of debris and cool the interface. The method may also adjust a focus depth of the laser beam as it deepens the kerf.

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**A. CLASSIFICATION OF SUBJECT MATTER*****B23K 26/14(2006.01)i, B23K 26/04(2006.01)i, B23K 26/36(2006.01)i***

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)

IPC: B23k26

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

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

eKOMPASS(KIPO internal) &amp; keywords "scribing", "depth", "gas" and "air jet"

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A X	JP 2006-024914 A ( SHOWDA DENKO K.K. ) 26.01.2006 See Paragraphs 48-53; Figure 2.	1-12, 14, 23 13, 15-22
A	JP 11-320171 A ( MATSUSHITA ELECTRIC IND CO., LTD. ) 24.11.1999 See Paragraphs 19-23; Figures 3-4.	1, 13, 22
A	JP 2003-062683 A (SUMITOMO ELECTRIC IND LTD ) 05.03.2003 See Paragraph 23; Figure 1.	1, 13, 22
A	JP 2003-071530 A ( MOLTEC:KK ) 11.03.2003 See Claims 1-3; Figures 1, 4.	1, 13, 22

 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

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