

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.

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

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		

F23J

- 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