

**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	<ul style="list-style-type: none"> <li>for tents; for log huts; for other inflammable structures</li> </ul>
F23J 11/12	<ul style="list-style-type: none"> <li>Smoke conduit systems for factories or large buildings</li> </ul>
<b>F23J 13/00</b>	<b>Fittings for chimneys or flues</b> (staying, stiffening <a href="#">E04H</a> ; means for facilitating climbing <a href="#">E06C</a> ; draught-inducing apparatus associated with chimneys or flues <a href="#">F23L</a> )
F23J 13/02	<ul style="list-style-type: none"> <li>Linings; Jackets; Casings</li> </ul>
F23J 13/025	<ul style="list-style-type: none"> <li>{composed of concentric elements, e.g. double walled (in general <a href="#">F16L</a>; terminals for balanced flue arrangements <a href="#">F23L 17/04</a>)}</li> </ul>
F23J 13/04	<ul style="list-style-type: none"> <li>Joints; Connections (pipe joints in general <a href="#">F16L</a>)</li> </ul>
F23J 13/06	<ul style="list-style-type: none"> <li>Mouths; Inlet holes</li> </ul>
F23J 13/08	<ul style="list-style-type: none"> <li>Doors or covers specially adapted for smoke-boxes, flues, or chimneys (in general <a href="#">E06B</a>)</li> </ul>
<b>F23J 15/00</b>	<b>Arrangement of devices for treating smoke or fumes</b> (treating smoke or fumes, see the relevant class for the treatment, e.g. <a href="#">B01D 53/00</a> )
F23J 15/003	<ul style="list-style-type: none"> <li>{for supplying chemicals to fumes, e.g. using injection devices (to fire <a href="#">F23J 7/00</a>)}</li> </ul>
F23J 15/006	<ul style="list-style-type: none"> <li>{Layout of treatment plant}</li> </ul>
F23J 15/02	<ul style="list-style-type: none"> <li>of purifiers, e.g. for removing noxious material (traps for solid {deposits}<a href="#">F23J 3/04</a>)</li> </ul>
F23J 15/022	<ul style="list-style-type: none"> <li>{for removing solid particulate material from the gasflow}</li> </ul>
F23J 15/025	<ul style="list-style-type: none"> <li>{using filters}</li> </ul>
F23J 15/027	<ul style="list-style-type: none"> <li>{using cyclone separators}</li> </ul>
F23J 15/04	<ul style="list-style-type: none"> <li>using washing fluids {(scrubbers for removing solids only <a href="#">F23J 15/022</a>)}</li> </ul>
F23J 15/06	<ul style="list-style-type: none"> <li>of coolers</li> </ul>
F23J 15/08	<ul style="list-style-type: none"> <li>of heaters</li> </ul>
<b>F23J 99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
<b>F23J 2211/00</b>	<b>Flue gas duct systems</b>
F23J 2211/10	<ul style="list-style-type: none"> <li>Balanced flues (combining air supply and flue gas exhaust)</li> </ul>
F23J 2211/101	<ul style="list-style-type: none"> <li>with coaxial duct arrangement</li> </ul>
F23J 2211/20	<ul style="list-style-type: none"> <li>Common flues for several combustion devices</li> </ul>
F23J 2211/30	<ul style="list-style-type: none"> <li>Chimney or flue associated with building ventilation system</li> </ul>
F23J 2211/40	<ul style="list-style-type: none"> <li>Chimney with internal flue pipe system</li> </ul>
<b>F23J 2213/00</b>	<b>Chimneys or flues</b>
F23J 2213/10	<ul style="list-style-type: none"> <li>Linings</li> </ul>
F23J 2213/101	<ul style="list-style-type: none"> <li>Fastening means therefor</li> </ul>
F23J 2213/20	<ul style="list-style-type: none"> <li>Joints; Connections</li> </ul>
F23J 2213/201	<ul style="list-style-type: none"> <li>between stack and branch pipes</li> </ul>
F23J 2213/202	<ul style="list-style-type: none"> <li>between duct or stack sections</li> </ul>
F23J 2213/203	<ul style="list-style-type: none"> <li>between stack/duct and combustion apparatus</li> </ul>
F23J 2213/204	<ul style="list-style-type: none"> <li>Sealing arrangements</li> </ul>

- 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 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 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