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.

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)}

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 [deposited] residues from passages or chambers beyond the fire, e.g. from flues by soot blowers {(soot blowers per se F28G 1/16)}

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)
3/023 . [cleaning the fireside of waterubes in boilers]
3/026 . [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 (supplying chemicals to fire C10L (to fumes F23J 15/003))

9/00 Preventing premature solidification of molten combustion residues

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 (to 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 (staying, stiffening E04H; means for facilitating climbing E06C; draught-inducing apparatus associated with chimneys or flues F23L)

13/02 . Linings; Jackets; Casings
13/025 . . [composed of concentric elements, e.g. double walled (in general F16L; terminals for balanced flue arrangements F23L 17/04)]
13/04 . Joints; Connections (pipe joints in general F16L)
13/06 . Mouths; Inlet holes
13/08 . Doors or covers specially adapted for smoke-boxes, flues, or chimneys (in general E06B)

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)

15/003 . [for supplying chemicals to fumes, e.g. using injection devices (to fire F23J 7/00)]
15/006 . [Layout of treatment plant]
15/02 . of purifiers, e.g. for removing noxious material (traps for solid deposits 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 {[scrubers for removing solids only F23J 15/022]}
Subject matter not provided for in other groups of this subclass

**2211/00** Flue gas duct systems

- 2211/10 Balanced flues (combining air supply and flue gas exhaust)
- 2211/101 with coaxial duct arrangement
- 2211/20 Common flues for several combustion devices
- 2211/30 Chimney or flue associated with building ventilation system
- 2211/40 Chimney with internal flue pipe system

**2213/00** Chimneys or flues

- 2213/10 Linings
- 2213/101 Fastening means therefor
- 2213/20 Joints; Connections
- 2213/201 between stack and branch pipes
- 2213/202 between duct or stack sections
- 2213/203 between stack/duct and combustion apparatus
- 2213/204 Sealing arrangements
- 2213/30 Specific materials
- 2213/301 flexible
- 2213/302 plastic
- 2213/303 metallic
- 2213/304 ceramic
- 2213/305 glass
- 2213/40 Heat insulation fittings
- 2213/50 Top cover
- 2213/60 Service arrangements
- 2213/70 Safety arrangements

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

- 2215/10 Nitrogen; Compounds thereof
- 2215/101 Nitrous oxide (N2O)
- 2215/20 Sulfur; Compounds thereof
- 2215/30 Halogen; Compounds thereof
- 2215/301 Dioxins; Furans
- 2215/40 Carbon monoxide
- 2215/50 Carbon dioxide
- 2215/60 Heavy metals; Compounds thereof

**2217/00** Intercepting solids

- 2217/10 by filters
- 2217/101 Baghouse type
- 2217/102 Electrostatic
- 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
- 2219/60 Sorption with dry devices, e.g. beds
- 2219/70 Condensing contaminants with coolers
- 2219/80 Quenching

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

- 2700/001 Ash removal, handling and treatment means
- 2700/002 Ash and slag handling in pulverulent fuel furnaces
- 2700/003 Ash removal means for incinerators

**2900/00** Special arrangements for conducting or purifying combustion fumes; Treatment of fumes or ashes

- 2900/01001 Sorting and classifying ashes or fly-ashes from the combustion chamber before further treatment
- 2900/01002 Cooling of ashes from the combustion chamber by indirect heat exchangers (for preheating air F23L 2900/15041)
- 2900/01003 Ash crushing means associated with ash removal means
- 2900/01004 Separating water from ash
- 2900/01005 Mixing water to ash
- 2900/01006 Airlock sealing associated with ash removal means
- 2900/01007 Thermal treatments of ash, e.g. temper or shock-cooling for granulation
- 2900/01009 Controls related to ash or slag extraction
- 2900/01021 Removing ashes from the ash pit using reciprocating means, e.g. pushers
- 2900/11001 Conducting systems with a gas flow bypass from main flue to an auxiliary flue
- 2900/11002 Modelling systems adapted for designing arrangements for conducting or purifying combustion fumes, e.g. flues
- 2900/13001 Preventing or reducing corrosion in chimneys
- 2900/13002 Initial heating of the flue before starting combustion
- 2900/13003 Means for reducing the noise in smoke conducting ducts or systems
- 2900/13004 Water draining devices associated with flues
- 2900/13005 Protections for chimneys or flue tops against external factors, e.g. birds
- 2900/13006 Devices for heating the chimney top to avoid ice formation
- 2900/13021 Means for supporting the lining of conducting means, e.g. ducts or chimneys
- 2900/13022 Manufacturing processes for the lining of conducting means, e.g. by extrusion
- 2900/13023 Ducts with non-circular cross-section
- 2900/15001 Irradiating fumes with electron or light beams, e.g. UV, for oxidizing or dissociating SOx and NOx
- 2900/15002 Cleaning fumes by letting them to pass a molten metal bath
- 2900/15003 Supplying fumes with ozone
- 2900/15004 Preventing plume emission at chimney outlet
- 2900/15021 Preventing emission of hexavalent chromium at the chimney outlet
- 2900/15022 Electrochemical cell filters
- 2900/15023 Magnetic filters
- 2900/15024 Photocatalytic filters
- 2900/15025 Cyclone walls forming heat exchangers
- 2900/15026 Cyclone separators with horizontal axis
- 2900/15027 Preventing emission of CO at the chimney outlet by using sea weeds filters or absorbers
- 2900/15041 Means for absorbing SOx using seawater
2900/15061. Deep cooling or freezing of flue gas rich of CO$_2$ to deliver CO$_2$-free emissions, or to deliver liquid CO$_2$

2900/15081. Reheating of flue gases