**CPC - COOPERATIVE PATENT CLASSIFICATION**

**F** MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

**LIGHTING; HEATING**

**F27** FURNACES; KILNS; OVENS; RETORTS (NOTES omitted)

**F27B** FURNACES, KILNS, OVENS, OR RETORTS IN GENERAL; OPEN SINTERING OR LIKE APPARATUS

**NOTE**

Attention is drawn to the references and notes following the title of class F27 and the note (par. III) following the Contents of Section H.

**WARNINGS**

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

   - F27B 1/09 covered by F27B 1/08
   - F27B 5/05 covered by F27B 5/04
   - F27B 14/16, F27B 14/18 covered by F27B 14/0806
   - F27B 21/08 - F27B 21/14 covered by F27D 3/00, F27D 21/00

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

### Classes and Subclasses

- **1/00** Shaft or like vertical or substantially vertical furnaces (for preheating, burning, calcining or cooling lime, magnesia or dolomite C04B 2/12)
  - **1/005** with or without preheating, or calcining or sintering furnaces
  - **1/02** with two or more shafts or chambers, e.g. multi-storey furnaces
  - **1/025** with fore-hearth
  - **1/04** Combinations or arrangements of shafts
  - **1/06** of other than up-draught type
  - **1/08** heated otherwise than by solid fuel mixed with charge
  - **1/10** Details, accessories, or equipment peculiar to furnaces of these types
  - **1/12** Shells or casings; Supports therefor
  - **1/14** Arrangements of linings (linings in general F27D 1/00)
  - **1/16** Arrangements of tuyeres
  - **1/18** Arrangements of dust collectors
  - **1/20** Arrangements of devices for charging
  - **1/21** Arrangements of devices for discharging
  - **1/22** Arrangements of heat-exchange apparatus (heat-exchangers in general F28C, F28D)
  - **1/24** Cooling arrangements
  - **1/26** Arrangements of controlling devices
  - **1/28** Arrangements of monitoring devices, of indicators, of alarm devices
  - **3/00** Hearth-type furnaces, e.g. of reverberatory type (F27B 9/00, F27B 11/00, F27B 13/00, F27B 14/00, F27B 15/00, F27B 21/00 take precedence); Tank furnaces
  - **3/002** Siemens-Martin type furnaces

- **3/005** Port construction
- **3/007** Removable burner head
- **3/02** Single-chamber fixed-hearth type
- **3/04** Multiple-hearth type; of multiple-chamber type; Combinations of hearth-type furnaces
- **3/045** Multiple chambers, e.g. one of which is used for charging
- **3/06** with movable working chambers or hearths, e.g. tiltable, oscillating or describing a composed movement
- **3/065** tiltable
- **3/08** heated electrically, with or without any other source of heat
- **3/085** Arc furnaces
- **3/10** Details, accessories, or equipment peculiar to hearth-type furnaces
- **3/105** Slag chamber
- **3/12** Working chambers or casings; Supports therefor
- **3/14** Arrangements of linings
- **3/16** Walls; Roofs
- **3/18** Arrangements of devices for charging
- **3/183** Charging of arc furnaces vertically through the roof, e.g. in three points
- **3/186** Charging in a vertical chamber adjacent to the melting chamber
- **3/19** Arrangements of devices for discharging
- **3/20** Arrangements of heating devices
- **3/205** Burners
- **3/22** Arrangements of air or gas supply devices
- **3/225** Oxygen blowing
- **3/24** Cooling arrangements
Arrangements of heat-exchange apparatus

(G27B 9/00) takes precedence

of multiple-chamber type

adapted for treating the charge in vacuum or special atmosphere

Details, accessories, or equipment peculiar to furnaces of these types

[Cooling elements]

[disposed in the furnace, around the chamber, e.g. coils]

[disposed around the fan]

[for external cooling]

Arrangements of linings

Muffles

Arrangement of devices for charging

Arrangement of devices for discharging

Arrangements of heating devices

[Heating rods disposed in the chamber]

[the heating rods being in the tubes which conduct the heating gases]

Arrangements of air or gas supply devices

[Gas inflow or outflow]

[through closable or non-closable openings of the chamber walls]

[Controlled openings, e.g. orientable]

[Air supply through a set of tubes with openings]

[Controlled tubes, e.g. orientable or with closable openings]

[Means to circulate the atmosphere]

[the atmosphere being recirculated through the treatment chamber by a turbine]

[by more than one turbine]

[the atmosphere being continuously renewed by exterior means]

Arrangement of controlling, monitoring, alarm or like devices

1. (for the treatment of slurries or wet materials)

of multiple-chamber or multiple-drum type

(the drum having a non-uniform section along its length)

(with different chambers, e.g. treatment zones)

(with more than one drum)

with longitudinal divisions

[Longitudinal tubes]

[the partition being a cylinder, coaxial to the rotary drum, defining two chambers]

[the charge going in one direction in one chamber, then after a turn coming back in the other direction in the other chamber]

[Radial partitions]

(Defining an helical chamber)

adapted for treating the charge in vacuum or special atmosphere

externally heated

internally heated, e.g. by means of passages in the wall

tiltable

with means for agitating or moving the charge

the means being fixed relatively to the drum, e.g. composite means (F27B 7/04 takes precedence)

(the means comprising projections jutting out from the wall)

(the projections consisting of separate lifting elements, e.g. lifting shovels)

(using only a ring of lifting elements to lift the charge)

(forming a helical lifting projection)

the means comprising chains]

(the means comprising partitions]

(Annular partition]

the means being movable within the drum

Details, accessories, or equipment peculiar to rotary-drum furnaces

[Devices for reintroducing dust in the drum]

[Arrangements of preheating devices for the charge]

[consisting of a single string of cyclones]

[with means for precalcining the raw material]

[consisting of at least two strings of cyclones with two different admissions of raw material]

[with precalcining means on the string supplied with exhaust gases from the cooler]

[with precalcining means on each string]

[comprising a band transporter]

[Removing inclusions]

[Arrangements for the melting of metals or the treatment of molten metals]

[Means for eliminating compounds from gases by condensation, e.g. alkali metals]

Rotary drums; Supports therefor

[Bearing rings]

[mounted floatingly on the drum]

[the mounting comprising radially resilient elements, e.g. springs]

[the mounting comprising elements to maintain the ring between series of abutments]

[the ring being fixed to the drum, e.g. welded]

[Discharge ends]

[Support rollers]

[mounted movable, e.g. resiliently on the ground]

[constituted of series of two rollers mounted on tiltable support along the drum]

[the mounting allowing a movement of the rollers support in a horizontal plane]

[with arrangements, e.g. rollers, to maintain the drum against longitudinal movement]

[comprising rollable bodies]

[supporting the drum directly, without the use of a bearing ring]

[the furnace being suspended]

Seals between rotary and stationary parts
Furnaces through which the charge is moved mechanically, e.g. of tunnel type (F27B 7/14 takes precedence); Similar furnaces in which the charge moves by gravity

9/00

9/02 . . . [working with a ring embracing the kiln]
9/026 . . . [Two or more conveyors, e.g. mounted successively]
9/027 . . . [working in parallel]

9/021 . . . [having two or more parallel tracks]
9/026 . . . [Multi-chamber type furnaces, (F27B 9/029 takes precedence)]
9/027 . . . [having more than one conveyor]

9/022 . . . [With two tracks moving in opposite directions]
9/029 . . . [Multicellular type furnaces constructed with add-on modules]

9/023 . . . [with a U turn at one end]
9/034 . . . [convolving conveyors]
9/035 . . . [with two or more cross conveyors]

9/024 . . . [with superimposed tracks]
9/04 . . . adapted for treating the charge in vacuum or special atmosphere

9/025 . . . [having two or more superimposed tracks (F27B 9/024 takes precedence)]
9/042 . . . [Vacuum furnaces]
9/045 . . . [Furnaces with controlled atmosphere]

9/026 . . . Drives
2007/261 . . . [working with a ring embracing the drum]
2007/262 . . . [A gear ring combined with a dented wheel drive]
2007/263 . . . [A gear ring combined with a ram drive]
2007/265 . . . [the ring being mounted floatingly]
2007/266 . . . [the ring being a bearing ring]
2007/267 . . . [A gear ring combined with a chain drive]
2007/268 . . . [Details of the motor or the pinions]
7/28 . . . Arrangements of linings
7/30 . . . Arrangements of partitions
7/32 . . . Arrangement of devices for charging
7/3205 . . . [Charging]
7/3211 . . . [at the open end of the drum]
7/3217 . . . [axially, optionally at some distance in the kiln]
7/3223 . . . [the charging device being movable axially, e.g. reciprocable]
7/3229 . . . [via a centrifugal device]
7/3235 . . . [the introducing device comprising a spray or a lance]
7/3241 . . . [in the flame of the burner]
7/3247 . . . [through a lateral opening in the drum]
7/3252 . . . [with lifting scoops attached to the drum]
7/3258 . . . [at the open end of the drum]
7/3264 . . . [using special discharge means located around the discharge end, e.g. lifting scoops or a transversal annular partition]
7/327 . . . [centrifugally through lateral openings in the drum]
7/3276 . . . [with a collector means extending longitudinally into the drum]
7/3282 . . . [Details]
7/3288 . . . [Sieves or grading means]
7/3294 . . . [Means to fluidise the charge in the air]
7/33 . . . Arrangement of devices for discharging
7/34 . . . Arrangements of heating devices
7/36 . . . Arrangements of air or gas supply devices
7/362 . . . [Introducing gas into the drum axially or through the wall]
7/365 . . . [longitudinally]
7/367 . . . [transversally through the wall of the drum]
7/38 . . . Arrangements of cooling devices
7/383 . . . [Cooling devices for the charge]
7/386 . . . [Rotary-drum cooler]
7/40 . . . Planetary coolers
7/42 . . . Arrangement of controlling, monitoring, alarm or like devices
F27B

9/208 . . . . {the workpieces being rotated during their advance}

9/22 . . . . [on rails, e.g. under the action of scrapers or pushers (F27B 9/26 takes precedence)]

9/222 . . . . {the path comprising a section specially adapted for effecting equalisation of the temperature of the charge}

9/225 . . . . {the charge being subjected to an additional manipulation along the path}

9/227 . . . . {with rotation of the charge (F27B 9/147 takes precedence)}

9/24 . . . . being carried by a conveyor {(transport by conveyors in general B65G)}

9/2407 . . . . {the conveyor being constituted by rollers (roller hearth furnace)}

9/2415 . . . . {the charge rotating about an axis transversal to the axis of advancement of the charge}

9/2423 . . . . {the charge rotating about an axis parallel to the axis of advancement of the charge}

9/243 . . . . {Endless-strand conveyor}

2009/2438 . . . . {with means to transfer the heat from the outcoming band to the incoming band}

2009/2446 . . . . {with means to control the tension of the band}

9/2453 . . . . {Vibrating conveyor (shaker hearth furnace)}

9/2461 . . . . {the charge being suspended from the conveyor}

9/2469 . . . . {the conveyor being constituted by rollable bodies}

9/2476 . . . . {the conveyor being constituted by air cushion}

2009/2484 . . . . {the conveyor being a helical device}

2009/2492 . . . . {the conveyor being constituted by series of little rams or ratchets, moving the charge along}

9/26 . . . . on or in trucks, sleds, or containers

9/262 . . . . {on or in trucks}

2009/264 . . . . {the truck carrying a partition}

2009/266 . . . . {the truck having conduits for guiding the oven atmosphere}

2009/268 . . . . {through the structure of the car and through the charge}

9/28 . . . . for treating continuous lengths of work

9/30 . . . . Details, accessories, or equipment peculiar to furnaces of these types

9/3005 . . . . {arrangements for circulating gases}

9/3011 . . . . {arrangements for circulating gases transversally}

2009/3016 . . . . {with arrangements to circulate gases through the charge}

2009/3022 . . . . {with arrangements to maintain oxidising reducing or neutral zones}

2009/3027 . . . . {Use of registers, partitions}

2009/3033 . . . . {Fumes circulating in the same direction as the charge}

2009/3038 . . . . {Fumes or gases alternatively changing their longitudinal direction}

9/3044 . . . . {Furnace regenerators}

2009/305 . . . . {Particular conformation of the furnace}

2009/3055 . . . . {Non-uniform section through the length of the furnace}

2009/3061 . . . . {Furnaces with longitudinal grooves}

2009/3066 . . . . {Cooling the under-structure of the kiln, e.g. under the cars}

2009/3072 . . . . {Balancing the pressure between the upper part and the lower part of the kiln, above and under the track}

9/3077 . . . . {Arrangements for treating electronic components, e.g. semiconductors}

2009/3083 . . . . {Arrangements to handle skid marks}

2009/3088 . . . . {Drying arrangements}

2009/3094 . . . . {Means to store a part of the charge in the furnace}

9/32 . . . . Casings

9/34 . . . . Arrangements of linings

9/36 . . . . Arrangements of heating devices

2009/3607 . . . . {Heaters located above the track of the charge}

2009/3615 . . . . {Burner in the ceiling directed vertically downwards}

2009/3623 . . . . {Heaters located under the track}

2009/363 . . . . {Burners in the hearth directed towards the ceiling}

2009/3638 . . . . {Heaters located above and under the track}

2009/3646 . . . . {Heating the ceiling or the walls for a reverberatory effect}

2009/3653 . . . . {Preheated fuel}

2009/3661 . . . . {preheated with the exhaust gases}

2009/3669 . . . . {preheated with the gases of the cooling zone}

2009/3676 . . . . {preheated with the gases of the preheating zone}

2009/3684 . . . . {Combustion within a combustion chamber with outlets in the kiln chamber}

2009/3692 . . . . {The charge containing combustible materials}

9/38 . . . . Arrangements of devices for charging

2009/382 . . . . {Charging}

2009/384 . . . . {Discharging}

2009/386 . . . . {Lateral intake or outtake}

2009/388 . . . . {Centrally in the lateral wall}

9/39 . . . . Arrangements of devices for discharging

9/40 . . . . Arrangements of controlling or monitoring devices

11/00 Bell-type furnaces (for treating metal strips or wire C21D 9/663)

13/00 Furnaces with both stationary charge and progression of heating, e.g. of ring type, of type in which segmental kiln moves over stationary charge

13/02 . . . . of multiple-chamber type with permanent partitions; Combinations of furnaces

13/04 . . . . of single-chamber type with temporary partitions

13/06 . . . . Details, accessories, or equipment peculiar to furnaces of this type

13/08 . . . . Casings

13/10 . . . . Arrangements of linings

13/12 . . . . Arrangements of heating devices

13/14 . . . . Arrangement of controlling, monitoring, alarm or like devices

14/00 Crucible or pot furnaces

2014/002 . . . . {Smelting process, e.g. sequences to melt a specific material}

2014/004 . . . . {Process involving a smelting step, e.g. vapourisation}

2014/006 . . . . {involving a salt bath or help metal bath}
<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15/12</td>
<td>Arrangements of dust collectors</td>
</tr>
<tr>
<td>15/14</td>
<td>Arrangements of heating devices</td>
</tr>
<tr>
<td>15/16</td>
<td>Arrangements of cooling devices</td>
</tr>
<tr>
<td>15/18</td>
<td>Arrangements of controlling devices</td>
</tr>
<tr>
<td>15/20</td>
<td>Arrangements of monitoring devices, of indicators, of alarm devices</td>
</tr>
<tr>
<td>17/00</td>
<td>Furnaces of a kind not covered by any preceding group (structural combinations of furnaces)</td>
</tr>
<tr>
<td>17/008</td>
<td>Open field furnace for burning bricks</td>
</tr>
<tr>
<td>17/0016</td>
<td>Chamber type furnaces</td>
</tr>
<tr>
<td>17/0025</td>
<td>Especially adapted for treating semiconductor wafers</td>
</tr>
<tr>
<td>17/0033</td>
<td>(the floor of the furnaces consisting of the support carrying the charge, e.g. car type furnaces)</td>
</tr>
<tr>
<td>17/0041</td>
<td>(specially adapted for burning bricks or pottery)</td>
</tr>
<tr>
<td>17/005</td>
<td>[with cylindrical chambers]</td>
</tr>
<tr>
<td>17/0058</td>
<td>[with superposed cylindrical chambers]</td>
</tr>
<tr>
<td>17/0066</td>
<td>[arrangement of the charge, e.g. bricks]</td>
</tr>
<tr>
<td>17/0075</td>
<td>[Heating devices therefor]</td>
</tr>
<tr>
<td>17/0083</td>
<td>[with means for circulating the atmosphere]</td>
</tr>
<tr>
<td>17/0091</td>
<td>Special chambers, e.g. associated in their use</td>
</tr>
<tr>
<td>17/02</td>
<td>specially designed for laboratory use</td>
</tr>
<tr>
<td>17/025</td>
<td>[for dental workpieces]</td>
</tr>
<tr>
<td>19/00</td>
<td>Combinations of furnaces of kinds not covered by a single preceding main group</td>
</tr>
<tr>
<td>19/02</td>
<td>combined in one structure</td>
</tr>
<tr>
<td>19/04</td>
<td>arranged for associated working</td>
</tr>
<tr>
<td>21/00</td>
<td>Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction</td>
</tr>
<tr>
<td>21/02</td>
<td>Sintering grates or tables</td>
</tr>
<tr>
<td>21/04</td>
<td>Sintering pots or sintering pans</td>
</tr>
<tr>
<td>21/06</td>
<td>Endless-strand sintering machines</td>
</tr>
</tbody>
</table>

15/00 Fluidised-bed furnaces; Other furnaces using or treating finely-divided materials in dispersion (apparatus in general for carrying out chemical or physical processes in a fluidised bed reactor B01J 8/24 - B01J 8/44)