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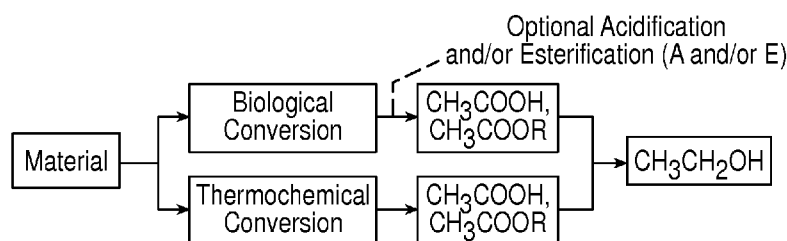
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(54) **Title**: PROCESSING BIOMASS

**FIG. 2**

(57) **Abstract**: Carbon-containing materials, such as biomass (e.g., plant biomass, animal biomass, and municipal waste biomass) or coal are processed to produce useful products, such as fuels, carboxylic acids and equivalents thereof (e.g., esters and salts). For example, systems are described that can use feedstock materials, such as cellulosic and/or lignocellulosic materials and/or starchy materials, to produce ethanol, butanol or organic acids (e.g., acetic or lactic acid), salts of organic acids or mixtures thereof. If desired, organic acids can be converted into alcohols, such as by first converting the acid, salt or mixtures of the acid and its salt to an ester, and then hydrogenating the formed ester. Acetogens or homoacetogens which are capable of utilizing a syngas from a thermochemical conversion of coal or biomass can be utilized to produce the desired product.