

**CPC****COOPERATIVE PATENT CLASSIFICATION****F23J**

**REMOVAL OR TREATMENT OF COMBUSTION PRODUCTS OR COMBUSTION RESIDUES** **{(from fluidised-bed combustion apparatus F23C 11/02T5)}**; **FLUES** (precipitating dust from flue gases B01D; composition of fuel C10; combustion apparatus for consuming smoke or fumes, e.g. exhaust gases, F23G 7/06)

**NOTE**

This subclass covers the cleaning of external surfaces of water tubes of boilers

**F23J 1/00**

**Removing ash, clinker, or slag from combustion chamber** { arrangements for collecting bottom ash and flyash F23J 3/06; removing flyash from flue gas F23J 15/022}

## F23J 1/02

- . Apparatus for removing ash, clinker, or slag from ash-pits, e.g. by employing trucks or conveyers, by employing suction devices

## F23J 1/04

- . Hand tools, e.g. rakes, pricklers, tongs

## F23J 1/06

- . Mechanically-operated devices, e.g. clinker pushers (forming part of the grate F23H)

## F23J 1/08

- . Liquid slag removal

**F23J 3/00**

**Removing solid { deposited} residues from passages or chambers beyond the fire, e.g. from flues by soot blowers** **{(soot blowers per se F28G 1/16)}**

## F23J 3/02

- . Cleaning furnace tubes; Cleaning flues or chimneys (by means which do not differ materially from the cleaning of any other tube once the fire is out B08B)

## F23J 3/023

- . . {cleaning the fireside of watertubes in boilers}

## F23J 3/026

- . . {cleaning the chimneys}

## F23J 3/04

- . Traps

## F23J 3/06

- . Systems for accumulating residues from different parts of furnace plant

**F23J 7/00**

**Arrangement of devices for supplying chemicals to fire** (supplying chemicals to fire C10L; {to fumes F23J 15/003})

**F23J 9/00**

**Preventing premature solidification of molten combustion residues**

**F23J 11/00**

**Devices for conducting smoke or fumes, e.g. flues** **{( removing fumes other than combustion fumes from the area where they are produced, in general B08B 15/00)}**; heat insulation therefor E04B 1/94; chimneys E04H 12/28; removing cooking fumes from

domestic stoves or ranges [F24C 15/20](#); { fume conduits of furnaces, kilns, ovens, or retorts [F27D 17/002](#)})

- [F23J 11/02](#)
  - . for conducting smoke or fumes originating from various locations to the outside, e.g. in locomotive sheds, in garages
- [F23J 11/04](#)
  - . in locomotives; in road vehicles; in ships
- [F23J 11/06](#)
  - .. for conducting smoke horizontally
- [F23J 11/08](#)
  - . for portable apparatus
- [F23J 11/10](#)
  - . for tents; for log huts; for other inflammable structures
- [F23J 11/12](#)
  - . Smoke conduit systems for factories or large buildings

**[F23J 13/00](#)** **Fittings for chimneys or flues** (staying, stiffening [E04H](#); means for facilitating climbing [E06C](#); draught-inducing apparatus associated with chimneys or flues [F23L](#))

- [F23J 13/02](#)
  - . Linings; Jackets; Casings
- [F23J 13/025](#)
  - .. {composed of concentric elements, e.g. double walled (in general [F16L](#); terminals for balanced flue arrangements [F23L 17/04](#))}
- [F23J 13/04](#)
  - . Joints; Connections (pipe joints in general [F16L](#))
- [F23J 13/06](#)
  - . Mouths; Inlet holes
- [F23J 13/08](#)
  - . Doors or covers specially adapted for smoke-boxes, flues, or chimneys (in general [E06B](#))

**[F23J 15/00](#)** **Arrangement of devices for treating smoke or fumes** (treating smoke or fumes, see the relevant class for the treatment, e.g. [B01D 53/00](#))

- [F23J 15/003](#)
  - . {for supplying chemicals to fumes, e.g. using injection devices (to fire [F23J 7/00](#))}
- [F23J 15/006](#)
  - . {Layout of treatment plant}
- [F23J 15/02](#)
  - . of purifiers, e.g. for removing noxious material (traps for solid {deposits}[F23J 3/04](#))
- [F23J 15/022](#)
  - .. { for removing solid particulate material from the gasflow}
- [F23J 15/025](#)
  - ... {using filters}
- [F23J 15/027](#)
  - ... {using cyclone separators}
- [F23J 15/04](#)
  - .. using washing fluids {scrubbers for removing solids only [F23J 15/022](#)}
- [F23J 15/06](#)
  - . of coolers
- [F23J 15/08](#)
  - . of heaters

**[F23J 99/00](#)** **Subject matter not provided for in other groups of this subclass**

**F23J 2211/00****Flue gas duct systems**

- F23J 2211/10 . Balanced flues ([combining air supply and flue gas exhaust](#))
- F23J 2211/101 . . with coaxial duct arrangement
- F23J 2211/20 . Common flues for several combustion devices
- F23J 2211/30 . Chimney or flue associated with building ventilation system
- F23J 2211/40 . Chimney with internal flue pipe system

**F23J 2213/00****Chimneys or flues**

- F23J 2213/10 . Linings
- F23J 2213/101 . . Fastening means therefor
- F23J 2213/20 . Joints; Connections
- F23J 2213/201 . . between stack and branch pipes
- F23J 2213/202 . . between duct or stack sections
- F23J 2213/203 . . between stack/duct and combustion apparatus
- F23J 2213/204 . . Sealing arrangements
- F23J 2213/30 . Specific materials
- F23J 2213/301 . . flexible
- F23J 2213/302 . . plastic
- F23J 2213/303 . . metallic
- F23J 2213/304 . . ceramic
- F23J 2213/305 . . glass
- F23J 2213/40 . Heat insulation fittings
- F23J 2213/50 . Top cover
- F23J 2213/60 . Service arrangements
- F23J 2213/70 . Safety arrangements

**F23J 2215/00****Preventing emissions ([solids only F23J 2217/00](#))**

- F23J 2215/10 . Nitrogen; Compounds thereof
- F23J 2215/101 . . Nitrous oxide([N<sub>2</sub>O](#))
- F23J 2215/20 . Sulfur; Compounds thereof

- F23J 2215/30 . Halogen; Compounds thereof
- F23J 2215/301 . . Dioxins; Furans
- F23J 2215/40 . Carbon monoxide
- F23J 2215/50 . Carbon dioxide
- F23J 2215/60 . Heavy metals; Compounds thereof

#### **F23J 2217/00 Intercepting solids**

- F23J 2217/10 . by filters
- F23J 2217/101 . . Baghouse type
- F23J 2217/102 . . electrostatic
- F23J 2217/103 . . ultrafine (HEPA)
- F23J 2217/104 . . High temperature resistant (ceramic) type
- F23J 2217/105 . . Granular bed
- F23J 2217/20 . by baffles
- F23J 2217/30 . by screens
- F23J 2217/40 . by cyclones
- F23J 2217/50 . by cleaning fluids (washers or scrubbers)
- F23J 2217/60 . using settling/precipitation chambers

#### **F23J 2219/00 Treatment devices**

- F23J 2219/10 . Catalytic reduction devices
- F23J 2219/20 . Non-catalytic reduction devices
- F23J 2219/201 . . Reducing species generators, e.g. plasma, corona
- F23J 2219/30 . Sorption devices using carbon, e.g. coke
- F23J 2219/40 . Sorption with wet devices, e.g. scrubbers
- F23J 2219/50 . Sorption with semi-dry devices, e.g. with slurries
- F23J 2219/60 . Sorption with dry devices, e.g. beds
- F23J 2219/70 . Condensing contaminants with coolers
- F23J 2219/80 . Quenching

**F23J 2700/00**      **Ash removal, handling and treatment means; Ash and slag handling in pulverulent fuel furnaces; Ash removal means for incinerators**

- F23J 2700/001      . Ash removal, handling and treatment means
- F23J 2700/002      . Ash and slag handling in pulverulent fuel furnaces
- F23J 2700/003      . Ash removal means for incinerators

**F23J 2900/00**      **Special arrangements for conducting or purifying combustion fumes; Treatment of fumes or ashes**

- F23J 2900/01001      . Sorting and classifying ashes or fly-ashes from the combustion chamber before further treatment
- F23J 2900/01002      . Cooling of ashes from the combustion chamber by indirect heat exchangers ([for preheating air F23L 2900/15041](#))
- F23J 2900/01003      . Ash crushing means associated with ash removal means
- F23J 2900/01004      . Separating water from ash
- F23J 2900/01005      . Mixing water to ash
- F23J 2900/01006      . Airlock sealing associated with ash removal means
- F23J 2900/01007      . Thermal treatments of ash, e.g. temper or shock-cooling for granulation
- F23J 2900/01009      . Controls related to ash or slag extraction
- F23J 2900/01021      . Removing ashes from the ash pit using reciprocating means, e.g. pushers
- F23J 2900/11001      . Conducting systems with a gas flow bypass from main flue to an auxiliary flue
- F23J 2900/11002      . Modelling systems adapted for designing arrangements for conducting or purifying combustion fumes, e.g. flues
- F23J 2900/13001      . Preventing or reducing corrosion in chimneys
- F23J 2900/13002      . Initial heating of the flue before starting combustion
- F23J 2900/13003      . Means for reducing the noise in smoke conducting ducts or systems
- F23J 2900/13004      . Water draining devices associated with flues
- F23J 2900/13005      . Protections for chimneys or flue tops against external factors, e.g. birds
- F23J 2900/13006      . Devices for heating the chimney top to avoid ice formation

- F23J 2900/13021 . Means for supporting the lining of conducting means, e.g. ducts or chimneys
- F23J 2900/13022 . Manufacturing processes for the lining of conducting means, e.g. by extrusion
- F23J 2900/13023 . Ducts with non-circular cross-section
- F23J 2900/15001 . Irradiating fumes with electron or light beams, e.g. UV, for oxidizing or dissociating SO<sub>x</sub> and NO<sub>x</sub>
- F23J 2900/15002 . Cleaning fumes by letting them to pass a molten metal bath
- F23J 2900/15003 . Supplying fumes with ozone
- F23J 2900/15004 . Preventing plume emission at chimney outlet
- F23J 2900/15021 . Preventing emission of hexavalent chromium at the chimney outlet
- F23J 2900/15022 . Electrochemical cell filters
- F23J 2900/15023 . Magnetic filters
- F23J 2900/15024 . Photocatalytic filters
- F23J 2900/15025 . Cyclone walls forming heat exchangers
- F23J 2900/15026 . Cyclone separators with horizontal axis
- F23J 2900/15027 . Preventing emission of CO<sub>2</sub> at the chimney outlet by using sea weeds filters or absorbers
- F23J 2900/15041 . Means for absorbing SO<sub>x</sub> using seawater
- F23J 2900/15061 . Deep cooling or freezing of flue gas rich of CO<sub>2</sub> to deliver CO<sub>2</sub>-free emissions, or to deliver liquid CO<sub>2</sub>
- F23J 2900/15081 . Reheating of flue gases