C21C

PROCESSING OF PIG-IRON, e.g. REFINING, MANUFACTURE OF WROUGHT-IRON OR STEEL; TREATMENT IN MOLTEN STATE OF FERROUS ALLOYS (refining metals in general C22B 9/00)

Definition statement

This place covers:
all treatments of molten iron or steel, including the apparatuses specifically related thereto, e.g. converter, electric furnace.

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Cast iron alloys</th>
<th>C22C 37/00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferrous alloy compositions</td>
<td>C22C 38/00</td>
</tr>
</tbody>
</table>

C21C 1/02

Dephosphorising or desulfurising

Definition statement

This place covers:
Also the specific treating agents

References

Informative references

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

| Dephosphorising or desulfurising of molten ferrous alloys | C21C 7/064 |

Special rules of classification

In case the dephosphorising, desulfurising are more generally claimed and could also apply to ferrous alloys (incl. steel), C21C 7/064 should be attributed as well.

If the method of introduction is specifically claimed, the corresponding class in C21C 7/00 should be attributed

C21C 1/04

Removing impurities other than carbon, phosphorus or sulfur

References

Informative references

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

| Removing impurities of ferrous alloys                | C21C 7/04 |
| General processes of refining metals                 | C22B 9/00 - C22B 9/22 |
**Special rules of classification**

In case the treatments to remove other impurities are more generally claimed and could also apply to ferrous alloys (incl. steel), C21C 7/04 or any appropriate class below should be attributed as well.

If the method of introduction is specifically claimed, the corresponding class in C21C 7/00 should be attributed

**C21C 1/06**

Constructional features of mixers for pig-iron

**References**

*Informative references*

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

| Stirring devices for molten metal | F27D 27/00 |

**C21C 1/08**

Manufacture of cast-iron

**Definition statement**

*This place covers:*

Treatment of pig iron to obtain non-spheroidal cast-iron.

**References**

*Limiting references*

*This place does not cover:*

| Cast-iron alloys (composition) | C22C 37/00 - C22C 37/10 |

*Informative references*

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

| Making of cast-iron alloys | C22C 33/08, C22C 33/10 |

**C21C 1/10**

Making spheroidal graphite cast-iron

**Definition statement**

*This place covers:*

Also the nodularising agents

**References**

*Informative references*

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

| Making of cast-iron alloys | C22C 33/08, C22C 33/10 |
C21C 5/00

Manufacture of carbon-steel, e.g. plain mild steel, medium carbon steel or cast steel (or stainless steel)

Definition statement

This place covers:

Also the manufacturing of stainless steels and ferro-alloys; apparatuses, in particular converters, which are specifically dedicated to the steel processing are classified within this group as well.

References

Limiting references

This place does not cover:

Ferrous alloy compositions

Special rules of classification

Indexing Codes C21C 5/00 - C21C 5/56 apply for additional information or in case no corresponding EC-subgroup exists.

C21C 5/28

Manufacture of steel in the converter {\(\text{[C21C 5/005 takes precedence]}\)}

Definition statement

This place covers:

Also the full plant lay-out.

C21C 5/30

Regulating or controlling the blowing

Definition statement

This place covers:

Converter processes in which the regulation or control of the blowing is claimed, be it from above, through the bath or a combination thereof, i.e. not specific to one of the methods; the regulation or control can relate to the amount, the sequence, the composition etc of the gases.

Also post-combustion is considered as a means to control the blowing.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

Post-combustion after burning
**C21C 5/32**

**Blowing from above (C21C 5/35 takes precedence)**

**Definition statement**

*This place covers:*

Regulation or control of blowing ONLY from above, i.e. through a lance

**References**

**Limiting references**

*This place does not cover:*

| Lance details                      | C21C 5/46, F27D 3/16, F27D 3/18 |

**C21C 5/34**

**Blowing through the bath (C21C 5/35 takes precedence)**

**Definition statement**

*This place covers:*

Regulation or control of blowing only through the melt, i.e. through a tuyere or bottom

**References**

**Limiting references**

*This place does not cover:*

| Tuyere details                     | C21C 5/48, B22D 1/005 |

**C21C 5/38**

**Removal of waste gases or dust**

**Definition statement**

*This place covers:*

The treatment of the off-gas

**References**

**Informative references**

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

<table>
<thead>
<tr>
<th>Separation</th>
<th>B01D</th>
</tr>
</thead>
<tbody>
<tr>
<td>In particular of solids from gases or vapours by gravity, inertia or centrifugal forces</td>
<td>B01D 45/00 - B01D 45/18</td>
</tr>
<tr>
<td>By filters</td>
<td>B01D 46/00 - B01D 46/54</td>
</tr>
<tr>
<td>By liquids</td>
<td>B01D 47/00 - B01D 47/18</td>
</tr>
<tr>
<td>By other means</td>
<td>B01D 49/00 - B01D 49/02</td>
</tr>
</tbody>
</table>
Purifying or modifying the chemical composition of combustible gases containing CO

<table>
<thead>
<tr>
<th>CPC - C21C - 2017.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>C21C 5/38 (continued)</td>
</tr>
<tr>
<td>C10K 1/00 - C10K 1/34, C10K 3/00 - C10K 1/06</td>
</tr>
</tbody>
</table>

**C21C 5/40**

**Offtakes or separating apparatus for converter waste gases or dust**

**Definition statement**

This place covers:
The installation required for capturing and treating the off-gas.

**References**

**Informative references**

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

| Preventing escape from fumes from the area where they are produced, collecting or removing fumes therefrom | B08B 15/00 - B08B 15/04 |
| Devices for conducting smoke or fumes for factories or large buildings | F23J 11/12 |
| Arrangements for using waste heat, using or disposing of waste gas | F27D 17/00 |

**C21C 5/44**

**Refractory linings**

**Definition statement**

This place covers:
Apart from the lining itself, the equipment to make, apply or repair the lining, both of the vessel and of the taphole in particular.

**References**

**Informative references**

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

| Linings for furnaces in general, incl. making and repairing | F27D 1/00, F27D 1/16 |
| Tapholes | F27D 3/15 |

**C21C 5/46**

**Details or accessories**

**Definition statement**

This place covers:
Lances, means for their handling; supporting means for the converter; cooling arrangements; tapholes, their opening and sealing; charging devices; measuring and sampling devices; support and transport devices for the converter; cleaning and skull removal.
## References

### Informative references

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Class (with ranges)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring the weight of the converter</td>
<td>C21C 5/46</td>
</tr>
<tr>
<td>Trunnions in general bearings and accessories in general</td>
<td>F16C 11/02, F16C 17/00 - F16C 43/00</td>
</tr>
<tr>
<td>Charging of furnaces</td>
<td>F27D 3/00 - F27D 3/18</td>
</tr>
<tr>
<td>Travelling or movable supports for the charge</td>
<td>F27D 3/12</td>
</tr>
<tr>
<td>Tapholes, opening and sealing</td>
<td>F27D 3/15, C21B 7/12</td>
</tr>
<tr>
<td>Lances injecting a gas jet; injecting particulate material using a fluid jet</td>
<td>F27D 3/16, F27D 3/18</td>
</tr>
<tr>
<td>Devices or methods for removing incrustations</td>
<td>F27D 15/00</td>
</tr>
<tr>
<td>Arrangements of controlling devices</td>
<td>F27D 19/00</td>
</tr>
<tr>
<td>Arrangements of monitoring devices</td>
<td>F27D 21/00 - F27D 21/04</td>
</tr>
<tr>
<td>Measuring, testing in general of weight of vibrations or ultra-, infra- or sonic waves radiation pyrometry other temperature measurements</td>
<td>G01, G01G, G01H, G01J 5/00 - G01J 5/62, G01K</td>
</tr>
<tr>
<td>Specific techniques for measuring or analysing materials by determining their chemical or physical properties</td>
<td>G01N</td>
</tr>
</tbody>
</table>

### C21C 5/48

**Bottoms or tuyéres of converters**

**Definition statement**

*This place covers:*

Porous plugs and tuyeres

**References**

**Informative references**

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Class (with ranges)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment of fused masses in a ladle, incl. with gases</td>
<td>B22D 1/00</td>
</tr>
</tbody>
</table>

### C21C 5/50

**Tilting mechanisms for converters**

**References**

**Informative references**

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

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Class (with ranges)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pivotal connections in general ;</td>
<td>F16C 11/00 - F16C 11/12</td>
</tr>
<tr>
<td>Bearings and accessories in general</td>
<td>F16C 17/00 - F16C 43/08</td>
</tr>
</tbody>
</table>
C21C 5/52

Manufacture of steel in electric furnaces (C21C 5/005 takes precedence); electric heating per se H05B)

Definition statement
This place covers:
Any type of electric heating: AC, DC, induction or plasma, incl. accessories as burners.
The manufacturing of alloyed steels, incl. ferro-alloys.
The charging of the electric furnace.
Multiple hearth furnaces.
The general lay-out of the melt shop.

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

| Methods or apparatus for combustion using fluent fuel | F23C |
| Burners                                              | F23D |
| Electrically heated hearth furnaces and their accessories | F27B 3/08, F27B 3/00 - F27B 3/26 |
| Arrangements of elements for electric heating in or on furnaces | F27D 11/00 - F27D 11/12 |
| Electric heating elements or system                  | F27D 99/00 |
| Electric heating in general                           | H05B |

Special rules of classification
specific Indexing Codes exist for the presence/absence of a foam or a molten heel in the electric furnace

C21C 5/56

Manufacture of steel by other methods (making liquid steel by direct processes C21B 13/00 ; C21C 5/005 takes precedence)

Definition statement
This place covers:
Also methods starting from scrap (with/without preheating) not treated in electric (arc) furnaces
**C21C 7/00**

Treating molten ferrous alloys, e.g. steel, not covered by groups

[C21C 1/00 - C21C 5/00](#) (treating molten metals during moulding [B22D 1/00](#), [B22D 27/00](#); remelting ferrous metals [C22B](#))

**Definition statement**

_This place covers:_

- Treatments of refining or alloying by means of the treatment agents, the form thereof, purpose or the circumstances.
- Metallic, carbonaceous or exothermic treatment agents.
- Loose or compacted agents or cored wires.
- Treatments in a ladle, under pressure or in a current of streaming metal;
- special treatments of the slag.

**References**

**Limiting references**

_This place does not cover:_

<table>
<thead>
<tr>
<th>Treatment Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treating molten metals during moulding</td>
<td>B22D</td>
</tr>
<tr>
<td>Remelting of ferrous alloys</td>
<td>C22B</td>
</tr>
</tbody>
</table>

**Informative references**

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

<table>
<thead>
<tr>
<th>Alternative Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Making tubes by bending sheet</td>
<td>B21D 5/00</td>
</tr>
<tr>
<td>Cored wires for welding, soldering</td>
<td>B23K</td>
</tr>
</tbody>
</table>

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**C21C 7/04**

Removing impurities by adding a treating agent

**References**

**Informative references**

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

<table>
<thead>
<tr>
<th>Alternative Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal of impurities from pig iron other than carbon, sulfur or phosphor</td>
<td>C21C 1/04</td>
</tr>
</tbody>
</table>

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**C21C 7/064**

Dephosphorising; Desulfurising

**Definition statement**

_This place covers:_

- Including specifically disclosed agents for desulfurising and dephosphorising
References

Informative references

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

| Removal of phosphor or sulfur from pig iron | C21C 1/02 |

C21C 7/068

Decarburising

Definition statement

This place covers:
Including stainless steels

References

Informative references

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

| Control and regulation of blowing in a converter | C21C 5/30 - C21C 5/35 |

C21C 7/072

Treatment with gases (C21C 7/06, C21C 7/064, C21C 7/068 take precedence)

References

Informative references

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

| Refining metals by treating with gases | C22B 9/05 |

C21C 7/076

Use of slags or fluxes as treating agents (C21C 7/06, C21C 7/064, C21C 7/068 take precedence)

References

Informative references

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

| Refining metals by treating with fluxes | C22B 9/10 |
C21C 7/10

Handling in a vacuum

References

Informative references

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

| Refining of metals by applying a vacuum | C22B 9/04 |