

CPC COOPERATIVE PATENT CLASSIFICATION

C CHEMISTRY; METALLURGY

(NOTES omitted)

METALLURGY

C21 METALLURGY OF IRON

C21B MANUFACTURE OF IRON OR STEEL (preliminary treatment of ferrous ores or scrap [C22B 1/00](#); electric heating [H05B](#))

NOTE

This subclass covers:

- the production of iron or steel from source materials, e.g. the production of pig-iron;
- apparatus specially adapted therefor, e.g. blast furnaces or air heaters.

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.

3/00	General features in the manufacture of pig-iron (mixers for pig-iron C21C 1/06)	7/12	• Opening or sealing the tap holes
3/02	• by applying additives, e.g. fluxing agents	7/125	• • {Refractory plugging mass}
3/04	• Recovery of by-products, e.g. slag	7/14	• Discharging devices, e.g. for slag
3/06	• • Treatment of liquid slag (slag wool C03B ; slag stones C04B)	7/16	• Tuyères
3/08	• • • Cooling slag	7/163	• • {Blowpipe assembly}
3/10	• • • Slag pots; Slag cars	7/166	• • {Tuyere replacement apparatus}
5/00	Making pig-iron in the blast furnace	7/18	• Bell-and-hopper arrangements
5/001	• {Injecting additional fuel or reducing agents}	7/20	• • with appliances for distributing the burden
5/002	• • {Heated electrically (plasma)}	7/205	• • • {Details concerning the gear-box driving the charge distribution system}
5/003	• • {Injection of pulverulent coal}	7/22	• Dust arresters
5/004	• • • {Injection of slurries}	7/24	• Test rods or other checking devices
2005/005	• • {Selection or treatment of the reducing gases}	9/00	Stoves for heating the blast in blast furnaces
5/006	• {Automatically controlling the process}	9/02	• Brick hot-blast stoves
5/007	• {Conditions of the cokes or characterised by the cokes used}	9/04	• • with combustion shaft
5/008	• {Composition or distribution of the charge}	9/06	• • Linings
5/02	• Making special pig-iron, e.g. by applying additives, e.g. oxides of other metals	9/08	• Iron hot-blast stoves
5/023	• • {Injection of the additives into the melting part}	9/10	• Other details, e.g. blast mains
5/026	• • • {of plastic material}	9/12	• • Hot-blast valves or slides for blast furnaces (valves in general F16K)
5/04	• Making slag of special composition	9/14	• Preheating the combustion air
5/06	• using top gas in the blast furnace process (in coke ovens C10B)	9/16	• Cooling or drying the hot-blast
7/00	Blast furnaces (lifts associated with blast furnaces B66B 9/06)	11/00	Making pig-iron other than in blast furnaces
7/002	• {Evacuating and treating of exhaust gases}	11/02	• in low shaft furnaces {or shaft furnaces}
7/005	• • {Bleeder valves or slides}	11/06	• in rotary kilns
7/007	• {Controlling or regulating of the top pressure}	11/08	• in hearth-type furnaces
7/02	• Internal forms	11/10	• in electric furnaces
7/04	• with special refractories (refractory materials C04B)	13/00	Making spongy iron or liquid steel, by direct processes
7/06	• • Linings for furnaces	13/0006	• {obtaining iron or steel in a molten state}
7/08	• Top armourings	13/0013	• • {introduction of iron oxide into a bath of molten iron containing a carbon reductant}
7/10	• Cooling; Devices therefor	13/002	• • • {Reduction of iron ores by passing through a heated column of carbon}
7/103	• • {Detection of leakages of the cooling liquid}	13/0026	• • {introduction of iron oxide in the flame of a burner or a hot gas stream}
7/106	• • {Cooling of the furnace bottom}		

- 13/0033 . {In fluidised bed furnaces or apparatus containing a dispersion of the material}
- 13/004 . {in a continuous way by reduction from ores}
- 13/0046 . {making metallised agglomerates or iron oxide}
- 13/0053 . . {On a massing grate}
- 13/006 . {Starting from ores containing non ferrous metallic oxides}
- 13/0066 . {Preliminary conditioning of the solid carbonaceous reductant}
- 13/0073 . {Selection or treatment of the reducing gases}
- 13/008 . {Use of special additives or fluxing agents}
- 13/0086 . {Conditioning, transformation of reduced iron ores}
- 13/0093 . . {Protecting against oxidation}
- 13/02 . in shaft furnaces
- 13/023 . . {wherein iron or steel is obtained in a molten state}
- 13/026 . . . {heated electrically}
- 13/029 . . {Introducing coolant gas in the shaft furnaces}
- 13/04 . in retorts
- 13/06 . in multi-storied furnaces
- 13/08 . in rotary furnaces
- 13/085 . . {wherein iron or steel is obtained in a molten state}
- 13/10 . in hearth-type furnaces
- 13/105 . . {Rotary hearth-type furnaces}
- 13/12 . in electric furnaces
- 13/125 . . {By using plasma}
- 13/14 . Multi-stage processes {processes carried out in different vessels or furnaces}
- 13/143 . . {Injection of partially reduced ore into a molten bath}
- 13/146 . . {Multi-step reduction without melting}
- 15/00 Other processes for the manufacture of iron from iron compounds (general methods of reducing to metal [C22B 5/00](#); by electrolysis [C25C 1/06](#))**
- 15/003 . {By using nuclear energy}
- 15/006 . {By a chloride process}
- 15/02 . Metallothermic processes, e.g. thermit reduction
- 15/04 . from iron carbonyl
- 2100/00 Handling of exhaust gases produced during the manufacture of iron or steel**
- 2100/20 . Increasing the gas reduction potential of recycled exhaust gases
- 2100/22 . . by reforming
- 2100/24 . . by shift reactions
- 2100/26 . . by adding additional fuel in recirculation pipes
- 2100/28 . . by separation
- 2100/282 . . . of carbon dioxide
- 2100/284 . . . of nitrogen
- 2100/40 . Gas purification of exhaust gases to be recirculated or used in other metallurgical processes
- 2100/42 . . Sulphur removal
- 2100/44 . . Removing particles, e.g. by scrubbing, dedusting
- 2100/60 . Process control or energy utilisation in the manufacture of iron or steel
- 2100/62 . . Energy conversion other than by heat exchange, e.g. by use of exhaust gas in energy production
- 2100/64 . . Controlling the physical properties of the gas, e.g. pressure or temperature
- 2100/66 . . Heat exchange
- 2100/80 . Interaction of exhaust gases produced during the manufacture of iron or steel with other processes
- 2200/00 Recycling of non-gaseous waste material**
- 2300/00 Process aspects**
- 2300/02 . Particular sequence of the process steps
- 2300/04 . Modeling of the process, e.g. for control purposes; CII
- 2400/00 Treatment of slags originating from iron or steel processes**
- 2400/02 . Physical or chemical treatment of slags
- 2400/022 . . Methods of cooling or quenching molten slag
- 2400/024 . . . with the direct use of steam or liquid coolants, e.g. water
- 2400/026 . . . using air, inert gases or removable conductive bodies
- 2400/028 . . . with the permanent addition of cooled slag or other solids
- 2400/03 . . Removing sulfur
- 2400/032 . . Separating slag from liquid, e.g. from water, after quenching
- 2400/034 . . Stirring or agitating by pressurised fluids or by moving apparatus
- 2400/04 . Specific shape of slag after cooling
- 2400/042 . . Sheets
- 2400/044 . . Briquettes or moulded bodies other than sheets
- 2400/05 . Apparatus features
- 2400/052 . . including rotating parts
- 2400/054 . . . Disc-shaped or conical parts for cooling, dispersing or atomising of molten slag rotating along vertical axis
- 2400/056 . . . Drums whereby slag is poured on or in between
- 2400/058 . . . Rotating beds on which slag is cooled
- 2400/06 . . Conveyors on which slag is cooled
- 2400/062 . . Jet nozzles or pressurised fluids for cooling, fragmenting or atomising slag
- 2400/064 . . Thermally-conductive removable bodies, e.g. balls
- 2400/066 . . Receptacle features where the slag is treated
- 2400/068 . . . with a sealed or controlled environment
- 2400/07 . . . open to atmosphere
- 2400/072 . . . Tanks to collect the slag, e.g. water tank
- 2400/074 . . . Tower structures for cooling, being confined but not sealed
- 2400/076 . . . Fluidised bed for cooling
- 2400/08 . with energy recovery