F23J REMOVAL OR TREATMENT OF COMBUSTION PRODUCTS OR COMBUSTION RESIDUES; FLUES (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

WARNING
(In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.)

1/00 Removing ash, clinker, or slag from combustion chambers (removing flyash from flue gas F23J 15/022) devices for removal of material from the bed of fluidised bed combustion apparatus F23C 10/24

1/02 . Apparatus for removing ash, clinker, or slag from ash-pits, e.g. by employing trucks or conveyors, by employing suction devices

1/04 . Hand tools, e.g. rakes, pickers, tongs

1/06 . Mechanically-operated devices, e.g. clinker pushers (forming part of the grate F23H)

1/08 . Liquid slag removal

3/00 Removing solid residues from passages or chambers beyond the fire, e.g. from flues by soot blowers

3/02 . Cleaning furnace tubes; Cleaning flues or chimneys

3/03 . . [cleaning the fireside of watertubes in boilers]

3/06 . . [cleaning the chimneys]

3/04 . Traps

3/06 . Systems for accumulating residues from different parts of furnace plant

7/00 Arrangement of devices for supplying chemicals to fire

9/00 Preventing premature solidification of molten combustion residues

11/00 Devices for conducting smoke or fumes, e.g. flues (chimney stacks 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])

11/02 . for conducting smoke or fumes originating from various locations to the outside, e.g. in locomotive sheds, in garages

11/04 . in locomotives; in road vehicles; in ships

11/06 . . for conducting smoke horizontally

11/08 . . for portable apparatus

11/10 . for tents; for log huts; for other inflammable structures

11/12 . Smoke conduit systems for factories or large buildings

13/00 Fittings for chimneys or flues (side-supporting means for chimney stacks E04H 12/20; ladders permanently attached to chimneys E06C 9/00; draught-inducing apparatus associated with chimneys or flues F23L 17/00; tops for chimneys, terminals for flues F23L 17/02)

13/02 . Linings; Jackets; Casings

13/05 . . [composed of concentric elements, e.g. double walled (terminals for balanced flue arrangements F23L 17/04)]

13/06 . Mouths; Inlet holes

13/08 . Doors or covers specially adapted for smoke-boxes, flues, or chimneys

15/00 Arrangements of devices for treating smoke or fumes

15/003 . [for supplying chemicals to fumes, e.g. using injection devices]

15/006 . [Layout of treatment plant]

15/02 . [for purifiers, e.g. for removing noxious material (traps for solid residues F23J 3/04)]

15/022 . . [for removing solid particulate material from the gasflow]

15/025 . . . [using filters]

15/027 . . . [using cyclone separators]

15/04 . . using washing fluids [(scrubbers for removing solids only F23J 15/022)]

15/06 . of coolers

15/08 . of heaters

99/00 Subject matter not provided for in other groups of this subclass

2211/00 Flue gas duct systems
<table>
<thead>
<tr>
<th>CPC</th>
<th>Title</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2211/10</td>
<td>Balanced flues (combining air supply and flue gas exhaust)</td>
<td></td>
</tr>
<tr>
<td>2211/101</td>
<td>with coaxial duct arrangement</td>
<td></td>
</tr>
<tr>
<td>2211/20</td>
<td>Common flues for several combustion devices</td>
<td></td>
</tr>
<tr>
<td>2211/30</td>
<td>Chimney or flue associated with building ventilation system</td>
<td></td>
</tr>
<tr>
<td>2211/40</td>
<td>Chimney with internal flue pipe system</td>
<td></td>
</tr>
<tr>
<td>2213/00</td>
<td><strong>Chimneys or flues</strong></td>
<td></td>
</tr>
<tr>
<td>2213/10</td>
<td>Linings</td>
<td></td>
</tr>
<tr>
<td>2213/101</td>
<td>Fastening means therefor</td>
<td></td>
</tr>
<tr>
<td>2213/20</td>
<td>Joints; Connections</td>
<td></td>
</tr>
<tr>
<td>2213/201</td>
<td>between stack and branch pipes</td>
<td></td>
</tr>
<tr>
<td>2213/202</td>
<td>between duct or stack sections</td>
<td></td>
</tr>
<tr>
<td>2213/203</td>
<td>between stack/duct and combustion apparatus</td>
<td></td>
</tr>
<tr>
<td>2213/204</td>
<td>Sealing arrangements</td>
<td></td>
</tr>
<tr>
<td>2213/30</td>
<td>Specific materials</td>
<td></td>
</tr>
<tr>
<td>2213/301</td>
<td>flexible</td>
<td></td>
</tr>
<tr>
<td>2213/302</td>
<td>plastic</td>
<td></td>
</tr>
<tr>
<td>2213/303</td>
<td>metallic</td>
<td></td>
</tr>
<tr>
<td>2213/304</td>
<td>ceramic</td>
<td></td>
</tr>
<tr>
<td>2213/305</td>
<td>glass</td>
<td></td>
</tr>
<tr>
<td>2213/40</td>
<td>Heat insulation fittings</td>
<td></td>
</tr>
<tr>
<td>2213/50</td>
<td>Top cover</td>
<td></td>
</tr>
<tr>
<td>2213/60</td>
<td>Service arrangements</td>
<td></td>
</tr>
<tr>
<td>2213/70</td>
<td>Safety arrangements</td>
<td></td>
</tr>
<tr>
<td>2215/00</td>
<td><strong>Preventing emissions (solids only F23J 2217/00)</strong></td>
<td></td>
</tr>
<tr>
<td>2215/10</td>
<td>Nitrogen; Compounds thereof</td>
<td></td>
</tr>
<tr>
<td>2215/101</td>
<td>Nitrous oxide (N₂O)</td>
<td></td>
</tr>
<tr>
<td>2215/20</td>
<td>Sulfur; Compounds thereof</td>
<td></td>
</tr>
<tr>
<td>2215/30</td>
<td>Halogen; Compounds thereof</td>
<td></td>
</tr>
<tr>
<td>2215/301</td>
<td>Dioxins; Furans</td>
<td></td>
</tr>
<tr>
<td>2215/40</td>
<td>Carbon monoxide</td>
<td></td>
</tr>
<tr>
<td>2215/50</td>
<td>Carbon dioxide</td>
<td></td>
</tr>
<tr>
<td>2215/60</td>
<td>Heavy metals; Compounds thereof</td>
<td></td>
</tr>
<tr>
<td>2217/00</td>
<td><strong>Intercepting solids</strong></td>
<td></td>
</tr>
<tr>
<td>2217/10</td>
<td>by filters</td>
<td></td>
</tr>
<tr>
<td>2217/101</td>
<td>Baghouse type</td>
<td></td>
</tr>
<tr>
<td>2217/102</td>
<td>electrostatic</td>
<td></td>
</tr>
<tr>
<td>2217/103</td>
<td>ultrafine [HEPA]</td>
<td></td>
</tr>
<tr>
<td>2217/104</td>
<td>High temperature resistant (ceramic) type</td>
<td></td>
</tr>
<tr>
<td>2217/105</td>
<td>Granular bed</td>
<td></td>
</tr>
<tr>
<td>2217/20</td>
<td>by baffles</td>
<td></td>
</tr>
<tr>
<td>2217/30</td>
<td>by screens</td>
<td></td>
</tr>
<tr>
<td>2217/40</td>
<td>by cyclones</td>
<td></td>
</tr>
<tr>
<td>2217/50</td>
<td>by cleaning fluids (washers or scrubbers)</td>
<td></td>
</tr>
<tr>
<td>2217/60</td>
<td>using settling/precipitation chambers</td>
<td></td>
</tr>
<tr>
<td>2219/00</td>
<td><strong>Treatment devices</strong></td>
<td></td>
</tr>
<tr>
<td>2219/10</td>
<td>Catalytic reduction devices</td>
<td></td>
</tr>
<tr>
<td>2219/20</td>
<td>Non-catalytic reduction devices</td>
<td></td>
</tr>
<tr>
<td>2219/201</td>
<td>Reducing species generators, e.g. plasma, corona</td>
<td></td>
</tr>
<tr>
<td>2219/30</td>
<td>Sorption devices using carbon, e.g. coke</td>
<td></td>
</tr>
<tr>
<td>2219/40</td>
<td>Sorption with wet devices, e.g. scrubbers</td>
<td></td>
</tr>
<tr>
<td>2219/50</td>
<td>Sorption with semi-dry devices, e.g. with slurries</td>
<td></td>
</tr>
<tr>
<td>2219/60</td>
<td>Sorption with dry devices, e.g. beds</td>
<td></td>
</tr>
<tr>
<td>2219/70</td>
<td>Condensing contaminants with coolers</td>
<td></td>
</tr>
<tr>
<td>2219/80</td>
<td>Quenching</td>
<td></td>
</tr>
<tr>
<td>2700/00</td>
<td>Ash removal, handling and treatment means; Ash and slag handling in pulverulent fuel furnaces; Ash removal means for incinerators</td>
<td></td>
</tr>
<tr>
<td>2700/001</td>
<td>Ash removal, handling and treatment means</td>
<td></td>
</tr>
<tr>
<td>2700/002</td>
<td>Ash and slag handling in pulverulent fuel furnaces</td>
<td></td>
</tr>
<tr>
<td>2700/003</td>
<td>Ash removal means for incinerators</td>
<td></td>
</tr>
<tr>
<td>2900/00</td>
<td>Special arrangements for conducting or purifying combustion fumes; Treatment of fumes or ashes</td>
<td></td>
</tr>
<tr>
<td>2900/01001</td>
<td>Sorting and classifying ashes or fly-ashes from the combustion chamber before further treatment</td>
<td></td>
</tr>
<tr>
<td>2900/01002</td>
<td>Cooling of ashes from the combustion chamber by indirect heat exchangers (for preheating air F23L 2900/15041)</td>
<td></td>
</tr>
<tr>
<td>2900/01003</td>
<td>Ash crushing means associated with ash removal means</td>
<td></td>
</tr>
<tr>
<td>2900/01004</td>
<td>Separating water from ash</td>
<td></td>
</tr>
<tr>
<td>2900/01005</td>
<td>Mixing water to ash</td>
<td></td>
</tr>
<tr>
<td>2900/01006</td>
<td>Airlock sealing associated with ash removal means</td>
<td></td>
</tr>
<tr>
<td>2900/01007</td>
<td>Thermal treatments of ash, e.g. temper or shock-cooling for granulation</td>
<td></td>
</tr>
<tr>
<td>2900/01009</td>
<td>Controls related to ash or slag extraction</td>
<td></td>
</tr>
<tr>
<td>2900/0101</td>
<td>Initial heating of the flue before starting combustion</td>
<td></td>
</tr>
<tr>
<td>2900/01003</td>
<td>Means for reducing the noise in smoke conducting ducts or systems</td>
<td></td>
</tr>
<tr>
<td>2900/01301</td>
<td>Preventing or reducing corrosion in chimneys</td>
<td></td>
</tr>
<tr>
<td>2900/01302</td>
<td>Means for supporting the lining of conducting means, e.g. ducts or chimneys</td>
<td></td>
</tr>
<tr>
<td>2900/013022</td>
<td>Manufacturing processes for the lining of conducting means, e.g. by extrusion</td>
<td></td>
</tr>
<tr>
<td>2900/013023</td>
<td>Ducts with non-circular cross-section</td>
<td></td>
</tr>
<tr>
<td>2900/013001</td>
<td>Irradiating fumes with electron or light beams, e.g. UV, for oxidizing or dissociating SOx and NOx</td>
<td></td>
</tr>
<tr>
<td>2900/015002</td>
<td>Cleaning fumes by letting them to pass a molten metal bath</td>
<td></td>
</tr>
<tr>
<td>2900/01503</td>
<td>Supplying fumes with ozone</td>
<td></td>
</tr>
<tr>
<td>2900/01504</td>
<td>Preventing plume emission at chimney outlet</td>
<td></td>
</tr>
<tr>
<td>2900/015021</td>
<td>Devices for heating the chimney top to avoid ice formation</td>
<td></td>
</tr>
<tr>
<td>2900/015021</td>
<td>Preventing emission of hexavalent chromium at the chimney outlet</td>
<td></td>
</tr>
<tr>
<td>2900/015022</td>
<td>Electrochemical cell filters</td>
<td></td>
</tr>
<tr>
<td>2900/015023</td>
<td>Magnetic filters</td>
<td></td>
</tr>
<tr>
<td>2900/015024</td>
<td>Photocatalytic filters</td>
<td></td>
</tr>
<tr>
<td>2900/015025</td>
<td>Cyclone walls forming heat exchangers</td>
<td></td>
</tr>
<tr>
<td>2900/015026</td>
<td>Cyclone separators with horizontal axis</td>
<td></td>
</tr>
<tr>
<td>2900/015027</td>
<td>Preventing emission of CO₂ at the chimney outlet by using sea weeds filters or absorbers</td>
<td></td>
</tr>
<tr>
<td>2900/015041</td>
<td>Means for absorbing SOx using seawater</td>
<td></td>
</tr>
<tr>
<td>2900/015061</td>
<td>Deep cooling or freezing of flue gas rich of CO₂ to deliver CO₂-free emissions, or to deliver liquid CO₂</td>
<td></td>
</tr>
<tr>
<td>2900/015081</td>
<td>Reheating of flue gases</td>
<td></td>
</tr>
</tbody>
</table>