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(54) Title: SYSTEMS AND METHODS FOR GROWING MONOCRYSTALLINE SILICON INGOTS BY DIRECTIONAL SOLIDIFICATION

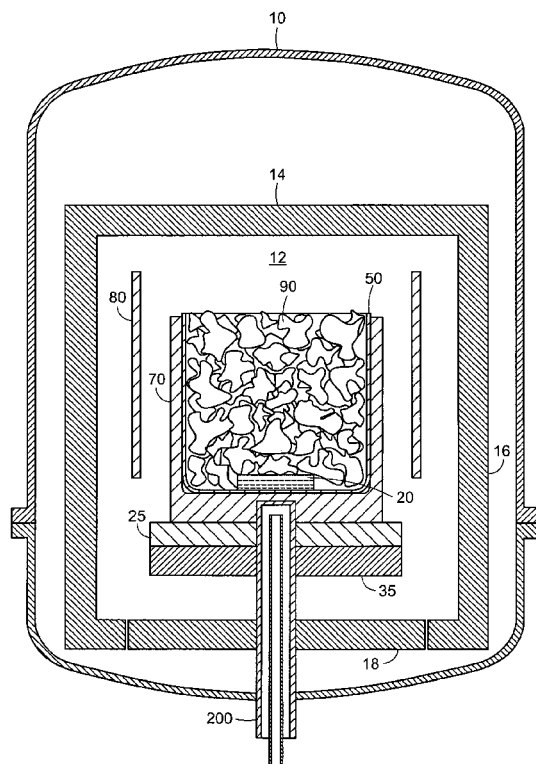


FIG. 1

(57) Abstract: Systems and methods are provided for producing monocrystalline materials such as silicon, the monocrystalline materials being usable in semiconductor and photovoltaic applications. A crucible (50) is received in a furnace (10) for growing a monocrystalline ingot, the crucible (50) initially containing a single seed crystal (20) and feedstock material (90), where the seed crystal (20) is at least partially melted, and the feedstock material (90) is completely melted in the crucible (50), which is followed by a growth and solidification process. Growth of monocrystalline materials such as silicon ingots is achieved by directional solidification, in which heat extraction during growth phases is achieved using insulation (14) that is movable relative to a crucible (50) containing feedstock (90). A heat exchanger (200) also is provided to control heat extraction from the crucible (50) during the growth and solidification process to achieve monocrystalline growth.



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