

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