

**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](#) ).

**Guidance heading:**

**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 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 . Tuyéres
- 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 . {Use of special additives or fluxing agents }
- C21B 13/0086 . {Conditioning, transformation of reduced iron ores }
- C21B 13/0093 . . {Protecting against oxidation }
- C21B 13/02 . in shaft furnaces
- C21B 13/023 . . {wherein iron or steel is obtained in a molten state }
- C21B 13/026 . . . {heated electrically }
- C21B 13/04 . in retorts
- C21B 13/06 . in multi-storied furnaces
- C21B 13/08 . in rotary furnaces
- C21B 13/085 . . {wherein iron or steel is obtained in a molten state }
- C21B 13/10 . in hearth-type furnaces
- C21B 13/105 . . {Rotary hearth-type furnaces }
- C21B 13/12 . in electric furnaces
- C21B 13/125 . . {By using plasma }
- C21B 13/14 . Multi-stage processes {processes carried out in different vessels or furnaces }

- C21B 13/143 . . {Injection of partially reduced ore into a molten bath }
- C21B 13/146 . . {Multi-step reduction without melting }

**C21B 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](#))

- C21B 15/003 . {By using nuclear energy }
- C21B 15/006 . {By a chloride process }
- C21B 15/02 . Metallothermic processes, e.g. thermit reduction
- C21B 15/04 . from iron carbonyl

**Guidance heading:**

**C21B 2005/00**      **Making pig-iron in the blast furnace**

- C21B 2005/001 . {Injecting additional fuel or reducing agents }
- C21B 2005/005 . . Selection or treatment of the reducing gases

**Guidance heading:**

**C21B 2100/00**      **Exhaust gases**

- C21B 2100/02 . Treatment of the exhaust gases
- C21B 2100/04 . Recirculation of the exhaust gases
- C21B 2100/06 . Energy from waste gases used in other processes

**Guidance heading:**

**C21B 2200/00**      **Recycling of waste material**

**C21B 2300/00**      **Process aspects**

- C21B 2300/02 . Particular sequence of the process steps
- C21B 2300/04 . Modeling of the process, e.g. for control purposes; CII