

CPC COOPERATIVE PATENT CLASSIFICATION

C CHEMISTRY; METALLURGY

(NOTES omitted)

CHEMISTRY

C10 PETROLEUM, GAS OR COKE INDUSTRIES; TECHNICAL GASES CONTAINING CARBON MONOXIDE; FUELS; LUBRICANTS; PEAT

C10J PRODUCTION OF PRODUCER GAS, WATER-GAS, SYNTHESIS GAS FROM SOLID CARBONACEOUS MATERIAL, OR MIXTURES CONTAINING THESE GASES (synthesis gas from liquid or gaseous hydrocarbons [C01B](#); underground gasification of minerals [E21B 43/295](#)); CARBURETTING AIR OR OTHER GASES

WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

1/00	Production of fuel gases by carburetted air or other gases without pyrolysis (for internal-combustion engines F02)	3/16	. . . simultaneously reacting oxygen and water with the carbonaceous material
		3/18	. . . using electricity
1/02	. Carburetted air	3/20	. . Apparatus; Plants
1/04	. . Controlling supply of air	3/22	. . . Arrangements or dispositions of valves or flues
1/06	. . with materials which are liquid at ordinary temperatures	3/24	. . . . to permit flow of gases or vapours other than upwardly through the fuel bed
1/08	. . . by passage of air through or over the surface of the liquid	3/26	. . . . . downwardly
		3/28	. . . . . fully automatic
1/10	. . . . with the liquid absorbed on carriers	3/30	. . . Fuel charging devices
1/12	. . . by atomisation of the liquid	3/32	. . . Devices for distributing fuel evenly over the bed or for stirring up the fuel bed
1/14	. . . Controlling the supply of liquid in accordance with the air supply	3/34	. . . Grates; Mechanical ash-removing devices
1/16	. . with solid hydrocarbons	3/36	. . . . Fixed grates
1/18	. . in rotary carburettors	3/38	. . . . . with stirring beams
1/20	. Carburetted gases other than air	3/40	. . . . . Movable grates
1/207	. Carburetted by pyrolysis of solid carbonaceous material in a fuel bed (C10J 3/66 takes precedence)	3/42	. . . . . Rotary grates
1/213	. Carburetted by pyrolysis of solid carbonaceous material in a carburettor	3/44	. . . adapted for use on vehicles
		3/46	. Gasification of granular or pulverulent flues in suspension
1/22	. Adding materials to prevent vapour deposition	3/463	. . {in stationary fluidised beds}
1/24	. Controlling humidity of the air or gas to be carburetted	3/466	. . {Entrained flow processes}
		3/48	. . Apparatus; Plants
1/26	. using raised temperatures or pressures	3/482	. . . {Gasifiers with stationary fluidised bed}
1/28	. Odourising air gas	3/485	. . . {Entrained flow gasifiers}
		3/487	. . . . {Swirling or cyclonic gasifiers}
3/00	Production of combustible gases containing carbon monoxide from solid carbonaceous fuels (destructive distillation processes C10B)	3/50	. . . Fuel charging devices
		3/503	. . . . {for gasifiers with stationary fluidised bed}
3/002	. {Horizontal gasifiers, e.g. belt-type gasifiers}	3/506	. . . . {for entrained flow gasifiers}
3/005	. {Rotary drum or kiln gasifiers}	3/52	. . . Ash-removing devices
3/007	. {Screw type gasifiers}	3/523	. . . . {for gasifiers with stationary fluidised bed}
3/02	. Fixed-bed gasification of lump fuel	3/526	. . . . {for entrained flow gasifiers}
3/04	. . Cyclic processes, e.g. alternate blast and run	3/54	. . Gasification of granular or pulverulent fuels by the Winkler technique, i.e. by fluidisation
3/06	. . Continuous processes		
3/08	. . . with ash-removal in liquid state	3/56	. . . Apparatus; Plants
3/10	. . . using external heating	3/57	. Gasification using molten salts or metals (C10J 3/02 , C10J 3/46 take precedence)
3/12	. . . using solid heat-carriers		
3/14	. . . using gaseous heat-carriers	3/58	. combined with pre-distillation of the fuel
		3/60	. . Processes

- 3/62 . . . with separate withdrawal of the distillation products
- 3/64 . . . with decomposition of the distillation products
- 3/66 by introducing them into the gasification zone
- 3/72 . Other features
- 3/721 . . {Multistage gasification, e.g. plural parallel or serial gasification stages}
- 3/723 . . {Controlling or regulating the gasification process}
- 3/725 . . {Redox processes}
- 3/726 . . {Start-up}
- 3/728 . . {Shut down}
- 3/74 . . Construction of shells or jackets
- 3/76 . . . Water jackets; Steam boiler-jackets
- 3/78 . . High-pressure apparatus
- 3/80 . . with arrangements for preheating the blast or the water vapour
- 3/82 . . Gas withdrawal means
- 3/84 . . . with means for removing dust or tar from the gas
- 3/845 {Quench rings}
- 3/86 . . combined with waste-heat boilers
- 2200/00** **Details of gasification apparatus**
- 2200/06 . Catalysts as integral part of gasifiers ([catalysts added to the feed C10J 2300/0986](#))
- 2200/09 . Mechanical details of gasifiers not otherwise provided for, e.g. sealing means
- 2200/12 . Electrodes present in the gasifier
- 2200/15 . Details of feeding means
- 2200/152 . . Nozzles or lances for introducing gas, liquids or suspensions
- 2200/154 . . Pushing devices, e.g. pistons
- 2200/156 . . Sluices, e.g. mechanical sluices for preventing escape of gas through the feed inlet
- 2200/158 . . Screws
- 2200/31 . Mobile gasifiers, e.g. for use in cars, ships or containers
- 2200/33 . Laboratory scale gasifiers
- 2200/36 . Moving parts inside the gasification reactor not otherwise provided for ([devices for distributing fuel evenly over a fixed bed C10J 3/32](#))
- 2200/39 . Gasifiers designed as centrifuge
- 2300/00** **Details of gasification processes**
- 2300/06 . Modeling or simulation of processes
- 2300/09 . Details of the feed, e.g. feeding of spent catalyst, inert gas or halogens
- 2300/0903 . . Feed preparation
- 2300/0906 . . . Physical processes, e.g. shredding, comminuting, chopping, sorting
- 2300/0909 . . . Drying
- 2300/0913 . . Carbonaceous raw material
- 2300/0916 . . . Biomass
- 2300/092 Wood, cellulose
- 2300/0923 Sludge, e.g. from water treatment plant
- 2300/0926 . . . Slurries comprising bio-oil or bio-coke, i.e. charcoal, obtained, e.g. by fast pyrolysis of biomass
- 2300/093 . . . Coal
- 2300/0933 Coal fines for producing water gas
- 2300/0936 Coal fines for producing producer gas
- 2300/094 . . . Char
- 2300/0943 . . . Coke
- 2300/0946 . . . Waste, e.g. MSW, tires, glass, tar sand, peat, paper, lignite, oil shale
- 2300/095 . . . Exhaust gas from an external process for purification
- 2300/0953 . . Gasifying agents
- 2300/0956 . . . Air or oxygen enriched air
- 2300/0959 . . . Oxygen
- 2300/0963 . . . Ozone
- 2300/0966 . . . Hydrogen
- 2300/0969 . . . Carbon dioxide
- 2300/0973 . . . Water
- 2300/0976 as steam
- 2300/0979 as supercritical steam
- 2300/0983 . . Additives
- 2300/0986 . . . Catalysts
- 2300/0989 . . . Hydrocarbons as additives to gasifying agents to improve caloric properties
- 2300/0993 . . . Inert particles, e.g. as heat exchange medium in a fluidized or moving bed, heat carriers, sand
- 2300/0996 . . . Calcium-containing inorganic materials, e.g. lime
- 2300/12 . Heating the gasifier
- 2300/1207 . . using pyrolysis gas as fuel
- 2300/1215 . . using synthesis gas as fuel
- 2300/1223 . . by burners
- 2300/123 . . by electromagnetic waves, e.g. microwaves
- 2300/1238 . . . by plasma
- 2300/1246 . . by external or indirect heating
- 2300/1253 . . by injecting hot gas
- 2300/1261 . . by pulse burners
- 2300/1269 . . by radiating device, e.g. radiant tubes
- 2300/1276 . . . by electricity, e.g. resistor heating
- 2300/1284 . . by renewable energy, e.g. solar energy, photovoltaic cells, wind
- 2300/1292 . . . mSolar energy
- 2300/16 . Integration of gasification processes with another plant or parts within the plant
- 2300/1603 . . with gas treatment ([gas cleaning C10K 1/00](#))
- 2300/1606 . . . Combustion processes
- 2300/1609 . . . Post-reduction, e.g. on a red-white-hot coke or coal bed
- 2300/1612 . . . CO₂-separation and sequestration, i.e. long time storage
- 2300/1615 . . . Stripping
- 2300/1618 . . . Modification of synthesis gas composition, e.g. to meet some criteria
- 2300/1621 . . . Compression of synthesis gas
- 2300/1625 . . with solids treatment
- 2300/1628 . . . Ash post-treatment
- 2300/1631 Ash recycling
- 2300/1634 Ash vitrification
- 2300/1637 . . . Char combustion
- 2300/164 . . with conversion of synthesis gas
- 2300/1643 . . . Conversion of synthesis gas to energy
- 2300/1646 integrated with a fuel cell ([gasification of solids in fuel cells H01M 8/0643](#))
- 2300/165 integrated with a gas turbine or gas motor ([gas turbine plants provided with a gas producer F02C 3/28; engines using solid fuels F02B 43/08](#))

C10J

- 2300/1653 integrated in a gasification combined cycle [IGCC] (engines driven by heat coming from a gasification or pyrolysis unit [F01K 23/067](#))
- 2300/1656 . . . Conversion of synthesis gas to chemicals
- 2300/1659 to liquid hydrocarbons (Fischer-Tropsch process [C10G 2/00](#))
- 2300/1662 to methane (SNG) (production of synthetic natural gas [C10L 3/08](#))
- 2300/1665 to alcohols, e.g. methanol or ethanol (preparation of alcohols in general [C07C 29/00](#))
- 2300/1668 to urea (preparation of urea [C07C 273/00](#)); to ammonia (preparation of ammonia [C01C 1/0405](#))
- 2300/1671 . . with the production of electricity
- 2300/1675 . . . making use of a steam turbine
- 2300/1678 . . with air separation (separating gases using rectification of air [F25J 3/04521](#))
- 2300/1681 . . with biological plants, e.g. involving bacteria, algae, fungi
- 2300/1684 . . with electrolysis of water
- 2300/1687 . . with steam generation
- 2300/169 . . with water treatments (treatment of water in general or water purification [C02F](#))
- 2300/1693 . . with storage facilities for intermediate, feed and/or product
- 2300/1696 . . with phase separation, e.g. after condensation
- 2300/18 . . Details of the gasification process, e.g. loops, autothermal operation
- 2300/1807 . . Recycle loops, e.g. gas, solids, heating medium, water
- 2300/1815 . . . for carbon dioxide
- 2300/1823 . . . for synthesis gas
- 2300/183 . . Non-continuous or semi-continuous processes (cyclic processes in fixed bed gasification [C10J 3/04](#))
- 2300/1838 . . Autothermal gasification by injection of oxygen or steam
- 2300/1846 . . Partial oxidation, i.e. injection of air or oxygen only
- 2300/1853 . . Steam reforming, i.e. injection of steam only
- 2300/1861 . . Heat exchange between at least two process streams
- 2300/1869 . . . with one stream being air, oxygen or ozone
- 2300/1876 . . . with one stream being combustion gas
- 2300/1884 . . . with one stream being synthesis gas
- 2300/1892 . . . with one stream being water/steam