

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

**REMOVAL OR TREATMENT OF COMBUSTION PRODUCTS OR COMBUSTION RESIDUES** { (from fluidised-bed combustion apparatus [F23C 10/24](#)) }; **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, prickers, 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 ([N2O](#))
- 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

<b>F23J 2900/00</b>	<b>Special arrangements for conducting or purifying combustion fumes; Treatment of fumes or ashes</b>
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 ( <a href="#">for preheating air F23L 2900/15041</a> )
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