

**CPC****COOPERATIVE PATENT CLASSIFICATION****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](#)).

**C21B 3/00**

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

C21B 3/02

- by applying additives, e.g. fluxing agents

C21B 3/04

- Recovery of by-products, e.g. slag

C21B 3/06

- . Treatment of liquid slag (slag wool [C03B](#); slag stones [C04B](#))

C21B 3/08

- . . Cooling slag

C21B 3/10

- . . Slag pots; Slag cars

**C21B 5/00**

**Making pig-iron in the blast furnace**

C21B 5/001

- {Injecting additional fuel or reducing agents}

C21B 5/002

- . {Heated electrically (plasma)}

C21B 5/003

- . {Injection of pulverulent coal}

C21B 5/004

- . . {Injection of slurries}

C21B 2005/005

- . {Selection or treatment of the reducing gases}

C21B 5/006

- {Automatically controlling the process}

C21B 5/007

- {Conditions of the cokes or characterised by the cokes used}

C21B 5/008

- {Composition or distribution of the charge}

C21B 5/02

- Making special pig-iron, e.g. by applying additives, e.g. oxides of other metals

C21B 5/023

- . {Injection of the additives into the melting part}

C21B 5/026

- . . {of plastic material}

C21B 5/04

- Making slag of special composition

C21B 5/06

- Using top gas in the blast furnace process (in coke ovens [C10B](#))

**C21B 7/00**

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

C21B 7/002

- {Evacuating and treating of exhaust gases}

C21B 7/005

- . {Bleeder valves or slides}

C21B 7/007

- {Controlling or regulating of the top pressure}

C21B 7/02

- Internal forms

C21B 7/04

- with special refractories (refractory materials [C04B](#))

C21B 7/06

- . Linings for furnaces

C21B 7/08

- Top armourings

C21B 7/10

- Cooling; Devices therefor

C21B 7/103

- . {Detection of leakages of the cooling liquid}

- C21B 7/106 . . {Cooling of the furnace bottom}
- C21B 7/12 . Opening or sealing the tap holes
- C21B 7/125 . . {Refractory plugging mass}
- C21B 7/14 . Discharging devices, e.g. for slag
- C21B 7/16 . Tuyères
- C21B 7/163 . . {Blowpipe assembly}
- C21B 7/166 . . {Tuyere replacement apparatus}
- C21B 7/18 . Bell-and-hopper arrangements
- C21B 7/20 . . with appliances for distributing the burden
- C21B 7/22 . Dust arresters
- C21B 7/24 . Test rods or other checking devices

**C21B 9/00****Stoves for heating the blast in blast furnaces**

- C21B 9/02 . Brick hot-blast stoves
- C21B 9/04 . . with combustion shaft
- C21B 9/06 . . Linings
- C21B 9/08 . Iron hot-blast stoves
- C21B 9/10 . Other details, e.g. blast mains
- C21B 9/12 . . Hot-blast valves or slides for blast furnaces ([valves in general F16K](#))
- C21B 9/14 . Preheating the combustion air
- C21B 9/16 . Cooling or drying the hot-blast

**C21B 11/00****Making pig-iron other than in blast furnaces**

- C21B 11/02 . in low shaft furnaces {or shaft furnaces}
- C21B 11/06 . in rotary kilns
- C21B 11/08 . in hearth-type furnaces
- C21B 11/10 . in electric furnaces

**C21B 13/00****Making spongy iron or liquid steel, by direct processes**

- C21B 13/0006 . {obtaining iron or steel in a molten state}
- C21B 13/0013 . . {introduction of iron oxide into a bath of molten iron containing a carbon reductant}
- C21B 13/002 . . . {Reduction of iron ores by passing through a heated column of carbon}
- C21B 13/0026 . . {introduction of iron oxide in the flame of a burner or a hot gas stream}
- C21B 13/0033 . {In fluidised bed furnaces or apparatus containing a dispersion of the material}
- C21B 13/004 . {in a continuous way by reduction from ores}
- C21B 13/0046 . {making metallised agglomerates or iron oxide}
- C21B 13/0053 . . {On a massing grate}
- C21B 13/006 . {Starting from ores containing non ferrous metallic oxides}
- C21B 13/0066 . {Preliminary conditioning of the solid carbonaceous reductant}
- C21B 13/0073 . {Selection or treatment of the reducing gases}

C21B 13/008	<ul style="list-style-type: none"> <li>• {Use of special additives or fluxing agents}</li> </ul>
C21B 13/0086	<ul style="list-style-type: none"> <li>• {Conditioning, transformation of reduced iron ores}</li> </ul>
C21B 13/0093	<ul style="list-style-type: none"> <li>• • {Protecting against oxidation}</li> </ul>
C21B 13/02	<ul style="list-style-type: none"> <li>• in shaft furnaces</li> </ul>
C21B 13/023	<ul style="list-style-type: none"> <li>• • {wherein iron or steel is obtained in a molten state}</li> </ul>
C21B 13/026	<ul style="list-style-type: none"> <li>• • • {heated electrically}</li> </ul>
C21B 13/04	<ul style="list-style-type: none"> <li>• in retorts</li> </ul>
C21B 13/06	<ul style="list-style-type: none"> <li>• in multi-storied furnaces</li> </ul>
C21B 13/08	<ul style="list-style-type: none"> <li>• in rotary furnaces</li> </ul>
C21B 13/085	<ul style="list-style-type: none"> <li>• • {wherein iron or steel is obtained in a molten state}</li> </ul>
C21B 13/10	<ul style="list-style-type: none"> <li>• in hearth-type furnaces</li> </ul>
C21B 13/105	<ul style="list-style-type: none"> <li>• • {Rotary hearth-type furnaces}</li> </ul>
C21B 13/12	<ul style="list-style-type: none"> <li>• in electric furnaces</li> </ul>
C21B 13/125	<ul style="list-style-type: none"> <li>• • {By using plasma}</li> </ul>
C21B 13/14	<ul style="list-style-type: none"> <li>• Multi-stage processes {processes carried out in different vessels or furnaces}</li> </ul>
C21B 13/143	<ul style="list-style-type: none"> <li>• • {Injection of partially reduced ore into a molten bath}</li> </ul>
C21B 13/146	<ul style="list-style-type: none"> <li>• • {Multi-step reduction without melting}</li> </ul>
<b>C21B 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> )
C21B 15/003	<ul style="list-style-type: none"> <li>• {By using nuclear energy}</li> </ul>
C21B 15/006	<ul style="list-style-type: none"> <li>• {By a chloride process}</li> </ul>
C21B 15/02	<ul style="list-style-type: none"> <li>• Metallothermic processes, e.g. thermit reduction</li> </ul>
C21B 15/04	<ul style="list-style-type: none"> <li>• from iron carbonyl</li> </ul>
<b>C21B 2100/00</b>	<b>Exhaust gases</b>
C21B 2100/02	<ul style="list-style-type: none"> <li>• Treatment of the exhaust gases</li> </ul>
C21B 2100/04	<ul style="list-style-type: none"> <li>• Recirculation of the exhaust gases</li> </ul>
C21B 2100/06	<ul style="list-style-type: none"> <li>• Energy from waste gases used in other processes</li> </ul>
<b>C21B 2200/00</b>	<b>Recycling of waste material</b>
<b>C21B 2300/00</b>	<b>Process aspects</b>
C21B 2300/02	<ul style="list-style-type: none"> <li>• Particular sequence of the process steps</li> </ul>
C21B 2300/04	<ul style="list-style-type: none"> <li>• Modeling of the process, e.g. for control purposes; CII</li> </ul>