

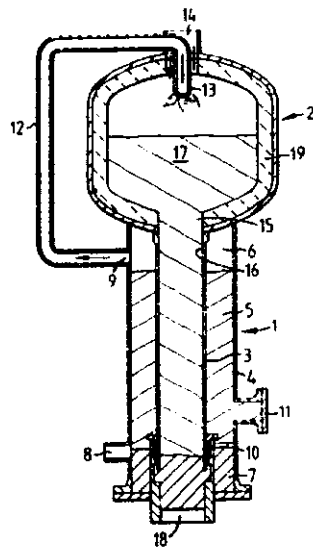
<p>87-293573/42 E36 H04 BRPE 15.04.86 BRITISH PETROLEUM PLC *EP -242-199-A 15.04.86-GB-009099 (21.10.87) B01j-08/06 C01b-03/38 Process and appts. for producing raw synthesis gas - in integral primary and secondary reformer, secondary effluent being used for indirect heating of primary zone C87-124602 R(BE DE FR GB IT NL)</p>	<p>E(31-A1) H(4-C2, 4-E4)</p>
<p>Process, and apparatus comprises</p> <p>(a) feeding hydrocarbon-containing gas and steam to a primary reforming zone containing a primary steam reforming catalyst under reforming conditions in which the hydrocarbon is partially reformed producing a primary reformer effluent;</p> <p>(b) feeding the primary reformer effluent and oxygen-containing gas to a secondary reforming zone containing secondary reforming catalyst under reforming conditions in which a secondary reformer effluent is produced;</p> <p>(c) passing the secondary reformer effluent to the primary reforming zone as indirect heating medium; and</p> <p>(d) removing the secondary reforming effluent from the primary reforming zone and recovering the raw synthesis gas; such that</p> <p>(e) the primary reforming zone consists of at least one double-pipe heat exchanger-reactor, the primary steam re-</p>	<p>forming catalyst being positioned either in the central core of the doublepipe heat exchanger-reactor or in the annulus thereof; and</p> <p>(f) the secondary reformer effluent is passed through which ever of the central core or annulus does not contain the primary steam reforming catalyst countercurrently to the hydrocarbon-containing gas and steam.</p> <p><u>USE</u></p> <p>For producing synthesis gas by reforming.</p> <p><u>ADVANTAGE</u></p> <p>The apparatus is relatively simple being made from standard pipe sections, so that capital cost is low; the heat requirement and/or capacity of the process can be relatively easily changed because of the modular design.</p> <p><u>INTEGRAL PRIMARY AND SECONDARY REFORMER</u></p> <p>The reformer comprises a primary reforming zone (1) and a secondary reforming zone (2). The primary reforming zone (1) consists of double pipe heat exchanger-reactor having concentric inner and outer pipes (3, 4).</p> <p style="text-align: right;">EP-242199-A*</p>

A primary reforming catalyst (5) is packed into the annulus (6) formed between the pipes, the catalyst being supported on packing (7). Feed enters through inlet (8) and effluent leaves by outlet (9) so that the feed passes along the length of the annulus (6). Packed gland (10) provides relative movement between the pipes.

The secondary reforming zone (2) consists of a reactor lined with refractory (19), attached to the primary reforming zone (1) at the opposite end to feed inlet (8). Pipe (12) conveys primary reformer effluent to the secondary reformer zone (2). Oxygen containing gas and optionally steam, hydrocarbon-containing gas and/or carbon dioxide can be introduced via inlet (14).

The secondary reformer effluent leaves the secondary reforming zone (2) via outlet (15) which is connected to the inner core (16) of the primary reforming zone (1). The secondary reforming catalyst is contained in the secondary reforming zone (2) and also in the inner core (16) of the primary reforming zone. (11pp1684CGDwgNo1/5).

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