

# 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 <a href="#">F23J 3/06</a> ; removing flyash from flue gas <a href="#">F23J 15/022</a> )}	11/08	• for portable apparatus
1/02	• Apparatus for removing ash, clinker, or slag from ash-pits, e.g. by employing trucks or conveyors, by employing suction devices	11/10	• for tents; for log huts; for other inflammable structures
1/04	• Hand tools, e.g. rakes, prickers, tongs	11/12	• Smoke conduit systems for factories or large buildings
1/06	• Mechanically-operated devices, e.g. clinker pushers (forming part of the grate <a href="#">F23H</a> )	13/00	Fittings for chimneys or flues (staying, stiffening <a href="#">E04H</a> ; means for facilitating climbing <a href="#">E06C</a> ; draught-inducing apparatus associated with chimneys or flues <a href="#">F23L</a> )
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 <a href="#">F28G 1/16</a> )}	13/025	• • {composed of concentric elements, e.g. double walled (in general <a href="#">F16L</a> ; terminals for balanced flue arrangements <a href="#">F23L 17/04</a> )}
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 <a href="#">B08B</a> )	13/04	• Joints; Connections (pipe joints in general <a href="#">F16L</a> )
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 <a href="#">E06B</a> )
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. <a href="#">B01D 53/00</a> )
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 <a href="#">F23J 7/00</a> )}
7/00	Arrangement of devices for supplying chemicals to fire (supplying chemicals to fire <a href="#">C10L</a> ; to fumes <a href="#">F23J 15/003</a> )	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} <a href="#">F23J 3/04</a> )
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 <a href="#">B08B 15/00</a> ); heat insulation therefor <a href="#">E04B 1/94</a> ; chimneys <a href="#">E04H 12/28</a> ; removing cooking fumes from domestic stoves or ranges <a href="#">F24C 15/20</a> ; fume conduits of furnaces, kilns, ovens, or retorts <a href="#">F27D 17/002</a> )	15/022	• • {for removing solid particulate material from the gasflow}
11/02	• for conducting smoke or fumes originating from various locations to the outside, e.g. in locomotive sheds, in garages	15/025	• • • {using filters}
11/04	• in locomotives; in road vehicles; in ships	15/027	• • • {using cyclone separators}
11/06	• • for conducting smoke horizontally	15/04	• • using washing fluids {(scrubbers for removing solids only <a href="#">F23J 15/022</a> )}
		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	2700/003	. Ash removal means for incinerators
2211/30	. Chimney or flue associated with building ventilation system	<b>2900/00</b>	<b>Special arrangements for conducting or purifying combustion fumes; Treatment of fumes or ashes</b>
2211/40	. Chimney with internal flue pipe system	2900/01001	. Sorting and classifying ashes or fly-ashes from the combustion chamber before further treatment
<b>2213/00</b>	<b>Chimneys or flues</b>	2900/01002	. Cooling of ashes from the combustion chamber by indirect heat exchangers ( <a href="#">for preheating air F23L 2900/15041</a> )
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
<b>2215/00</b>	<b>Preventing emissions (solids only <a href="#">F23J 2217/00</a>)</b>	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 <sub>x</sub> and NO <sub>x</sub>
2215/101	. . Nitrous oxide (N <sub>2</sub> 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
<b>2217/00</b>	<b>Intercepting solids</b>	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 <sub>2</sub> at the chimney outlet by using sea weeds filters or absorbers
2217/102	. . electrostatic	2900/15041	. Means for absorbing SO <sub>x</sub> using seawater
2217/103	. . ultrafine [HEPA]	2900/15061	. Deep cooling or freezing of flue gas rich of CO <sub>2</sub> to deliver CO <sub>2</sub> -free emissions, or to deliver liquid CO <sub>2</sub>
2217/104	. . High temperature resistant (ceramic) type	2900/15081	. Reheating of flue gases
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		
<b>2219/00</b>	<b>Treatment devices</b>		
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		
<b>2700/00</b>	<b>Ash removal, handling and treatment means; Ash and slag handling in pulverulent fuel furnaces; Ash removal means for incinerators</b>		
2700/001	. Ash removal, handling and treatment means		
2700/002	. Ash and slag handling in pulverulent fuel furnaces		