

ECLA**EUROPEAN CLASSIFICATION****F23D****BURNERS (generating combustion products of high pressure or high velocity F23R)****F23D1/00****Burners for combustion of pulverulent fuel (disposition of burners F23C)**

F23D1/00B

- [N: burning a mixture of pulverulent fuel delivered as a slurry, i.e. comprising a carrying liquid (preparing slurries [F23K1/02](#))]

F23D1/02

- Vortex burners, e.g. for cyclone-type combustion apparatus

F23D1/04

- Burners producing cylindrical flames without centrifugal action

F23D1/06

- Burners producing sheet flames

Guide heading:**Combustion of a liquid****F23D3/00****Burner using capillary action**

F23D3/02

- Wick burners

F23D3/04

- . with flame spreaders ([F23D3/12](#) takes precedence)

F23D3/06

- . Inverted wick burners, e.g. for illumination

F23D3/08

- . characterised by shape, construction, or material, of wick

F23D3/10

- . Blue-flame burners

F23D3/12

- . . with flame spreaders

F23D3/14

- . . with mixing of air and fuel vapour in a chamber before the flame

F23D3/16

- . using candles ([candles per se C11C](#))

F23D3/18

- . Details of wick burners

F23D3/20

- . . Flame spreaders

F23D3/22

- . . Devices for mixing evaporated fuel with air

F23D3/24

- . . Carriers for wicks

F23D3/26

- . . . Safety devices thereon

F23D3/28

- . . Wick-adjusting devices

F23D3/30

- . . . directly engaging with the wick

F23D3/32

- . . . engaging with a tube carrying the wick

F23D3/34

- . . . Wick stop devices; Wick-fixing devices

F23D3/36

- . . Devices for trimming wicks

F23D3/38

- . . Devices for replacement of wicks

F23D3/40

- the capillary action taking place in one or more rigid porous bodies

F23D5/00**Burners in which liquid fuel evaporates in the combustion space, with or without chemical conversion of evaporated fuel**

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|------------------|---|
| F23D5/02 | the liquid forming a pool, e.g. bowl-type evaporators, dish-type evaporators |
| F23D5/04 | . . Pot-type evaporators, i.e. using a partially-enclosed combustion space |
| F23D5/04B | . . . [N: with forced draft] |
| F23D5/06 | the liquid forming a film on one or more plane or convex surfaces |
| F23D5/08 | . . on cascaded surfaces |
| F23D5/10 | . . on grids |
| F23D5/12 | . Details |
| F23D5/12B | . . [N: Inserts promoting evaporation] |
| F23D5/12C | . . [N: Catalytic elements] |
| F23D5/14 | . . Maintaining predetermined amount of fuel in evaporator |
| F23D5/16 | . . Safety devices |
| F23D5/18 | . . Preheating devices |
| F23D7/00 | Burners in which drops of liquid fuel impinge on a surface |
| F23D9/00 | Burners in which a stream of liquid fuel impinges intermittently on a hot surface |
| F23D11/00 | Burners using a direct spraying action of liquid droplets or vaporised liquid into the combustion space (spraying in general B05B, B05D) |
| F23D11/00B | . [N: spraying nozzle combined with forced draft fan in one unit (nozzles per se F23D11/38)] |
| F23D11/00C | . [N: spraying nozzle arranged within furnace openings (refractory bricks or blocks specially shaped for burner openings F23M5/02B)] |
| F23D11/00C1 | . . [N: for producing radiant heat] |
| F23D11/00F | . [N: with combinations of different spraying or vaporising means] |
| F23D11/00F1 | . . [N: combination of means covered by sub-groups F23D11/10 and F23D11/24] |
| F23D11/00F3 | . . [N: combination of means covered by sub-groups F23D5/00 and F23D11/00] |
| F23D11/02 | . the combustion space being a chamber substantially at atmospheric pressure |
| F23D11/04 | . the spraying action being obtained by centrifugal action |
| F23D11/06 | . . using a horizontal shaft |
| F23D11/08 | . . using a vertical shaft |
| F23D11/10 | . the spraying being induced by a gaseous medium, e.g. water vapour |
| F23D11/10A | . . [N: medium and fuel meeting before the burner outlet] |
| F23D11/10A1 | . . . [N: in an internal mixing chamber] |
| F23D11/10A1A | [N: with means creating a swirl inside the mixing chamber] |
| F23D11/10A2 | . . . [N: intersecting at a sharp angle, e.g. Y-jet atomiser] |
| F23D11/10A3 | . . . [N: at least one of the fluids being submitted to a swirling motion] |

- F23D11/10B . . [N: medium and fuel meeting at the burner outlet]
- F23D11/10B1 . . . [N: at least one of both being subjected to a swirling motion]
- F23D11/10C . . [N: medium and fuel intersecting downstream of the burner outlet]
- F23D11/12 . . characterised by the shape or arrangement of the outlets from the nozzle
- F23D11/14 . . . with a single outlet, e.g. slit
- F23D11/16 . . in which an emulsion of water and fuel is sprayed
- F23D11/18 . . the gaseous medium being water vapour generated at the nozzle
- F23D11/20 . . . the water vapour being superheated
- F23D11/22 . . the gaseous medium being vaporised fuel, e.g. for a soldering lamp, [N: or other gaseous fuel]

- F23D11/24 . by pressurisation of the fuel before a nozzle through which it is sprayed by a substantial pressure reduction into a space
- F23D11/26 . . with provision for varying the rate at which the fuel is sprayed
- F23D11/28 . . . with flow-back of fuel at the burner, e.g. using by-pass
- F23D11/30 . . . with return feed of uncombusted sprayed fuel to reservoir

- F23D11/32 . by electrostatic means

- F23D11/34 . by ultrasonic means [N: or other kinds of vibrations]
- F23D11/34B . . [N: with vibrating atomiser surfaces]

- F23D11/36 . Details [N: e.g. burner cooling means, noise reduction means]
- F23D11/38 . . Nozzles (nozzles in general [B05B](#)); Cleaning devices therefor
- F23D11/38B . . . [N: with swirl means]
- F23D11/38T . . . [N: Nozzle cleaning]
- F23D11/40 . . Mixing tubes [or chambers]; Burner heads
- F23D11/40B . . . [N: Mixing chambers downstream of the nozzle]
- F23D11/40C . . . [N: Flame tubes (not forming part of the burner [F23M9/06](#))]
- F23D11/40D . . . [N: Flame stabilising means, e.g. flame holders]
- F23D11/40F . . . [N: Flow influencing devices in the air tube]
- F23D11/42 . . Starting devices ([igniting F23Q](#))
- F23D11/44 . . Preheating devices; Vaporising devices ([vaporising devices per se F23K5/22](#))
- F23D11/44B . . . [N: Vaporizing devices incorporated with burners] [[C1111](#)]
- F23D11/44B1 [N: heated by the main burner flame]
- F23D11/44B1B [N: the flame and the vaporiser not coming into direct contact]
- F23D11/44B3 [N: heated by an auxiliary flame]
- F23D11/44B5 [N: heated by electrical means]
- F23D11/46 . . Devices on the vaporiser for controlling the feeding of the fuel

- F23D14/00 Burners for combustion of a gas, e.g. of a gas stored under pressure as a liquid**

- F23D14/02 . Premix gas burners, i.e. in which gaseous fuel is mixed with combustion air upstream of the combustion zone
- F23D14/04 . . induction type, e.g. Bunsen burner, ([N: atmospheric or aerated gas burner])

- F23D14/04B . . . [N: with a plurality of burner bars assembled together, e.g. in a grid-like arrangement]
- F23D14/06 . . . with radial outlets at the burner head
- F23D14/06B [N: with injector axis inclined to the burner head axis]
- F23D14/08 . . . with axial outlets at the burner head
- F23D14/08B [N: with injector axis inclined to the burner head axis]
- F23D14/10 . . . with elongated tubular burner head
- F23D14/10B [N: with injector axis parallel to the burner head axis]

- F23D14/12 . Radiant burners
- F23D14/12B . . [N: heating a wall surface to incandescence]
- F23D14/14 . . using screens or perforated plates
- F23D14/14B . . . [N: the burner plate being a screen] [N9410]
- F23D14/16 . . using permeable blocks
- F23D14/18 . . using catalysis for flameless combustion

- F23D14/20 . Non-premix gas burners, i.e. in which gaseous fuel is mixed with combustion air on arrival at the combustion zone ([F23D14/30](#) to [F23D14/44](#) take precedence)
- F23D14/22 . . with separate air and gas feed ducts, e.g. with ducts running parallel or crossing each other
- F23D14/24 . . . at least one of the fluids being submitted to a swirling motion

- F23D14/26 . with provision for a retention flame ([pilot flame igniters F23Q9/00](#))

- F23D14/28 . in association with a gaseous fuel source, e.g. acetylene generator, or a container for liquefied gas [C9410]

- F23D14/30 . Inverted burners, e.g. for illumination

- F23D14/32 . using a mixture of gaseous fuel and pure oxygen or oxygen-enriched air ([F23D14/38](#) takes precedence)

- F23D14/34 . Burners specially adapted for use with means for pressurising the gaseous fuel or the combustion air ([F23D14/38](#) takes precedence)
- F23D14/36 . . in which the compressor and burner form a single unit

- F23D14/38 . Torches, e.g. for cutting, brazing, welding or heating ([N: nozzles for torches [F23D14/52](#)] [C1111])
- F23D14/40 . . for welding ([F23D14/44](#) takes precedence)
- F23D14/42 . . for cutting ([F23D14/44](#) takes precedence)
- F23D14/44 . . for use under water

- F23D14/46 . Details [N: e.g. noise reduction means]
- F23D14/46B . . [N: for torches ([F23D14/52](#) takes precedence)]
- F23D14/48 . . Nozzles ([N: injectors for mixing devices [F23D14/64](#)]; for spraying or coating [B05B](#)) [C9410]
- F23D14/50 . . . Cleaning devices therefor
- F23D14/52 . . . for torches; for blow-pipes

- F23D14/54 for cutting or welding metal
- F23D14/56 for spreading the flame over an area, e.g. for desurfacing of solid material, for surface hardening, for heating workpieces, ([scarfing by applying flames B23K7/00](#))
- F23D14/58 characterised by the shape or arrangement of the outlet or outlets from the nozzle, e.g. of annular configuration
- F23D14/58F [N: of elongated shape, e.g. slits]
- F23D14/58F1 [N: formed by a set of sheets, strips, ribbons or the like]
- F23D14/60 Devices for simultaneous control of gas and combustion air ([regulation of combustion in general F23N](#))
- F23D14/62 Mixing devices; Mixing tubes
- F23D14/64 with injectors
- F23D14/66 Preheating the combustion air or gas
- F23D14/68 Treating the combustion air or gas, e.g. by filtering, by moistening ([in general B01](#))
- F23D14/70 Baffles or like flow-disturbing devices
- F23D14/72 Safety devices, e.g. operative in case of failure of gas supply ([protection or supervision of pipe-line systems F17D5/00](#))
- F23D14/72B [N: Protection against flame failure by using flame detection devices ([pilot flame igniters with interlock with main fuel supply F23Q9/08](#))]
- F23D14/74 Preventing flame lift-off ([F23D14/70 takes precedence](#))
- F23D14/76 Protecting flame and burner parts
- F23D14/78 Cooling burner parts
- F23D14/80 Selection of a non-toxic gas
- F23D14/82 Preventing flashback or blowback ([F23D14/70 takes precedence](#); [N: by use of a retention flame [F23D14/26](#)]; in gas feed lines [A62C4/02](#)) [[C9410](#)]
- F23D14/82B [N: using valves]
- F23D14/84 Flame spreading or otherwise shaping ([F23D14/70 takes precedence](#))

Guide heading: **Other burners**

F23D17/00 **Burners for combustion conjointly or alternatively of gaseous or liquid or pulverulent fuel**

- F23D17/00B . . [N: gaseous or liquid fuel]
- F23D17/00C . . [N: gaseous or pulverulent fuel]
- F23D17/00D . . [N: liquid or pulverulent fuel]

F23D21/00 **Burners not otherwise provided for** [N: Note : combinations of spraying or vaporising means covered by sub-groups [F23D5/00](#) and [F23D21/00](#) are classified in [F23D11/00F3](#)]

- F23D21/00B . . [N: specially adapted for use in particular heating operations]

F23D23/00 **Assemblies of two or more burners** (gas burners with provision for a retention flame [F23D14/26](#); disposition of burners [F23C](#); for industrial furnaces [F27](#))

F23D99/00 **Subject matter not provided for in other groups of this subclass [N1006]**

F23D99/00B . [N: specially adapted for use in particular heating operations] [N1006]

F23D99/00B1 . . [N: for heating liquids, e.g. for vaporising, for concentrating] [N1006]