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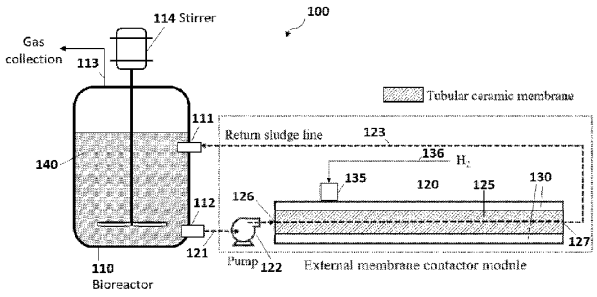



FIG. 2

(57) Abstract: The current invention relates to a method of biogas upgrading, the method comprising the steps of (a) providing a system comprising a bioreactor comprising a liquid inlet and a liquid outlet; and an external ceramic membrane module comprising a hollow ceramic membrane and a gas-tight housing surrounding the hollow ceramic membrane, where the hollow ceramic membrane has an interior lumen, a first end fluidly connected to the liquid outlet of the bioreactor and a second end fluidly connected to the liquid inlet of the bioreactor, and the gas- tight housing has a gaseous inlet suitable to provide a gas to an interior of the gas-tight housing; and a wastewater mixture situated within the bioreactor comprising a wastewater to be treated and a microbial population comprising anaerobic bacteria; and (b) operating the system under anaerobic conditions and recirculating the wastewater mixture from the bioreactor through the liquid outlet into the hollow ceramic membrane and back to the bioreactor via the liquid inlet, wherein: hydrogen gas is provided through the gaseous inlet of the gas-tight housing at a suitable pressure to enable the hydrogen gas to transit into the interior lumen of the hollow ceramic membrane and be substantially dissolved in the wastewater mixture; and the hydrogen gas is reacted by the anaerobic bacteria with CO2 generated by microbial action on the wastewater to generate a biogas comprising methane.

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