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(54) Title: A PROCESS AND APPARATUS FOR PRODUCING HYDROGEN BY THERMAL REFORMING OF AMMONIA

(57) Abstract: The invention provides a process for producing hydrogen by thermal reforming of ammonia in an apparatus comprising an ammonia cracking reactor with a catalyst chamber and a staged combustion unit, wherein the catalyst chamber of the ammonia cracking reactor is heated indirectly by heat exchange with the hot flue gases from the staged combustion unit, comprising the steps of: a) incomplete combustion of a fuel comprising ammonia in the first stage of the staged combustion unit to generate a flue gas stream of elevated temperature T1 in the range of 750 to 2000°C, preferably in the range of 1200 to 2000°C; b) complete combustion of the fuel comprising ammonia in the second stage of the staged combustion unit to generate a flue gas stream of a temperature T3 that is less than T1; c) exchanging heat from the flue gas provided in step b) with the ammonia cracking reactor to raise the temperature in the catalyst chamber to a catalytic cracking temperature T2 in the range of 400 to 1000°C, more preferably in the range of 600 to 800°C; d) subjecting an ammonia stream in the heated ammonia cracking reactor of step c) to a catalytic ammonia-cracking step to yield a thermally cracked stream comprising hydrogen, and e) separating the thermally cracked stream into a reject gas stream and an enriched hydrogen stream and withdrawing the enriched hydrogen stream, wherein T3 is at least 50°C above T2 up to a maximum of 1600°C, and wherein T3 is at least 50°C below T1, and wherein the fuel consists of ammonia and the reject gas stream of step e). An apparatus for performing this process is also provided.

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