

**CPC****COOPERATIVE PATENT CLASSIFICATION****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.

**F23G 1/00****Furnaces for cremation of human or animal carcasses****F23G 5/00****Incineration of waste (of specific waste [F23G 7/00](#)); Incinerator constructions; Details, accessories or control therefor**[F23G 5/002](#)

- . {characterised by their grates ([F23G 5/05](#) takes precedence)}

[F23G 5/004](#)

- .. {with endless travelling grates}

[F23G 5/006](#)

- . {General arrangement of incineration plant, e.g. flow sheets}

[F23G 5/008](#)

- . {adapted for burning two or more kinds, e.g. liquid and solid, of waste being fed through separate inlets}

[F23G 5/02](#)

- . with pretreatment

[F23G 5/027](#)

- .. pyrolysing or gasifying stage ([pyrolysis of sludge C02F 11/00](#); [destructive distillation of carbonaceous materials C10B 53/00](#))

[F23G 5/0273](#)

- ... {using indirect heating}

[F23G 5/0276](#)

- ... {using direct heating}

[F23G 5/033](#)

- .. comminuting or crushing

[F23G 5/04](#)

- .. drying

[F23G 5/05](#)

- ... using drying grates

[F23G 5/08](#)

- . having supplementary heating

[F23G 5/085](#)

- .. {High-temperature heating means, e.g. plasma, for partly melting the waste}

[F23G 5/10](#)

- .. electric

[F23G 5/12](#)

- .. using gaseous or liquid fuel ([F23G 5/14](#) takes precedence)

[F23G 5/14](#)

- .. including secondary combustion

[F23G 5/16](#)

- ... in a separate combustion chamber

[F23G 5/165](#)

- .... {arranged at a different level}

[F23G 5/18](#)

- ... in a stack

[F23G 5/20](#)

- . having rotating or oscillating drums

[F23G 5/22](#)

- .. the drums being conically shaped

[F23G 5/24](#)

- . having a vertical, substantially cylindrical, combustion chamber

[F23G 5/245](#)

- .. {with perforated bottom or grate}

[F23G 5/26](#)

- .. having rotating bottom

[F23G 5/28](#)

- .. having raking arms

[F23G 5/30](#)

- . having a fluidised bed

- F23G 5/32 . the waste being subjected to a whirling movement, e.g. cyclonic incinerators
  - F23G 5/34 . the waste being burnt in a pit or arranged in a heap for combustion
  - F23G 5/36 . having a conical combustion chamber, e.g. "teepee" incinerators ([F23G 5/22](#) takes precedence)
  - F23G 5/38 . Multi-hearth arrangements
  - F23G 5/40 . Portable or mobile incinerators
  - F23G 5/42 . . of the basket type
  - F23G 5/44 . Details; Accessories
  - F23G 5/442 . . {Waste feed arrangements}
  - F23G 5/444 . . . {for solid waste ([F23G 5/448](#) takes precedence)}
  - F23G 5/446 . . . {for liquid waste ([F23G 5/448](#) takes precedence)}
  - F23G 5/448 . . . {in which the waste is fed in containers or the like}
  - F23G 5/46 . . Recuperation of heat
  - F23G 5/48 . . Preventing corrosion
  - F23G 5/50 . Control or safety arrangements
- F23G 7/00 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](#))
- F23G 7/001 . {for sludges or waste products from water treatment installations ([F23G 5/008](#) takes precedence)}
  - F23G 7/003 . {for used articles}
  - F23G 7/005 . . {cars, vehicles}
  - F23G 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](#))}
  - F23G 7/008 . {for liquid waste (waste oil [F23G 7/05](#), waste liquors [F23G 7/04](#), sludges [F23G 7/001](#))}
  - F23G 7/02 . of bagasse, megasse or the like
  - F23G 7/04 . of waste liquors, e.g. sulfite liquors
  - F23G 7/05 . of waste oils
  - F23G 7/06 . 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](#))
  - F23G 7/061 . . {with supplementary heating}
  - F23G 7/063 . . . {electric heating}
  - F23G 7/065 . . . {using gaseous or liquid fuel}
  - F23G 7/066 . . . . {preheating the waste gas by the heat of the combustion, e.g. recuperation type incinerator}
  - F23G 7/068 . . . . . {using regenerative heat recovery means}
  - F23G 7/07 . . in which combustion takes place in the presence of catalytic material

**WARNING**

F23G 7/07  
(continued)

This subgroup [IPC8] introduced in January 2006 is not complete. Documents from IPC7-based groups are in the process of being reorganised to this new group

- F23G 7/08 . . . using flares, e.g. in stacks
- F23G 7/085 . . . {in stacks}
- F23G 7/10 . . of field or garden waste {or biomasses}
- F23G 7/105 . . {of wood waste}
- F23G 7/12 . . of plastics, e.g. rubber
- F23G 7/14 . . of contaminated soil, e.g. by oil

## **F23G 2200/00**

### **Waste incineration**

#### **F23G 2201/00**

##### **Pretreatment**

- F23G 2201/10 . . Drying by heat
- F23G 2201/101 . . . using indirect heat transfer
- F23G 2201/20 . . Dewatering by mechanical means
- F23G 2201/30 . . Pyrolysing
- F23G 2201/301 . . . Treating pyrogases
- F23G 2201/302 . . . Treating pyrosolids
- F23G 2201/303 . . . Burning pyrogases
- F23G 2201/304 . . . Burning pyrosolids
- F23G 2201/40 . . Gasification
- F23G 2201/50 . . Devolatilising; from soil, objects
- F23G 2201/60 . . Separating
- F23G 2201/601 . . . different calorific values
- F23G 2201/602 . . . different sizes
- F23G 2201/603 . . . recyclible material
- F23G 2201/70 . . Blending
- F23G 2201/701 . . . with additives
- F23G 2201/702 . . . with other waste
- F23G 2201/80 . . Shredding
- F23G 2201/90 . . Cooling

#### **F23G 2202/00**

##### **Combustion**

- F23G 2202/10 . . in two or more stages
- F23G 2202/101 . . . with controlled oxidant supply
- F23G 2202/102 . . . with supplementary heating
- F23G 2202/103 . . . in separate chambers
- F23G 2202/104 . . . with ash melting stage
- F23G 2202/105 . . . with waste supply in stages
- F23G 2202/106 . . . with recirculation of unburned solid or gaseous matter into combustion chamber

- F23G 2202/20 . to temperatures melting waste
- F23G 2202/30 . in a pressurised chamber
- F23G 2202/40 . in a pulsed combustion chamber
- F23G 2202/50 . in a matrix bed combustion chamber
- F23G 2202/60 . in a catalytic combustion chamber
- F23G 2202/70 . with application of specific energy
- F23G 2202/701 .. Electrical fields
- F23G 2202/703 .. Acoustic energy

**F23G 2203/00****Furnace arrangements**

- F23G 2203/10 . Stoker grate furnace
- F23G 2203/101 . with stepped or inclined grate
- F23G 2203/103 . with roller grate
- F23G 2203/105 . with endless chain or travelling grate
- F23G 2203/107 . with vibrating grate
- F23G 2203/20 . Rotary drum furnace
- F23G 2203/201 .. using oscillating movement
- F23G 2203/202 .. rotating around substantially vertical axis
- F23G 2203/203 .. with conically shaped drum
- F23G 2203/204 .. having non-circular inner cross-section
- F23G 2203/205 .. with water-cooled wall
- F23G 2203/206 .. with charging ports in the sidewall
- F23G 2203/207 .. with air supply ports in the sidewall
- F23G 2203/208 .. with interior agitating members
- F23G 2203/209 .. with variable inclination of rotation axis
- F23G 2203/21 .. with variable speed of rotation
- F23G 2203/211 .. Arrangement of a plurality of drums
- F23G 2203/212 .. Sealing arrangements between rotary and stationary parts
- F23G 2203/30 . Cyclonic combustion furnace
- F23G 2203/40 . Stationary bed furnace
- F23G 2203/401 .. with support for a grate or perforated plate
- F23G 2203/403 .. with substantial cylindrical combustion chamber
- F23G 2203/50 . Fluidised bed furnace
- F23G 2203/501 .. with external recirculation of entrained bed material
- F23G 2203/502 .. with recirculation of bed material inside combustion chamber
- F23G 2203/503 .. with two or more fluidised beds
- F23G 2203/504 .. with essentially horizontal flow of bed material
- F23G 2203/505 .. with fluidised bed rotated as a whole
- F23G 2203/60 . Mobile furnace
- F23G 2203/601 .. carried by a vehicle

- F23G 2203/70 . Modular furnace
- F23G 2203/80 . Furnaces with other means for moving the waste through the combustion zone
- F23G 2203/801 .. using conveyors
- F23G 2203/8013 ... Screw conveyors
- F23G 2203/8016 ... Belt conveyors
- F23G 2203/803 .. Rams or pushers
- F23G 2203/805 .. using a rotating hearth

**F23G 2204/00****Supplementary heating arrangements**

- F23G 2204/10 . using auxiliary fuel
- F23G 2204/101 .. solid fuel
- F23G 2204/103 .. gaseous or liquid fuel
- F23G 2204/20 . using electric energy
- F23G 2204/201 .. Plasma
- F23G 2204/202 .. Laser
- F23G 2204/203 .. Microwave
- F23G 2204/204 .. Induction

**F23G 2205/00****Waste feed arrangements**

- F23G 2205/10 . using ram or pusher
- F23G 2205/101 .. sequentially operated
- F23G 2205/12 . using conveyors
- F23G 2205/121 .. Screw conveyor
- F23G 2205/122 .. Belt conveyor
- F23G 2205/123 .. Roller conveyor
- F23G 2205/124 .. Chain conveyor
- F23G 2205/125 .. Vibrating conveyor
- F23G 2205/14 . using hopper or bin
- F23G 2205/16 . using chute
- F23G 2205/18 . using airlock systems
- F23G 2205/20 . using airblast or pneumatic feeding

**F23G 2206/00****Waste heat recuperation**

- F23G 2206/10 . reintroducing the heat in the same process, e.g. for predrying
- F23G 2206/20 . using the heat in association with another installation
- F23G 2206/201 .. with an industrial furnace
- F23G 2206/202 .. with an internal combustion engine
- F23G 2206/203 .. with a power/heat generating installation

**F23G 2207/00****Control**

- F23G 2207/10 . Arrangement of sensing devices

F23G 2207/101	..	for temperature
F23G 2207/1015	...	Heat pattern monitoring of flames
F23G 2207/102	..	for pressure
F23G 2207/103	..	for oxygen
F23G 2207/104	..	for CO or CO <sub>2</sub>
F23G 2207/105	..	for NO <sub>x</sub>
F23G 2207/106	..	for SO <sub>x</sub>
F23G 2207/107	..	for halogen concentration
F23G 2207/108	..	for hydrocarbon concentration
F23G 2207/112	..	for waste supply flowrate
F23G 2207/113	..	for oxidant supply flowrate
F23G 2207/114	..	for combustion bed level
F23G 2207/20	.	Waste supply
F23G 2207/30	.	Oxidant supply
F23G 2207/40	.	Supplementary heat supply
F23G 2207/50	.	Cooling fluid supply
F23G 2207/60	.	Additives supply
<b>F23G 2208/00</b>		<b>Safety aspects</b>
F23G 2208/10	.	Preventing or abating fire or explosion, e.g. by purging
<b>F23G 2209/00</b>		<b>Specific waste</b>
F23G 2209/10	.	Liquid waste
F23G 2209/101	..	Waste liquor
F23G 2209/102	..	Waste oil
F23G 2209/103	..	Bagasse, megasse
F23G 2209/12	.	Sludge, slurries or mixtures of liquids
F23G 2209/14	.	Gaseous waste or fumes
F23G 2209/141	..	Explosive gases
F23G 2209/142	..	Halogen gases, e.g. silane
F23G 2209/16	.	Warfare materials, e.g. ammunition
F23G 2209/18	.	Radioactive materials
F23G 2209/20	.	Medical materials
F23G 2209/22	.	Waste papers
F23G 2209/24	.	Contaminated soil; foundry sand
F23G 2209/26	.	Biowaste
F23G 2209/261	..	Woodwaste
F23G 2209/262	..	Agricultural waste
F23G 2209/28	.	Plastics or rubber like materials
F23G 2209/281	..	Tyres
F23G 2209/30	.	Solid combustion residus, e.g. bottom or flyash

**F23G 2900/00****Special features of, or arrangements for incinerators**

- F23G 2900/00001 . Exhaust gas recirculation ([using the heat thereof F23G 2206/10](#))
- F23G 2900/50001 . Combination of two or more furnaces
- F23G 2900/50002 . Burning with downwards directed draft through the waste mass
- F23G 2900/50003 . Waste oxidation, pyrolysis or gasification in water under supercritical conditions
- F23G 2900/50004 . Furnace with inclined hearth
- F23G 2900/50005 . Waste in combustion chamber supported on bed made of special materials
- F23G 2900/50006 . Combustion chamber walls reflecting radiant energy within the chamber
- F23G 2900/50007 . Co-combustion of two or more kinds of waste, separately fed into the furnace
- F23G 2900/50008 . Combustion of waste suspended or lifted by upward gas flows
- F23G 2900/50009 . Furnace with progressive waste movements in vertical or steeply inclined direction
- F23G 2900/50201 . Waste pyrolysis, gasification or cracking by indirect heat transfer
- F23G 2900/50202 . Waste pyrolysis, gasification or cracking in presence of catalysts
- F23G 2900/50203 . Waste pyrolysis, gasification or cracking in a mechanically fluidised bed, e.g. obtained by a centrifugal force
- F23G 2900/50204 . Waste pre-treatment by pyrolysis, gasification or cracking
- F23G 2900/50205 . Waste pre-treatment by pyrolysis, gasification or cracking followed by condensation of gas into combustible oil or fat
- F23G 2900/50206 . Pelletising waste before combustion
- F23G 2900/50207 . Thermoforming of plastic waste materials before combustion
- F23G 2900/50208 . Biologic treatment before burning, e.g. biogas generation
- F23G 2900/50209 . Compacting waste before burning
- F23G 2900/50211 . Evaporating, e.g. liquid waste before burning
- F23G 2900/50212 . Extruding waste before combustion
- F23G 2900/50213 . Preheating processes other than drying or pyrolysis
- F23G 2900/50214 . Separating non combustible matters
- F23G 2900/50401 . Drying waste by mixing with drying chemicals, e.g. with CaO
- F23G 2900/508 . Providing additional energy for combustion, e.g. by using supplementary heating
- F23G 2900/50801 . using the heat from externally heated bodies, e.g. steel balls
- F23G 2900/50802 . . . using solid propellant
- F23G 2900/50803 . . . using solar energy
- F23G 2900/50804 . . . using thermit or other compositions of metal oxides as auxiliary fuel
- F23G 2900/51001 . . . using arc discharge electrodes to provide heat
- F23G 2900/52001 . Rotary drums with co-current flows of waste and gas
- F23G 2900/52002 . Rotary drum furnaces with counter-current flows of waste and gas
- F23G 2900/52003 . Rotary drum furnaces with foramenous drum walls, e.g. grate drums
- F23G 2900/53801 . Multi-hearth furnaces with vertical axis
- F23G 2900/54001 . Hearths or supports movable into and from the furnace, e.g. by a conveyor
- F23G 2900/54401 . Feeding waste in containers, bags or barrels
- F23G 2900/54402 . Injecting fluid waste into incinerator

- F23G 2900/54601 . using waste heat for desalinating sea water
- F23G 2900/55 . Controlling; Monitoring or measuring
- F23G 2900/55001 .. Controlling combustion air preheating
- F23G 2900/55002 .. Sensing exhaust gas opacity
- F23G 2900/55003 .. Sensing for exhaust gas properties, e.g. O<sub>2</sub> content
- F23G 2900/55004 .. Sensing exhaust gas radioactivity
- F23G 2900/55005 .. Sensing ash or slag properties
- F23G 2900/55006 .. Measuring material flow rates
- F23G 2900/55007 .. Sensors arranged in waste loading zone, e.g. feed hopper level
- F23G 2900/55008 .. Measuring produced steam flow rate
- F23G 2900/55009 .. Controlling stoker grate speed or vibrations for waste movement
- F23G 2900/55011 .. Detecting the properties of waste to be incinerated, e.g. heating value, density
- F23G 2900/70 . Incinerating particular products or waste
- F23G 2900/7001 .. Air bags or seat belt pre-tensioners
- F23G 2900/7002 .. Animal fat, e.g. lard, tallow, stearin
- F23G 2900/7003 .. Incinerating litter from animals, e.g. poultry litter
- F23G 2900/7004 .. Incinerating contaminated animal meals
- F23G 2900/7005 .. Incinerating used asbestos
- F23G 2900/7006 .. Incinerating used automobiles
- F23G 2900/7007 .. Incinerating or pyrolysing used batteries
- F23G 2900/7008 .. Incinerating remains of building materials after demolishing, e.g. fibreglass asphalt shingles
- F23G 2900/7009 .. Incinerating human or animal corpses or remains
- F23G 2900/7011 .. Incinerating PCB-materials
- F23G 2900/7012 .. Incinerating rice or grain husks, hulls or bran
- F23G 2900/7013 .. Incinerating oil shales
- F23G 2900/70401 .. Incinerating drainage water from waste pits of incinerators
- F23G 2900/70601 . Temporary storage means, e.g. buffers for accumulating fumes or gases, between treatment stages