

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, 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 ([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

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 SOx and NOx
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 CO₂ at the chimney outlet by using sea weeds filters or absorbers
- F23J 2900/15041 . Means for absorbing SO_x using seawater
- F23J 2900/15061 . Deep cooling or freezing of flue gas rich of CO₂ to deliver CO₂-free emissions, or to deliver liquid CO₂
- F23J 2900/15081 . Reheating of flue gases