

**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**

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
<b>F23G 2202/00</b>	<b>Combustion</b>
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
<b>F23G 2203/00</b>	<b>Furnace arrangements</b>
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 stationnary 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

## **F23G 2208/00 Safety aspects**

F23G 2208/10 . Preventing or abating fire or explosion, e.g. by purging

## **F23G 2209/00 Specific waste**

- 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