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(54) Title: METHODS OF OPERATING CHEMICAL PROCESSING VESSELS THAT INCLUDE SHROUDS

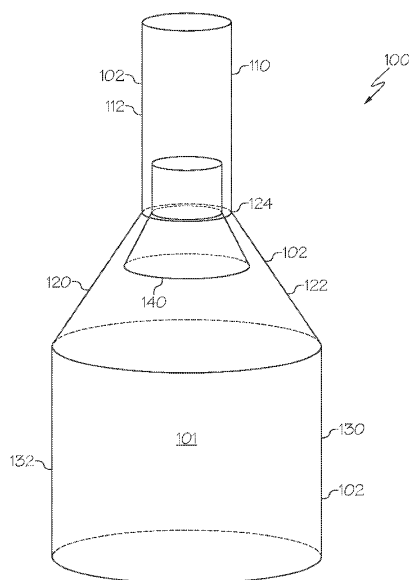


FIG. 1

(57) Abstract: Chemical processing vessels and methods for their operation are disclosed herein. A chemical processing vessel may be operated by a method including contacting a chemical reactant with a fluidized particulate in the chemical processing vessel to form a chemical product, wherein the fluidized particulate and the chemical reactant moves in a generally upward direction through the chemical processing vessel. The chemical processing vessel may include an exterior vessel wall forming a continuous passage extending therethrough, wherein the exterior vessel wall has a wall temperature of less than 350 °C during operation. The exterior vessel wall may include a riser wall having a substantially continuous cross-sectional shape, a frustum wall positioned below the riser wall and having a variable cross-sectional shape extending radially outwardly from the riser wall, and a transition region between the riser wall and the frustum wall. The chemical processing vessel may further include a primary refractory layer disposed on and in direct contact with the inner surface of the exterior vessel wall. The chemical processing vessel may further include a shroud including a first end and a second end opposite the first end, the shroud disposed radially inward of the exterior vessel wall and positioned over at least a portion of the primary refractory layer. The first end of the shroud may be disposed above the transition region and the second end of the shroud may be disposed below the transition region. The shroud may include metal material.

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