

# 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](#), [C10I](#), 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

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

<a href="#">F27B 1/09</a>	covered by	<a href="#">F27B 1/08</a>
<a href="#">F27B 5/05</a>	covered by	<a href="#">F27B 5/04</a>
<a href="#">F27B 14/16</a> , <a href="#">F27B 14/18</a>	covered by	<a href="#">F27B 14/0806</a>
<a href="#">F27B 21/08</a> - <a href="#">F27B 21/14</a>	covered by	<a href="#">F27D</a>

- 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.

<b>1/00</b>	<b>Shaft or like vertical or substantially vertical furnaces (for preheating, burning, calcining or cooling lime, magnesia or dolomite <a href="#">C04B 2/12</a>)</b>	1/28	. . Arrangements of monitoring devices, of indicators, of alarm devices
1/005	. {wherein no smelting of the charge occurs, e.g. calcining or sintering furnaces}	<b>3/00</b>	<b>Hearth-type furnaces, e.g. of reverberatory type (<a href="#">F27B 9/00</a>, <a href="#">F27B 11/00</a>, <a href="#">F27B 13/00</a>, <a href="#">F27B 14/00</a>, <a href="#">F27B 15/00</a>, <a href="#">F27B 21/00</a> take precedence); Tank furnaces</b>
1/02	. with two or more shafts or chambers, e.g. multi-storey	3/002	. {Siemens-Martin type furnaces}
1/025	. . {with fore-hearth}	3/005	. . {Port construction}
1/04	. . Combinations or arrangements of shafts	3/007	. . . {Removable burner head}
1/06	. of other than up-draught type	3/02	. of single-chamber fixed-hearth type
1/08	. heated otherwise than by solid fuel mixed with charge	3/04	. of multiple-hearth type; of multiple-chamber type; Combinations of hearth-type furnaces
1/10	. Details, accessories, or equipment peculiar to furnaces of these types	3/045	. . {Multiple chambers, e.g. one of which is used for charging}
1/12	. . Shells or casings; Supports therefor	3/06	. with movable working chambers or hearths, e.g. tiltable {, oscillating or describing a composed movement}
1/14	. . . Arrangements of linings ( <a href="#">linings in general <a href="#">F27D 1/00</a></a> )	3/065	. . {tiltable}
1/16	. . Arrangements of tuyeres	3/08	. heated electrically, with or without any other source of heat
1/18	. . Arrangements of dust collectors	3/085	. . {Arc furnaces}
1/20	. . Arrangements of devices for charging	3/10	. Details, accessories, or equipment peculiar to hearth-type furnaces
1/21	. . Arrangements of devices for discharging	3/105	. . {Slag chamber}
1/22	. . Arrangements of heat-exchange apparatus ( <a href="#">heat-exchangers in general <a href="#">F28C</a>, <a href="#">F28D</a></a> )	3/12	. . Working chambers or casings; Supports therefor
1/24	. . Cooling arrangements	2003/125	. . . {Hearths}
1/26	. . Arrangements of controlling devices		

3/14	. . . Arrangements of linings	2007/022	. . {the drum having a non-uniform section along its length}
3/16	. . . Walls; Roofs	2007/025	. . {with different chambers, e.g. treatment zones}
2003/165	. . . . {Roofs}	2007/027	. . {with more than one drum}
3/18	. . Arrangements of devices for charging	7/04	. . with longitudinal divisions
3/183	. . . {Charging of arc furnaces vertically through the roof, e.g. in three points}	2007/041	. . . {Longitudinal tubes}
3/186	. . . . {Charging in a vertical chamber adjacent to the melting chamber}	2007/043	. . . {the partition being a cylinder, coaxial to the rotary drum, defining two chambers}
3/19	. . Arrangements of devices for discharging	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}
3/20	. . Arrangements of heating devices	2007/046	. . . {Radial partitions}
3/205	. . . {Burners}	2007/048	. . . . {defining an helical chamber}
3/22	. . Arrangements of air or gas supply devices	7/06	. adapted for treating the charge in vacuum or special atmosphere
3/225	. . . {Oxygen blowing}	7/08	. externally heated
3/24	. . Cooling arrangements	7/10	. internally heated, e.g. by means of passages in the wall
3/26	. . Arrangements of heat-exchange apparatus	7/12	. tiltable
3/263	. . . {Regenerators}	7/14	. with means for agitating or moving the charge
3/266	. . . . {Exhaust gases reversing flow devices}	7/16	. . the means being fixed relatively to the drum, {e.g. composite means} (F27B 7/04 takes precedence)
3/28	. . Arrangement of controlling, monitoring, alarm or the like devices	7/161	. . . {the means comprising projections jutting out from the wall}
<b>5/00</b>	<b>Muffle furnaces; Retort furnaces; Other furnaces in which the charge is held completely isolated (F27B 9/00 takes precedence)</b>	7/162	. . . . {the projections consisting of separate lifting elements, e.g. lifting shovels}
5/02	. of multiple-chamber type	2007/163	. . . . . {using only a ring of lifting elements to lift the charge}
5/04	. adapted for treating the charge in vacuum or special atmosphere	2007/165	. . . . . {forming a helical lifting projection}
5/06	. Details, accessories, or equipment peculiar to furnaces of these types	7/166	. . . . {the means comprising chains}
2005/062	. . {Cooling elements}	7/167	. . . . {the means comprising partitions}
2005/064	. . . {disposed in the furnace, around the chamber, e.g. coils}	2007/168	. . . . . {Annular partition}
2005/066	. . . {disposed around the fan}	7/18	. . the means being movable within the drum
2005/068	. . . {for external cooling}	7/20	. Details, accessories, or equipment peculiar to rotary-drum furnaces
5/08	. . Arrangements of linings	2007/2008	. . {Devices for reintroducing dust in the drum}
5/10	. . Muffles	7/2016	. . {Arrangements of preheating devices for the charge}
5/12	. . Arrangement of devices for charging	7/2025	. . . {consisting of a single string of cyclones}
5/13	. . Arrangement of devices for discharging	7/2033	. . . . {with means for precalcining the raw material}
5/14	. . Arrangements of heating devices	7/2041	. . . {consisting of at least two strings of cyclones with two different admissions of raw material}
2005/143	. . . {Heating rods disposed in the chamber}	7/205	. . . . {with precalcining means on the string supplied with exhaust gases from the cooler}
2005/146	. . . . {the heating rods being in the tubes which conduct the heating gases}	7/2058	. . . . {with precalcining means on each string}
5/16	. . Arrangements of air or gas supply devices	7/2066	. . . {comprising a band transporter}
2005/161	. . . {Gas inflow or outflow}	7/2075	. . {Removing incrustations}
2005/162	. . . . {through closable or non-closable openings of the chamber walls}	7/2083	. . {Arrangements for the melting of metals or the treatment of molten metals}
2005/163	. . . . . {Controlled openings, e.g. orientable}	2007/2091	. . {Means for eliminating compounds from gases by condensation, e.g. alkali metals}
2005/164	. . . . {Air supply through a set of tubes with openings}	7/22	. . Rotary drums; Supports therefor
2005/165	. . . . . {Controlled tubes, e.g. orientable or with closable openings}	7/2206	. . . {Bearing rings}
2005/166	. . . {Means to circulate the atmosphere}	2007/2213	. . . . {mounted floatingly on the drum}
2005/167	. . . . {the atmosphere being recirculated through the treatment chamber by a turbine}	2007/222	. . . . . {the mounting comprising radially resilient elements, e.g. springs}
2005/168	. . . . . {by more than one turbine}	2007/2226	. . . . . {the mounting comprising elements to maintain the ring between series of abutments}
2005/169	. . . . . {the atmosphere being continuously renewed by exterior means}	2007/2233	. . . . . {the ring being fixed to the drum, e.g. welded}
5/18	. . Arrangement of controlling, monitoring, alarm or like devices	7/224	. . . {Discharge ends}
<b>7/00</b>	<b>Rotary-drum furnaces, i.e. horizontal or slightly inclined</b>		
2007/005	. {for the treatment of slurries or wet materials}		
7/02	. of multiple-chamber or multiple-drum type		

2007/2246	. . . {Support rollers}	7/42	. . Arrangement of controlling, monitoring, alarm or like devices
2007/2253	. . . . {mounted movable, e.g. resiliently on the ground}	9/00	<b>Furnaces through which the charge is moved mechanically, e.g. of tunnel type (<a href="#">F27B 7/14</a> takes precedence); Similar furnaces in which the charge moves by gravity</b>
2007/226	. . . . . {constituted of series of two rollers mounted on tiltable support along the drum}	9/02	. of multiple-track type; of multiple-chamber type; Combinations of furnaces
2007/2266	. . . . . {the mounting allowing a movement of the rollers support in a horizontal plane}	9/021	. . {having two or more parallel tracks}
2007/2273	. . . . {with arrangements, e.g. rollers, to maintain the drum against longitudinal movement}	9/022	. . . {With two tracks moving in opposite directions}
2007/228	. . . . {comprising rollable bodies}	9/023	. . . . {with a U turn at one end}
2007/2286	. . . . {supporting the drum directly, without the use of a bearing ring}	9/024	. . . . . {with superimposed tracks}
2007/2293	. . . {the furnace being suspended}	9/025	. . . {having two or more superimposed tracks ( <a href="#">F27B 9/024</a> takes precedence)}
7/24	. . . Seals between rotary and stationary parts	2009/026	. . {Two or more conveyors, e.g. mounted successively}
7/26	. . Drives	2009/027	. . . {working in parallel}
2007/261	. . . {working with a ring embracing the drum}	9/028	. . {Multi-chamber type furnaces, ( <a href="#">F27B 9/029</a> takes precedence)}
2007/262	. . . . {A gear ring combined with a dented wheel drive}	9/029	. . {Multicellular type furnaces constructed with add-on modules}
2007/263	. . . . {A gear ring combined with a ram drive}	9/04	. adapted for treating the charge in vacuum or special atmosphere
2007/265	. . . . {the ring being mounted floatingly}	9/042	. . {Vacuum furnaces}
2007/266	. . . . {the ring being a bearing ring}	9/045	. . {Furnaces with controlled atmosphere}
2007/267	. . . . {A gear ring combined with a chain drive}	9/047	. . . {the atmosphere consisting of protective gases}
2007/268	. . . {Details of the motor or the pinions}	9/06	. heated without contact between combustion gases and charge; electrically heated
7/28	. . Arrangements of linings	9/061	. . {with at least two longitudinal chambers carrying combustion gases, i.e. of the Dressler type}
7/30	. . Arrangements of partitions	9/062	. . {electrically heated}
7/32	. . Arrangement of devices for charging	9/063	. . . {Resistor heating, e.g. with resistors also emitting IR rays}
7/3205	. . . {Charging}	9/065	. . . . {the resistance being transported by the conveyor}
2007/3211	. . . . {at the open end of the drum}	9/066	. . . {heated by lamps}
2007/3217	. . . . . {axially, optionally at some distance in the kiln}	9/067	. . . {heated by induction}
2007/3223	. . . . . {the charging device being movable axially, e.g. reciprocable}	9/068	. . {heated by radiant tubes, the tube being heated by a hot medium, e.g. hot gases}
2007/3229	. . . . . {via a centrifugal device}	9/08	. . heated through chamber walls
2007/3235	. . . . . {the introducing device comprising a spray or a lance}	9/082	. . . {Muffle furnaces}
2007/3241	. . . . . {in the flame of the burner}	9/084	. . . . {the muffle being fixed and in a single piece}
2007/3247	. . . . {through a lateral opening in the drum}	9/086	. . . . {with two or more fixed muffles}
2007/3252	. . . . . {with lifting scoops attached to the drum}	9/088	. . . . {Series of separate muffles conveyed through the furnace}
2007/3258	. . . . {at the open end of the drum}	9/10	. . heated by hot air or gas
2007/3264	. . . . . {using special discharge means located around the discharge end, e.g. lifting scoops or a transversal annular partition}	9/12	. with special arrangements for preheating or cooling the charge
2007/327	. . . . {centrifugally through lateral openings in the drum}	2009/122	. . {Preheating}
2007/3276	. . . . {with a collector means extending longitudinally into the drum}	2009/124	. . {Cooling}
2007/3282	. . . {Details}	2009/126	. . . {involving the circulation of cooling gases, e.g. air}
2007/3288	. . . . {Sieves or grading means}	2009/128	. . . . {the gases being further utilised as oxidants in the burners}
2007/3294	. . . . {Means to fluidise the charge in the air}	9/14	. characterised by the path of the charge during treatment; characterised by the means by which the charge is moved during treatment ( <a href="#">F27B 9/28</a> takes precedence; travelling or movable supports or containers for the charge <a href="#">F27D 3/12</a> )
7/33	. . Arrangement of devices for discharging	9/142	. . {the charge moving along a vertical axis}
7/34	. . Arrangements of heating devices	9/145	. . {the charge moving along a serpentine path}
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		

9/147	. . . {the charge moving on an inclined floor}	9/3011	. . . {arrangements for circulating gases transversally}
9/16	. . the charge moving in a circular or arcuate path	2009/3016	. . . . {with arrangements to circulate gases through the charge}
9/18	. . . under the action of scrapers or pushers	2009/3022	. . . . {with arrangements to maintain oxidising reducing or neutral zones}
9/185	. . . . {multiple hearth type furnaces}	2009/3027	. . . . {Use of registers, partitions}
9/20	. . the charge moving in a substantially straight path {tunnel furnace}	2009/3033	. . . . {Fumes circulating in the same direction as the charge}
9/201	. . . . {walking beam furnace}	2009/3038	. . . . {Fumes or gases alternatively changing their longitudinal direction}
9/202	. . . . {Conveyor mechanisms therefor}	9/3044	. . {Furnace regenerators}
9/203	. . . . . {having ramps (F27B 9/206 takes precedence)}	2009/305	. . {Particular conformation of the furnace}
9/205	. . . . . {having excentrics or lever arms (F27B 9/206 takes precedence)}	2009/3055	. . . . {Non-uniform section through the length of the furnace}
9/206	. . . . . {consisting of a single central beam}	2009/3061	. . . . {Furnaces with longitudinal grooves}
9/207	. . . . . {consisting of two or more conveyors}	2009/3066	. . . {Cooling the under-structure of the kiln, e.g. under the cars}
9/208	. . . . {the workpieces being rotated during their advance}	2009/3072	. . . {Balancing the pressure between the upper part and the lower part of the kiln, above and under the track}
9/22	. . . {on rails, e.g.} under the action of scrapers or pushers (F27B 9/26 takes precedence)	9/3077	. . {Arrangements for treating electronic components, e.g. semiconductors}
9/222	. . . . {the path comprising a section specially adapted for effecting equalisation of the temperature of the charge}	2009/3083	. . {Arrangements to handle skid marks}
9/225	. . . . {the charge being subjected to an additional manipulation along the path}	2009/3088	. . {Drying arrangements}
9/227	. . . . {with rotation of the charge (F27B 9/147 takes precedence)}	2009/3094	. . {Means to store a part of the charge in the furnace}
9/24	. . . being carried by a conveyor {(transport by conveyors in general B65G)}	9/32	. . Casings
9/2407	. . . . {the conveyor being constituted by rollers (roller hearth furnace)}	9/34	. . . Arrangements of linings
9/2415	. . . . . {the charge rotating about an axis transversal to the axis of advancement of the charge}	9/36	. . Arrangements of heating devices
9/2423	. . . . . {the charge rotating about an axis parallel to the axis of advancement of the charge}	2009/3607	. . . . {Heaters located above the track of the charge}
9/243	. . . . {Endless-strand conveyor}	2009/3615	. . . . . {Burner in the ceiling directed vertically downwards}
2009/2438	. . . . . {with means to transfer the heat from the outcoming band to the incoming band}	2009/3623	. . . . {Heaters located under the track}
2009/2446	. . . . . {with means to control the tension of the band}	2009/363	. . . . . {Burners in the hearth directed towards the ceiling}
9/2453	. . . . . {Vibrating conveyor (shaker hearth furnace)}	2009/3638	. . . . {Heaters located above and under the track}
9/2461	. . . . . {the charge being suspended from the conveyor}	2009/3646	. . . . {Heating the ceiling or the walls for a reverberatory effect}
9/2469	. . . . . {the conveyor being constituted by rollable bodies}	2009/3653	. . . . {Preheated fuel}
9/2476	. . . . . {the conveyor being constituted by air cushion}	2009/3661	. . . . . {preheated with the exhaust gases}
2009/2484	. . . . . {the conveyor being a helical device}	2009/3669	. . . . . {preheated with the gases of the cooling zone}
2009/2492	. . . . . {the conveyor being constituted by series of little rams or ratchets, moving the charge along}	2009/3676	. . . . . {preheated with the gases of the preheating zone}
9/26	. . . on or in trucks, sleds, or containers	2009/3684	. . . . {Combustion within a combustion chamber with outlets in the kiln chamber}
9/262	. . . . {on or in trucks}	2009/3692	. . . . {The charge containing combustible materials}
2009/264	. . . . . {the truck carrying a partition}	9/38	. . Arrangements of devices for charging
2009/266	. . . . . {the truck having conducts for guiding the oven atmosphere}	2009/382	. . . . {Charging}
2009/268	. . . . . {through the structure of the car and through the charge}	2009/384	. . . . {Discharging}
9/28	. for treating continuous lengths of work	2009/386	. . . . {Lateral intake or outtake}
9/30	. Details, accessories, or equipment peculiar to furnaces of these types	2009/388	. . . . . {Centrally in the lateral wall}
9/3005	. . {arrangements for circulating gases}	9/39	. . Arrangements of devices for discharging
		9/40	. . Arrangements of controlling or monitoring devices
		11/00	<b>Bell-type furnaces (for treating metal strips or wire C21D 9/663)</b>
		13/00	<b>Furnaces with both stationary charge and progression of heating, e.g. of ring type, of type in which segmental kiln moves over stationary charge</b>

13/02	. of multiple-chamber type with permanent partitions; Combinations of furnaces	14/20	. . Arrangement of controlling, monitoring, alarm or like devices
13/04	. of single-chamber type with temporary partitions	<b>15/00</b>	<b>Fluidised-bed furnaces; Other furnaces using or treating finely-divided materials in dispersion</b>
13/06	. Details, accessories, or equipment peculiar to furnaces of this type		{(apparatus in general for carrying out chemical or physical processes in a fluidised bed reactor <a href="#">B01J 8/24</a> - <a href="#">B01J 8/44</a> )}
13/08	. . Casings	15/003	. {Cyclones or chain of cyclones}
13/10	. . . Arrangements of linings	15/006	. {Equipment for treating dispersed material falling under gravity with ascending gases}
13/12	. . Arrangements of heating devices	15/02	. Details, accessories, or equipment peculiar to furnaces of these types
13/14	. . Arrangement of controlling, monitoring, alarm or like devices	15/04	. . Casings; Supports therefor
<b>14/00</b>	<b>Crucible or pot furnaces</b>	15/06	. . . Arrangements of linings
2014/002	. {Smelting process, e.g. sequences to melt a specific material}	15/08	. . Arrangements of devices for charging
2014/004	. . {Process involving a smelting step, e.g. vaporisation}	15/09	. . Arrangements of devices for discharging
2014/006	. . {involving a salt bath or help metal bath}	15/10	. . Arrangements of air or gas supply devices
2014/008	. {Continuous casting}	15/12	. . Arrangements of dust collectors
14/02	. with tilting or rocking arrangements ( <a href="#">F27B 14/04</a> takes precedence)	15/14	. . Arrangements of heating devices
14/04	. adapted for treating the charge in vacuum or special atmosphere	15/16	. . Arrangements of cooling devices
2014/045	. . {Vacuum}	15/18	. . Arrangements of controlling devices
14/06	. heated electrically, e.g. induction crucible furnaces with or without any other source of heat ( <a href="#">F27B 14/04</a> takes precedence)	15/20	. . Arrangements of monitoring devices, of indicators, of alarm devices
14/061	. . {Induction furnaces}	<b>17/00</b>	<b>Furnaces of a kind not covered by any preceding group (structural combinations of furnaces <a href="#">F27B 19/02</a>)</b>
14/063	. . . {Skull melting type}	17/0008	. {Open field furnace for burning bricks}
14/065	. . . {Channel type}	17/0016	. {Chamber type furnaces}
2014/066	. . . {Construction of the induction furnace}	17/0025	. . {Especially adapted for treating semiconductor wafers}
2014/068	. . {with the use of an electrode producing a current in the melt}	17/0033	. . {the floor of the furnaces consisting of the support carrying the charge, e.g. car type furnaces}
14/08	. Details peculiar to crucible or pot furnaces	17/0041	. . {specially adapted for burning bricks or pottery ( <a href="#">F27B 17/0033</a> takes precedence)}
14/0806	. . {Charging or discharging devices}	17/005	. . . {with cylindrical chambers}
2014/0812	. . . {Continuously charging}	17/0058	. . . . {with superposed cylindrical chambers}
2014/0818	. . . {Discharging}	17/0066	. . . {arrangement of the charge, e.g. bricks}
2014/0825	. . {Crucible or pot support}	17/0075	. . . {Heating devices therefor}
2014/0831	. . . {Support or means for the transport of crucibles}	17/0083	. . {with means for circulating the atmosphere}
2014/0837	. . {Cooling arrangements}	2017/0091	. . {Series of chambers, e.g. associated in their use}
2014/0843	. . {Lining or casing}	17/02	. specially designed for laboratory use
2014/085	. . {Preheating of the charge}	17/025	. . {for dental workpieces}
2014/0856	. . . {Preheating of the crucible}	<b>19/00</b>	<b>Combinations of furnaces of kinds not covered by a single preceding main group</b>
2014/0862	. . {Flux guides}	19/02	. combined in one structure
2014/0868	. . {Magnetic shields}	19/04	. arranged for associated working
2014/0875	. . {Two zones or chambers, e.g. one used for charging}	<b>21/00</b>	<b>Open or uncovered sintering apparatus; Other heat-treatment apparatus of like construction</b>
2014/0881	. . {Two or more crucibles}	21/02	. Sintering grates or tables
2014/0887	. . {Movement of the melt}	21/04	. Sintering pots or sintering pans
2014/0893	. . {Heat-conductive material disposed on the surface of the melt}	21/06	. Endless-strand sintering machines
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}		