

CPC COOPERATIVE PATENT CLASSIFICATION

F MECHANICAL ENGINEERING; LIGHTING; HEATING; WEAPONS; BLASTING (NOTE omitted)

LIGHTING; HEATING

F23 COMBUSTION APPARATUS; COMBUSTION PROCESSES (NOTE omitted)

F23N REGULATING OR CONTROLLING COMBUSTION (control devices specially adapted for fluidised-bed combustion apparatus [F23C 10/28](#); condition responsive controls for regulating combustion in domestic stoves with open fires for solid fuel [F24B 1/187](#))

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.

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|-------------|--|-------------|---|
| 1/00 | Regulating fuel supply | 3/045 | . . {using electrical or electromechanical means} |
| 1/002 | . {using electronic means (F23N 1/04 - F23N 1/10 take precedence)} | 3/047 | . . {using mechanical means} |
| 1/005 | . {using electrical or electromechanical means (F23N 1/04 - F23N 1/10 take precedence)} | 3/06 | . by conjoint operation of two or more valves or dampers (F23N 3/08 takes precedence) |
| 1/007 | . {using mechanical means (F23N 1/04 - F23N 1/10 take precedence)} | 3/065 | . . {using mechanical means} |
| 1/02 | . conjointly with air supply | 3/08 | . by power-assisted systems |
| 1/022 | . . {using electronic means} | 3/082 | . . {using electronic means} |
| 1/025 | . . {using electrical or electromechanical means} | 3/085 | . . {using electrical or electromechanical means} |
| 1/027 | . . {using mechanical means} | 3/087 | . . {using mechanical means} |
| 1/04 | . conjointly with air supply and with draught | 5/00 | Systems for controlling combustion (F23N 1/00, F23N 3/00 take precedence) |
| 1/042 | . . {using electronic means} | 5/003 | . {using detectors sensitive to combustion gas properties (F23N 5/02 , F23N 5/18 - F23N 5/26 take precedence)} |
| 1/045 | . . {using electrical or electromechanical means} | 5/006 | . . {the detector being sensitive to oxygen} |
| 1/047 | . . {using mechanical means} | 5/02 | . using devices responsive to thermal changes or to thermal expansion of a medium |
| 1/06 | . conjointly with draught | 5/022 | . . {using electronic means (F23N 5/04 - F23N 5/14 take precedence)} |
| 1/062 | . . {using electronic means} | 5/025 | . . {using electrical or electromechanical means (F23N 5/04 - F23N 5/14 take precedence)} |
| 1/065 | . . {using electrical or electromechanical means} | 5/027 | . . {using mechanical means (F23N 5/04 - F23N 5/14 take precedence)} |
| 1/067 | . . {using mechanical means} | 5/04 | . . using bimetallic elements |
| 1/08 | . conjointly with another medium, e.g. boiler water | 5/042 | . . . {using electronic means} |
| 1/082 | . . {using electronic means} | 5/045 | . . . {using electrical or electromechanical means} |
| 1/085 | . . {using electrical or electromechanical means} | 5/047 | . . . {using mechanical means} |
| 1/087 | . . {using mechanical means} | 5/06 | . . using bellows; using diaphragms |
| 1/10 | . . and with air supply or draught | 5/062 | . . . {using electronic means} |
| 1/102 | . . . {using electronic means} | 5/065 | . . . {using electrical or electromechanical means} |
| 1/105 | . . . {using electrical or electromechanical means} | 5/067 | . . . {using mechanical means} |
| 1/107 | . . . {using mechanical means} | 5/08 | . . using light-sensitive elements |
| 3/00 | Regulating air supply or draught (conjointly with fuel supply F23N 1/00) | 5/082 | . . . {using electronic means} |
| 3/002 | . {using electronic means (F23N 3/02 - F23N 3/08 take precedence)} | 5/085 | . . . {using electrical or electromechanical means} |
| 3/005 | . {using electrical or electromechanical means (F23N 3/02 - F23N 3/08 take precedence)} | 5/087 | . . . {using mechanical means} |
| 3/007 | . {using mechanical means (F23N 3/02 - F23N 3/08 take precedence)} | 5/10 | . . using thermocouples |
| 3/02 | . Regulating draught by direct pressure operation of single valves or dampers | 5/102 | . . . {using electronic means} |
| 3/04 | . by operation of single valves or dampers by temperature sensitive elements | 5/105 | . . . {using electrical or electromechanical means} |
| 3/042 | . . {using electronic means} | 5/107 | . . . {using mechanical means, e.g. safety valves} |

- 5/12 . . using ionisation-sensitive elements, i.e. flame rods [{\(testing of other ignition means, e.g. flame F02P 17/12; analysing gases by investigating the ionisation by using heat G01N 27/626\)}](#)
- 5/123 . . . {using electronic means}
- 5/126 . . . {using electrical or electromechanical means}
- 5/14 . . using thermo-sensitive resistors
- 5/143 . . . {using electronic means}
- 5/146 . . . {using electrical or electromechanical means}
- 5/16 . using noise-sensitive detectors
- 2005/165 . . {with ultrasonic means}
- 5/18 . using detectors sensitive to rate of flow of air or fuel
- 2005/181 . . {using detectors sensitive to rate of flow of air}
- 2005/182 . . . {Air flow switch}
- 5/184 . . {using electronic means}
- 2005/185 . . {using detectors sensitive to rate of flow of fuel}
- 5/187 . . {using electrical or electromechanical means}
- 5/188 . . {using mechanical means}
- 5/20 . with a time programme acting through electrical means, e.g. using time-delay relays
- 5/203 . . {using electronic means}
- 5/206 . . {using electrical or electromechanical means}
- 5/22 . with a time programme acting through mechanical means, e.g. using cams
- 5/24 . Preventing development of abnormal or undesired conditions, i.e. safety arrangements [\(F23N 5/02 - F23N 5/18 take precedence\)](#)
- 5/242 . . {using electronic means}
- 5/245 . . {using electrical or electromechanical means}
- 5/247 . . {using mechanical means}
- 5/26 . Details
- 5/265 . . {using electronic means}
- 2021/00 Pretreatment or prehandling**
- 2021/02 . using belt conveyors
- 2021/04 . Preheating liquid fuel
- 2021/06 . Preheating gaseous fuel
- 2021/08 . Preheating the air
- 2021/10 . Analysing fuel properties, e.g. density, calorific
- 2021/12 . Recycling exhaust gases
- 2023/00 Signal processing; Details thereof**
- 2023/02 . Multiplex transmission
- 2023/04 . Memory
- 2023/06 . Sampling
- 2023/08 . Microprocessor; Microcomputer
- 2023/10 . Correlation
- 2023/12 . Integration
- 2023/14 . Differentiation
- 2023/16 . Measuring bridge
- 2023/18 . Chopper
- 2023/20 . Opto-coupler
- 2023/22 . Timing network
- 2023/24 . . with bimetallic elements
- 2023/26 . . with capacitors
- 2023/28 . . with more than one timing element
- 2023/30 . Switches
- 2023/32 . . Reed switches
- 2023/34 . with feedforward processing
- 2023/36 . PID signal processing
- 2023/38 . Remote control
- 2023/40 . Simulation
- 2023/42 . Function generator
- 2023/44 . Optimum control
- 2023/46 . Identification
- 2023/48 . Learning / Adaptive control
- 2023/50 . Human control
- 2023/52 . Fuzzy logic
- 2023/54 . Recording
- 2025/00 Measuring**
- 2025/02 . filling height in burners
- 2025/04 . pressure
- 2025/06 . . for determining flow
- 2025/08 . temperature
- 2025/10 . . stack temperature
- 2025/12 . . room temperature
- 2025/13 . . outdoor temperature
- 2025/14 . . Ambient temperature around burners
- 2025/16 . . burner temperature
- 2025/18 . . feedwater temperature
- 2025/19 . . outlet temperature water heat-exchanger
- 2025/20 . . entrant temperature
- 2025/21 . . outlet temperature
- 2025/22 . heat losses
- 2025/24 . . indicated in an amount of money
- 2025/26 . humidity
- 2025/30 . . measuring lambda
- 2027/00 Ignition or checking**
- 2027/02 . Starting or ignition cycles
- 2027/04 . Prepurge
- 2027/06 . Postpurge
- 2027/08 . Hold fire apparatus
- 2027/10 . Sequential burner running
- 2027/12 . Burner simulation or checking
- 2027/14 . . Flame simulation
- 2027/16 . . Checking components, e.g. electronic
- 2027/18 . Applying test signals, e.g. periodic
- 2027/20 . Calibrating devices
- 2027/22 . Pilot burners [\(ignition circuits therefor F23N 2027/32\)](#)
- 2027/24 . . the pilot burner not burning continuously
- 2027/26 . . comprising two or more distinct pilot burners
- 2027/28 . Ignition circuits
- 2027/30 . . for pilot burners
- 2027/32 . Igniting for a predetermined number of cycles
- 2027/34 . Continuously applied ignition cycles
- 2027/36 . Spark ignition, e.g. by means of a high voltage
- 2027/38 . Electrical resistance ignition
- 2027/40 . Catalytic ignition
- 2027/42 . Ceramic glow ignition
- 2029/00 Flame sensors**
- 2029/02 . Pilot flame sensors
- 2029/04 . sensitive to the colour of flames
- 2029/06 . with periodical shutters; Modulation signals
- 2029/08 . detecting flame flicker
- 2029/10 . comprising application of periodical fuel flow fluctuations
- 2029/12 . with flame rectification current detecting means
- 2029/14 . using two or more different types of flame sensor
- 2029/16 . using two or more of the same types of flame sensor
- 2029/18 . Flame sensor cooling means
- 2029/20 . Camera viewing

2029/22 . the sensor's sensitivity being variable

2031/00 Fail safe

2031/02 . using electric energy accumulators
 2031/04 . for electrical power failures
 2031/06 . for flame failures
 2031/08 . . for pilot flame failures
 2031/10 . for component failures
 2031/12 . for ignition failures
 2031/14 . for earthquakes
 2031/16 . using melting materials or shape memory alloys
 2031/18 . Detecting fluid leaks
 2031/20 . Warning devices
 2031/22 . . using warning lamps
 2031/24 . Freezing
 2031/26 . for clogging air inlet
 2031/28 . preventing flash-back or blow-back
 2031/30 . Representation of working time

2033/00 Ventilators

2033/02 . in stacks
 2033/04 . . with variable speed
 2033/06 . at the air intake
 2033/08 . . with variable speed
 2033/10 . forcing air through heat exchangers

2035/00 Valves, nozzles or pumps

2035/02 . Air or combustion gas valves or dampers
 2035/04 . . in stacks
 2035/06 . . at the air intake
 2035/08 . . used with heat exchanges
 2035/10 . . power assisted, e.g. using electric motors
 2035/12 . Fuel valves
 2035/14 . . electromagnetically operated
 2035/16 . . variable flow or proportional valves
 2035/18 . . Groups of two or more valves
 2035/20 . . Membrane valves
 2035/22 . . cooperating with magnets
 2035/24 . . Valve details
 2035/26 . Fuel nozzles
 2035/28 . . Spray fuel nozzles
 2035/30 . Pumps

2037/00 Controlling (F23N 5/00 takes precedence)

2037/02 . two or more burners
 2037/04 . at two or more different localities
 2037/06 . two predetermining temperatures, e.g. day-night
 2037/08 . two or more different types of fuel simultaneously
 2037/10 . High or low fire
 2037/12 . catalytic burners
 2037/14 . burners with gasification or vaporizer elements
 2037/16 . secondary air
 2037/18 . fluidized bed burners
 2037/20 . one or more bypass conduits
 2037/22 . water injection
 2037/24 . height of burner
 2037/26 . . oxygen-air ratio
 2037/28 . . oxygen as pure oxydant
 2037/30 . . matrix burners
 2037/32 . . Nox

2039/00 Fuels

2039/02 . Solid fuels
 2039/04 . Gaseous fuels

2039/06 . Liquid fuels

2041/00 Applications

2041/02 . Space-heating
 2041/04 . Heating water
 2041/06 . Space-heating and heating water
 2041/08 . Household apparatus
 2041/10 . Generating vapour
 2041/11 . Torches
 2041/12 . Stack-torches
 2041/14 . Vehicle heating, the heat being derived otherwise than from the propulsion plant
 2041/16 . Spectrometer burners
 2041/18 . Incinerating apparatus
 2041/20 . Gas turbines
 2041/22 . Absorption refrigerator

2900/00 Special features of, or arrangements for controlling combustion

2900/01001 . Micro Electro Mechanical Systems [MEMS] for controlling fuel supply to burners
 2900/01002 . Electromagnetically operated fuel valves with a single solenoid controlling two or more cores
 2900/05001 . Measuring CO content in flue gas
 2900/05002 . Measuring CO₂ content in flue gas
 2900/05003 . Measuring NO_x content in flue gas
 2900/05004 . Details of components, e.g. connecting adaptors
 2900/05005 . Mounting arrangements for sensing, detecting or measuring devices
 2900/05006 . Controlling systems using neuronal networks
 2900/05101 . Connections between thermocouple and magnetic valves, e.g. by plug and socket connectors
 2900/05181 . Controlling air to fuel ratio by using a single differential pressure detector