

# 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, and apparatus specially adapted therefor, e.g. blast furnaces, air heaters (furnaces in general [F27](#)).

#### 3/00 General features in the manufacture of pig-iron (mixers for pig-iron [C21C 1/06](#))

- 3/02 . by applying additives, e.g. fluxing agents
- 3/04 . Recovery of by-products, e.g. slag
- 3/06 . . Treatment of liquid slag (slag wool [C03B](#); slag stones [C04B](#))
- 3/08 . . . Cooling slag
- 3/10 . . . Slag pots; Slag cars

#### 5/00 Making pig-iron in the blast furnace

- 5/001 . {Injecting additional fuel or reducing agents}
- 5/002 . . {Heated electrically (plasma)}
- 5/003 . . {Injection of pulverulent coal}
- 5/004 . . . {Injection of slurries}
- 2005/005 . . {Selection or treatment of the reducing gases}
- 5/006 . {Automatically controlling the process}
- 5/007 . {Conditions of the cokes or characterised by the cokes used}
- 5/008 . {Composition or distribution of the charge}
- 5/02 . Making special pig-iron, e.g. by applying additives, e.g. oxides of other metals
- 5/023 . . {Injection of the additives into the melting part}
- 5/026 . . . {of plastic material}
- 5/04 . Making slag of special composition
- 5/06 . using top gas in the blast furnace process (in coke ovens [C10B](#))

#### 7/00 Blast furnaces (lifts associated with blast furnaces [B66B 9/06](#))

- 7/002 . {Evacuating and treating of exhaust gases}
- 7/005 . . {Bleeder valves or slides}
- 7/007 . {Controlling or regulating of the top pressure}
- 7/02 . Internal forms
- 7/04 . with special refractories (refractory materials [C04B](#))
- 7/06 . . Linings for furnaces
- 7/08 . Top armourings
- 7/10 . Cooling; Devices therefor
- 7/103 . . {Detection of leakages of the cooling liquid}
- 7/106 . . {Cooling of the furnace bottom}
- 7/12 . Opening or sealing the tap holes
- 7/125 . . {Refractory plugging mass}
- 7/14 . Discharging devices, e.g. for slag
- 7/16 . Tuyères
- 7/163 . . {Blowpipe assembly}

- 7/166 . . {Tuyere replacement apparatus}
- 7/18 . Bell-and-hopper arrangements
- 7/20 . . with appliances for distributing the burden
- 7/22 . Dust arresters
- 7/24 . Test rods or other checking devices

#### 9/00 Stoves for heating the blast in blast furnaces

- 9/02 . Brick hot-blast stoves
- 9/04 . . with combustion shaft
- 9/06 . . Linings
- 9/08 . Iron hot-blast stoves
- 9/10 . Other details, e.g. blast mains
- 9/12 . . Hot-blast valves or slides for blast furnaces (valves in general [F16K](#))
- 9/14 . Preheating the combustion air
- 9/16 . Cooling or drying the hot-blast

#### 11/00 Making pig-iron other than in blast furnaces

- 11/02 . in low shaft furnaces {or shaft furnaces}
- 11/06 . in rotary kilns
- 11/08 . in hearth-type furnaces
- 11/10 . in electric furnaces

#### 13/00 Making spongy iron or liquid steel, by direct processes

- 13/0006 . {obtaining iron or steel in a molten state}
- 13/0013 . . {introduction of iron oxide into a bath of molten iron containing a carbon reductant}
- 13/002 . . . {Reduction of iron ores by passing through a heated column of carbon}
- 13/0026 . . {introduction of iron oxide in the flame of a burner or a hot gas stream}
- 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}	2100/20	. Increasing the gas reduction potential of recycled exhaust gases
13/02	. in shaft furnaces		
	<b>WARNING</b>		<b>WARNING</b>
	Group <a href="#">C21B 13/02</a> is impacted by reclassification into group <a href="#">C21B 13/029</a> .		Groups <a href="#">C21B 2100/20</a> - <a href="#">C21B 2100/284</a> are incomplete pending reclassification of documents from groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> .
	Groups <a href="#">C21B 13/02</a> and <a href="#">C21B 13/029</a> should be considered in order to perform a complete search.		Groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> and <a href="#">C21B 2100/20</a> - <a href="#">C21B 2100/284</a> should be considered in order to perform a complete search.
13/023	. . {wherein iron or steel is obtained in a molten state}	2100/22	. . by reforming
13/026	. . . {heated electrically}	2100/24	. . by shift reactions
13/029	. . {Introducing coolant gas in the shaft furnaces}	2100/26	. . by adding additional fuel in recirculation pipes
	<b>WARNING</b>	2100/28	. . by separation
	Group <a href="#">C21B 13/029</a> is incomplete pending reclassification of documents from group <a href="#">C21B 13/02</a> .	2100/282	. . . of carbon dioxide
	Groups <a href="#">C21B 13/02</a> and <a href="#">C21B 13/029</a> should be considered in order to perform a complete search.	2100/284	. . . of nitrogen
		2100/40	. Gas purification of exhaust gases to be recirculated or used in other metallurgical processes
13/04	. in retorts		<b>WARNING</b>
13/06	. in multi-storied furnaces		Groups <a href="#">C21B 2100/40</a> - <a href="#">C21B 2100/44</a> are incomplete pending reclassification of documents from groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> .
13/08	. in rotary furnaces		Groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> and <a href="#">C21B 2100/40</a> - <a href="#">C21B 2100/44</a> should be considered in order to perform a complete search.
13/085	. . {wherein iron or steel is obtained in a molten state}	2100/42	. . Sulphur removal
13/10	. in hearth-type furnaces	2100/44	. . Removing particles, e.g. by scrubbing, dedusting
13/105	. . {Rotary hearth-type furnaces}	2100/60	. Process control or energy utilisation in the manufacture of iron or steel
13/12	. in electric furnaces		<b>WARNING</b>
13/125	. . {By using plasma}		Groups <a href="#">C21B 2100/60</a> - <a href="#">C21B 2100/66</a> are incomplete pending reclassification of documents from groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> .
13/14	. Multi-stage processes {processes carried out in different vessels or furnaces}		Groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> and <a href="#">C21B 2100/60</a> - <a href="#">C21B 2100/66</a> should be considered in order to perform a complete search.
13/143	. . {Injection of partially reduced ore into a molten bath}		
13/146	. . {Multi-step reduction without melting}		
<b>15/00</b>	<b>Other processes for the manufacture of iron from iron compounds</b> (general methods of reducing to metal <a href="#">C22B 5/00</a> ; by electrolysis <a href="#">C25C 1/06</a> )		
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		
<b>2100/00</b>	<b>Handling of exhaust gases produced during the manufacture of iron or steel</b>		
	<b>WARNING</b>		<b>WARNING</b>
	Groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> are no longer used for the classification of documents as of May 1, 2017. The content of these groups is being reclassified into groups <a href="#">C21B 2100/20</a> - <a href="#">C21B 2100/80</a> .		Group <a href="#">C21B 2100/80</a> is incomplete pending reclassification of documents from groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> .
	Groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> and <a href="#">C21B 2100/20</a> - <a href="#">C21B 2100/80</a> should be considered in order to perform a complete search.		Groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> and <a href="#">C21B 2100/80</a> should be considered in order to perform a complete search.
2100/02	. Treatment of the exhaust gases	2100/62	. . Energy conversion other than by heat exchange, e.g. by use of exhaust gas in energy production
(Frozen)		2100/64	. . Controlling the physical properties of the gas, e.g. pressure or temperature
2100/04	. Recirculation of the exhaust gases	2100/66	. . Heat exchange
(Frozen)		2100/80	. Interaction of exhaust gases produced during the manufacture of iron or steel with other processes
2100/06	. Energy from waste gases used in other processes		<b>WARNING</b>
(Frozen)			Group <a href="#">C21B 2100/80</a> is incomplete pending reclassification of documents from groups <a href="#">C21B 2100/02</a> - <a href="#">C21B 2100/06</a> .
		<b>2200/00</b>	<b>Recycling of non-gaseous waste material</b>
		<b>2300/00</b>	<b>Process aspects</b>

## C21B

- 2300/02 . Particular sequence of the process steps
- 2300/04 . Modeling of the process, e.g. for control purposes;  
CII