

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(N_2O)
- 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

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| 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 _x and NO _x |
| 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