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[54] **BIOCONVERSION OF WASTE BIOMASS TO USEFUL PRODUCTS**

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Related U.S. Application Data

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[58] **Field of Search** 435/168, 252.5, 435/139, 135, 140, 832

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[57] **ABSTRACT**

A process is provided for converting waste biomass to useful products by gasifying the biomass to produce synthesis gas and converting the synthesis gas substrate to one or more useful products. The present invention is directed to the conversion of biomass wastes including municipal solid waste, sewage sludge, plastic, tires, agricultural residues and the like, as well as coal, to useful products such as hydrogen, ethanol and acetic acid. The overall process includes the steps of gasifying the waste biomass to produce raw synthesis gas, cooling the synthesis gas, converting the synthesis gas to the desired product or products using anaerobic bioconversion, and then recovering the product or products. In accordance with a particular embodiment of the present invention, waste biomass is converted to synthesis gas containing carbon monoxide and, then, the carbon monoxide is converted to hydrogen by an anaerobic microorganism ERIH2, *bacillus smithii* ATCC No. 55404.

7 Claims, 42 Drawing Sheets