

# CPC COOPERATIVE PATENT CLASSIFICATION

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

### LIGHTING; HEATING

## F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES (NOTE omitted)

## F23G CREMATION FURNACES; CONSUMING WASTE PRODUCTS BY COMBUSTION

### NOTE

This subclass covers also the burning of low-grade fuel of solid, liquid, or gaseous nature.

### WARNING

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   | <b>Furnaces for cremation of human or animal carcasses</b>  | 5/32  | • the waste being subjected to a whirling movement, e.g. cyclonic incinerators  |
| 5/00   | <b>Incineration of waste (of specific waste F23G 7/00); Incinerator constructions; Details, accessories or control therefor</b>     | 5/34  | • the waste being burnt in a pit or arranged in a heap for combustion   |
| 5/002  | • {characterised by their grates (F23G 5/05 takes precedence)}  | 5/36  | • having a conical combustion chamber, e.g. "teepee" incinerators (F23G 5/22 takes precedence)  |
| 5/004  | • . . {with endless travelling grates}  | 5/38  | • Multi-hearth arrangements   |
| 5/006  | • {General arrangement of incineration plant, e.g. flow sheets}   | 5/40  | • Portable or mobile incinerators   |
| 5/008  | • {adapted for burning two or more kinds, e.g. liquid and solid, of waste being fed through separate inlets}                        | 5/42  | • . . of the basket type  |
| 5/02   | • with pretreatment   | 5/44  | • Details; Accessories  |
| 5/027  | • . . pyrolysing or gasifying stage (pyrolysis of sludge C02F 11/00; destructive distillation of carbonaceous materials C10B 53/00) | 5/442 | • . . {Waste feed arrangements}   |
| 5/0273 | • . . . {using indirect heating}  | 5/444 | • . . . {for solid waste (F23G 5/448 takes precedence)}   |
| 5/0276 | • . . . {using direct heating}  | 5/446 | • . . . {for liquid waste (F23G 5/448 takes precedence)}  |
| 5/033  | • . . comminuting or crushing   | 5/448 | • . . . {in which the waste is fed in containers or the like}   |
| 5/04   | • . . drying  | 5/46  | • . . Recuperation of heat  |
| 5/05   | • . . . using drying grates   | 5/48  | • . . Preventing corrosion  |
| 5/08   | • having supplementary heating  | 5/50  | • Control or safety arrangements  |
| 5/085  | • . . {High-temperature heating means, e.g. plasma, for partly melting the waste}   | 7/00  | <b>Incinerators or other apparatus for consuming industrial waste, e.g. chemicals (incinerator closets A47K 11/02; oxidation of sludge C02F 11/06; burners in general, burner details F23D; incinerating radioactive waste G21F 9/00)</b> |
| 5/10   | • . . electric  | 7/001 | • {for sludges or waste products from water treatment installations (F23G 5/008 takes precedence)}  |
| 5/12   | • . . using gaseous or liquid fuel (F23G 5/14 takes precedence)   | 7/003 | • {for used articles}   |
| 5/14   | • . . including secondary combustion  | 7/005 | • . . {cars, vehicles}  |
| 5/16   | • . . . in a separate combustion chamber  | 7/006 | • . . {wires, cables (production and refining of metals C22B, e.g. from scrap to produce non-ferrous metals C22B 7/00; salvaging material from cables H01B 15/003)}   |
| 5/165  | • . . . . {arranged at a different level}   | 7/008 | • {for liquid waste (waste oil F23G 7/05, waste liquors F23G 7/04, sludges F23G 7/001)}   |
| 5/18   | • . . . in a stack  | 7/02  | • of bagasse, megasse or the like   |
| 5/20   | • having rotating or oscillating drums  | 7/04  | • of waste liquors, e.g. sulfite liquors  |
| 5/22   | • . . the drums being conically shaped  | 7/05  | • of waste oils   |
| 5/24   | • having a vertical, substantially cylindrical, combustion chamber  |       |   |
| 5/245  | • . . {with perforated bottom or grate}   |       |   |
| 5/26   | • . . having rotating bottom  |       |   |
| 5/28   | • . . having raking arms  |       |   |
| 5/30   | • having a fluidised bed  |       |   |

7/06	<ul style="list-style-type: none"> <li>of waste gases or noxious gases, e.g. exhaust gases (exhaust apparatus for engines with means for rendering the exhaust innocuous, e.g. by thermal or catalytic conversion, F01N 3/08; combustion of uncombusted material from primary combustion within apparatus for combustion of solid or fluent fuel F23B, {of non combusted material from primary combustion of solid fuels F23B 5/00; of gases produced by primary combustion of solid fuels F23B 90/04}, F23C)</li> </ul>	2202/701	<ul style="list-style-type: none"> <li>Electrical fields</li> </ul>
		2202/703	<ul style="list-style-type: none"> <li>Acoustic energy</li> </ul>
		<b>2203/00</b>	<b>Furnace arrangements</b>
7/061	<ul style="list-style-type: none"> <li>{with supplementary heating}</li> </ul>	2203/10	<ul style="list-style-type: none"> <li>Stoker grate furnace</li> </ul>
7/063	<ul style="list-style-type: none"> <li>{electric heating}</li> </ul>	2203/101	<ul style="list-style-type: none"> <li>with stepped or inclined grate</li> </ul>
7/065	<ul style="list-style-type: none"> <li>{using gaseous or liquid fuel}</li> </ul>	2203/103	<ul style="list-style-type: none"> <li>with roller grate</li> </ul>
7/066	<ul style="list-style-type: none"> <li>{preheating the waste gas by the heat of the combustion, e.g. recuperation type incinerator}</li> </ul>	2203/105	<ul style="list-style-type: none"> <li>with endless chain or travelling grate</li> </ul>
		2203/107	<ul style="list-style-type: none"> <li>with vibrating grate</li> </ul>
		2203/20	<ul style="list-style-type: none"> <li>Rotary drum furnace</li> </ul>
7/068	<ul style="list-style-type: none"> <li>{using regenerative heat recovery means}</li> </ul>	2203/201	<ul style="list-style-type: none"> <li>using oscillating movement</li> </ul>
7/07	<ul style="list-style-type: none"> <li>in which combustion takes place in the presence of catalytic material</li> </ul>	2203/202	<ul style="list-style-type: none"> <li>rotating around substantially vertical axis</li> </ul>
		2203/203	<ul style="list-style-type: none"> <li>with conically shaped drum</li> </ul>
7/08	<ul style="list-style-type: none"> <li>using flares, e.g. in stacks</li> </ul>	2203/204	<ul style="list-style-type: none"> <li>having non-circular inner cross-section</li> </ul>
7/085	<ul style="list-style-type: none"> <li>{in stacks}</li> </ul>	2203/205	<ul style="list-style-type: none"> <li>with water-cooled wall</li> </ul>
7/10	<ul style="list-style-type: none"> <li>of field or garden waste {or biomasses}</li> </ul>	2203/206	<ul style="list-style-type: none"> <li>with charging ports in the sidewall</li> </ul>
7/105	<ul style="list-style-type: none"> <li>{of wood waste}</li> </ul>	2203/207	<ul style="list-style-type: none"> <li>with air supply ports in the sidewall</li> </ul>
7/12	<ul style="list-style-type: none"> <li>of plastics, e.g. rubber</li> </ul>	2203/208	<ul style="list-style-type: none"> <li>with interior agitating members</li> </ul>
7/14	<ul style="list-style-type: none"> <li>of contaminated soil, e.g. by oil</li> </ul>	2203/209	<ul style="list-style-type: none"> <li>with variable inclination of rotation axis</li> </ul>
		2203/21	<ul style="list-style-type: none"> <li>with variable speed of rotation</li> </ul>
		2203/211	<ul style="list-style-type: none"> <li>Arrangement of a plurality of drums</li> </ul>
		2203/212	<ul style="list-style-type: none"> <li>Sealing arrangements between rotary and stationary parts</li> </ul>
<b>2200/00</b>	<b>Waste incineration</b>	2203/30	<ul style="list-style-type: none"> <li>Cyclonic combustion furnace</li> </ul>
<b>2201/00</b>	<b>Pretreatment</b>	2203/40	<ul style="list-style-type: none"> <li>Stationary bed furnace</li> </ul>
2201/10	<ul style="list-style-type: none"> <li>Drying by heat</li> </ul>	2203/401	<ul style="list-style-type: none"> <li>with support for a grate or perforated plate</li> </ul>
2201/101	<ul style="list-style-type: none"> <li>using indirect heat transfer</li> </ul>	2203/403	<ul style="list-style-type: none"> <li>with substantial cylindrical combustion chamber</li> </ul>
2201/20	<ul style="list-style-type: none"> <li>Dewatering by mechanical means</li> </ul>	2203/50	<ul style="list-style-type: none"> <li>Fluidised bed furnace</li> </ul>
2201/30	<ul style="list-style-type: none"> <li>Pyrolysing</li> </ul>	2203/501	<ul style="list-style-type: none"> <li>with external recirculation of entrained bed material</li> </ul>
2201/301	<ul style="list-style-type: none"> <li>Treating pyrogases</li> </ul>	2203/502	<ul style="list-style-type: none"> <li>with recirculation of bed material inside combustion chamber</li> </ul>
2201/302	<ul style="list-style-type: none"> <li>Treating pyrosolids</li> </ul>	2203/503	<ul style="list-style-type: none"> <li>with two or more fluidised beds</li> </ul>
2201/303	<ul style="list-style-type: none"> <li>Burning pyrogases</li> </ul>	2203/504	<ul style="list-style-type: none"> <li>with essentially horizontal flow of bed material</li> </ul>
2201/304	<ul style="list-style-type: none"> <li>Burning pyrosolids</li> </ul>	2203/505	<ul style="list-style-type: none"> <li>with fluidised bed rotated as a whole</li> </ul>
2201/40	<ul style="list-style-type: none"> <li>Gasification</li> </ul>	2203/60	<ul style="list-style-type: none"> <li>Mobile furnace</li> </ul>
2201/50	<ul style="list-style-type: none"> <li>Devolatilising; from soil, objects</li> </ul>	2203/601	<ul style="list-style-type: none"> <li>carried by a vehicle</li> </ul>
2201/60	<ul style="list-style-type: none"> <li>Separating</li> </ul>	2203/70	<ul style="list-style-type: none"> <li>Modular furnace</li> </ul>
2201/601	<ul style="list-style-type: none"> <li>different calorific values</li> </ul>	2203/80	<ul style="list-style-type: none"> <li>Furnaces with other means for moving the waste through the combustion zone</li> </ul>
2201/602	<ul style="list-style-type: none"> <li>different sizes</li> </ul>	2203/801	<ul style="list-style-type: none"> <li>using conveyors</li> </ul>
2201/603	<ul style="list-style-type: none"> <li>recyclable material</li> </ul>	2203/8013	<ul style="list-style-type: none"> <li>Screw conveyors</li> </ul>
2201/70	<ul style="list-style-type: none"> <li>Blending</li> </ul>	2203/8016	<ul style="list-style-type: none"> <li>Belt conveyors</li> </ul>
2201/701	<ul style="list-style-type: none"> <li>with additives</li> </ul>	2203/803	<ul style="list-style-type: none"> <li>Rams or pushers</li> </ul>
2201/702	<ul style="list-style-type: none"> <li>with other waste</li> </ul>	2203/805	<ul style="list-style-type: none"> <li>using a rotating hearth</li> </ul>
2201/80	<ul style="list-style-type: none"> <li>Shredding</li> </ul>	<b>2204/00</b>	<b>Supplementary heating arrangements</b>
2201/90	<ul style="list-style-type: none"> <li>Cooling</li> </ul>	2204/10	<ul style="list-style-type: none"> <li>using auxiliary fuel</li> </ul>
<b>2202/00</b>	<b>Combustion</b>	2204/101	<ul style="list-style-type: none"> <li>solid fuel</li> </ul>
2202/10	<ul style="list-style-type: none"> <li>in two or more stages</li> </ul>	2204/103	<ul style="list-style-type: none"> <li>gaseous or liquid fuel</li> </ul>
2202/101	<ul style="list-style-type: none"> <li>with controlled oxidant supply</li> </ul>	2204/20	<ul style="list-style-type: none"> <li>using electric energy</li> </ul>
2202/102	<ul style="list-style-type: none"> <li>with supplementary heating</li> </ul>	2204/201	<ul style="list-style-type: none"> <li>Plasma</li> </ul>
2202/103	<ul style="list-style-type: none"> <li>in separate chambers</li> </ul>	2204/202	<ul style="list-style-type: none"> <li>Laser</li> </ul>
2202/104	<ul style="list-style-type: none"> <li>with ash melting stage</li> </ul>	2204/203	<ul style="list-style-type: none"> <li>Microwave</li> </ul>
2202/105	<ul style="list-style-type: none"> <li>with waste supply in stages</li> </ul>	2204/204	<ul style="list-style-type: none"> <li>Induction</li> </ul>
2202/106	<ul style="list-style-type: none"> <li>with recirculation of unburned solid or gaseous matter into combustion chamber</li> </ul>	<b>2205/00</b>	<b>Waste feed arrangements</b>
2202/20	<ul style="list-style-type: none"> <li>to temperatures melting waste</li> </ul>	2205/10	<ul style="list-style-type: none"> <li>using ram or pusher</li> </ul>
2202/30	<ul style="list-style-type: none"> <li>in a pressurised chamber</li> </ul>	2205/101	<ul style="list-style-type: none"> <li>sequentially operated</li> </ul>
2202/40	<ul style="list-style-type: none"> <li>in a pulsed combustion chamber</li> </ul>	2205/12	<ul style="list-style-type: none"> <li>using conveyors</li> </ul>
2202/50	<ul style="list-style-type: none"> <li>in a matrix bed combustion chamber</li> </ul>	2205/121	<ul style="list-style-type: none"> <li>Screw conveyor</li> </ul>
2202/60	<ul style="list-style-type: none"> <li>in a catalytic combustion chamber</li> </ul>	2205/122	<ul style="list-style-type: none"> <li>Belt conveyor</li> </ul>
2202/70	<ul style="list-style-type: none"> <li>with application of specific energy</li> </ul>	2205/123	<ul style="list-style-type: none"> <li>Roller conveyor</li> </ul>

2205/124	. . Chain conveyor	2900/00001	. Exhaust gas recirculation ( <a href="#">using the heat thereof F23G 2206/10</a> )
2205/125	. . Vibrating conveyor	2900/50001	. Combination of two or more furnaces
2205/14	. using hopper or bin	2900/50002	. Burning with downwards directed draft through the waste mass
2205/16	. using chute	2900/50003	. Waste oxidation, pyrolysis or gasification in water under supercritical conditions
2205/18	. using airlock systems	2900/50004	. Furnace with inclined hearth
2205/20	. using airblast or pneumatic feeding	2900/50005	. Waste in combustion chamber supported on bed made of special materials
<b>2206/00</b>	<b>Waste heat recuperation</b>	2900/50006	. Combustion chamber walls reflecting radiant energy within the chamber
2206/10	. reintroducing the heat in the same process, e.g. for predrying	2900/50007	. Co-combustion of two or more kinds of waste, separately fed into the furnace
2206/20	. using the heat in association with another installation	2900/50008	. Combustion of waste suspended or lifted by upward gas flows
2206/201	. . with an industrial furnace	2900/50009	. Furnace with progressive waste movements in vertical or steeply inclined direction
2206/202	. . with an internal combustion engine	2900/50201	. Waste pyrolysis, gasification or cracking by indirect heat transfer
2206/203	. . with a power/heat generating installation	2900/50202	. Waste pyrolysis, gasification or cracking in presence of catalysts
<b>2207/00</b>	<b>Control</b>	2900/50203	. Waste pyrolysis, gasification or cracking in a mechanically fluidised bed, e.g. obtained by a centrifugal force
2207/10	. Arrangement of sensing devices	2900/50204	. Waste pre-treatment by pyrolysis, gasification or cracking
2207/101	. . for temperature	2900/50205	. Waste pre-treatment by pyrolysis, gasification or cracking followed by condensation of gas into combustible oil or fat
2207/1015	. . . Heat pattern monitoring of flames	2900/50206	. Pelletising waste before combustion
2207/102	. . for pressure	2900/50207	. Thermoforming of plastic waste materials before combustion
2207/103	. . for oxygen	2900/50208	. Biologic treatment before burning, e.g. biogas generation
2207/104	. . for CO or CO <sub>2</sub>	2900/50209	. Compacting waste before burning
2207/105	. . for NO <sub>x</sub>	2900/50211	. Evaporating, e.g. liquid waste before burning
2207/106	. . for SO <sub>x</sub>	2900/50212	. Extruding waste before combustion
2207/107	. . for halogen concentration	2900/50213	. Preheating processes other than drying or pyrolysis
2207/108	. . for hydrocarbon concentration	2900/50214	. Separating non combustible matters
2207/112	. . for waste supply flowrate	2900/50401	. Drying waste by mixing with drying chemicals, e.g. with CaO
2207/113	. . for oxidant supply flowrate	2900/508	. Providing additional energy for combustion, e.g. by using supplementary heating
2207/114	. . for combustion bed level	2900/50801	. . using the heat from externally heated bodies, e.g. steel balls
2207/20	. Waste supply	2900/50802	. . using solid propellant
2207/30	. Oxidant supply	2900/50803	. . using solar energy
2207/40	. Supplementary heat supply	2900/50804	. . using thermit or other compositions of metal oxides as auxiliary fuel
2207/50	. Cooling fluid supply	2900/51001	. . using arc discharge electrodes to provide heat
2207/60	. Additives supply	2900/52001	. Rotary drums with co-current flows of waste and gas
<b>2208/00</b>	<b>Safety aspects</b>	2900/52002	. Rotary drum furnaces with counter-current flows of waste and gas
2208/10	. Preventing or abating fire or explosion, e.g. by purging	2900/52003	. Rotary drum furnaces with foramenous drum walls, e.g. grate drums
<b>2209/00</b>	<b>Specific waste</b>	2900/53801	. Multi-hearth furnaces with vertical axis
2209/10	. Liquid waste	2900/54001	. Hearths or supports movable into and from the furnace, e.g. by a conveyor
2209/101	. . Waste liquor	2900/54401	. Feeding waste in containers, bags or barrels
2209/102	. . Waste oil	2900/54402	. Injecting fluid waste into incinerator
2209/103	. . Bagasse, megasse	2900/54601	. using waste heat for desalinating sea water
2209/12	. Sludge, slurries or mixtures of liquids		
2209/14	. Gaseous waste or fumes		
2209/141	. . Explosive gases		
2209/142	. . Halogen gases, e.g. silane		
2209/16	. Warfare materials, e.g. ammunition		
2209/18	. Radioactive materials		
2209/20	. Medical materials		
2209/22	. Waste papers		
2209/24	. Contaminated soil; foundry sand		
2209/26	. Biowaste		
2209/261	. . Woodwaste		
2209/262	. . Agricultural waste		
2209/28	. Plastics or rubber like materials		
2209/281	. . Tyres		
2209/30	. Solid combustion residues, e.g. bottom or flyash		
<b>2900/00</b>	<b>Special features of, or arrangements for incinerators</b>		

- 2900/55 . Controlling; Monitoring or measuring
- 2900/55001 . . Controlling combustion air preheating
- 2900/55002 . . Sensing exhaust gas opacity
- 2900/55003 . . Sensing for exhaust gas properties, e.g. O<sub>2</sub> content
- 2900/55004 . . Sensing exhaust gas radioactivity
- 2900/55005 . . Sensing ash or slag properties
- 2900/55006 . . Measuring material flow rates
- 2900/55007 . . Sensors arranged in waste loading zone, e.g. feed hopper level
- 2900/55008 . . Measuring produced steam flow rate
- 2900/55009 . . Controlling stoker grate speed or vibrations for waste movement
- 2900/55011 . . Detecting the properties of waste to be incinerated, e.g. heating value, density
- 2900/70 . Incinerating particular products or waste
- 2900/7001 . . Air bags or seat belt pre-tensioners
- 2900/7002 . . Animal fat, e.g. lard, tallow, stearin
- 2900/7003 . . Incinerating litter from animals, e.g. poultry litter
- 2900/7004 . . Incinerating contaminated animal meals
- 2900/7005 . . Incinerating used asbestos
- 2900/7006 . . Incinerating used automobiles
- 2900/7007 . . Incinerating or pyrolysing used batteries
- 2900/7008 . . Incinerating remains of building materials after demolishing, e.g. fibreglass asphalt shingles
- 2900/7009 . . Incinerating human or animal corpses or remains
- 2900/7011 . . Incinerating PCB-materials
- 2900/7012 . . Incinerating rice or grain husks, hulls or bran
- 2900/7013 . . Incinerating oil shales
- 2900/70401 . . Incinerating drainage water from waste pits of incinerators
- 2900/70601 . Temporary storage means, e.g. buffers for accumulating fumes or gases, between treatment stages