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(54) Title: TUNABLE, SELF-POWERED INTEGRATED ARC PLASMA-MELTER VITRIFICATION SYSTEM FOR WASTE TREAT-
MENT AND RESOURCE RECOVERY

(57) Abstract

The present invention provides a relatively compact self-powered, tunable waste conversion system and apparatus which has the advantage of highly robust operation which provides complete or substantially complete conversion of a wide range of waste streams into useful gas and a stable, nonleachable solid product at a single location with greatly reduced air pollution to meet air quality standards. The system provides the capability for highly efficient conversion of waste into high quality combustible gas and for high efficiency conversion of the gas into electricity by utilizing a high efficiency gas turbine or by an internal combustion engine. The solid product can be suitable for various commercial applications. Alternatively, the solid product stream, which is a safe, stable material, may be disposed of without special considerations as hazardous material. In the preferred embodiment of the invention, the arc plasma furnace and joule heated melter are formed as a fully integrated unit with a common melt pool having circuit arrangements for the simultaneous

independently controllable operation of both the arc plasma and the joule heated portions of the unit without interference with one another. The preferred configuration of this embodiment of the invention utilizes two arc plasma electrodes with an elongated chamber for the molten pool such that the molten pool is capable of providing conducting paths between electrodes. The apparatus may additionally be employed with reduced or without further use of the gases generated by the conversion process. The apparatus may be employed as a self-powered or net electricity producing unit where use of an auxiliary fuel provides the required level of electricity production.

