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E(31-A) H(9-C)

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Synthesis gas generator with separate supplies of fuel powder - and oxygen-contg. gas without burners gives uniform reaction zone

kg/sec x cu. m. of reactor space, and O₂ is fed at about 0.6-0.8 kg/kg carbon. The O₂ may contain steam as moderator.

In a process for mfr. of synthesis gas, O₂-contg. gas is fed axially to the bottom of a vertical cylindrical reactor, and powdered solid fuel (e. g. coal) is delivered into the reactor downstream of the gas inlet, in a stream approximately at right angles (+20°) to the axis. This stream is provided by one or more stationary or rotating sprayers at the end of an axial supply pipe. A centrifugal pump can provide the rotating spray.

EMBODIMENT

A rotating pipe (3) for fuel supply has a hollow rotor (4) attached, having a narrow slit in its periphery for the delivery of particles (in a carrier gas, e. g. N₂). The whole is a centrifugal pump, where the centripetal force on the fuel particles overcomes the excess pressure in the reactor. The O₂-contg. gas enters the axial pipe (6), ending in a diffusing opening (5) with a conical deflector (9), so that the projection of the opening strikes the reactor wall at the same height as the rotor (4). Molten slag falls directly or drips down the wall to the ring shaped channel (7), from which it is drained to a water bath. Synthesis gas prod. leaves the top of the reactor (8) for cooling and purification.

ADVANTAGES

There are no ordinary burners to require adjustment or to develop blowback or other operating faults. Replacement of eroded parts is simplified. The whole cross section of the reactor can be filled with a uniform reaction zone.

EXAMPLE

To a reactor of vol. 13 cu. m., there was fed per hr by centrifugal pump 30 tonnes of fine coal powder (mean particle dia. 50 microns) with 100 kg N₂. The ash-free

DETAILS

The reactor pressure is pref. 3-60 atm., and the temp. 1300-1900°C. Carbonaceous fuel is fed at about 0.1-0.9

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compsn. of the coal (wt. %) was C (78.1), H (5.5), N (1.2), O (10.9), S (4.3); and there was 12.6 wt. % ash and 2 wt. % water. Every hr there was also fed 25 tonnes of O_2 (99 vol. %) and 6.7 tonnes steam. The reactor pressure was 40 atm.

The prod. leaving the reactor at $1500^\circ C$ contg. (vol. %): CO (63.5), H_2 (31.8), CO_2 (0.8), H_2S (1.3), H_2O (1.5), N_2 (0.8), COS (0.1). The gas was practically soot-free, but contg. 3 wt. % fly-ash, which was removed in a cyclone. (13pp1492).

