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[Continued on next page]

(54) Title: CRYSTAL GROWTH APPARATUS FOR SOLAR CELL MANUFACTURING

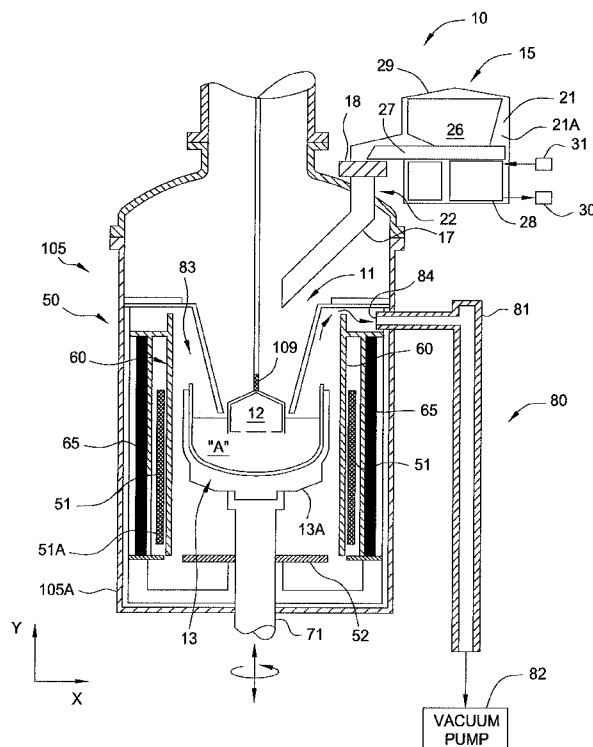


FIG. 2

(57) Abstract: The present invention(s) provide an apparatus for forming a rod, which is also sometimes referred to as an ingot or boule, which can be subsequently diced to form multiple substrates that may be utilized to form a solar cell device. The substrate may be a monocrystalline, or polycrystalline, substrate made by use of a CZ type crystal pulling technology. In one embodiment, the crystal pulling apparatus is used to form a substrate used form a solar cell device. In one embodiment, a feed material is delivered to a crucible using a vibratory feeder assembly and is heated using a novel heater assembly to allow a CZ type crystal pulling process to be performed.



TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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A. CLASSIFICATION OF SUBJECT MATTER***H01L 31/042(2006.01)i, H01L 21/20(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)

IPC8 H01L

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) and keywords "apparatus, crystalline, semiconductor, substrate, crucible, wall, vibratory, feeder, assembly, isolation, hopper, and similar terms"

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 03-023286 A (MITSUBISHI MATERIALS CORP.) 31 January 1991 See abstract, Figures 1-2 and claims 1-4	1-15
A	JP 09-202686 A (SUMITOMO SITIX CORP.) 05 August 1997 See abstract, Figures 1-4 and claims 1-2	1-15
A	US 5279798 A (Keneto et al.) 18 January 1994 See abstract, Figures 1-12 and claims 1-5	1-15
A	US 5312600 A (Kamio et al.) 17 May 1994 See abstract, Figures 1-16 and claims 1-7	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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"&" document member of the same patent family

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INTERNATIONAL SEARCH REPORT

Information on patent family members

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