

**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	<ul style="list-style-type: none"> <li>• . Sealing arrangements</li> </ul>
F23J 2213/30	<ul style="list-style-type: none"> <li>• Specific materials</li> </ul>
F23J 2213/301	<ul style="list-style-type: none"> <li>• . flexible</li> </ul>
F23J 2213/302	<ul style="list-style-type: none"> <li>• . plastic</li> </ul>
F23J 2213/303	<ul style="list-style-type: none"> <li>• . metallic</li> </ul>
F23J 2213/304	<ul style="list-style-type: none"> <li>• . ceramic</li> </ul>
F23J 2213/305	<ul style="list-style-type: none"> <li>• . glass</li> </ul>
F23J 2213/40	<ul style="list-style-type: none"> <li>• Heat insulation fittings</li> </ul>
F23J 2213/50	<ul style="list-style-type: none"> <li>• Top cover</li> </ul>
F23J 2213/60	<ul style="list-style-type: none"> <li>• Service arrangements</li> </ul>
F23J 2213/70	<ul style="list-style-type: none"> <li>• Safety arrangements</li> </ul>

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

F23J 2215/10	<ul style="list-style-type: none"> <li>• Nitrogen; Compounds thereof</li> </ul>
F23J 2215/101	<ul style="list-style-type: none"> <li>• . Nitrous oxide (N<sub>2</sub>O)</li> </ul>
F23J 2215/20	<ul style="list-style-type: none"> <li>• Sulfur; Compounds thereof</li> </ul>
F23J 2215/30	<ul style="list-style-type: none"> <li>• Halogen; Compounds thereof</li> </ul>
F23J 2215/301	<ul style="list-style-type: none"> <li>• . Dioxins; Furans</li> </ul>
F23J 2215/40	<ul style="list-style-type: none"> <li>• Carbon monoxide</li> </ul>
F23J 2215/50	<ul style="list-style-type: none"> <li>• Carbon dioxide</li> </ul>
F23J 2215/60	<ul style="list-style-type: none"> <li>• Heavy metals; Compounds thereof</li> </ul>

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

F23J 2217/10	<ul style="list-style-type: none"> <li>• by filters</li> </ul>
F23J 2217/101	<ul style="list-style-type: none"> <li>• . Baghouse type</li> </ul>
F23J 2217/102	<ul style="list-style-type: none"> <li>• . electrostatic</li> </ul>
F23J 2217/103	<ul style="list-style-type: none"> <li>• . ultrafine [HEPA]</li> </ul>
F23J 2217/104	<ul style="list-style-type: none"> <li>• . High temperature resistant (ceramic) type</li> </ul>
F23J 2217/105	<ul style="list-style-type: none"> <li>• . Granular bed</li> </ul>
F23J 2217/20	<ul style="list-style-type: none"> <li>• by baffles</li> </ul>
F23J 2217/30	<ul style="list-style-type: none"> <li>• by screens</li> </ul>
F23J 2217/40	<ul style="list-style-type: none"> <li>• by cyclones</li> </ul>
F23J 2217/50	<ul style="list-style-type: none"> <li>• by cleaning fluids (washers or scrubbers)</li> </ul>
F23J 2217/60	<ul style="list-style-type: none"> <li>• using settling/precipitation chambers</li> </ul>

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

F23J 2219/10	<ul style="list-style-type: none"> <li>• Catalytic reduction devices</li> </ul>
F23J 2219/20	<ul style="list-style-type: none"> <li>• Non-catalytic reduction devices</li> </ul>
F23J 2219/201	<ul style="list-style-type: none"> <li>• . Reducing species generators, e.g. plasma, corona</li> </ul>
F23J 2219/30	<ul style="list-style-type: none"> <li>• Sorption devices using carbon, e.g. coke</li> </ul>
F23J 2219/40	<ul style="list-style-type: none"> <li>• Sorption with wet devices, e.g. scrubbers</li> </ul>

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