

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

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)}	11/08	• for portable apparatus
		11/10	• for tents; for log huts; for other inflammable structures
1/02	• Apparatus for removing ash, clinker, or slag from ash-pits, e.g. by employing trucks or conveyors, by employing suction devices	11/12	• Smoke conduit systems for factories or large buildings
1/04	• Hand tools, e.g. rakes, prickers, tongs	13/00	Fittings for chimneys or flues (staying, stiffening E04H ; means for facilitating climbing E06C ; draught-inducing apparatus associated with chimneys or flues F23L)
1/06	• Mechanically-operated devices, e.g. clinker pushers (forming part of the grate F23H)		
1/08	• Liquid slag removal	13/02	• Linings; Jackets; Casings
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)}	13/025	• • {composed of concentric elements, e.g. double walled (in general F16L ; terminals for balanced flue arrangements F23L 17/04)}
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)	13/04	• Joints; Connections (pipe joints in general F16L)
3/023	• • {cleaning the fireside of watertubes in boilers}	13/06	• Mouths; Inlet holes
3/026	• • {cleaning the chimneys}	13/08	• Doors or covers specially adapted for smoke-boxes, flues, or chimneys (in general E06B)
3/04	• Traps	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)
3/06	• Systems for accumulating residues from different parts of furnace plant	15/003	• {for supplying chemicals to fumes, e.g. using injection devices (to fire F23J 7/00)}
7/00	Arrangement of devices for supplying chemicals to fire (supplying chemicals to fire C10L {; to fumes F23J 15/003 })	15/006	• {Layout of treatment plant}
9/00	Preventing premature solidification of molten combustion residues	15/02	• of purifiers, e.g. for removing noxious material (traps for solid {deposits} F23J 3/04)
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 })	15/022	• • {for removing solid particulate material from the gasflow}
		15/025	• • • {using filters}
11/02	• for conducting smoke or fumes originating from various locations to the outside, e.g. in locomotive sheds, in garages	15/027	• • • {using cyclone separators}
11/04	• in locomotives; in road vehicles; in ships	15/04	• • using washing fluids {(scrubbers for removing solids only F23J 15/022)}
11/06	• • for conducting smoke horizontally	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
		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 SO_x and NO_x
- 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 CO₂ at the chimney outlet by using sea weeds filters or absorbers
- 2900/15041 . Means for absorbing SO_x using seawater
- 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