

**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

### **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. O2 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 2900/70001 . . Air bags or seat belt pre-tensioners
  - F23G 2900/70002 . . Animal fat, e.g. lard, tallow, stearin
  - F23G 2900/70003 . . Incinerating litter from animals, e.g. poultry litter
  - F23G 2900/70004 . . Incinerating contaminated animal meals

F23G 2900/70005	..	Incinerating used asbestos
F23G 2900/70006	..	Incinerating used automobiles
F23G 2900/70007	..	Incinerating or pyrolysing used batteries
F23G 2900/70008	..	Incinerating remains of building materials after demolishing, e.g. fibreglass asphalt shingles
F23G 2900/70009	..	Incinerating human or animal corpses or remains
F23G 2900/7001	..	Air bags or seat belt pre-tensioners
F23G 2900/70011	..	Incinerating PCB-materials
F23G 2900/70012	..	Incinerating rice or grain husks, hulls or bran
F23G 2900/70013	..	Incinerating oil shales
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