

# 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; FLUES (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	<b>Removing ash, clinker, or slag from combustion chambers</b> ({ <a href="#">removing flyash from flue gas F23J 15/022</a> ; } devices for removal of material from the bed of fluidised bed combustion apparatus <a href="#">F23C 10/24</a> )	11/10	. for tents; for log huts; for other inflammable structures
		11/12	. Smoke conduit systems for factories or large buildings
1/02	. Apparatus for removing ash, clinker, or slag from ash-pits, e.g. by employing trucks or conveyors, by employing suction devices	<b>13/00</b>	<b>Fittings for chimneys or flues</b> (side-supporting means for chimney stacks <a href="#">E04H 12/20</a> ; ladders permanently attached to chimneys <a href="#">E06C 9/00</a> ; draught-inducing apparatus associated with chimneys or flues <a href="#">F23L 17/00</a> ; tops for chimneys, terminals for flues <a href="#">F23L 17/02</a> )
1/04	. Hand tools, e.g. rakes, prickers, tongs		
1/06	. Mechanically-operated devices, e.g. clinker pushers ( <a href="#">forming part of the grate F23H</a> )	13/02	. Linings; Jackets; Casings
1/08	. Liquid slag removal	13/025	. . { <a href="#">composed of concentric elements, e.g. double walled (terminals for balanced flue arrangements F23L 17/04)</a> }
<b>3/00</b>	<b>Removing solid residues from passages or chambers beyond the fire, e.g. from flues by soot blowers</b>	13/04	. Joints; Connections
3/02	. Cleaning furnace tubes; Cleaning flues or chimneys	13/06	. Mouths; Inlet holes
3/023	. . { <a href="#">cleaning the fireside of watertubes in boilers</a> }	13/08	. Doors or covers specially adapted for smoke-boxes, flues, or chimneys
3/026	. . { <a href="#">cleaning the chimneys</a> }	<b>15/00</b>	<b>Arrangements of devices for treating smoke or fumes</b>
3/04	. Traps	15/003	. { <a href="#">for supplying chemicals to fumes, e.g. using injection devices</a> }
3/06	. Systems for accumulating residues from different parts of furnace plant	15/006	. { <a href="#">Layout of treatment plant</a> }
<b>7/00</b>	<b>Arrangement of devices for supplying chemicals to fire</b>	15/02	. of purifiers, e.g. for removing noxious material ( <a href="#">traps for solid residues F23J 3/04</a> )
<b>9/00</b>	<b>Preventing premature solidification of molten combustion residues</b>	15/022	. . { <a href="#">for removing solid particulate material from the gasflow</a> }
<b>11/00</b>	<b>Devices for conducting smoke or fumes, e.g. flues</b> (chimney stacks <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 17/302</a> })	15/025	. . . { <a href="#">using filters</a> }
		15/027	. . . { <a href="#">using cyclone separators</a> }
		15/04	. . using washing fluids ({ <a href="#">scrubbers for removing solids only F23J 15/022</a> })
11/02	. for conducting smoke or fumes originating from various locations to the outside, e.g. in locomotive sheds, in garages	15/06	. of coolers
		15/08	. of heaters
11/04	. in locomotives; in road vehicles; in ships	<b>99/00</b>	<b>Subject matter not provided for in other groups of this subclass</b>
11/06	. . for conducting smoke horizontally		
11/08	. for portable apparatus	<b>2211/00</b>	<b>Flue gas duct systems</b>

- 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**
- 2215/10 . Nitrogen; Compounds thereof
- 2215/101 . . Nitrous oxide (N<sub>2</sub>O)
- 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
- 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<sub>x</sub> and NO<sub>x</sub>
- 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<sub>2</sub> at the chimney outlet by using sea weeds filters or absorbers
- 2900/15041 . Means for absorbing SO<sub>x</sub> using seawater
- 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>
- 2900/15081 . Reheating of flue gases