CPC COOPERATIVE PATENT CLASSIFICATION

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

LIGHTING; HEATING

F27 FURNACES; KILNS; OVENS; RETORTS (specially adapted for a purpose covered by a single other class and specifically mentioned in that class, see the class in question, e.g. bakery ovens A21B, glass melting furnaces C03B, coke or gas-making apparatus C10B, C10J, apparatus for cracking hydrocarbons C10G, blast furnaces C21B, converters for making steel C21C, furnaces for heat treatment of metal C21D; furnaces for electroslag or arc remelting of metals C22B 9/00; enamelling ovens C23D; combustion apparatus F23; electric heating H05B)
(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

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.

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 . {wherein no smelting of the charge occurs, e.g. calcining or sintering furnaces}

1/02 . with two or more shafts or chambers, e.g. multi-storey

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 . of single-chamber fixed-hearth type

3/04 . of 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

2003/125 . . . {Hearths}

3/14 . . . Arrangements of linings
3/16 . . . Walls; Roofs
2003/165 . . . . {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
3/26 . . Arrangements of heat-exchange apparatus
3/263 . . . {Regenerators}
3/266 . . . . {Exhaust gases reversing flow devices}
3/28 . . Arrangement of controlling, monitoring, alarm or the like devices

5/00 Muffle furnaces; Retort furnaces; Other furnaces in which the charge is held completely isolated (F27B 9/00 takes precedence)

5/02 . of multiple-chamber type
5/04 . adapted for treating the charge in vacuum or special atmosphere
5/06 . Details, accessories, or equipment peculiar to furnaces of these types
2005/062 . . {Cooling elements}
2005/064 . . . {disposed in the furnace, around the chamber, e.g. coils}
2005/066 . . . {disposed around the fan}
2005/068 . . . {for external cooling}
5/08 . . Arrangements of linings
5/10 . . Muffles
5/12 . . Arrangement of devices for charging
5/13 . . Arrangement of devices for discharging
5/14 . . Arrangements of heating devices
2005/143 . . . {Heating rods disposed in the chamber}
2005/146 . . . . {the heating rods being in the tubes which conduct the heating gases}
5/16 . . Arrangements of air or gas supply devices
2005/161 . . . {Gas inflow or outflow}
2005/162 . . . . {through closable or non-closable openings of the chamber walls}
2005/163 . . . . . {Controlled openings, e.g. orientable}
2005/164 . . . . {Air supply through a set of tubes with openings}
2005/165 . . . . . {Controlled tubes, e.g. orientable or with closable openings}
2005/166 . . . {Means to circulate the atmosphere}
2005/167 . . . . {the atmosphere being recirculated through the treatment chamber by a turbine}
2005/168 . . . . . {by more than one turbine}
2005/169 . . . . {the atmosphere being continuously renewed by exterior means}
5/18 . . Arrangement of controlling, monitoring, alarm or like devices

7/00 Rotary-drum furnaces, i.e. horizontal or slightly inclined

2007/005 . {for the treatment of slurries or wet materials}
7/02 . of multiple-chamber or multiple-drum type
2007/022 . . {the drum having a non-uniform section along its length}
2007/025 . . {with different chambers, e.g. treatment zones}
2007/027 . . {with more than one drum}
7/04 . . with longitudinal divisions
2007/041 . . . {Longitudinal tubes}
2007/043 . . . {the partition being a cylinder, coaxial to the rotary drum, defining two chambers}
2007/045 . . . . {the charge going in one direction in one chamber, then after a turn coming back in the other direction in the other chamber}
2007/046 . . . {Radial partitions}
2007/048 . . . . {defining an helical chamber}
7/06 . adapted for treating the charge in vacuum or special atmosphere
7/08 . externally heated
7/10 . internally heated, e.g. by means of passages in the wall
7/12 . tiltable
7/14 . with means for agitating or moving the charge
7/16 . . the means being fixed relatively to the drum, {e.g. composite means} (F27B 7/04 takes precedence)
7/161 . . . {the means comprising projections jutting out from the wall}
7/162 . . . . {the projections consisting of separate lifting elements, e.g. lifting shovels}
2007/163 . . . . . {using only a ring of lifting elements to lift the charge}
2007/165 . . . . {forming a helical lifting projection}
7/166 . . . {the means comprising chains}
7/167 . . . {the means comprising partitions}
2007/168 . . . . {Annular partition}
7/18 . . the means being movable within the drum
7/20 . Details, accessories, or equipment peculiar to rotary-drum furnaces
2007/2008 . . {Devices for reintroducing dust in the drum}
7/2016 . . {Arrangements of preheating devices for the charge}
7/2025 . . . {consisting of a single string of cyclones}
7/2033 . . . . {with means for precalcining the raw material}
7/2041 . . . {consisting of at least two strings of cyclones with two different admissions of raw material}
7/205 . . . . {with precalcining means on the string supplied with exhaust gases from the cooler}
7/2058 . . . . {with precalcining means on each string}
7/2066 . . . {comprising a band transporter}
7/2075 . . {Removing incrustations}
7/2083 . . {Arrangements for the melting of metals or the treatment of molten metals}
2007/2091 . . {Means for eliminating compounds from gases by condensation, e.g. alkali metals}
7/22 . . Rotary drums; Supports therefor
7/2206 . . . {Bearing rings}
2007/2213 . . . . {mounted floatingly on the drum}
2007/222 . . . . . {the mounting comprising radially resilient elements, e.g. springs}
2007/2226 . . . . . {the mounting comprising elements to maintain the ring between series of abutments}
2007/2233 . . . . {the ring being fixed to the drum, e.g. welded}
7/224 . . . {Discharge ends}

2007/2246 . . . {Support rollers}
2007/2253 . . . . {mounted movable, e.g. resiliently on the ground}
2007/226 . . . . . {constituted of series of two rollers mounted on tiltable support along the drum}
2007/2266 . . . . . {the mounting allowing a movement of the rollers support in a horizontal plane}
2007/2273 . . . . {with arrangements, e.g. rollers, to maintain the drum against longitudinal movement}
2007/228 . . . . {comprising rollable bodies}
2007/2286 . . . . {supporting the drum directly, without the use of a bearing ring}
2007/2293 . . . {the furnace being suspended}
7/24 . . . Seals between rotary and stationary parts
7/26 . . 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}
2007/3211 . . . . {at the open end of the drum}
2007/3217 . . . . . {axially, optionally at some distance in the kiln}
2007/3223 . . . . . {the charging device being movable axially, e.g. reciprocable}
2007/3229 . . . . . {via a centrifugal device}
2007/3235 . . . . . {the introducing device comprising a spray or a lance}
2007/3241 . . . . . {in the flame of the burner}
2007/3247 . . . . {through a lateral opening in the drum}
2007/3252 . . . . . {with lifting scoops attached to the drum}
2007/3258 . . . . {at the open end of the drum}
2007/3264 . . . . . {using special discharge means located around the discharge end, e.g. lifting scoops or a transversal annular partition}
2007/327 . . . . {centrifugally through lateral openings in the drum}
2007/3276 . . . . {with a collector means extending longitudinally into the drum}
2007/3282 . . . {Details}
2007/3288 . . . . {Sieves or grading means}
2007/3294 . . . . {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}
2007/365 . . . . {longitudinally}
2007/367 . . . . {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

9/00 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**

9/02 . of multiple-track type; of multiple-chamber type; Combinations of furnaces
9/021 . . {having two or more parallel tracks}
9/022 . . . {With two tracks moving in opposite directions}
9/023 . . . . {with a U turn at one end}
9/024 . . . . . {with superimposed tracks}
9/025 . . . {having two or more superimposed tracks (F27B 9/024 takes precedence)}
2009/026 . . {Two or more conveyors, e.g. mounted successively}
2009/027 . . . {working in parallel}
9/028 . . {Multi-chamber type furnaces, (F27B 9/029 takes precedence)}
9/029 . . {Multicellular type furnaces constructed with add-on modules}
9/04 . adapted for treating the charge in vacuum or special atmosphere
9/042 . . {Vacuum furnaces}
9/045 . . {Furnaces with controlled atmosphere}
9/047 . . . {the atmosphere consisting of protective gases}
9/06 . heated without contact between combustion gases and charge; electrically heated
9/061 . . {with at least two longitudinal chambers carrying combustion gases, i.e. of the Dressler type}
9/062 . . {electrically heated}
9/063 . . . {Resistor heating, e.g. with resistors also emitting IR rays}
9/065 . . . . {the resistance being transported by the conveyor}
9/066 . . . {heated by lamps}
9/067 . . . {heated by induction}
9/068 . . {heated by radiant tubes, the tube being heated by a hot medium, e.g. hot gases}
9/08 . . heated through chamber walls
9/082 . . . {Muffle furnaces}
9/084 . . . . {the muffle being fixed and in a single piece}
9/086 . . . . {with two or more fixed muffles}
9/088 . . . . {Series of separate muffles conveyed through the furnace}
9/10 . . heated by hot air or gas
9/12 . with special arrangements for preheating or cooling the charge
2009/122 . . {Preheating}
2009/124 . . {Cooling}
2009/126 . . . {involving the circulation of cooling gases, e.g. air}
2009/128 . . . . {the gases being further utilised as oxidants in the burners}
9/14 . characterised by the path of the charge during treatment; characterised by the means by which the charge is moved during treatment (F27B 9/28 takes precedence; travelling or movable supports or containers for the charge F27D 3/12)
9/142 . . {the charge moving along a vertical axis}
9/145 . . {the charge moving along a serpentine path}

9/147 . . {the charge moving on an inclined floor}
9/16 . . the charge moving in a circular or arcuate path
9/18 . . . under the action of scrapers or pushers
9/185 . . . . {multiple hearth type furnaces}
9/20 . . the charge moving in a substantially straight path {tunnel furnace}
9/201 . . . {walking beam furnace}
9/202 . . . . {Conveyor mechanisms therefor}
9/203 . . . . . {having ramps (F27B 9/206 takes precedence)}
9/205 . . . . . {having excentrics or lever arms (F27B 9/206 takes precedence)}
9/206 . . . . . {consisting of a single central beam}
9/207 . . . . . {consisting of two or more conveyors}
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 conducts 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. vaporisation}
2014/006 . . {involving a salt bath or help metal bath}
2014/008 . {Continuous casting}
14/02 . with tilting or rocking arrangements (F27B 14/04 takes precedence)
14/04 . adapted for treating the charge in vacuum or special atmosphere
2014/045 . . {Vacuum}
14/06 . heated electrically, e.g. induction crucible furnaces with or without any other source of heat (F27B 14/04 takes precedence)
14/061 . . {Induction furnaces}
14/063 . . . {Skull melting type}
14/065 . . . {Channel type}
2014/066 . . . {Construction of the induction furnace}
2014/068 . . {with the use of an electrode producing a current in the melt}
14/08 . Details peculiar to crucible or pot furnaces
14/0806 . . {Charging or discharging devices}
2014/0812 . . . {Continuously charging}
2014/0818 . . . {Discharging}
2014/0825 . . {Crucible or pot support}
2014/0831 . . . {Support or means for the transport of crucibles}
2014/0837 . . {Cooling arrangements}
2014/0843 . . {Lining or casing}
2014/085 . . {Preheating of the charge}
2014/0856 . . . {Preheating of the crucible}
2014/0862 . . {Flux guides}
2014/0868 . . {Magnetic shields}
2014/0875 . . {Two zones or chambers, e.g. one used for charging}
2014/0881 . . {Two or more crucibles}
2014/0887 . . {Movement of the melt}
2014/0893 . . {Heat-conductive material disposed on the surface of the melt}
14/10 . . Crucibles
2014/102 . . . {Form of the crucibles}
2014/104 . . . {Crucible linings}
2014/106 . . . {Ladles}
2014/108 . . . {Cold crucibles (transparent to electromagnetic radiations)}
14/12 . . . Covers therefor
14/14 . . Arrangements of heating devices
14/143 . . . {Heating of the crucible by convection of combustion gases}
2014/146 . . . {Recuperation of lost heat, e.g. regenerators}
14/20 . . Arrangement of controlling, monitoring, alarm or like devices

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)**}**
15/003 . {Cyclones or chain of cyclones}
15/006 . {Equipment for treating dispersed material falling under gravity with ascending gases}
15/02 . Details, accessories, or equipment peculiar to furnaces of these types
15/04 . . Casings; Supports therefor
15/06 . . . Arrangements of linings
15/08 . . Arrangements of devices for charging
15/09 . . Arrangements of devices for discharging
15/10 . . Arrangements of air or gas supply devices
15/12 . . Arrangements of dust collectors
15/14 . . Arrangements of heating devices
15/16 . . Arrangements of cooling devices
15/18 . . Arrangements of controlling devices
15/20 . . Arrangements of monitoring devices, of indicators, of alarm devices

17/00 Furnaces of a kind not covered by any preceding group (structural combinations of furnaces F27B 19/02)
17/0008 . {Open field furnace for burning bricks}
17/0016 . {Chamber type furnaces}
17/0025 . . {Especially adapted for treating semiconductor wafers}
17/0033 . . {the floor of the furnaces consisting of the support carrying the charge, e.g. car type furnaces}
17/0041 . . {specially adapted for burning bricks or pottery (F27B 17/0033 takes precedence)}
17/005 . . . {with cylindrical chambers}
17/0058 . . . . {with superposed cylindrical chambers}
17/0066 . . . {arrangement of the charge, e.g. bricks}
17/0075 . . . {Heating devices therefor}
17/0083 . . {with means for circulating the atmosphere}
2017/0091 . . {Series of chambers, e.g. associated in their use}
17/02 . specially designed for laboratory use
17/025 . . {for dental workpieces}

19/00 Combinations of furnaces of kinds not covered by a single preceding main group
19/02 . combined in one structure
19/04 . arranged for associated working

21/00 Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction
21/02 . Sintering grates or tables
21/04 . Sintering pots or sintering pans
21/06 . Endless-strand sintering machines