

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

LIGHTING; HEATING

F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES (NOTE omitted)

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

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.

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| <p>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)}</p> <p>1/02 . Apparatus for removing ash, clinker, or slag from ash-pits, e.g. by employing trucks or conveyors, by employing suction devices</p> <p>1/04 . Hand tools, e.g. rakes, prickers, tongs</p> <p>1/06 . Mechanically-operated devices, e.g. clinker pushers (forming part of the grate F23H)</p> <p>1/08 . Liquid slag removal</p> <p>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)}</p> <p>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)</p> <p>3/023 . . {cleaning the fireside of watertubes in boilers}</p> <p>3/026 . . {cleaning the chimneys}</p> <p>3/04 . Traps</p> <p>3/06 . Systems for accumulating residues from different parts of furnace plant</p> <p>7/00 Arrangement of devices for supplying chemicals to fire (supplying chemicals to fire C10L ; to fumes F23J 15/003)</p> <p>9/00 Preventing premature solidification of molten combustion residues</p> <p>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)</p> | <p>11/02 . for conducting smoke or fumes originating from various locations to the outside, e.g. in locomotive sheds, in garages</p> <p>11/04 . in locomotives; in road vehicles; in ships</p> <p>11/06 . . for conducting smoke horizontally</p> <p>11/08 . for portable apparatus</p> <p>11/10 . for tents; for log huts; for other inflammable structures</p> <p>11/12 . Smoke conduit systems for factories or large buildings</p> <p>13/00 Fittings for chimneys or flues (staying, stiffening E04H; means for facilitating climbing E06C; draught-inducing apparatus associated with chimneys or flues F23L)</p> <p>13/02 . Linings; Jackets; Casings</p> <p>13/025 . . {composed of concentric elements, e.g. double walled (in general F16L; terminals for balanced flue arrangements F23L 17/04)}</p> <p>13/04 . Joints; Connections (pipe joints in general F16L)</p> <p>13/06 . Mouths; Inlet holes</p> <p>13/08 . Doors or covers specially adapted for smoke-boxes, flues, or chimneys (in general E06B)</p> <p>15/00 Arrangements of devices for treating smoke or fumes (treating smoke or fumes, see the relevant class for the treatment, e.g. B01D 53/00)</p> <p>15/003 . {for supplying chemicals to fumes, e.g. using injection devices (to fire F23J 7/00)}</p> <p>15/006 . {Layout of treatment plant}</p> <p>15/02 . of purifiers, e.g. for removing noxious material (traps for solid {deposits} F23J 3/04)</p> <p>15/022 . . {for removing solid particulate material from the gasflow}</p> <p>15/025 . . . {using filters}</p> <p>15/027 . . . {using cyclone separators}</p> <p>15/04 . . using washing fluids {(scrubbers for removing solids only F23J 15/022)}</p> |
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| 15/06 | . of coolers | 2219/60 | . Sorption with dry devices, e.g. beds |
| 15/08 | . of heaters | 2219/70 | . Condensing contaminants with coolers |
| 99/00 | Subject matter not provided for in other groups of this subclass | 2219/80 | . Quenching |
| 2211/00 | Flue gas duct systems | 2700/00 | Ash removal, handling and treatment means; Ash and slag handling in pulverulent fuel furnaces; Ash removal means for incinerators |
| 2211/10 | . Balanced flues (combining air supply and flue gas exhaust) | 2700/001 | . Ash removal, handling and treatment means |
| 2211/101 | . . with coaxial duct arrangement | 2700/002 | . Ash and slag handling in pulverulent fuel furnaces |
| 2211/20 | . Common flues for several combustion devices | 2700/003 | . Ash removal means for incinerators |
| 2211/30 | . Chimney or flue associated with building ventilation system | 2900/00 | Special arrangements for conducting or purifying combustion fumes; Treatment of fumes or ashes |
| 2211/40 | . Chimney with internal flue pipe system | 2900/01001 | . Sorting and classifying ashes or fly-ashes from the combustion chamber before further treatment |
| 2213/00 | Chimneys or flues | 2900/01002 | . Cooling of ashes from the combustion chamber by indirect heat exchangers (for preheating air F23L 2900/15041) |
| 2213/10 | . Linings | 2900/01003 | . Ash crushing means associated with ash removal means |
| 2213/101 | . . Fastening means therefor | 2900/01004 | . Separating water from ash |
| 2213/20 | . Joints; Connections | 2900/01005 | . Mixing water to ash |
| 2213/201 | . . between stack and branch pipes | 2900/01006 | . Airlock sealing associated with ash removal means |
| 2213/202 | . . between duct or stack sections | 2900/01007 | . Thermal treatments of ash, e.g. temper or shock-cooling for granulation |
| 2213/203 | . . between stack/duct and combustion apparatus | 2900/01009 | . Controls related to ash or slag extraction |
| 2213/204 | . . Sealing arrangements | 2900/01021 | . Removing ashes from the ash pit using reciprocating means, e.g. pushers |
| 2213/30 | . Specific materials | 2900/11001 | . Conducting systems with a gas flow bypass from main flue to an auxiliary flue |
| 2213/301 | . . flexible | 2900/11002 | . Modelling systems adapted for designing arrangements for conducting or purifying combustion fumes, e.g. flues |
| 2213/302 | . . plastic | 2900/13001 | . Preventing or reducing corrosion in chimneys |
| 2213/303 | . . metallic | 2900/13002 | . Initial heating of the flue before starting combustion |
| 2213/304 | . . ceramic | 2900/13003 | . Means for reducing the noise in smoke conducting ducts or systems |
| 2213/305 | . . glass | 2900/13004 | . Water draining devices associated with flues |
| 2213/40 | . Heat insulation fittings | 2900/13005 | . Protections for chimneys or flue tops against external factors, e.g. birds |
| 2213/50 | . Top cover | 2900/13006 | . Devices for heating the chimney top to avoid ice formation |
| 2213/60 | . Service arrangements | 2900/13021 | . Means for supporting the lining of conducting means, e.g. ducts or chimneys |
| 2213/70 | . Safety arrangements | 2900/13022 | . Manufacturing processes for the lining of conducting means, e.g. by extrusion |
| 2215/00 | Preventing emissions (solids only F23J 2217/00) | 2900/13023 | . Ducts with non-circular cross-section |
| 2215/10 | . Nitrogen; Compounds thereof | 2900/15001 | . Irradiating fumes with electron or light beams, e.g. UV, for oxidizing or dissociating SO _x and NO _x |
| 2215/101 | . . Nitrous oxide (N ₂ O) | 2900/15002 | . Cleaning fumes by letting them to pass a molten metal bath |
| 2215/20 | . Sulfur; Compounds thereof | 2900/15003 | . Supplying fumes with ozone |
| 2215/30 | . Halogen; Compounds thereof | 2900/15004 | . Preventing plume emission at chimney outlet |
| 2215/301 | . . Dioxins; Furans | 2900/15021 | . Preventing emission of hexavalent chromium at the chimney outlet |
| 2215/40 | . Carbon monoxide | 2900/15022 | . Electrochemical cell filters |
| 2215/50 | . Carbon dioxide | 2900/15023 | . Magnetic filters |
| 2215/60 | . Heavy metals; Compounds thereof | 2900/15024 | . Photocatalytic filters |
| 2217/00 | Intercepting solids | 2900/15025 | . Cyclone walls forming heat exchangers |
| 2217/10 | . by filters | 2900/15026 | . Cyclone separators with horizontal axis |
| 2217/101 | . . Baghouse type | 2900/15027 | . Preventing emission of CO ₂ at the chimney outlet by using sea weeds filters or absorbers |
| 2217/102 | . . electrostatic | 2900/15041 | . Means for absorbing SO _x using seawater |
| 2217/103 | . . ultrafine [HEPA] | | |
| 2217/104 | . . High temperature resistant (ceramic) type | | |
| 2217/105 | . . Granular bed | | |
| 2217/20 | . by baffles | | |
| 2217/30 | . by screens | | |
| 2217/40 | . by cyclones | | |
| 2217/50 | . by cleaning fluids (washers or scrubbers) | | |
| 2217/60 | . using settling/precipitation chambers | | |
| 2219/00 | Treatment devices | | |
| 2219/10 | . Catalytic reduction devices | | |
| 2219/20 | . Non-catalytic reduction devices | | |
| 2219/201 | . . Reducing species generators, e.g. plasma, corona | | |
| 2219/30 | . Sorption devices using carbon, e.g. coke | | |
| 2219/40 | . Sorption with wet devices, e.g. scrubbers | | |
| 2219/50 | . Sorption with semi-dry devices, e.g. with slurries | | |

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- 2900/15061 . Deep cooling or freezing of flue gas rich of CO₂ to deliver CO₂-free emissions, or to deliver liquid CO₂
- 2900/15081 . Reheating of flue gases