24316 K/14 H09 TEXC 30.05.79
TEXACO DEVE CORP *US 4377-394
28.07.80-US-172746 (+043918) (22.03.83) C10j-03/20

Pressure vessel for prodn. of cleaned and cooled gas - includes gas diversion and residue sepn. and gas-solids impingement sepn. chambers with associated slag chambers

C83-033572 C.i.p. of 4251228 (=DE 3019937; 90431C)

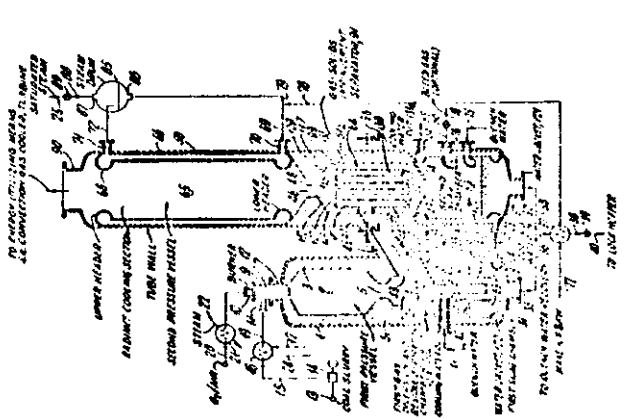
Appts. is claimed for continuously producing a high-pressure stream of cleaned and cooled synthesis gas, reducing gas, or fuel gas. It comprises a cylindrical, refractory-lined pressure vessel contg. a reaction zone with a burner mounted in a top inlet. A thermally insulated gas diversion and residue sepn. chamber is connected to the bottom outlet of the reaction zone. A slag chamber is located beneath the sepn. chamber. A thermally insulated transfer line connects the sepn. chamber with a thermally insulated gas-solids impingement separator located in a separate vertical pressure vessel. A slag chamber is located beneath the impingement separator and a radiant cooling zone is located above the separator.

ADVANTAGES

Combustion residue may be removed from the raw stream of synthesis gas, and its sensible heat may be extracted at max. temp. to produce by-product steam.

EMBODIMENT

A pressure vessel (1) comprises a reaction zone (2), a gas diversion and residue separation chamber (4) and a slag chamber (6). Preheated coal-water slurry is passed through a burner (9) into the reaction zone where it impinges and reacts by partial oxidation with a stream of free-O_2 contg. gas. A dip-tank assembly (26) depends into the slag chamber. A transfer line (44) directs hot raw gas into a gas-solids impingement separator (91) in a second gas diversion and residue separation chamber (46) located in a second pressure vessel (50). A second slag chamber (53) is located beneath the impingement separator. A radiant cooling section (65) is provided above the separator.(14pp 1044).



US4377394

DERWENT PUBLICATIONS LTD.

41292

41292 E/20 H09 TEXC 30.05.79
TEXACO DEV CORP *US 4328-008
02.07.80-US-165305 (+043918) (04.05.82) C10k-01/02

Cleansing and cooling synthesis gas - by gravity sepn. and then cyclone sepn. without cooling, then cooling in radiant cooling zone

C.i.p. of 4251228.

Entrained solid matter and slag are sepd. from a hot raw gas stream contg. H_2, CO, CO_2, H_2O, H_2S, COS, CH_4, NH_3, N_2 and Ar by (a) passing the gas downwards at high velocity into a thermally insulated unobstructed free-flow gas diversion and residue chamber (4) where the gas velocity is reduced (its temp. remaining the same) and a portion of the slag separates by gravity and falls through a bottom outlet (30) into a slag pot (6); (b) passing 80-100 vol.% of the gas leaving the chamber (4) through a thermally insulated (45) transfer line (44) and then through a number of insulated cyclones, connected in series and/or parallel which are in a separate pressure vessel (50) to that of chamber (4), so that slag and solids fall into a second slag pot (53); (c) passing 80-100 vol.% of the gas from the cyclones upwards, at reduced velocity, through a radiant cooling zone (65) comprising vertical tubes (68) lining the inside walls (66), so that any remaining slag or solids, solidify and fall out; and (d) removing cleaned gas from the top of the cooling zone.

USES

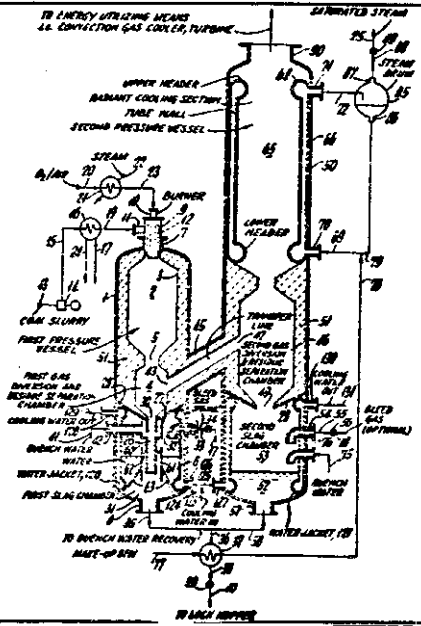
The process is esp. used in treating synthesis gas produced by the partial oxidn. of coal (e.g. at 1800-3000°F. and 10-190 atms.).

DETAILS

The solids and slags sepd. in (a) and/or (b) and (c) are cooled by passing the material sepd. in (a) through outlet (30) and then through a vertical dip tube (26), communicating with outlet (30) and ending below the level of the quench water in slag pot (8) and passing the material sepd. in (b) and (c) through the bottom outlet (49) of chamber (46) and through a second dip tube (not shown) ending below the water level in slag pot (53).

Bridging of the bottom outlets (30) and (49) is prevented by passing bleed gas comprising 0.5-20 vol.% of the hot gas from reaction zone (2) into the slag pot (8) along with sepd. solids and by passing bleed gas comprising 0.5-20 vol.% of the hot gas from transfer line (44) through the

bottom outlet of the cyclones along with sepd. solids. (16pp959).



US4328008

DERWENT PUBLICATIONS LTD.

41291 E/20 H09 TEXC 29.11.79
TEXACO DEV CORP *US 4328-006
10.07.80-US-168849 (+098457) (04.05.82) B01j-03

Appts. for producing synthesis, reducing or fuel gas - comprises two vertical chambers, one contg. reaction and sepn. zones, the other contg. sepn. and cooling zones

Intermediate priority: 29.11.79; US-098457. C.i.p. of 4251228 and 4289502.

Appts. for producing a continuous high-pressure stream of cleaned and cooled synthesis gas, reducing gas or fuel gas is claimed. It comprises a vertical, lined (3) pressure vessel (1) contg. a reaction zone (2) in which solid carbonaceous fuel is reacted with O_2 and, underneath zone (2), an insulated gas diversion and residue sepn. chamber (4) whose internal volume is smaller than that of zone (2). A bottom outlet (30) discharges sepd. solids into a slag pot (6). A side outlet (43) leads 80-100 vol.% of the gas stream, via insulated (45) transfer line (44), to a number (e.g. two) of cyclones in a second pressure vessel (50). The cyclones discharge sepd. solids into a second slag pot (53) and 80-100 vol.% of the gas from the cyclones passes into a radiant cooling zone (65) comprising vertical tubes (68) lining the inside walls (66).

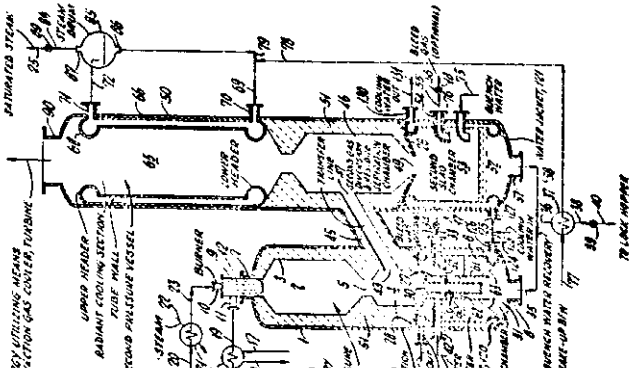
ADVANTAGES

The appts. cleans the gas, reducing downstream fouling of equipment, such as compressors and turbines, and preventing plugging of downstream catalyst beds.

DETAILS

The axis of line (44) makes an angle of 30-120° with the axis of vessel (50). Either or both sepn. zones (4) and (46) may have a vertical dip tube (e.g. 26) leading the slag to below the level of the slag quench water.

Outlets may be provided in either or both chambers or in transfer line (44) for a stream of bleed gas which may be used to prevent bridging of the bottom outlets of the chambers. (15pp959).


SATURATED STEAM
TO ENERGY UTILIZING MEANS
4A CONVECTION GAS COOLER, FUNNING
UPPER HEADER
RADIANT COOLING SECTION
TUBE WALL
SECOND PRESSURE VESSEL
LOWER HEADER
STEAM
O2/AIR
BURNER
COAL SLURRY
FIRST PRESSURE VESSEL
FIRST GAS DIVERSION AND RECYCLE SEPARATION CHAMBER
COOLING WATER
BOILER FEED WATER
WATER JACKETED
FIRST SLAG CHAMBER
TRANSFER LINE
SECOND GAS DIVERSION CHAMBER
SECOND SLAG CHAMBER
WATER JACKETED
TO BOILER WATER RECOVERY
MAKE-UP BFW
TO LOCK HOPPER

DERWENT PUBLICATIONS LTD.

39128 E/19 E36 H09 J01 TEXC 30.05.79
TEXACO DEV CORP *US 4326-856
28.07.80-US-172747 (+043918) (27.04.82) C10k-01/02

Cleaning and cooling synthesis gas - using diversion sepn. and impingement sepn. chambers and vertical cooling zones

E(31-A, 31-N5) H(9-C, 9-D) J(1-G2)

248

C.i.p. of 4251228 (=DT 3019937; 90431 C).

A process is claimed for sepg. entrained solids and slag from a hot raw gas stream (comprising H_2, CO and CO_2, and also H_2O, H_2S, COS, CH_4, NH_3, N_2 and Ar) produced by the partial oxidn. of solid carbonaceous fuels at 1800-3000° F and 10-190 atmospheres.

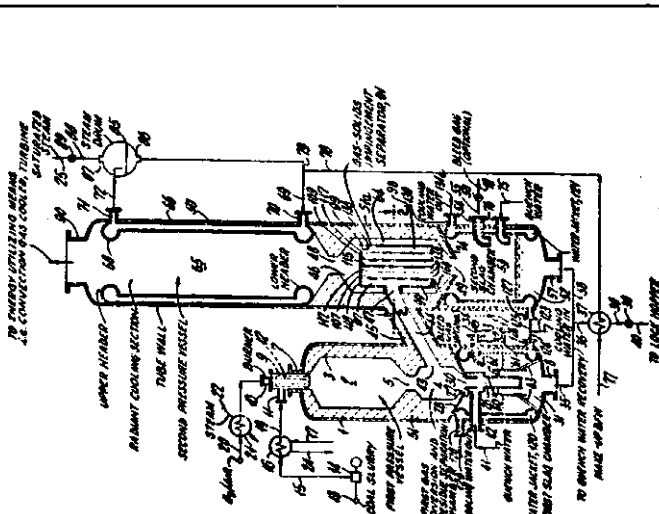
The process comprises (a) passing the raw gas downwards (5) at high velocity into a thermally insulated, unobstructed, free-flow gas-diversion and residue-sepn. chamber (4) which separates solids and slag (via a bottom exit) from hot gas (which is not cooled at all); (b) passing 80-100 vol. % of the hot gas from (a), which exits from the side (43) of the chamber, through a heat insulated (45) transfer line (44) then through at least one heat insulated gas-solids impingement sepn. device (91) located in a separate vertical pressure vessel (50); (c) passing 80-100 vol. % of the hot gas from (b) up through a vertical cooling zone (65) comprising vertical cooling tubes lining the walls (66) of a passage, so that the gas is cooled to a safe temp. and the remaining ash particles solidify, drop under gravity and are passed into the slag pot (52) underneath the sepn. device in (b); and (d) removing cleaned, cooled gas from the radiant cooling zone.

ADVANTAGES

The synthesis gas is cleaned and partially cooled, thus avoiding fouling of downstream waste heat boilers, compressors, turbines, etc. and avoiding clogging of downstream catalyst beds.

DETAILS

2-8 impingement separators (91) may be used in parallel and/or series. 0-20 vol. % of the hot gas streams may be passed through bottom outlets in each diversion zone to prevent bridging. Cooling zone lowers the gas temp. to 900-1800°F.(15pp959).



90431

90431 C/51 H09 TEXC 30.05.79
TEXACO DEV CORP *DT 3019-937
30.05.79-US-043918 *(11.12.80)* C10k-01/02

Particulate sepn. and cooling of synthesis gas - by passage through two insulated sepn. chambers and a heat exchanger

Process and appts. are claimed for sepg. entrained solids and molten ash (slag) from and reducing the temp. of crude gas streams produced by partial oxidn. of solid carbonaceous fuels at 982-1649°C and 10-190 bar.

The process comprises first passing the gas at high velocity directly from the gasification zone downwards into an insulated free-flow gas-deflection/residue-sepn. (GDRS) chamber with a smaller capacity than the gasification zone, and collecting sepd. residues in an underlying slag chamber. 80-100 vol % of the hot gas stream from the 1st GDRS chamber is then passed via an insulated transfer line to a 2nd insulated GDRS chamber, and sepd. residues are collected in a 2nd slag chamber. 80-100 vol % of the hot gas stream from the 2nd GDRS chamber is then passed upwards through a free-flow concentric vertical passage for cooling by indirect heat exchange with a coolant, and sepd. residues are collected in the 2nd slag chamber.

ADVANTAGES

H(9-C, 9-D).

16

The process removes particulates and cools the gas without the need for quenching in water or other coolants.

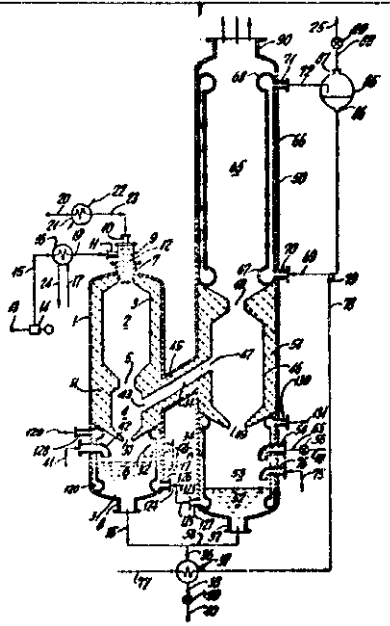
EMBODIMENT

The gas from the gasification zone (2) passes directly into the 1st GDRS chamber (4), which is an insulated pressure vessel. Gravity-sepd. particulates drop into an underlying slag chamber (6) contg. water. A small side stream of gas (0.5-20 vol %) can be diverted into the chamber to prevent plugging.

The gas is then passed through an ascending insulated conduit (44) into the 2nd GDRS chamber (46), again in the form of an insulated pressure vessel with an underlying slag chamber (52). The gas then ascends through a heat-exchange section (65) vertically above the 2nd GDRS chamber. The internal vol. of the heat-exchange section is pref. 5-10 times that of the gasification zone, and the internal vol. of the 2nd GDRS chamber is pref. 4-10 times that of the 1st.

In other embodiments, the 2nd GDRS chamber can incorporate a one- or multi-stage cyclone separator or an impingement-type separator. (56pp367).

DT3019937+



DT3019937