

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