

CPC COOPERATIVE PATENT CLASSIFICATION

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](#).

WARNING

The following IPC groups are not used in the CPC system. Subject matter covered by these 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

- | | | | |
|-------------|--|-------------|--|
| 1/00 | Shaft or like vertical or substantially vertical furnaces (for preheating, burning, calcining or cooling lime, magnesia or dolomite C04B 2/12) | 3/08 | . heated electrically, with or without any other source of heat |
| 1/005 | . {wherein no smelting of the charge occurs, e.g. calcining or sintering furnaces} | 3/085 | . . {Arc furnaces} |
| 1/02 | . with two or more shafts or chambers, e.g. multi-storey | 3/10 | . Details, accessories, or equipment peculiar to hearth-type furnaces |
| 1/025 | . . {with fore-hearth} | 3/105 | . . {Slag chamber} |
| 1/04 | . . Combinations or arrangements of shafts | 3/12 | . . Working chambers or casings; Supports therefor |
| 1/06 | . of other than up-draught type | 2003/125 | . . . {Hearths} |
| 1/08 | . heated otherwise than by solid fuel mixed with charge | 3/14 | . . . Arrangements of linings |
| 1/10 | . Details, accessories, or equipment peculiar to furnaces of these types | 3/16 | . . . Walls; Roofs |
| 1/12 | . . Shells or casings; Supports therefor | 2003/165 | {Roofs} |
| 1/14 | . . . Arrangements of linings (linings in general F27D 1/00) | 3/18 | . . Arrangements of devices for charging |
| 1/16 | . . Arrangements of tuyeres | 3/183 | . . . {Charging of arc furnaces vertically through the roof, e.g. in three points} |
| 1/18 | . . Arrangements of dust collectors | 3/186 | {Charging in a vertical chamber adjacent to the melting chamber} |
| 1/20 | . . Arrangements of devices for charging | 3/19 | . . Arrangements of devices for discharging |
| 1/21 | . . Arrangements of devices for discharging | 3/20 | . . Arrangements of heating devices |
| 1/22 | . . Arrangements of heat-exchange apparatus (heat-exchangers in general F28C , F28D) | 3/205 | . . . {Burners} |
| 1/24 | . . Cooling arrangements | 3/22 | . . Arrangements of air or gas supply devices |
| 1/26 | . . Arrangements of controlling devices | 3/225 | . . . {Oxygen blowing} |
| 1/28 | . . Arrangements of monitoring devices, of indicators, of alarm devices | 3/24 | . . Cooling arrangements |
| 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 | 3/26 | . . Arrangements of heat-exchange apparatus |
| 3/002 | . {Siemens-Martin type furnaces} | 3/263 | . . . {Regenerators} |
| 3/005 | . . {Port construction} | 3/266 | {Exhaust gases reversing flow devices} |
| 3/007 | . . . {Removable burner head} | 3/28 | . . Arrangement of controlling, monitoring, alarm or the like devices |
| 3/02 | . of single-chamber fixed-hearth type | 5/00 | Muffle furnaces; Retort furnaces; Other furnaces in which the charge is held completely isolated (F27B 9/00 takes precedence) |
| 3/04 | . of multiple-hearth type; of multiple-chamber type; Combinations of hearth-type furnaces | 5/02 | . of multiple-chamber type |
| 3/045 | . . {Multiple chambers, e.g. one of which is used for charging} | 5/04 | . adapted for treating the charge in vacuum or special atmosphere |
| 3/06 | . with movable working chambers or hearths, e.g. tiltable, {oscillating or describing a composed movement} | 5/06 | . Details, accessories, or equipment peculiar to furnaces of these types |
| 3/065 | . . {tiltable} | 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	7/2016	. . {Arrangements of preheating devices for the charge}
5/14	. . Arrangements of heating devices	7/2025	. . . {consisting of a single string of cyclones}
2005/143	. . . {Heating rods disposed in the chamber}	7/2033	. . . . {with means for precalcining the raw material}
2005/146	. . . . {the heating rods being in the tubes which conduct the heating gases}	7/2041	. . . . {consisting of at least two strings of cyclones with two different admissions of raw material}
5/16	. . Arrangements of air or gas supply devices	7/205	. . . . {with precalcining means on the string supplied with exhaust gases from the cooler}
2005/161	. . . {Gas inflow or outflow}	7/2058	. . . . {with precalcining means on each string}
2005/162	. . . . {through closable or non-closable openings of the chamber walls}	7/2066	. . . {comprising a band transporter}
2005/163	. . . . . {Controlled openings, e.g. orientable}	7/2075	. . {Removing incrustations}
2005/164	. . . . {Air supply through a set of tubes with openings}	7/2083	. . {Arrangements for the melting of metals or the treatment of molten metals}
2005/165	. . . . . {Controlled tubes, e.g. orientable or with closable openings}	2007/2091	. . {Means for eliminating compounds from gases by condensation, e.g. alkali metals}
2005/166	. . . {Means to circulate the atmosphere}	7/22	. . Rotary drums; Supports therefor
2005/167	. . . . {the atmosphere being recirculated through the treatment chamber by a turbine}	7/2206	. . . {Bearing rings}
2005/168	. . . . . {by more than one turbine}	2007/2213	. . . . {mounted floatingly on the drum}
2005/169	. . . . {the atmosphere being continuously renewed by exterior means}	2007/222	. . . . . {the mounting comprising radially resilient elements, e.g. springs}
5/18	. . Arrangement of controlling, monitoring, alarm or like devices	2007/2226	. . . . . {the mounting comprising elements to maintain the ring between series of abutments}
7/00	Rotary-drum furnaces, i.e. horizontal or slightly inclined	2007/2233	. . . . {the ring being fixed to the drum, e.g. welded}
2007/005	. {for the treatment of slurries or wet materials}	7/224	. . . {Discharge ends}
7/02	. of multiple-chamber or multiple-drum type	2007/2246	. . . {Support rollers}
2007/022	. . {the drum having a non-uniform section along its length}	2007/2253	. . . . {mounted movable, e.g. resiliently on the ground}
2007/025	. . {with different chambers, e.g. treatment zones}	2007/226	. . . . . {constituted of series of two rollers mounted on tiltable support along the drum}
2007/027	. . {with more than one drum}	2007/2266	. . . . . {the mounting allowing a movement of the rollers support in a horizontal plane}
7/04	. . with longitudinal divisions	2007/2273	. . . . . {with arrangements, e.g. rollers, to maintain the drum against longitudinal movement}
2007/041	. . . {Longitudinal tubes}	2007/228	. . . . {comprising rollable bodies}
2007/043	. . . {the partition being a cylinder, coaxial to the rotary drum, defining two chambers}	2007/2286	. . . . {supporting the drum directly, without the use of a bearing ring}
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}	2007/2293	. . . {the furnace being suspended}
2007/046	. . . {Radial partitions}	7/24	. . . Seals between rotary and stationary parts
2007/048	. . . . {defining an helical chamber}	7/26	. . Drives
7/06	. adapted for treating the charge in vacuum or special atmosphere	2007/261	. . . {working with a ring embracing the drum}
7/08	. externally heated	2007/262	. . . . {A gear ring combined with a dented wheel drive}
7/10	. internally heated, e.g. by means of passages in the wall	2007/263	. . . . . {A gear ring combined with a ram drive}
7/12	. tiltable	2007/265	. . . . . {the ring being mounted floatingly}
7/14	. with means for agitating or moving the charge	2007/266	. . . . . {the ring being a bearing ring}
7/16	. . the means being fixed relatively to the drum, {e.g. composite means} (F27B 7/04 takes precedence)	2007/267	. . . . . {A gear ring combined with a chain drive}
7/161	. . . {the means comprising projections jutting out from the wall}	2007/268	. . . {Details of the motor or the pinions}
7/162	. . . . {the projections consisting of separate lifting elements, e.g. lifting shovels}	7/28	. . Arrangements of linings
2007/163	. . . . . {using only a ring of lifting elements to lift the charge}	7/30	. . Arrangements of partitions
2007/165	. . . . . {forming a helical lifting projection}	7/32	. . Arrangement of devices for charging
7/166	. . . {the means comprising chains}	7/3205	. . . {Charging}
7/167	. . . {the means comprising partitions}	2007/3211	. . . . {at the open end of the drum}
2007/168	. . . . {Annular partition}	2007/3217	. . . . . {axially, optionally at some distance in the kiln}
7/18	. . the means being movable within the drum	2007/3223	. . . . . {the charging device being movable axially, e.g. reciprocable}
7/20	. Details, accessories, or equipment peculiar to rotary-drum furnaces	2007/3229	. . . . . {via a centrifugal device}
2007/2008	. . {Devices for reintroducing dust in the drum}	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}	2009/3646	. . . {Heating the ceiling or the walls for a reverberatory effect}
9/2453	. . . . {Vibrating conveyor (shaker hearth furnace)}	2009/3653	. . . {Preheated fuel}
9/2461	. . . . {the charge being suspended from the conveyor}	2009/3661	. . . . {preheated with the exhaust gases}
9/2469	. . . . {the conveyor being constituted by rollable bodies}	2009/3669	. . . . {preheated with the gases of the cooling zone}
9/2476	. . . . {the conveyor being constituted by air cushion}	2009/3676	. . . . {preheated with the gases of the preheating zone}
2009/2484	. . . . {the conveyor being a helical device}	2009/3684	. . . {Combustion within a combustion chamber with outlets in the kiln chamber}
2009/2492	. . . . {the conveyor being constituted by series of little rams or ratchets, moving the charge along}	2009/3692	. . . {The charge containing combustible materials}
9/26	. . . on or in trucks, sleds, or containers	9/38	. . Arrangements of devices for charging
9/262	. . . . {on or in trucks}	2009/382	. . . {Charging}
2009/264	. . . . . {the truck carrying a partition}	2009/384	. . . {Discharging}
2009/266	. . . . . {the truck having conducts for guiding the oven atmosphere}	2009/386	. . . {Lateral intake or outtake}
2009/268	. . . . . {through the structure of the car and through the charge}	2009/388	. . . . {Centrally in the lateral wall}
9/28	. for treating continuous lengths of work	9/39	. . Arrangements of devices for discharging
9/30	. Details, accessories, or equipment peculiar to furnaces of these types	9/40	. . Arrangements of controlling or monitoring devices
9/3005	. . {arrangements for circulating gases}	11/00	Bell-type furnaces (for treating metal strips or wire C21D 9/663)
9/3011	. . . {arrangements for circulating gases transversally}	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
2009/3016	. . . . {with arrangements to circulate gases through the charge}	13/02	. of multiple-chamber type with permanent partitions; Combinations of furnaces
2009/3022	. . . . {with arrangements to maintain oxidising reducing or neutral zones}	13/04	. of single-chamber type with temporary partitions
2009/3027	. . . {Use of registers, partitions}	13/06	. Details, accessories, or equipment peculiar to furnaces of this type
2009/3033	. . . {Fumes circulating in the same direction as the charge}	13/08	. . Casings
2009/3038	. . . {Fumes or gases alternatively changing their longitudinal direction}	13/10	. . . Arrangements of linings
9/3044	. . {Furnace regenerators}	13/12	. . Arrangements of heating devices
2009/305	. . {Particular conformation of the furnace}	13/14	. . Arrangement of controlling, monitoring, alarm or like devices
2009/3055	. . . {Non-uniform section through the length of the furnace}	14/00	Crucible or pot furnace
2009/3061	. . . {Furnaces with longitudinal grooves}	2014/002	. {Smelting process, e.g. sequences to melt a specific material}
2009/3066	. . {Cooling the under-structure of the kiln, e.g. under the cars}	2014/004	. . {Process involving a smelting step, e.g. vaporisation}
2009/3072	. . {Balancing the pressure between the upper part and the lower part of the kiln, above and under the track}	2014/006	. . {involving a salt bath or help metal bath}
9/3077	. . {Arrangements for treating electronic components, e.g. semiconductors}	2014/008	. {Continuous casting}
2009/3083	. . {Arrangements to handle skid marks}	14/02	. with tilting or rocking arrangements (F27B 14/04 takes precedence)
2009/3088	. . {Drying arrangements}	14/04	. adapted for treating the charge in vacuum or special atmosphere
2009/3094	. . {Means to store a part of the charge in the furnace}	2014/045	. . {Vacuum}
9/32	. . Casings	14/06	. heated electrically, e.g. induction crucible furnaces with or without any other source of heat (F27B 14/04 takes precedence)
9/34	. . . Arrangements of linings	14/061	. . {Induction furnaces}
9/36	. . Arrangements of heating devices	14/063	. . . {Skull melting type}
2009/3607	. . . {Heaters located above the track of the charge}	14/065	. . . {Channel type}
2009/3615	. . . . {Burner in the ceiling directed vertically downwards}	2014/066	. . . {Construction of the induction furnace}
2009/3623	. . . {Heaters located under the track}	2014/068	. . {with the use of an electrode producing a current in the melt}
2009/363	. . . . {Burners in the hearth directed towards the ceiling}	14/08	. Details peculiar to crucible or pot furnaces
2009/3638	. . . {Heaters located above and under the track}	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