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(54) Title: LASER CRAFTING APPARATUS, SYSTEM, AND METHOD

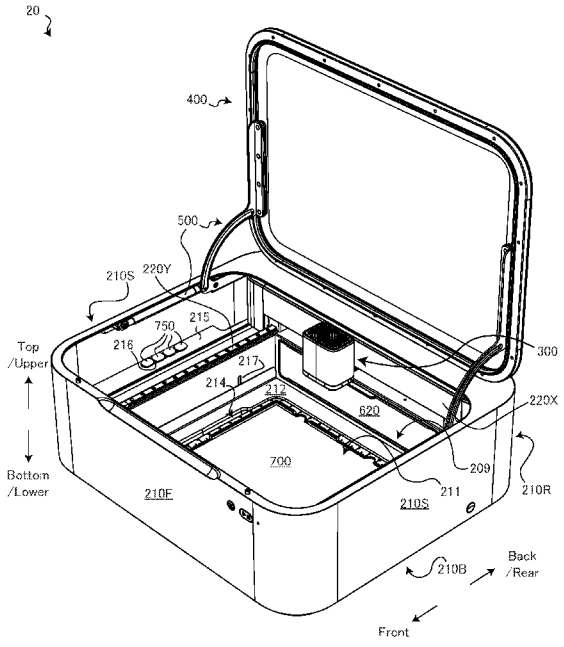


FIG. 2B

(57) Abstract: A laser crafting apparatus for directing electromagnetic radiation toward a workpiece may include various features. For example, the laser crafting apparatus may include a material support tray that is removably supported within an internal volume of the laser crafting apparatus. Further, the apparatus may include pre-filter disposed in a ventilation pathway between a workspace region of the internal volume and an extractor fan. The laser crafting apparatus may include a laser carriage assembly that houses a laser module and the assembly may include a lens tray detachably coupled to the support structure of the laser carriage assembly. In various embodiments, the laser crafting apparatus includes a lid having a radiation attenuation layer and a fire suppression layer.

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[Continued on next page]

DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

B23K 26/38(2006.01)i; **B23K 37/02**(2006.01)i; **B23K 37/04**(2006.01)i; **B23K 26/06**(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)

B23K 26/38(2006.01); B23K 26/03(2006.01); B23K 26/14(2006.01); B23K 26/16(2006.01); B23K 26/36(2006.01); G05B 19/406(2006.01)

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
Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: laser crafting apparatus, support tray, ventilation, sensor, and hinge structure

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007-0034613 A1 (LUNDBERG, JOHN D.) 15 February 2007 (2007-02-15) paragraphs [0031]-[0043] and figures 1-9	1-4,6,45,48
Y		5,7-44,46-47,49-57
Y	US 2005-0011874 A1 (LAI, JIN-SHENG) 20 January 2005 (2005-01-20) paragraphs [0022]-[0026] and figures 2-5	5,7-14
Y	JP 2020-001057 A (AMADA HOLDINGS CO., LTD.) 09 January 2020 (2020-01-09) paragraphs [0025]-[0044] and figures 1-8	15-39
Y	JP 10-296479 A (TOYOTA MOTOR CORP.) 10 November 1998 (1998-11-10) paragraphs [0014], [0015] and figures 3-5	32-39
Y	US 2020-0073362 A1 (GLOWFORGE INC.) 05 March 2020 (2020-03-05) paragraphs [0044], [0067], [0093], [0100], [0119], [0172] and figure 1	40-44,46-47

☑ 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
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"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)
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
13 September 2022	**13 September 2022**

Name and mailing address of the ISA/KR	Authorized officer
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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.
Y	US 6855911 B1 (LAI, JIN-SHENG) 15 February 2005 (2005-02-15) column 2, lines 24-40 and figures 2-5	49-57
Y	KR 10-2074866 B1 (3EONE CO., LTD.) 07 February 2020 (2020-02-07) paragraph [0026] and figure 2	51,56,57

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2022/019403

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:

I: claims 1-57 relate to a laser crafting apparatus.
II: claims 58-79 relate to a laser carriage assembly for a laser crafting apparatus.
III: claims 80-105 relate to a lid for a laser crafting apparatus.

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 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.: **1-57**

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.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2022/019403

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KR 10-2074866 B1	07 February 2020	None	