

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