

CPC**COOPERATIVE PATENT CLASSIFICATION****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

F23J 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](#)}

F23J 1/02

- . Apparatus for removing ash, clinker, or slag from ash-pits, e.g. by employing trucks or conveyers, by employing suction devices

F23J 1/04

- . Hand tools, e.g. rakes, prickers, tongs

F23J 1/06

- . Mechanically-operated devices, e.g. clinker pushers (**forming part of the grate** [F23H](#))

F23J 1/08

- . Liquid slag removal

F23J 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](#))}

F23J 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](#))

F23J 3/023

- .. {cleaning the fireside of watertubes in boilers}

F23J 3/026

- .. {cleaning the chimneys}

F23J 3/04

- . Traps

F23J 3/06

- . Systems for accumulating residues from different parts of furnace plant

F23J 7/00

Arrangement of devices for supplying chemicals to fire (supplying chemicals to fire [C10L](#); {to fumes [F23J 15/003](#)})

F23J 9/00

Preventing premature solidification of molten combustion residues

F23J 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](#)})

F23J 11/02

- . for conducting smoke or fumes originating from various locations to the outside, e.g. in locomotive sheds, in garages

F23J 11/04

- . in locomotives; in road vehicles; in ships

F23J 11/06

- .. for conducting smoke horizontally

F23J 11/08

- . for portable apparatus

F23J 11/10

- . for tents; for log huts; for other inflammable structures

F23J 11/12	<ul style="list-style-type: none"> Smoke conduit systems for factories or large buildings
F23J 13/00	Fittings for chimneys or flues (staying, stiffening E04H ; means for facilitating climbing E06C ; draught-inducing apparatus associated with chimneys or flues F23L)
F23J 13/02	<ul style="list-style-type: none"> Linings; Jackets; Casings
F23J 13/025	<ul style="list-style-type: none"> {composed of concentric elements, e.g. double walled (in general F16L; terminals for balanced flue arrangements F23L 17/04)}
F23J 13/04	<ul style="list-style-type: none"> Joints; Connections (pipe joints in general F16L)
F23J 13/06	<ul style="list-style-type: none"> Mouths; Inlet holes
F23J 13/08	<ul style="list-style-type: none"> Doors or covers specially adapted for smoke-boxes, flues, or chimneys (in general E06B)
F23J 15/00	Arrangement of devices for treating smoke or fumes (treating smoke or fumes, see the relevant class for the treatment, e.g. B01D 53/00)
F23J 15/003	<ul style="list-style-type: none"> {for supplying chemicals to fumes, e.g. using injection devices (to fire F23J 7/00)}
F23J 15/006	<ul style="list-style-type: none"> {Layout of treatment plant}
F23J 15/02	<ul style="list-style-type: none"> of purifiers, e.g. for removing noxious material (traps for solid {deposits} F23J 3/04)
F23J 15/022	<ul style="list-style-type: none"> { for removing solid particulate material from the gasflow}
F23J 15/025	<ul style="list-style-type: none"> {using filters}
F23J 15/027	<ul style="list-style-type: none"> {using cyclone separators}
F23J 15/04	<ul style="list-style-type: none"> using washing fluids {scrubbers for removing solids only F23J 15/022}
F23J 15/06	<ul style="list-style-type: none"> of coolers
F23J 15/08	<ul style="list-style-type: none"> of heaters
F23J 99/00	Subject matter not provided for in other groups of this subclass
F23J 2211/00	Flue gas duct systems
F23J 2211/10	<ul style="list-style-type: none"> Balanced flues (combining air supply and flue gas exhaust)
F23J 2211/101	<ul style="list-style-type: none"> with coaxial duct arrangement
F23J 2211/20	<ul style="list-style-type: none"> Common flues for several combustion devices
F23J 2211/30	<ul style="list-style-type: none"> Chimney or flue associated with building ventilation system
F23J 2211/40	<ul style="list-style-type: none"> Chimney with internal flue pipe system
F23J 2213/00	Chimneys or flues
F23J 2213/10	<ul style="list-style-type: none"> Linings
F23J 2213/101	<ul style="list-style-type: none"> Fastening means therefor
F23J 2213/20	<ul style="list-style-type: none"> Joints; Connections
F23J 2213/201	<ul style="list-style-type: none"> between stack and branch pipes
F23J 2213/202	<ul style="list-style-type: none"> between duct or stack sections
F23J 2213/203	<ul style="list-style-type: none"> between stack/duct and combustion apparatus
F23J 2213/204	<ul style="list-style-type: none"> Sealing arrangements
F23J 2213/30	<ul style="list-style-type: none"> Specific materials
F23J 2213/301	<ul style="list-style-type: none"> flexible

- F23J 2213/302 . . plastic
- F23J 2213/303 . . metallic
- F23J 2213/304 . . ceramic
- F23J 2213/305 . . glass
- F23J 2213/40 . Heat insulation fittings
- F23J 2213/50 . Top cover
- F23J 2213/60 . Service arrangements
- F23J 2213/70 . Safety arrangements

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

- F23J 2215/10 . Nitrogen; Compounds thereof
- F23J 2215/101 . . Nitrous oxide (N₂O)
- F23J 2215/20 . Sulfur; Compounds thereof
- F23J 2215/30 . Halogen; Compounds thereof
- F23J 2215/301 . . Dioxins; Furans
- F23J 2215/40 . Carbon monoxide
- F23J 2215/50 . Carbon dioxide
- F23J 2215/60 . Heavy metals; Compounds thereof

F23J 2217/00**Intercepting solids**

- F23J 2217/10 . by filters
- F23J 2217/101 . . Baghouse type
- F23J 2217/102 . . electrostatic
- F23J 2217/103 . . ultrafine (HEPA)
- F23J 2217/104 . . High temperature resistant (ceramic) type
- F23J 2217/105 . . Granular bed
- F23J 2217/20 . by baffles
- F23J 2217/30 . by screens
- F23J 2217/40 . by cyclones
- F23J 2217/50 . by cleaning fluids ([washers or scrubbers](#))
- F23J 2217/60 . using settling/precipitation chambers

F23J 2219/00**Treatment devices**

- F23J 2219/10 . Catalytic reduction devices
- F23J 2219/20 . Non-catalytic reduction devices
- F23J 2219/201 . . Reducing species generators, e.g. plasma, corona
- F23J 2219/30 . Sorption devices using carbon, e.g. coke
- F23J 2219/40 . Sorption with wet devices, e.g. scrubbers
- F23J 2219/50 . Sorption with semi-dry devices, e.g. with slurries
- F23J 2219/60 . Sorption with dry devices, e.g. beds
- F23J 2219/70 . Condensing contaminants with coolers

F23J 2219/80	. Quenching
F23J 2700/00	Ash removal, handling and treatment means; Ash and slag handling in pulverulent fuel furnaces; Ash removal means for incinerators
F23J 2700/001	. Ash removal, handling and treatment means
F23J 2700/002	. Ash and slag handling in pulverulent fuel furnaces
F23J 2700/003	. Ash removal means for incinerators
F23J 2900/00	Special arrangements for conducting or purifying combustion fumes; Treatment of fumes or ashes
F23J 2900/01001	. Sorting and classifying ashes or fly-ashes from the combustion chamber before further treatment
F23J 2900/01002	. Cooling of ashes from the combustion chamber by indirect heat exchangers (for preheating air F23L 2900/15041)
F23J 2900/01003	. Ash crushing means associated with ash removal means
F23J 2900/01004	. Separating water from ash
F23J 2900/01005	. Mixing water to ash
F23J 2900/01006	. Airlock sealing associated with ash removal means
F23J 2900/01007	. Thermal treatments of ash, e.g. temper or shock-cooling for granulation
F23J 2900/01009	. Controls related to ash or slag extraction
F23J 2900/01021	. Removing ashes from the ash pit using reciprocating means, e.g. pushers
F23J 2900/11001	. Conducting systems with a gas flow bypass from main flue to an auxiliary flue
F23J 2900/11002	. Modelling systems adapted for designing arrangements for conducting or purifying combustion fumes, e.g. flues
F23J 2900/13001	. Preventing or reducing corrosion in chimneys
F23J 2900/13002	. Initial heating of the flue before starting combustion
F23J 2900/13003	. Means for reducing the noise in smoke conducting ducts or systems
F23J 2900/13004	. Water draining devices associated with flues
F23J 2900/13005	. Protections for chimneys or flue tops against external factors, e.g. birds
F23J 2900/13006	. Devices for heating the chimney top to avoid ice formation
F23J 2900/13021	. Means for supporting the lining of conducting means, e.g. ducts or chimneys
F23J 2900/13022	. Manufacturing processes for the lining of conducting means, e.g. by extrusion
F23J 2900/13023	. Ducts with non-circular cross-section
F23J 2900/15001	. Irradiating fumes with electron or light beams, e.g. UV, for oxidizing or dissociating SO _x and NO _x
F23J 2900/15002	. Cleaning fumes by letting them to pass a molten metal bath
F23J 2900/15003	. Supplying fumes with ozone
F23J 2900/15004	. Preventing plume emission at chimney outlet
F23J 2900/15021	. Preventing emission of hexavalent chromium at the chimney outlet
F23J 2900/15022	. Electrochemical cell filters
F23J 2900/15023	. Magnetic filters
F23J 2900/15024	. Photocatalytic filters

- F23J 2900/15025 . Cyclone walls forming heat exchangers
- F23J 2900/15026 . Cyclone separators with horizontal axis
- F23J 2900/15027 . Preventing emission of CO₂ at the chimney outlet by using sea weeds filters or absorbers
- F23J 2900/15041 . Means for absorbing SO_x using seawater
- F23J 2900/15061 . Deep cooling or freezing of flue gas rich of CO₂ to deliver CO₂-free emissions, or to deliver liquid CO₂
- F23J 2900/15081 . Reheating of flue gases