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Huffman

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(54) **METHOD TO ELIMINATE ALL CARBON DIOXIDE EMISSIONS DURING THE PRODUCTION OF LIQUID FUELS FROM COAL AND NATURAL GAS**

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CPC **C07C 1/0485** (2013.01); **C07C 1/041** (2013.01); **C10G 2/30** (2013.01); **C10G 2/33** (2013.01)

(58) **Field of Classification Search**
CPC **C07C 1/0485**; **C07C 1/041**; **C10G 2/30**; **C10G 2/33**

See application file for complete search history.

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(57) **ABSTRACT**

This invention relates to the production of liquid fuels from coal and natural gas and, more specifically, to a new process that combines Fischer-Tropsch synthesis (FTS) with catalytic dehydrogenation (CDH) and methane injection (MI) into the CDH reactor (FTS-CDH-MI) to eliminate all carbon dioxide emissions during the production of liquid fuels. The additional methane for the FTS-CDH-MI process can be derived from natural gas produced by hydro-fracking. The addition of methane in the CDH process eliminates the need for the standard water-gas shift (WGS) reaction to the syngas, which is used to increase the hydrogen (H₂) of the syngas in FTS. This eliminates the use of water in the process and eliminates entirely the production of CO₂. In addition to producing the H₂ needed for FTS, this process (FTS-CDH) converts the C in these gases into multi-walled carbon nanotubes (MWCNT).

12 Claims, 7 Drawing Sheets