

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](#).

WARNING

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

1/00	Shaft or like vertical or substantially vertical furnaces (for preheating, burning, calcining or cooling lime, magnesia or dolomite C04B 2/12)	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
1/005	. {wherein no smelting of the charge occurs, e.g. calcining or sintering furnaces}	3/002	. {Siemens-Martin type furnaces}
1/02	. with two or more shafts or chambers, e.g. multi-storey	3/005	. . {Port construction}
1/025	. . {with fore-hearth}	3/007	. . . {Removable burner head}
1/04	. . Combinations or arrangements of shafts	3/02	. of single-chamber fixed-hearth type
1/06	. of other than up-draught type	3/04	. of multiple-hearth type; of multiple-chamber type; Combinations of hearth-type furnaces
1/08	. heated otherwise than by solid fuel mixed with charge	3/045	. . {Multiple chambers, e.g. one of which is used for charging}
1/10	. Details, accessories, or equipment peculiar to furnaces of these types	3/06	. with movable working chambers or hearths, e.g. tiltable {, oscillating or describing a composed movement}
1/12	. . Shells or casings; Supports therefor	3/065	. . {tiltable}
1/14	. . . Arrangements of linings (linings in general F27D 1/00)	3/08	. heated electrically, with or without any other source of heat
1/16	. . Arrangements of tuyeres	3/085	. . {Arc furnaces}
1/18	. . Arrangements of dust collectors	3/10	. Details, accessories, or equipment peculiar to hearth-type furnaces
1/20	. . Arrangements of devices for charging	3/105	. . {Slag chamber}
1/21	. . Arrangements of devices for discharging	3/12	. . Working chambers or casings; Supports therefor
1/22	. . Arrangements of heat-exchange apparatus (heat-exchangers in general F28C , F28D)	2003/125	. . . {Hearths}
1/24	. . Cooling arrangements	3/14	. . . Arrangements of linings
1/26	. . Arrangements of controlling devices	3/16	. . . Walls; Roofs
1/28	. . Arrangements of monitoring devices, of indicators, of alarm devices	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