

C21B

MANUFACTURE OF IRON OR STEEL (preliminary treatment of ferrous ores or scrap C22B1/00 ; electric heating H05B)

Definition statement

This subclass/group covers:

- The production of iron or steel starting from iron ores, e.g. the production of pig-iron;
- The recovery of by-products, e.g. slag, from these production methods ;
- Apparatus specially adapted therefore, e.g. blast furnaces, air heaters.

Relationship between large subject matter areas

General metallurgical processes for obtaining metal from ores, and non-ferrous ores in particular, are treated in [C22B](#).

Details of the apparatus which are of general interest to the group of installations, e.g. shaft furnaces, are also to be classified in [F27B](#) and/or [F27D](#).

Informative references

Attention is drawn to the following places, which may be of interest for search:

Furnaces, kilns, ovens or retorts in general	F27B
Details or accessories of furnaces, kilns, ovens or retorts in general	F27D

C21B 3/00

General features in the manufacture of pig-iron (mixers for pig-iron C21C1/06)

C21B 3/02

by applying additives, e.g. fluxing agents

Definition statement

This subclass/group covers:

Processes in which the additives can be added to dry products (e.g. pellets,

briquettes), a metal melt or a slag.

Special rules of classification within this group

The group overlaps with [C21B 5/008](#), [C21B 5/02](#), [C21B 5/04](#), [C21B 13/008](#) : depending on whether the additives are generally applicable or related to a specific process either in the Blast Furnace ([C21B 5/00](#)) or in Direct Reduction process ([C21B 13/00](#)), double or single classification will apply.

C21B 3/04

Recovery of by-products, e.g. slag

Relationship between large subject matter areas

Treatment of (metallurgical) slag is also classified in [C04B 5/00](#) when artificial stone, cement, road material or like building materials are obtained therefrom.

C21B 3/06

Treatment of liquid slag (slag wool C03B; slag stones C04B)

References relevant to classification in this group

This subclass/group does not cover:

Slag wool	C03B
Slag stone	C04B

Informative references

Attention is drawn to the following places, which may be of interest for search:

Processes or devices for granulating material	B01J 2/00
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C21B 3/08

Cooling slag

Definition statement

This subclass/group covers:

Cooling covers both dry and wet methods of cooling.

Informative references

Attention is drawn to the following places, which may be of interest for search:

General arrangements of separating plants	B03B 9/04
Handling or treating discharged material	F27D 15/00 to F27D 15/02 ,
Ingredients other than water added to the slag ; treatment with gases or gas generating material	C04B 5/06

C21B 5/00

Making pig-iron in the blast furnace

Definition statement

This subclass/group covers:

Also the injection of additional (pure) oxygen and additional fuel ; automatic control of the process ; condition of the cokes or their characterisation ; composition and distribution of the charge.

C21B 5/06

Using top gas in the blast furnace process (in coke ovens C10B)

Informative references

Attention is drawn to the following places, which may be of interest for search:

In coke ovens	C10B
Purifying or modifying the chemical composition of combustible gases containing carbon monoxide	C10K
Production of fuel gases by carburetting air or other gases without pyrolysis or of combustible gases containing carbon monoxide from solid carbonaceous fuels	C10J

Special rules of classification within this group

In case the top gas is treated before being sent back into the furnace, this aspect is also classified : either by the relevant class in another field (specific, e.g. [C10K 1/02](#), dust removal).

C21B 7/00

Blast furnaces (lifts associated with blast furnaces B66B9/06)

Definition statement

This subclass/group covers:

Features which relate to the lay-out of the BF area or to repair ; also the evacuation and treatment of exhaust gases and the control and regulation of the top pressure.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separating solids from solids by wet methods	B03B
Magnetic or electrostatic separation of solid materials from solid materials or fluids, separation by high-voltage electric fields	B03C
Centrifuges	B04B
Apparatus using free vortex flow, e.g. cyclones	B04C
Separation	B01D
Cleaning of gases from solids	B01D 45/00 TO B01D 53/00
Filtering elements	B01D 24/00 TO B01D 35/00
Filtering material	B01D 39/00
Purifying or modifying the chemical composition of combustible gases containing carbon monoxide	C10K

C21B 7/04

with special refractories (refractory materials C04B)

Informative references

Attention is drawn to the following places, which may be of interest for search:

Refractory materials	C04B
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C21B 7/06

Linings for furnaces

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements of linings in shaft furnaces	F27B 1/14 , F27B 1/14
Linings or walls for metallurgical furnaces in general	F27D 1/00 , F27D 1/00

C21B 7/10

Cooling; Devices therefor

Definition statement

This subclass/group covers:

Cooling devices for the walls and bottom including staves, plates, pipes, etc ; also leakage detection.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Linings or walls incorporating cooling arrangements	F27D 1/12 , F27D 1/12
Shaft furnaces with cooling arrangements	F27B 1/24 , F27B 1/24
Cooling of furnaces or of charges	F27D 9/00 , F27D 9/00

therein	
Cooling of linings of combustion chambers	F23M 5/08
Heat exchange apparatus in which heat exchange media do not come into direct contact	F28D
Details of heat exchange apparatus of general application	F28F

C21B 7/12

Opening or sealing the tap holes

Informative references

Attention is drawn to the following places, which may be of interest for search:

Tapping equipment	F27D 3/15 , C21C 5/46 F27D 3/15 , C21C 5/46
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C21B 7/14

Discharging devices, e.g. for slag

Definition statement

This subclass/group covers:

Runners and their accessories (roofs, heating etc) ; also equipment for transporting said runners.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Charging or discharging liquid or molten material	F27D 3/14 , F27D 3/14
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C21B 7/16

Tuyéres

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements of tuyeres	F27B 1/16 , F27B 1/16
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C21B 7/20

with appliances for distributing the burden

Definition statement

This subclass/group covers:

All distribution means different from bell-and-hopper, i.e. including revolving chute.

Informative references

Attention is drawn to the following places, which may be of interest for search:

Transport or storage devices, including chutes, conveyor belts etc	B65G
Arrangements of devices for charging of shaft furnaces	F27B 1/20 , F27B 1/20
Charging of particulate material	F27D 3/00 , F27D 3/00
Charging directly from hoppers or chutes	F27D 3/10 , F27D 3/10

C21B 7/22

Dust arresters

Informative references

Attention is drawn to the following places, which may be of interest for search:

Separating solids from solids by wet methods	B03B
Magnetic or electrostatic separation	B03C

of solid materials from solid materials or fluids, separation by high-voltage electric fields	
Centrifuges	B04B
Apparatus using free vortex flow, e.g. cyclones	B04C
Separation	B01D
Cleaning of gases from solids	B01D 45/00 to B01D 53/96
Filtering elements	B01D 24/00 to B01D 35/34
Filtering material	B01D 39/00 to B01D 39/20
Purifying or modifying the chemical composition of combustible gases containing carbon monoxide	C10K
Removal of waste gases or dust (from converter)	C21C 5/38 , C21C 5/38
Offtakes or separating apparatus for converter waste gases or dust	C21C 5/40 , C21C 5/40

C21B 7/24

Test rods or other checking devices

Definition statement

This subclass/group covers:

Covers any measuring, controlling or observation devices

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements of monitoring devices, of indicators, of alarm devices for shaft furnaces	F27B 1/28
Arrangements of controlling devices	F27D 19/00 ,

Arrangements of monitoring devices	F27D 21/00 to F27D 21/04 ,
Specific investigation or analysing means of materials by determining their chemical or physical properties	G01N

C21B 9/00

Stoves for heating the blast in blast furnaces

C21B 11/00

Making pig-iron other than in blast furnaces

C21B 13/00

Making spongy iron or liquid steel, by direct processes

Definition statement

This subclass/group covers:

Direct reduction processes obtaining either sponge iron or molten iron or steel.

Inventions which concern the treatment of the reducing gases, the solid reductant, the ores, the reduced iron or the addition of fluxes or the treatment of the ores in a fluidised bed or lead to attainment of molten iron or steel.

Informative references

Attention is drawn to the following places, which may be of interest for search:

General purpose Fluidised Beds	B01J 8/24 to B01J 8/44
Fluidised bed furnaces	F27B 15/00 to F27B 15/20
General methods of reducing to metals : - by solid carbonaceous reducing agents ; - by gases	C22B 5/10 C22B 5/12

Special rules of classification within this group

When disclosed, the apparatus or group of apparatuses ([C21B 13/14](#)) in which the process takes place, should always be given a class

Details of apparatuses being part of the invention should be classified in the relevant apparatus class ([F27B](#), [F27D](#)) when possible.

C21B 13/10

in hearth-type furnaces

Definition statement

This subclass/group covers:
Also rotary-hearth furnaces.

C21B 13/12

in electric furnaces

Definition statement

This subclass/group covers:
Also using a plasma.

C21B 13/14

Multi-stage processes [N: processes carried out in different vessels or furnaces]

Definition statement

This subclass/group covers:
Inventions in which different types of installations are used in sequence to arrive either at a solid or a molten product.

C21B 15/00

Other processes for the manufacture of iron from iron compounds (general methods of reducing to metal C22B5/00; by electrolysis C25C1/06)

Definition statement

This subclass/group covers:
Also processes involving nuclear energy or a chloride process.

Informative references

Attention is drawn to the following places, which may be of interest for search:

General methods of reducing to metals	C22B 5/00 to C22B 5/20
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